



JOURNAL OF THE PHILIPPINE MEDICAL ASSOCIATION

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MESSAGE



This year's issue of Philippine Medical Association Journal comprises of the research papers of the winners for the Resident's Research Competition. These papers were accomplished by our Filipino resident physicians and have been thoroughly reviewed and selected for publication by the Committee on Publications. These and other research papers are original materials submitted from different healthcare institutions, specialty organizations, medical school, and universities.

The Philippine Medical Association continues to support and promote the Continuing Professional Development Law or Republic Act 10912 to boost the professional competencies of all Filipino doctors and to open up further healthcare development needs thru research and lay fora. The pace of change is probably faster than it has ever been; thus, CPD ensures that our professionals' knowledge and skills stay up-to-date and that they are aware of the changing trends and directions in their own professions.

Along with this endeavor, our doctors are also strongly encouraged to be advocates of innovation in modern medicine that would be valuable in providing exceptional health care to patients and in delivering real-time service to all stakeholders of the medical industry. We anticipate that PMA's journal will be beneficial to all our doctors in intensifying their knowledge in modern and innovative healthcare.

IRINEO C. BERNARDO III, M.D.
President

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EDITOR'S *notes*

In this issue, we are publishing the award winners of The Residents' Research Competition, with two categories, Original Paper and Case Report. These entries represent a variety of disciplines and they come from different institutions. In subsequent issues, we hope to see more of the same and thus, we encourage vibrant participation.

Likewise, we included other papers, representing broader aspects of health care: Health Policy and Administration, Community Health, a distinctive and comprehensive approach to a case. This is part of our objective of reaching a wider audience in the profession.

Modern medicine is certainly a time for innovation and technological advances; the task of publication is to keep pace with this dynamism. Our Journal continues to move in such a direction, incorporating improvements despite the constraints.

AJBAJ

Journal of the
Philippine Medical Association
Instruction for Authors

General Information

The Journal of the Philippine Medical Association (JPMA) is the official publication of the Philippine Medical Association (PMA).

The JPMA is published twice in a year at the PMA Office, 2nd Floor, PMA Building, North Avenue, Quezon City 1105, Philippines. It publishes original scientific papers pertinent to medicine and allied fields. It also considers for republications of previously published articles, either in their original or modified forms, provided they are accompanied by written permission from the publisher and principal author.

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Editorial Policies

The JPMA is a peer-review journal designed to meet the continuing education requirements of PMA members and the medical community. It adheres to the guidelines established by the International Community of Medical Journal Editors (ICMJE); however, for purposes of this issue, the previously circulated JPMA Instructions for Authors, although with some modifications, are still being followed.

Ethical Considerations

In the conduct and reporting of research, the JPMA adheres to the ethical considerations set forth by the ICMJE with respect to authorship and contributorship, editorship, peer review, conflicts of interest, right to privacy and confidentiality of patients, study participants as well as authors and reviewers; and, the protection of human subjects and animals in research.

All financial or personal relationships that could be viewed as presenting a potential conflict of interest must be disclosed by the author(s) and all participants in the review and publication process.

In experiments involving human subjects, authors must indicate in their reports whatever procedures are compliant with the standards of the responsible institutional and national committee on human experimentation as well as with the Helsinki Declaration of 1975, as revised in 2000. In case of doubts as to the procedures, authors must show proof of approval of their institutional review body or its equivalent.

In experiments involving animals, authors must indicate in their reports compliance with the institutional and national guide for laboratory animal experimentation.

Manuscript Preparation

(This section is primarily based on the previous and existing JPMA Instructions to Contributors but with some modifications based on the ICMJE recommendations. A completely revised version based on the guidelines of the ICMJE will be published in the next issue.

Accompanied by a cover letter from the principal author, the manuscripts, figures, tables, photographs, and references should be submitted in duplicate (an original and a copy) and typed double-space (including legends and footnotes) on one side of a white bond paper, 8.5 and 11 inches properly numbered consecutively on the upper right-hand corner of each page beginning with the title page. Illustrations must also be in duplicates. An electronic copy of the articles in a CD must be submitted.

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Abbreviations and nomenclatures: the use of abbreviations should be minimized and preferably confined to tables only; non-standard abbreviations must be accompanied by legends.

Generic names of drugs are preferred. Trade names may be given only once at the end of the paper or in the acknowledgement and should follow the generic name in parenthesis.

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Manuscripts, correspondence, and all materials for review and publication should be sent to the Editor-in-Chief of the Journal of Philippine Medical Association at the Editorial Office.

Subscription and advertisements, including change of address should be sent to the PMA Secretariat at 2nd floor PMA Building, North Avenue, Quezon City, 1105 Philippines.

Effect of Regular Progression of Diet, Early Oral Feeding and Early Oral Feeding with Domperidone on Post Cesarean Diet Tolerance in a Tertiary Hospital *

Lucky Faith A. Dequina, M.D.¹

ABSTRACT

The rate of admission in the Obstetrics and Gynecology Department in a tertiary hospital in Quezon City is continuously increasing, sometimes more than its bed capacity. An average of 2-3 mothers occupying a single bed with their newborn children can be overwhelming, to the point where the comfort hygiene and wellness of the patients after delivery are sacrificed. It is important for us to find a way in which the ward can accommodate all patients without any risk of losing the comfort that the hospital can offer during their stay. A faster patient turnover can at least help in this kind of situation.

This study aims to investigate if early feeding can lead to early return of normal bowel function which could mean shorter hospital stay due to lesser post-operative discomfort and early ambulation. A randomized, three arm study was done in a tertiary hospital from June 2016 to September 2016. Ninety three women who underwent elective Cesarean Section were admitted and were randomly assigned into three groups. Group A had regular progression of diet, Group B were those who were fed early and Group C those who were given Domperidone before they were fed early. The primary outcome would be the time to regular diet tolerance. Secondary outcomes include the time of first flatus, time to ambulation out of bed, duration of intravenous infusion, duration of indwelling foley catheter and finally, length of hospital stay.

**First place, Original Paper Category, PMA Residents' Research Competition 2016*

¹From the Department of Obstetrics and Gynecology, Quezon City General Hospital

OBJECTIVES

General Objective:

To compare the effect of regular progression of diet, early feeding and early feeding with Domperidone on the diet tolerance of post cesarean patients in the Obstetrics and Gynecology Department in a tertiary hospital.

Specific Objectives:

- To compare the time to regular diet tolerance among the three Groups
- To compare the time of return to normal bowel function among the three groups
- To investigate if these protocols have significant effect on the other aspects of post-operative well-being like time to first flatus, time to ambulation out of bed, duration of intravenous fluid, duration of indwelling catheter and length of hospital stay.

INTRODUCTION

Around the globe, cesarean section rates have increased dramatically. This can be attributed to many factors including more births among older women and technological advances¹¹. The World Health Organization reported that 18.5 million cases of cesarean section are performed yearly worldwide⁸. In the Philippines alone, we have a cesarean section rate of 7-10% of all live births¹⁰. In the Department of Obstetrics and Gynecology in a Tertiary hospital in Quezon City the Cesarean Section Rate is 10-15 % per month.

Cesarean Section involves a variable amount of bowel manipulation causing temporary impairment of bowel motility, leading to abdominal discomfort and delayed post-operative recovery¹. Conventionally, patients are not allowed any oral intake 18-24 hours postoperatively because bowel sounds should be appreciated first.

In the normal physiologic recovery of the digestive tract, the small bowel and stomach resume their function within 8 hours; large bowel activity returns within 48 hours while the recto sigmoid recovers within 72 hours post operatively². However some studies revealed that early oral feeding can enhance early gastrointestinal function which would result to

early ambulation, good nutritional status and thus shorter hospital stay⁵.

Studies have reported that early oral feeding enhanced gastrointestinal function recovery, resulting in good nutritional status, rapid wound healing, early ambulation and an early return to normal daily life activities. Others, however, have reported that early oral feeding did not have an effect on gastrointestinal function recovery⁶.

Regular diet tolerance is defined as the ability to eat at least two regular diet meals and consume more than half of the food at each meal without vomiting⁶.

When a patient undergoes cesarean section, visceral irritation occur which in turn causes dopamine and serotonin secretion. Dopamine and serotonin stimulate the medullary vomiting center and then cause postoperative nausea and vomiting². Domperidone, a prokinetic and antiemetic drug acts as a peripherally selective dopamine receptor antagonist that relieves vomiting and stimulates peristalsis⁷. This study investigates whether early oral feeding and early feeding with Domperidone can be a potential accelerator of gastrointestinal recovery of post cesarean section patients.

The objective of this study was to compare the efficacy of early oral feeding and early oral feeding with Domperidone with the conventional diet schedule in terms of return of tolerance to regular diet in women who had undergone cesarean delivery. It aims to provide the post cesarean patients in a tertiary hospital the comfort of a shorter hospital stay.

METHODOLOGY

This is a randomized controlled trial study conducted in a tertiary institution in Quezon City, Department of Obstetrics and Gynecology from June 1, 2016 to September 30, 2016.

In the outpatient department, pregnant women 16-35 years old at 34 weeks age of gestation scheduled for elective cesarean section under spinal anesthesia were recruited. The study was presented and thoroughly explained to each subject. If an informed consent was signed, the subject would be asked to get a number from a box. The number would be the basis of her group. They were counseled about the preoperative preparations including fasting for eight hours prior to the procedure.

The patients were divided into three groups. Group A would have the conventional progression of diet, that is, nothing per ore postoperatively for 18-24 hours, after which, diet is progressed to sips of water and tea and crackers. When the patient passes flatus she is allowed to have soft diet and later on diet as tolerated once they had bowel movement. Group B would be started with sips of water as early as 6 hours post operatively then after 2 hours soft diet and then after another 2 hours regular diet. Group C would follow the same diet as Group B with the addition of Domperidone 10mg tablet taken orally before the meals were given.

The exclusion criteria are: 1. History of major gastrointestinal surgery; 2. Any signs of infection prior to surgery like fever; 3. Medical complications like Hypertension and Diabetes Mellitus; 4. Operative complications requiring longer fasting like bowel injuries.

Intraoperatively, all patients underwent an infraumbilical incision, low transverse cesarean section with an average duration of one to one and a half hour operating time.

Postoperatively, intravenous fluids were given to all groups until the women tolerated oral intake well. Indwelling foley catheter was inserted to all patients preoperatively and was removed after the patient was ambulating freely. At the obstetrics ward, the type and amount of food each patient consumed, the time of the first flatus and defecation, the time of ambulation out of bed and any gastrointestinal symptoms like nausea and vomiting were recorded.

Drop-out criteria include those with allergy to Domperidone and those who had intraoperative complications. The surgeon when doing ward rounds would assess the condition of each patient, observe bowel sounds, watch out for any signs of ileus and infection and check wound condition. Patients were discharged after they had tolerated a regular diet with no other post-operative complications present.

Sample size was set to a minimum of 31 women for each group who underwent elective cesarean section at a tertiary hospital. All of them should satisfy the inclusion criteria for the study based on 5 percent level of significance, 90 percent power and observed maximum average difference of 24.3 hours. Descriptive statistics of demographic and clinical data of the patients were reported as mean and standard deviation (mean $\pm$ SD) or frequency and

percentages (n(%)). Nonparametric statistical tests were used in the study since it was found out that the data were not normally distributed.

The Pearson Chi-square Test or Fisher's Exact Test was computed to test significant differences among the three groups based on the categorical variables, whichever was appropriate. Continuous data was compared by Kruskal-Wallis analysis of variance tests, according to the distribution of data. The level of significance was set to 0.05 and P-values less than this value were considered statistically significant. The analysis of the data was aided with the statistical software IBM-SPSS version 20.

RESULTS

Among ninety eight pregnant women interviewed for this study, ninety three patients were enrolled. All of them were interviewed and counseled at the outpatient clinic. Thirty one patients were brought to each of the three groups.

Table 1 represents the demographic profile and clinical characteristics of the sample patients. These sample patients were randomly distributed to the three post cesarean groups namely the regular progression, early oral feeding, and early oral feeding with Domperidone.

It was noted however that patients distributed in the early oral feeding group (mean=25.9, SD=4.1) were older compared to the other groups. Most of the patients ages were between 20 to 29 years old, but the age groupings showed no significant differences between post cesarean groups (Pvalue=0.493). When it comes to the gravidity, majority of these patients had gravidity equivalent to 1. However, gravidity classifications was not significantly different between groups (P-value=0.081).

Table 2 shows the post cesarean outcomes among the three groups. As to diet tolerance, all of the patients among the three groups developed no complications. The data however revealed that there were significant differences among the three groups in the number of hours to regular diet tolerance (P-value<0.000). Patients in the regular progression group tends to have higher average time (mean=33.1, SD=1.9) as compared to the other groups. There were also significant differences between groups in the outcomes of time to flatus (P-value<0.000), duration of indwelling foley catheter (P-value<0.000),

and length of hospital stay (P -value <0.000). Patients in the regular progression group would have statistically higher average values in these outcomes as compared to EOF and EOF with Domperidone. On the other hand, the time to ambulation out of bed (P -value $=0.217$) and the duration of intravenous infusion (P -value $=1.000$) showed no statistically significant differences among the 3 post cesarean groups.

The outcomes showed that the median time to regular diet tolerance in Group A was thirty three hours while both Group B and Group C were twenty three hours. The median time of the length of hospital stay for the women who had conventional diet was forty one hours and thirty hours for both groups of women who were fed early.

The secondary outcomes which include the time to first flatus and duration of indwelling foley catheter were noted to be significant. The time to first flatus in the women who had conventional diet as compared to the women who were fed early with or without the Domperidone was twenty two hours and thirteen hours respectively. There were no difference among the three groups with regards to the time of intravenous infusion and the time of ambulation out of bed.

DISCUSSION

Because of the belief that early oral feeding would cause distention of the gastrointestinal tract and thereby result in additional abdominal discomfort, nausea and vomiting, most Obstetricians are still reluctant to give early oral feeding to post cesarean patients. Thus the challenge to investigate the effect of early oral feeding and addition of Domperidone to post cesarean diet tolerance arose.

In this study, the outcomes showed that post-operative women who had early oral feeding compared to those who had conventional diet had an earlier tolerance to regular diet with no significant complications noted. Likewise, the secondary outcomes that were observed like the time to first flatus and duration of indwelling foley catheter were significantly decreased in those who were fed early. There was no difference among the three groups with regards to the time of intravenous infusion and the time of ambulation out of bed.

Notably, there were no adverse complications that were seen in all the patients. All of them tolerated their diet well and those who were fed early had a shorter hospital stay of an average of less than 48 hours.

Meanwhile it was also noted that the post-operative women who were given Domperidone before being fed early and those who were fed early without any medications had no significant difference on all parameters of the study as shown in the outcomes presented. Visceral manipulation in cesarean delivery may not be to the extent that any benefit would be perceived from the antiemetic mechanism of Domperidone. This may be an advantage because this means that we can achieve an early diet tolerance and among hospital stay without any added medication and expense.

CONCLUSION AND RECOMMENDATION

In conclusion, the two early oral feeding groups demonstrated a significantly shorter time to regular diet tolerance when compared with a conventional diet schedule. Domperidone did not enhance the return of gastrointestinal function in the elective post cesarean patients in this study. To facilitate an accelerated return to normal activity and shorten the duration of hospital stay of post cesarean section women, early oral feeding should be used in routine practice. There were no adverse effects that were noted in this study.

It is recommended that future studies would include more subjects. Other parameters observed from the post cesarean woman should be included in the data collection like surgical site condition and maternal lactation.

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TABLE 1: Demographic and Clinical Characteristics of Patients

	Regular Progression (n=31)	EOF (n=31)	EOF with Domperidone (n=31)	P-value
Age (in years), mean±SD	22.9±3.8	25.9±4.1	24.4±4.4	0.019*
Age Groups, n(%)				0.493
<=19	5(16.1)	2(6.5)	4(12.9)	
20-29	24(77.4)	23(74.2)	22(71.0)	
>=30	2(6.5)	6(19.4)	5(16.1)	
Gravidity, n(%)				0.081
1	17(54.8)	10(32.3)	15(48.4)	
2	11(35.5)	9(29.0)	11(35.5)	
3	3(9.7)	12(38.7)	5(16.1)	
>=4	-	-	-	

Note: *Significant at 0.05 level.

Table 2: Post Cesarean Outcomes

	Regular Progression (n=31)	EOF (n=31)	EOF with Domperidone (n=31)	P-value
Diet Tolerance, n(%)				-
With complications	-	-	-	
Without complications	31(100.0)	31(100.0)	31(100.0)	
Time to regular diet tolerance (in hours), mean±SD	33.1±1.9	23.5±1.1	23.4±1.2	<0.000*
Time to first flatus (in hours), mean±SD	22.5±1.9	13.5±1.1	13.4±1.2	<0.000*
Time to ambulation out of bed (in hours), mean±SD	13.9±1.3	14.5±1.1	14.4±1.2	0.217
Duration of Intravenous infusion, mean±SD	24.0±0.0	24.0±0.0	24.0±0.0	1.000
Duration of Indwelling foley catheter, mean±SD	18.2±1.5	11.5±1.1	11.4±1.2	<0.000*
Length of Hospital stay (in hours), mean±SD	41.1±1.9	31.5±1.1	31.4±1.2	<0.000*

Note: *Significant at 0.05 level.

KASULATAN NG PAHINTULOT

TITULO NG PANANALIKSIK: Effect of Regular Progression of Diet, Early Feeding and Early Feeding with Domperidone on Post Cesarean Diet Tolerance in a Tertiary Hospital

MANANALIKSIK: Lucky Faith A. Dequina MD

PANINIMULA

Ako po ay manggagamot mula sa kagawaran ng Obstetrics at Gynecology ng Quezon City General Hospital. Kayo po ay inaanyayahan ko na sumali sa aking pag-aaral na pinamagatang Effect of Regular Progression of Diet, Early Feeding and Early Feeding with Domperidone on Post Cesarean Diet Tolerance in a Tertiary Hospital. Ilalahad ko po sa iyo ang mga impormasyon ukol sa pagsasagawa ng aing pag-aaral. Kapaga mayroon po kayong hindi maunawaan, ipapaliwanag ko po yon ng masinsin sa abot ng aking mkakaya. Bibigyan ko po kayo ng panahon na siyasatin ang pag-aaral na ito at panahong ipakita ang kasulatan na ito sa kung sinumang nais mo.

BOLUNTARYONG PAGSALI

Ang pagsali mo po sa pananaliksik na ito ay sarili mong kusa at maari kang tumiwalag sa anumang oras sa kahit na anong kadahilanan. Hindi po maapektuhan ang iyong pagpapagamot at serbisyong iyong makakamtansa pagamutan na ito sakaling ikaw ay tumigil sa paglahok sa pag-aaral.

PANGANIB

Ikaw po ay magsasabi ng anumang nararamdaman na maaringmaging epekto ng pagaaral na ito. Alam mo rin po na kung sakaling may mangyari na di kanais-nais na epekto mula sa anumang prosesong kaugnay sa pagaaral na ito, gagawin ng manunuri ang lahat ng nararapat upang siguraduhin ang iyong kaligtasan at kalusugan ng walang anumang bayad na manggagaling sa inyo.

KARAPATANG TUMANGGI O PAGBAWI NG KAGUSTUHANG MAKILAHOK

Hindi po sapilitan ang paglahok sa pagaaral na ito. Maari po kayong tumigil sa pakikilahok anumang oras ninyo gustuhin

KASULATAN NG PAHINTULOT

Nabasa ko at aking naintindihan ang mga nabanggit na impormasyon. Ako ay binigyan ng pagkakataong magtanong at ang mga ito ay naliwanagan. Ako ay kusang loob na lumalahok sa pananaliksik na ito.

Pangalan at Lagda ng

Pangalan at Lagda ng
Saksi

Pangalan at Lagda ng Kalahok
Mananalisik

A Retrospective Study on the Accuracy of Sassone Lerner and IOTA Simple Rules in Determining Malignancy of Ovarian Masses in a Tertiary Hospital Ob-GYN Ultrasound Diagnostic Unit*

Arriane R. Morales, M.D.¹

ABSTRACT

Ultrasonography has been established as one of the important diagnostic tools in detecting and classifying ovarian masses. Several studies have been made in determining the sensitivity and specificity of the different scoring systems as to determining the malignancy of ovarian masses. In a tertiary hospital ultrasound diagnostic unit, three scoring systems are utilized namely Lerner, Sassone and IOTA simple rules. With this reason, it is important to determine and compare the sensitivity and specificity on the most utilized ultrasound scoring systems in determining malignancy of ovarian masses. A single center observational, analytical, cross-sectional study utilizing review of the transvaginal or pelvic ultrasound results of women with ovarian masses that were scored using Sassone, Lerner and IOTA Simple Rules in a tertiary hospital ultrasound diagnostics unit from January 2013 to June 2016 was done. The sensitivity, specificity, positive and negative predictive values of each scoring system utilized was determined and compared with the histopathologic result. Out of the 111 ovarian masses that were included in the study, 44 ovarian masses were scored using Lerner Scoring system with a sensitivity, specificity, positive and negative predictive values of 100%, 65%, 22.2% and 100%. 105 ovarian masses screened using Sassone Scoring System showed a sensitivity, specificity, positive and negative predictive values of 100%, 68%, 20.5% and 100%. A total of 33 out of the 111 ovarian masses were scored using the IOTA scoring system with a sensitivity, specificity, positive and negative predictive values of 100%, 85.6%, 55.5% and 100%. In conclusion, IOTA simple rules had a high sensitivity and specificity compared to Sassone or Lerner Scoring System. However, we cannot fully conclude that individual specificity will be better than combined tests since there is limited number of ovarian masses analyzed.

Keywords: ultrasound, IOTA simple rules, sassone, lerners

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INTRODUCTION

Ultrasonography has been established as one of the important diagnostic tools in detecting and classifying ovarian masses. It is widely used because of its non-invasiveness and cost-effectiveness in producing quality imaging that can aid clinicians in diagnosing masses. Several scoring systems have been developed through the years in helping sonologists in determining whether a mass is benign or malignant. The scoring systems have utilized morphological characteristics of the masses and color flow in some cases. In the latest International Society of Ultrasound in Obstetrics and Gynecology (ISUOG), they have recommended the use of IOTA Scoring system in classifying adnexal masses. While the latest Philippine Society of Ultrasound in Obstetrics and Gynecology (PSUOG) guideline recommends assessment of tumors be initially done by pattern recognition using the ten simple rules in determining benign or malignant tumors. Further assessment of the tumors can be employed using IOTA which now includes color flow assessment. However in the absence of color flow capability, Sassone scoring may be used instead. Despite ultrasound being a necessary diagnostic modality, the gold standard in identifying malignancy among ovarian masses still is histopathology.

Several studies have been made in determining the sensitivity and specificity of the different scoring systems as to determining the malignancy of ovarian masses. However locally, several sonologists may still use different scoring systems based on their comfort and availability of color flow in their respective institutions. With this reason, it is important to determine and compare the sensitivity and specificity on the most utilized ultrasound scoring systems in determining malignancy of ovarian masses.

OBJECTIVES

General Objective:

To find out the accuracy of 3 scoring systems namely Sassone, Lerner and IOTA Simple Rules in determining malignancy of ovarian masses.

Specific Objectives:

1. To determine the sensitivity, specificity, positive predictive value, negative predictive value of Sassone Scoring System, Lerner Scoring System and IOTA Simple Rules in detecting malignancy in patients with ovarian mass.
2. To compare the accuracy of IOTA Simple Rules, Lerner, and Sassone in determining clearly benign, clearly malignant and borderline malignant in patients with ovarian mass with histopathology result as the gold standard.
3. To determine whether use of 2 or more scoring systems will have greater sensitivity, specificity, positive and negative predictive values compared to use of a single scoring system.

MATERIALS

Study Design:

This is was a single center observational, cross-sectional study utilizing review of the transvaginal or pelvic ultrasound results of women with ovarian masses that were scored using Sassone, Lerner and IOTA Simple Rules by OB-GYN Sonologists who are fellows of Philippine Society of Ultrasound in Obstetrics and Gynecology in a tertiary hospital ultrasound diagnostics unit from January 2013 to June 2016. The sensitivity, specificity, positive and negative predictive values of each scoring system utilized for the ovarian masses in determining malignancy will be computed. The ultrasound findings of the ovarian masses will be compared to the final histopathological results.

Inclusion Criteria:

All transvaginal or pelvic ultrasound results of unilateral or bilateral ovarian masses that were scored using Sassone Score, Lerner Score and IOTA Simple Rules from January 2013 to June 2016 in a tertiary hospital ultrasound diagnostic unit and had undergone exploratory laparotomy or laparoscopic surgery with or without frozen section which have been done within 2 months of the performance of the scan. The final histopathology should show the result of one or both ovaries scored by the said scoring system.

Exclusion Criteria:

Ovarian masses that were scanned in the tertiary hospital OB-GYN ultrasound diagnostic unit but were not classified as benign or malignant using any of the following scoring systems, Sassone, Lerner or IOTA Simple Rules. Masses that were not operated on or was operated after 2 months from the time of scan. Masses that do not have any histopathologic report will be excluded.

Definition of Terms:

Sassone Scoring System

Morphology	1	2	3	4	5
Inner wall structure	Smooth	Irregularities (<3 mm)	Papillarities (>3 mm)	Not applicable, mostly solid	-
Wall Thickness	Thin <3 mm	Thick >3 mm	Not applicable Mostly solid	-	-
Septa	None	Thin <3	Thick >3		
Echogenicity	Sonolucent	Low echogenicity	Low echogenicity with echogenic core; mixed echogenicity	-	High echogenicity

Cut off score suggestive of malignancy: > 9

Lerner Scoring System

Morphology	0	1	2	3
Wall Structure (mm)	Smooth or small irregularities (<3 mm)	-	Solid or not applicable	Papillarities (>3 mm)
Shadowing	Yes	No		
Septa (mm)	None or thin (<3 mm)	Thick (>3 mm)		
Echogenicity	Sonoluscent or Low level echo or echogenic core	-	-	Mixed or high

Cut off score suggestive of malignancy: > 3

Lerner Scoring System

IOTA Simple Rules:

A collection of 10 simple ultrasound based rules developed by the International Ovarian Tumor Analysis Group in determining ovarian malignancy. These rules are based on certain sonographic findings which may indicate malignancy (M-rules) or benignity (B-rules). If 1 or more M rules apply, in the absence of a B-rule, then the mass is classified as malignant. Likewise, if 1 or more B rules apply in the absence of an M rule, the mass is classified as

malignant. However, if both M rules and B rules apply or if neither or the rules apply, the mass cannot be classified and is inconclusive.⁶

Rules for predicting a malignant tumor (M-rules)	
M1 Irregular solid tumor	☐
M2 Presence of ascites	☐
M3 At least four papillary structures	☐
M4 Irregular multilocular solid tumor with largest diameter ≥100 mm	☐
M5 Very strong blood flow (color score 4)	☐
Rules for predicting a benign tumor (B-rules)	
B1 Unilocular	☐
B2 Presence of solid components with the largest diameter <7 mm	☐
B3 Presence of acoustic shadows	☐
B4 Smooth multilocular tumor with largest diameter <100 mm	☐
B5 No blood flow (color score 1)	☐

Sensitivity $a/(a+c)$

A test's sensitivity is defined as the probability that the test says a person has the disease when in fact they do have the disease. It is a measure of how likely it is for a test to detect the presence of a disease in a person who has it.

Specificity $d/(b+d)$

Specificity of a test is defined as probability that a test says a person does not have the disease when in fact they are disease free.

Positive Predictive Value $a/(a+b)$

A positive predictive value of a test is the ability of the test to correctly predict the presence of disease.

Negative Predictive Value $d/(c+d)$

A negative predictive value of the test is the ability of the test to correctly predict the absence of disease

Limitations of the Study:

This study was limited to a retrospective single center study. The data gathered was limited to review of transvaginal and pelvic ultrasound results of ovarian masses that were scanned from January 2013 to June 2016 in a tertiary hospital OB-GYN ultrasound diagnostic unit. The final histopathologic results were limited to those surgeries done within the same tertiary hospital within 2 months of the date of the ultrasound result. The histopathologic report should classify the ovarian mass as benign or malignant. This study was limited to determining the sensitivity, specificity, positive predictive and

negative predictive values of Sassone, Lerner and IOTA Simple Rules scoring systems of ovarian masses. This study tackled some descriptions of the ovarian masses in determining benign or malignant features.

METHODOLOGY

This was a single center observational, analytical, cross-sectional study utilizing review of the transvaginal or pelvic ultrasound results of women with ovarian masses that were scored using Sassone, Lerner and IOTA Simple Rules by OB-GYN Sonologists who are fellows of Philippine Society of Ultrasound in Obstetrics and Gynecology in a tertiary hospital ultrasound diagnostics. Review of transvaginal and pelvic gynecologic ultrasound reports with ovarian masses done at a tertiary hospital OB-GYN ultrasound unit using Voluson E6 machine from January 2013 to June 2016 was done. The reports with ovarian masses that were classified as benign or malignant using Lerner, Sassone and IOTA Simple rules were tabulated and the sensitivity, specificity, positive and negative predictive values of Sassone, Lerner and IOTA Simple rules will be computed. The results were compared to the final histopath result to determine malignancy.

Sample Size:

The study utilized the Epi Info Version 7, in determining the minimum sample size requirement and was estimated to be at least 101 based on sensitivity of IOTA in detecting malignancy in patients with ovarian mass = 82 %⁽⁶⁾, with 95% confidence interval and 7.5% margin of error.

Statistical Analysis:

Data was analyzed using Stata SE Version 12. Quantitative variables were summarized as mean average and standard deviation, while qualitative variables were tabulated as frequency and percentage. Sensitivity, specificity, positive predictive value and negative predictive value of Sassone, Lerner and IOTA scoring system in detecting malignancy in patients with ovarian masses with histopathology result as gold standard.

RESULTS

A total of 111 ovarian masses were scanned in the Ultrasound Diagnostics Unit from June 2013 until June 2016 that were scored using Lerner, Sassone and IOTA Simple Rules with histopathologic reports from surgeries done within 2 months of the scan. The total mean ($\pm$ SD) age of the women with ovarian masses is 41 $\pm$ 11.4 years (range 13-77 years). Among the gravidity and parity, majority of the subjects were nulligravid and nulliparous. Among the symptoms reported, 39 % of subjects noted a palpable abdominal mass, 22% complained of dysmenorrhea, 20% complained of abdominal pain, 13 % complained of irregular menses, 4% noted increase in abdominal girth, 4 % complained of vaginal bleeding, 2% complained of pelvic heaviness as seen in table 1.

Table 1. Demographics

Demographics	Mean $\pm$ SD or n (%)
Mean Age in Years	41.18 ($\pm$ 11)
Gravidity	
0	52 (46%)
1-2	31 (27.93%)
3-4	20 (18.02%)
≥ 5	8 (7.20%)
Parity	
0	58 (52.25%)
1-2	27 (24.32%)
3-4	18 (16.21%)
≥ 5	8(7.20 %)
<u>Symptoms</u>	
Abdominal mass	44 (39.64%)
Abdominal pain	22 (20%)
Increase in abdominal girth	4 (3.77%)
Irregular menses	14 (12.61%)
Vaginal Bleeding	4 (3.64%)
Urinary Symptoms	0
Pelvic Heaviness	0

The final histopathology results of the 111 ovarian masses screened using the three different scoring systems showed 10 (9%) malignant findings and 101 (90%) benign findings. (Table 2). There were no borderline malignant findings seen. The majority of the benign masses were endometriomas (44.14%) and mature cystic teratomas (21.62%). There were also 15 (13.5%) mucinous cystadenomas and 10 (9%) serous cystadenomas .

Table 2. Histological Diagnosis

Histological Diagnosis	n(%)
Benign Lesions	
Endometrioma	49 (44.14%)
Mature Cystic Teratoma	24 (21.62%)
Mucinous Cystadenoma	15 (13.51%)
Serous Cystadenoma	10 (9%)
Struma Ovarii	1 (0.9%)
Fibroma	1 (0.9%)
Malignant Lesions	
Papillary Serous Cystadenocarcinoma	1 (0.9%)
Ovarian New Growth Malignant	1 (0.9%)
High grade Serous Papillary Carcinoma	2 (1.8%)
Adenocarcinoma	1 (0.9%)
Clear Cell Adenocarcinoma	1 (0.9%)
Endometrioid Adenocarcinoma	1 (0.9%)
Granulosa Cell Tumor	1 (0.9%)
Signet Ring Adenocarcinoma	1 (0.9%)

Lerner, Sassone and IOTA Simple Rules were utilized in determining the malignancy of the 111 ovarian masses and was compared to the histopathologic result. In addition, those ovarian masses screened using combined scoring system were also identified and compared to the final histopath result. The sensitivity, specificity, positive and negative predictive values were computed for each scoring system and are shown in Table 3.

Table 3. Summary of Sensitivity, Specificity, Positive and Negative Predictive Values

Ultrasound Scoring	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value
Lerner (n=44)	100%	65%	22.22%	100%
Sassone (n=105)	100%	68%	20.5%	100%
IOTA Simple Rules (n=33)	100%	85.6%	55.5%	100%
Lerner + Sassone (n=44)	100%	65%	22.2%	100%
Lerner + IOTA (n=7)	100%	50%	25%	100%
Sassone + IOTA Simple Rules (n=27)	100%	82.61%	50%	100%
Lerner + Sassone + IOTA Simple (n=7)	100%	50%	25%	100%

Out of the 111 ovarian masses that were included in the study, 44 ovarian masses were scored using Lerner Scoring system. The test was able to score correctly all ovarian cysts that were malignant on histopath. However, out of the 40 ovarian cysts that were benign, there were 14 ovarian cysts that were false positive. These 14 ovarian masses were interpreted as malignant using the Lerner scoring system although they were benign on final histopath. Among the 14 ovarian cysts, majority were mature cystic teratomas and endometriotic cysts.

Almost all ovarian masses were scored using Sassone scoring system. Out of the 105 ovarian masses screened, the test was able to identify correctly all malignant ovarian masses. Among the 97 ovarian masses that were benign, one third were identified as malignant and were false positive hence giving a specificity of only 68%.

A total of 33 out of the 111 ovarian masses were scored using the IOTA scoring system. All 5 malignant ovarian cysts were correctly identified hence the high sensitivity of the scoring system. Out of the 28 ovarian masses that were benign on final histopath, 4 were classified by IOTA simple rules as malignant hence the specificity of 85.6%

A combination of the scoring systems were utilized in order to determine the malignancy of the ovarian masses. The outcomes showed that there were 44 ovarian masses that were scored using both Lerner and Sassone. When both tests were utilized, the specificity of the test was at 65% which was similar to utilizing Lerner score alone but slightly lower than

using Sassone alone. The sensitivity of the tests in combination was similar to when used alone. Both tests were able to identify all malignant ovarian masses. Among the 40 benign ovarian masses, 14 out of 40 were scored by both as malignant. These masses were mostly dermoid and endometriotic cysts.

Among the 7 ovarian masses scored using combined Lerner and IOTA simple rules, there was 1 malignant ovarian cyst on histopath and this was correctly identified by both scoring systems. Half of the ovarian masses interpreted as benign on histopath were scored as malignant using both Lerner and IOTA hence decreasing the specificity of the combined test to 50%.

There were 27 ovarian masses screened using both Sassone Score and IOTA simple rules. All malignant ovarian masses were correctly interpreted by both scoring systems. Out of the 23 benign masses, there were 4 masses that were read as malignant. The specificity of the combined Sassone and IOTA was higher than utilizing Sassone alone but slightly lower than using IOTA simple rules alone. The 4 masses showed histopathologic finding of mature cystic teratoma.

IOTA Simple Rules, Lerner and Sassone Scoring was used in 7 ovarian masses. The combination of the three showed a high sensitivity since there was only 1 malignant ovarian mass and it was detected by all three scoring systems. However, half of the benign masses were scored as malignant hence decreasing the specificity to 50%. The specificity of all three combined is lower than the specificity of the individual tests alone. Comparing the specificity of combined tests, the combination of IOTA and Sassone had higher specificity than the combination of IOTA Simple rules and Lerner as well as Lerner and Sassone. This can be attributed to the increase in the number of ovarian masses analyzed with IOTA and Sassone compared with the other combination tests with only 7 samples.

DISCUSSION

Significance of the Study:

In the advent of technology, ovarian masses can be diagnosed earlier. At present, there are a lot of morphological scoring systems that are utilized in determining the malignant potential of ovarian masses. Several studies made on these different

scoring systems have established different sets of sensitivity and specificity in diagnosing ovarian masses as benign or malignant. Moreover, some ovarian masses may be classified as borderline malignant histopathologically while exhibiting benign features on ultrasound. Some borderline characteristics include unilocular cysts with crescent sign and extensive papillations or a cyst with a well-defined multilocular nodule.⁽¹¹⁾ Locally, in a tertiary hospital setting, three scoring systems are being utilized in determining malignant potential of ovarian masses, namely Sassone, Lerner and IOTA simple rules. These three scoring systems have different sensitivities and specificities as seen in the different studies worldwide. The study will be helpful in determining the accuracy of each scoring system utilized by OB-GYN sonologists in a local tertiary ultrasound diagnostics unit in terms of sensitivity, specificity and predictive values. The determination and comparison of the sensitivity and specificity of the three scoring systems done in the local setting will help in determining the best scoring system to be utilized in the tertiary hospital ultrasound unit. Further recommendation can be given as to which among the three scoring systems can be utilized better or if the specificity or sensitivity will be increased if they are utilized together. Moreover, this study helped identify the possible ultrasound features of benign ovarian masses which turn out to be borderline masses on histopathology. This can help clinicians in accurately diagnosing borderline ovarian tumors pre-operatively.

In this present study, we determined the accuracy of detecting ovarian malignancy in the ultrasound department of a tertiary hospital utilizing three scoring systems namely Lerner, Sassone and IOTA Simple Rules. Several studies have showed various sensitivity and specificity of the different tests. The ultrasound machine utilized in the study was Voluson E10 and E8 which are both capable in providing clear and resonant ultrasound images. Both machines are also capable of color flow as well as Doppler studies. Most of the sonologists in the tertiary hospital ultrasound diagnostics unit were all fellows of the PSUOG and have experience years of scanning from 3 to 25 years.

The study done by Lerner et al in 1994 modified the previously devised morphologic system by removing variables which they deemed unnecessary and added another variable called shadowing. The parameters tested were wall structure, shadowing, septal thickness and echogenicity. It established a cut-off of 3 for malignancy. This study yielded a sensitivity of 96.8% and a specificity of 77%. It also

had a positive and negative predictive value of 96.8% and 77%. Conversely, our study yielded a higher sensitivity but slightly lower specificity. The positive predictive value was slightly lower and the negative predictive value were also the same. In another study by Klangsin et al, which studied the comparison of five sonographic scoring systems in malignant ovarian tumors among 146 patients, the sensitivity of Lerner score was 82.2 % and specificity of 68.3%.⁽¹²⁾ Among the 44 ovarian masses screened by lerner's scoring system, there were 14 ovarian masses that were scored to be malignant but were benign on final histopath result. These masses were dermoid cysts, endometriotic cyst and mucinous cystadenoma. The ovarian cysts that were mature cystic teratoma on histopathology were described as having mixed echoes with hyperechoic focus, thick wall (1.17 cm) and thick capsule (0.71 cm). Another had a reticular pattern with medium level echoes, thick capsule (0.37) and septum (0.83 cm) and an irregularity measuring 0.4x0.4 cm. Another mass was described as a complex mass predominantly cystic with scanty flow at the inferior pole and high resistance index. There were 2 ovarian masses that were endometriotic cysts on histopath but was scored as 7 using lerner scoring system and was interpreted as malignant. The masses were described as mixed echogenicity with thick capsule (0.3 cm) and thick septum (0.4 cm), with no solid areas but with multiple echogenic stipplings and posterior shadowing.

The study done by Sassone et al in 1991, provided promising results when their study yielded a specificity of 83% and sensitivity of 100%, positive and negative predictive values of 37 and 100% respectively. Moreover, since they were able to rigidly and explicitly define each characteristic of the adnexal mass, their approach was more sensitive compared to other morphologic scoring system.⁽³⁾ Sassone scoring system describes adnexal masses based on inner wall structure, wall thickness, septum thickness, and echogenicity. The maximum score for an adnexal mass is 15 while the minimum score is 4. A score of greater than or equal to 9 is considered malignant. This scoring system may be useful particularly in countries with low resources since it relies on 2D scans and it doesn't need the use of color flow.

Most of the sonologists in this study utilized the sassone scoring system compared with that or IOTA and Lerner. The cut off size of the wall thickness, papillarities and irregularities was 3 mm. Those

greater than 3 mm received a higher score. The sonolucency on the other hand was graded according to echogenicity. Those with higher echoes scored greater compared to the anechoic masses. Since the cut off for malignancy is 9, there were several ovarian cysts that were scored malignant despite showing benign results on histopathology. Other masses that scored 7 or 8 were interpreted as borderline malignant. 14 out of 105 ovarian masses were interpreted as borderline malignant with a sassone score of 7 or 8. These masses exhibited the following characteristics, first, the wall thickness were more than 3 millimeters, second they were characterized as having mixed echogenicity or low echogenicity with echogenic cores. Third, some masses were solid. The final histopathologic results of these borderline masses were endometriotic cyst, mucinous cystadenoma and mature cystic teratoma which are all benign. Also, 5 ovarian masses were Similarly, our study had higher sensitivity than specificity making sassone a good screening tool in detecting malignancy in adnexal masses. In the study of Sassone, although other studies identified tumor size as a risk factor for malignancy, they concluded that it's addition in their scoring system did not improve the test's sensitivity since there are large benign tumors. They also noted the source of their large false positive test were the benign teratomas since their characteristics overlapped with that of malignant tumors. In this study, 24 of the ovarian masses were mature cystic teratomas.

The International Society of Ultrasound in Obstetrics and Gynecology (ISUOG), they have recommended the use of IOTA Scoring system in classifying adnexal masses. While the latest Philippine Society of Ultrasound in Obstetrics and Gynecology (PSUOG) guideline recommends assessment of tumors be initially done by pattern recognition using the ten simple rules in determining benign or malignant tumors. Further assessment of the tumors can be employed using IOTA which now includes color flow assessment. In this study, the sensitivity and specificity of IOTA Simple rules was at 100% and 85% respectively. The sensitivity was higher in IOTA compared to that of Sassone and Lerner. It also has a higher positive predictive value compared to the other scoring system. Comparing it to the study done by Tantipalakorn in 2014, IOTA was found to have higher specificity in their study as compared to the sensitivity. Out of the 34 ovarian masses scored using IOTA Simple Rules, only 4 ovarian masses were interpreted as having malignant features but with

benign final histopath result. The masses exhibited irregular multilocular solid tumor and with presence of at least 4 papillarities. The histopathologic result was mature cystic teratoma. Current recommendation for classifying ovarian or adnexal masses utilize pattern recognition the n application of the IOTA simple rules. Timmerman et al in 2014 established there set of ultrasound simple rules in order to be more practical and make the assessment more simplified. Due to the relative novelty of this scoring system, many of the sonologist in the study were more comfortable in utilizing other scoring systems such as Sassone and Lerner scoring System.

In the study of Jung in 2015, described ultrasound of ovarian masses using pattern recognition approach. The study described the classical features of endometrioma are homogenously low level echoes in the cyst commonly called as ground glass appearance which signifies hemorrhages within the cyst. However some atypical findings of endometriomas include fluid – fluid level, hyperechoic mural heterogeneity or calcification. In this study there were several ovarian masses that were endometriomas on histopath. Mature cystic teratoma, usually shows focal high echogenic nodules, heterogeneous internal echoes in the cyst with acoustic shadows, and multiple hyperechoic fine lines and dots, which are due to reflection by clumps of hair, sebum, or fat component within the mass . The hyperechoic area is not usually as intensely echogenic as calcification and may be confused with the echo of adjacent bowel gas.

A study done by Tongsson et al in 2008 determined the validity of pattern recognition in diagnosing ovarian mature cystic teratomas. They concluded that ultrasound pattern recognition using transabdominal ultrasound with color extended-flow mapping can accurately diagnose mature cystic teratoma with a sensitivity of 94% and a specificity of 98%. Moreover, they concluded that, subjective evaluation of an adnexal mass by an experienced sonographer is a highly accurate method for diagnosis of cystic teratomas. Also, training should be done to focus on recognizing the morphologic features of a mass, rather than on any particular scoring system.⁽¹³⁾

Review of Related Literature:

Precise diagnosis of ovarian masses is important in clinical decision making in the practice of

gynecology. Currently, ultrasonography is the widely utilized diagnostic modality in identifying adnexal masses because of its relative simplicity and non-invasiveness. According to the Royal College of Obstetricians and Gynaecologists Green-top Guidelines, a pelvic ultrasound is the single most effective way of evaluating an ovarian mass with transvaginal sonography being preferable due to its increased sensitivity over a transabdominal ultrasound.⁽¹⁾ Some studies show that an ultrasound can accurately characterize about 90% of adnexal masses and the reported sensitivity and specificity of ultrasound for detecting ovarian malignancies is 88%-96% and 90%-96%, respectively.⁽²⁾

In the past, several morphological scoring systems have been utilized in determining benign and malignant adnexal masses. These scoring systems classify ovarian masses based on several characteristics namely wall thickness, inner wall structures, echogenicity and presence or absence of solid areas. In a study done by Sassone et al in 1991, it provided promising results when their study yielded a specificity of 83% and sensitivity of 100%, positive and negative predictive values of 37 and 100% respectively. Moreover, since they were able to rigidly and explicitly define each characteristic of the adnexal mass, their approach was more sensitive compared to other morphologic scoring system.⁽³⁾ Sassone scoring system describes adnexal masses based on inner wall structure, wall thickness, septum thickness, and echogenicity. The maximum score for an adnexal mass is 15 while the minimum score is 4. A score of greater than or equal to 9 is considered malignant. This scoring system may be useful particularly in countries with low resources since it relies on 2D scans and it doesn't need the use of color flow. In a prospective study done by Shende V. et al (2016) in India, where they utilized the Sassone scoring system in 56 patients with adnexal masses in determining benign from malignant adnexal masses, they concluded that there is a highly significant association between the Sassone score and type of adnexal masses (P value is <0.000001).⁽⁴⁾

Over time, several other morphological scoring systems have been developed. However, these scoring systems were found to be subjective since some of them failed to show a systematic description of the lesions and would require extra effort to properly classify each lesion into the scoring system.⁽⁵⁾

In the advent of new technology, doppler flow has been used to further classify ovarian masses as benign or malignant. In a study done by Tantipalakorn C. et al (2014) where the International Ovarian Tumor Analysis (IOTA) group, proposed simple ultrasound-based rules in predicting ovarian malignancy. The rules were based on the simple demonstration of certain sonographic findings, some of which are indicative of malignancy (M-features) and others of benignity (B-features).⁽⁶⁾ In addition to the morphological characteristics, they also accounted for the blood flow within the adnexal masses, utilizing color flow parameters. The IOTA Group has published the largest study to date looking into the use of ultrasound in distinguishing benign and malignant ovarian masses. Utilizing the data derived from the IOTA Group, simple ultrasound rules were developed to help classify the masses as benign (B- rules) or malignant (M-rules). The B - rules included the following characteristics such as unilocular cysts, presence of solid components where the largest component measures < 7 mm, presence of acoustic shadowing, smooth multilocular tumor with a largest diameter of <100 mm, and no blood flow. The M- rules on the other hand included irregular solid tumor, presence of ascites, presence of at least four papillary structures, Presence of irregular multilocular solid tumor with largest diameter $\geq$ 100 mm and a very strong blood flow. Using this rules, the reported sensitivity was 95%, specificity 91%, positive likelihood ratio of 10.37 and a negative likelihood ratio of 0.06. ⁽⁷⁾

In a study done by Valentin in 2000, it determined the sensitivity and false positive rate of Lerner's score and Doppler variable utilizing time average maximum velocity. The study tested prospectively earlier defined cut-off values for Lerner's score and Doppler variables and verified whether the combination of Doppler variable and Lerner's score had better sensitivity and specificity in determining malignancy than the use of each alone. The study compared the ultrasound examinations with those of the histologic examinations of the specimens. The study defined the best diagnostic method as the one who can detect the most malignancy with the lowest false positive rate. The study concluded that a combination of Lerner's score and measurement of time averaged velocity were best diagnostic tests with a sensitivity of 92% and a false positive rate of 19%.⁽⁸⁾ A study done by Lerner et al in 1994 tried to simplify the determination of ovarian malignancy by Sassone. The group removed the determination of

wall thickness and replaced it with shadowing in order to differentiate the features of Dermoid cyst from ovarian malignancy. The cut off value for Lerner was 3 in determining malignancy with a specificity of 77% and a sensitivity of 96.8%.⁽⁹⁾

The Philippine Society of Ultrasound in Obstetrics and Gynecology (PSUOG) recommends that assessment of ovarian tumors be initially done using the ten simple rules for identifying a benign from a malignant tumor. Further assessment should then be done by IOTA scoring which includes color flow assessment. In the absence of color flow capability, Sassone Scoring may be used instead. ⁽¹⁰⁾

CONCLUSION

In conclusion, the ultrasound diagnostic unit of the tertiary hospital can accurately determine benign ovarian masses utilizing any of the three scoring systems. All three scoring systems had high sensitivity. However, in determining malignancy, use of IOTA Simple rules has a higher specificity (85%) compared to Sassone and Lerner Scoring. Borderline interpretation of ovarian masses may vary depending on the scoring system used. Combination of the scoring system (double and triple) showed persistently high sensitivity. Moreover, the combination of Sassone and IOTA simple rules had higher specificity than combination of Lerner and Sassone or Lerner and IOTA. When all three scoring systems were combined, it showed lower specificity compared to the sensitivity of the individual scoring systems. However, we cannot fully conclude that individual specificity will be better than combined tests since there is limited number of ovarian masses analyzed.

RECOMMENDATION

Due to the limited number of ovarian masses analyzed, further study should be done with increased number of ovarian masses. We recommend that at least 101 ovarian masses be analyzed by Sassone, Lerner and IOTA simple rules individually so as to come up with a greater number of sample size. We also recommend to determine the experience years of the sonologists and find out how it affects the accuracy of the ultrasound unit in determining the malignant potential of ovarian masses utilizing Sassone, Lerner and IOTA Simple rules. A prospective study can be done in order to ensure that the sampled ovarian masses will be scored utilizing all three

scoring systems to be able to compare the accuracy of each test. A detailed examination of the ovarian masses can also be done to describe the differences in the features of the most commonly mistaken masses as malignant.

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Bullying and Its Association with Depression, Anxiety and Stress Among Adolescents Aged 12-18 Years Old of a Public High School in Quezon City*

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INTRODUCTION

Bullying is a form of aggression characterized by negative behavior intended to harm or distress others occurring repeatedly and involving an imbalance in the strength and power of the parties involved. It has become increasingly recognized in the pediatric age group because of the implications it has on the psychosocial health of children. Involvement in bullying be it a victim, a bully and a bully-victim has been associated with depression, anxiety and psychosomatic symptoms in the pediatric age group. Adolescents being a vulnerable stage, when afflicted with depression can have long-term serious effects on their mental health and functioning.

There are numerous studies on bullying in Western countries. However, in the Philippines, there are few studies on bullying and its psychological effects on children. Bullying being a culture-based phenomenon, studies conducted in the Philippine setting is warranted.

The aim of the study is to provide data on the prevalence of bullying and its associated psychological effects of depression, anxiety and stress on adolescents. It aims to investigate the association between being a victim of bullying to depression, anxiety and stress in adolescents.

Review of Related Literature:

Bullying

Bullying is an aggressive behavior characterized by negative or malicious behavior intended to harm or distress others which is repeated over a time period and involves an imbalance in the strength or power between the parties involved.¹ Bullying can be physical acts, verbal utterances or other discrete behaviors including social isolation and exclusion.

Children and adolescents who are victims of bullying have both physical and mental health problems. Mental health problems include depression, anxiety and suicide ideation.³ Victims of bullying have negative peer relations including rejection and lack of acceptance in the peer group.

The advancement in communication and information technology has expanded the phenomenon of bullying to cyberbullying. Cyberbullying is defined as the repeated harassment of peers by using information and communication technology thru the Internet and cellphones.⁶ As in traditional bullying, the goal of cyberbullies is to harm their victims through repeated disturbance to gain control over them. However, in cyberbullying, the power of the bullies does not come from their physical advantage over their victims but from their competence in using technology and their ability to hide their identity.⁶

Depression in Children and Adolescents

Traditionally, depression was seen as an adult disorder. Children were considered developmentally immature to experience depression. An adolescent's low mood was seen as part of normal teenage mood swings. However, in a meta-analysis done by Costello in 2006, the prevalence of depression among children is 3% and among adolescents is 6%. Levels begin to rise in the early teens and by the midteens the prevalence of depression reaches 4-5%.⁹ The greatest prevalence of depression in children occurs in the adolescence stage specifically starting in the early teens hence, adolescent students aged 12 to 18 years old are the subjects of this study.

There are a variety of risk factors implicated for the cause of depression in children. In a study by Thapar in 2010, adults, adolescents, children and

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pre-schoolers all point to a family history of depression and exposure to stressful life events as the most robust risk factors for depression.¹² Psychosocial risks include family conflict, maltreatment, neglect, and peer conflict and bullying.¹² Among these, chronic stressors affecting relationships appear to have a greater impact than isolated acute events. Bullying being a chronic stressor to children and adolescents is an emerging risk factor warranting further investigation.

Victims of Bullying and Depression, Anxiety and Stress

Adolescents involved in bullying are at a significant risk of experiencing psychiatric symptoms and suicidal ideation or acts¹². During adolescence when peer relationships are of great importance, traumatic events such as being a victim of bullying could cause trauma severe enough to lead to depression. Emotional instability and lowered self-esteem caused by being a victim of bullying has significant effects on the adolescent's school performance and peer relationships. A meta-analysis published in 2014 stated that involvement in bullying among children and adolescents is associated with suicidal ideation and behavior¹³.

In study done by Turner in 2010 among adolescents aged 10-17 years old, victimization from bullying increased the risk of depression through lowered self-esteem¹⁴. Studies have shown that victims of school bullying have physical and mental health problems such as depression, anxiety, suicide ideation, hyperactivity and conduct problems¹. Victims of bullying have also been found to show social difficulties such as social anxiety, loneliness, avoidance of social situations and social skills deficits. Furthermore, adolescents who exhibit social difficulties as a result of being a victim of bullying makes them vulnerable to more bullying.

The effects of being a victim of bullying extends well into adulthood¹⁵. Lund in 2010 reported that having been bullied at school was associated with an increased risk of clinical depression in adulthood. Longer and more intensive forms of bullying posed a higher risk for depression among the victims¹⁵. Among adult patients with anxiety disorders, having been bullied at school correlated with depression as well as with social anxiety and functional impairment¹⁵. In a study by Sourander in 2010, being a victim of bullying was shown to predict persistence of depression among adolescent girls. Females who

were victims of bullying in childhood and adolescence were likely to have psychiatric hospitalization and use of antidepressants, anxiolytics and antipsychotics by the age of 25 years¹⁶.

Adolescents who are victims of bullying predicted depression in young adulthood, and more clearly among socio-economically-deprived adolescents than among those with affluent backgrounds¹⁵. The population studied were adolescents from a public high school belonging to the lower-income families posing them to a greater risk of developing depression in young adulthood.

An adolescent suffering from depression may predispose him/her to being a victim of bullying. Bullying predisposes adolescents to depression hence reducing or preventing bullying has an impact on addressing adolescent depression. Likewise, being a victim of bullying is a sign that can help in identifying adolescents who are suffering from depression.

OBJECTIVES

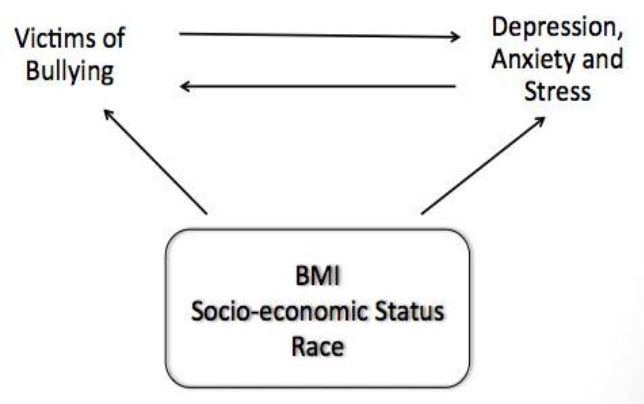
General Objective:

To determine the association between being a victim of bullying with depression, anxiety and stress among adolescents aged 12-18 of a public high school in Quezon City

Specific Objectives:

1. To determine the prevalence of bullying among adolescents aged 12-18 years in a public high school in Quezon City
2. To determine the forms of bullying present among adolescents aged 12-18 years old in a public high school in Quezon City
3. To determine the Depression, Anxiety and Stress Scale scores of students who are victims of bullying according to the form of bullying experienced
4. To determine the Depression, Anxiety and Stress Scale scores of students who are non-victims of bullying
5. To determine the association between being a victim of bullying to the Depression, Anxiety and Stress Scale Scores among victims and non-victims of bullying

Conceptual framework



SIGNIFICANCE OF THE STUDY

The result of this research can serve as additional data on victims of bullying among adolescents in the Philippines, including cyberbullying, a new and emerging type of bullying. Bullying being a culture-based phenomenon, results of the study can establish the association between being a victim of bullying and its psychological effects on adolescents such as depression, anxiety and stress in the Philippine setting. The results of the study will emphasize the need to address bullying in the Philippines. Early identification of the victims of bullying and its associated psychological effects in adolescents is vital to prevent consequences such as suicide. For the primary pediatrician, routinely asking and screening patients and parents about experiences with bullying is fundamental. Upon identification of the victims of bullying with its associated negative effects, proper advice and support can be given and prompt referral to a specialist can be made. For the school officials, programs to address bullying in the school should be instituted. For children and adolescents who were identified as victims of bullying, further evaluation, counseling and therapy is recommended as they may be suffering from its negative psychological effects such as depression, anxiety and stress.

METHODOLOGY

- A. Study Design:
Cross Sectional Study
- B. Study setting:
Public high school in Quezon City in the academic year 2015-2016

- C. Study Population:
Adolescent high school students aged 12-18 years old from a public high school in Quezon City (Academic Year 2015-2016)

Inclusion Criteria: Adolescents aged 12 to 18 years old enrolled in the academic year 2015-2016 at Roxas High School in Quezon City

Exclusion Criteria: Adolescents who have chronic diseases and other endocrinopathies which could manifest with depression were not included in the study

- D. Definition of Variables:

- 1. Victims of Bullying

This **Personal Experience Checklist (PECK)** was used to identify the victims of bullying. In this questionnaire, there are three domains of bullying, namely: physical, verbal-relational and cyberbullying. The scoring system is as follows:

Scoring:

- 0 – never
- 1 – rarely
- 2 – sometimes
- 3 – most days
- 4 – every day

A respondent who gave a score of 3 in any particular item, indicating that the particular bullying experience happened most days is considered positive for the perception of being a victim of bullying in that domain. A score of 3, indicating that the experience occurred most days was based on the definition of the experience of being bullied that the behavior occurred repeatedly.

The PECK questionnaire was developed by Hunt, Peters and Rapee in 2012. The questionnaire was validated in the Philippines in a study by Ouano in 2013. In the exploratory phase of the validity study, certain words from the original questionnaire were reworded to make it more understandable in the Philippine setting. Three factors were extracted from the original questionnaire, namely: verbal-relational bullying, physical bullying, and cyberbullying. This generated a new 28-item questionnaire.

In the cross-validation phase, questions extracted from this new model were then subjected to a Confirmatory Factor Analysis to test the generalizability and to increase its validity for its use across schools in the Philippines.⁸ The internal consistency of the items in each new factor was established thru this analysis, and was found to be adequately reliable as indicated by their Cronbach alpha coefficients as follows, Factor 1: Verbal-Relational bullying 0.89, Factor 2: Physical bullying 0.79 and Factor 3: Cyber bullying 0.79.⁸ In the validated questionnaire, items 2, 3, 5, 6, 8, 11, 16, 17, 23, 24, 27 and 28 corresponded to the verbal-relational domain of bullying, items 1, 7, 13, 15, 18, 20 and 25 corresponded to the physical domain of bullying and items 4, 9, 10, 12, 14, 19, 21 and 26 corresponded to the domain of cyberbullying.

The Personal Experiences Checklist (PECK) was developed by Hunt, Peters and Rapee in 2012 to provide a multidimensional assessment of a young person's personal experience of being bullied. It can be administered to children aged eight years and older and covers the full range of bullying behaviors, including covert relational forms of bullying and a new and emerging form of bullying which is cyber bullying⁷. The Personal Experiences Checklist (PECK) was seen to be closer to the cases of bullying in Philippine schools and has a relatively acceptable validity evidence of the measure for the experience of being bullied in both private and public schools⁸

2. Depression, Anxiety and Stress Scale

score is the cumulative score of the subject in the 21-item DASS scale multiplied by 2

a. **Low Score** – Score that is below the cut off value for all of the 3 parameters measured in the DASS scale. This means that the respondent is not at risk for depression, anxiety and stress disorder.

1. Depression – score 0-8
2. Anxiety – score 0-6
3. Stress – score 0-13

b. **High Score** - Score greater than the cut off value in any of the 3 parameters measured in the DASS scale:

1. Depression – score ≥ 9
2. Anxiety – score ≥ 7
3. Stress – score ≥ 14

High score means that the respondent is experiencing negative symptoms and at risk for depression, anxiety and stress disorder.

The presence of depression, anxiety and stress in adolescents who were victims of bullying were determined with the Depression, Anxiety, Stress Scale (DASS). The twenty-one item version of the questionnaire was used in the study as recommended by Lovibond for research purposes. This scale has been validated for use in nonclinical populations and in research settings. Reliability is considered excellent with Cronbach's alpha 0.95 for D, 0.90 for A, 0.93 for S and 0.97 for total score. The DASS has adequate convergent and discriminant validity (CFI = 0.93) inter-correlations between the three scales not as indicating conceptual overlap between the constructs of depression, anxiety and stress, but rather shared causes.¹² Scores for Depression, Anxiety and Stress are calculated by summing the scores for the relevant items. As recommended, the obtained scale scores are multiplied by 2, to make them comparable to the 42 item-DASS normative data scores. DASS was designed to measure three related but distinct negative affective states in nonclinical populations: depression (D), anxiety (A), and stress (S). Each of the three DASS-21 scales contains 7 items, divided into subscales with similar content. The depression scale assesses dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest / involvement, anhedonia and inertia. These are questions 3, 5, 10, 13, 16, 17 and 21. The anxiety scale assesses autonomic arousal, skeletal muscle effects, situational anxiety, and subjective experience of anxious affect. These are questions 2, 4, 7, 9, 15, 19 and 20. The stress scale is sensitive to levels of chronic nonspecific arousal, measured in items 1, 6, 8, 11, 12, 14 and 18. It assesses difficulty relaxing, nervous arousal, and being easily upset / agitated, irritable / over-reactive and impatient. Scores for depression, anxiety and stress are calculated by summing the scores for the relevant items. Respondents are asked to use 4-point severity/frequency scales to rate the extent to which they have experienced. Each item is scored on a 4-point scale 0 – Never, 1- Sometimes, 2- Often, 3- Almost always.¹²

The DASS is a 21-item questionnaire which includes three self-report scales designed to measure the negative emotional states of depression, anxiety and stress¹². Each of the three scales contains 14 items, divided into subscales of 2-5 items with similar content. The Depression scale assesses dysphoria, hopelessness, devaluation of life, self-deprecation, lack

of interest/involvement, anhedonia, and inertia. The Anxiety scale assesses autonomic arousal, skeletal muscle effects, situational anxiety, and subjective experience of anxious affect. The Stress scale (items) is sensitive to levels of chronic non-specific arousal. It assesses difficulty relaxing, nervous arousal, and being easily upset/agitated, irritable/over-reactive and impatient. Respondents are asked to use 4-point severity/frequency scales to rate the extent to which they have experienced each state over the past week. This questionnaire was developed by Lovibond to identify individuals who are likely to be undergoing a psychological problem. The DASS questionnaire has undergone extensive evaluation and has been found to be a reliable and valid method for assessing changes in depressive mood and anxiety.¹²

3. Study Period 2015-2016

$$\begin{aligned} \text{Sample Size: } SS &= 1.96^2 \times (0.5) \times (0.5)/0.01 \\ SS &= 96/1 + (95/284) \\ SS &= 72 \end{aligned}$$

$$SS = Z^2 \times P \times (1-P)$$

$$C^2$$

SS= sample size

Z= Z value (1.96 for CI 95%)

P= percentage of population picking a choice

P= 0.5 (prevalence of bullying according to PLAN international study)

PLAN- study on violence against children.Towards a child friendly school environment. A Baseline study on violence against children in schools(2008)

4. Conduct of Study

Prior to the conduct of the study, research proposal passed through the research and ethics committee of the department. Adolescents aged 12 to 18 years old currently enrolled in the academic year 2015-2016 who satisfied the inclusion criteria were randomly selected and recruited in the study. Consent forms were given and were signed by all parents or guardians. A written assent form was secured from the adolescent respondents. After consent and assent forms were secured, subjects were given the Personal Experience Checklist to identify victims of bullying. Respondents who were identified as victims of bullying were then be given the DASS questionnaire.

5. Materials

To identify victims of bullying the Personal Experience Checklist questionnaire was used. To determine the presence of depression, anxiety and stress in adolescents, the Depression, Anxiety, Stress Scale (DASS) Questionnaire was used.

Data Analysis:

Chi-Square test was used to associate the DASS scores of victims and non-victims of bullying. A p-value of equal to or less than 0.05 was considered statistically significant.

Results

Table 1 shows the demographic data of the adolescent respondents aged 12-18 years old.

Table 1. Demographic Data of Adolescent Respondents Aged 12-18 years old

n = 150	Victims of Bullying 129 (86%)	Non-Victims of Bullying 21 (14%)
Gender		
Male	87 (67%)	11 (52.4%)
Female	42 (33%)	10 (47.6%)
BMI		
Normal	77 (60%)	16 (76%)
Overweight	45 (35%)	5 (24%)
Obese	7 (5%)	0

Out of the 150 high school students given the PECK questionnaire to identify victims of bullying, 129 students responded that they have been victims of bullying. Only 21 responded that they were not victims of bullying. The prevalence of bullying in the public high school is 86%. Among the victims of bullying, eighty-seven of the respondents were male (67%) and 42 were female (33%). Among the victims of bullying, majority had normal BMI seen in 77 subjects (60%). Only seven victims of bullying were obese comprising 5%.

Table 2 shows the forms of bullying present in the public high school studied. Among the three forms of bullying, the verbal-relational form of bullying was the most prevalent type of bullying in

84 subjects. This was followed by physical bullying identified in 39 subjects and lastly by cyberbullying identified in 36 subjects.

Forms of Bullying	
Verbal-Relational Bullying	84 (65%)
Physical Bullying	39 (30%)
Cyberbullying	36 (25%)

In this study, most of the students report that they have been victims of more than one type of bullying. Victims of physical bullying and cyberbullying were also victims of verbal-relational type of bullying. This overlap explains the percentages totaling more than 100% in Table 2.

Table 3. DASS Scores of the victims of the three forms of bullying

	High DASS		Low DASS		p value
		Percentage		Percentage	
Verbal-Relational Bullying	75	53.6	9	47.4	0.7471
Physical Bullying	33	23.6	6	31.6	
Cyber-bullying	32	22.7	4	21.1	

Table 3 shows the DASS Scores of the victims of bullying. Based on the p-value of 0.7471, the DASS scores of the victims were not significantly different across the different forms of bullying. However, among the three forms of bullying, the higher percentage of a high DASS score in the verbal-relational type of bullying compared to the Low DASS Score is evident. The verbal-relational type of bullying has a potential to be associated with a high DASS score compared to the other forms of bullying.

Table 4. Chi- Square Analysis of the DASS Scores of Victims and Non-victims of bullying

	High DASS	Low DASS	p-value	Odds Ratio
Victims of Bullying	115 (95.0)	14 (48.3)	0.0001	20.54
Non-Victims of Bullying	6 (5.0)	15 (51.7)		

Table 4 shows the DASS scores of the victims and non-victims of bullying. More victims of bullying have higher DASS scores compared to non-victims of bullying. A p-value of 0.0001 was obtained indicating that a high DASS score is significantly associated with being a victim of bullying. Results also show that subjects with a high DASS Score is 20.54 times more likely be victims of bullying compared to those with Low DASS scores.

Discussion

Bullying is an aggressive behavior intended to harm or distress others. Several studies done in other countries have shown the association between school bullying and depression among children and adolescents¹. In the Philippines, there are few studies done on physical, verbal-relational bullying and cyberbullying, a new and emerging type of bullying.

Out of the 150 high school students given the PECK questionnaire to identify victims of bullying, 129 students responded that they have been victims of bullying. Only 21 responded that they were not victims of bullying. The prevalence of bullying in the public highschool studied was 86%. In the United States, according to data released in 2013, 28% of students ages 12–18 reported being bullied at school, during the school year according to the Bureau of Justice Statistics (BJS) and National Center for Education Statistics Institute of Education Sciences (IES). The majority of bullying still takes place at school. According to the Center for Disease Control in 2013, 28% of U.S. students in grades 6–12 experienced bullying and 20% of U.S. students in grades 9–12 experienced bullying. In European countries, in a report published in 2010, among boys age 11–15 years who report being bullied, in Austria, the prevalence rate is 21%, in Russia 18%, in Belgium and Portugal 17%, in Canada, Switzerland and France, the prevalence is 15%. In Hong Kong, Taiwan and Macau, the prevalence of being a victim of bullying is 9.1%¹⁷. In the Philippines, the Department of Education reported more than 1,700 cases of bullying in schools for the years of 2013 and 2014.

Results of the study showed that males were more involved in bullying than females. This finding was similar to previous studies done showing that boys are more often involved in bullying than girls, both as bullies and victims.¹⁷ Involvement in bullying can be attributed to males showing more aggressive behavior compared to females.

Among the victims of bullying, majority had normal BMI seen in 77 respondents. Only seven victims of bullying were obese comprising only 5%. This is contrast from previous studies done which showed overweight male students were more likely to both physically bully others and be victims of bullying in comparison with normal weight males¹⁹. This could be attributed to the subjects in this study belonging to low-income families. In a study done by Dinsa in 2012 associating socio-economic status and obesity in developing countries, it was found that in low-income countries the more affluent families are more likely to be obese²⁰. Obesity in children appears to be predominantly a problem of the rich in low and middle -income countries.

The forms of bullying identified in the public high school include verbal-relational, physical and cyberbullying. Among the three forms of bullying present, victims of the verbal-relational form of bullying was the most common identified in 84 subjects. This was followed by victims of cyberbullying identified in 36 respondents and lastly victims of physical bullying identified in 39 subjects. The results of the study was similar to a study done in the United States among adolescents in 2009 where the form of bullying which has the highest prevalence rate of being a victim is the verbal-relational type of bullying having a prevalence rate of 53.6%. This was followed by physical bullying with a prevalence rate of 20.8% and cyberbullying at 13.6%.

Results of the study showed that victims of verbal -relational and physical bullying were also victims of cyberbullying. This was similar to studies done in Western countries which showed adolescents who participated in verbal and physical bullying also were involved in cyberbullying (Stoltz,2007). In a study done in Germany, adolescents who were victims of cyberbullying were also victims of traditional forms of bullying (verbal and physical) (Dooley, 2009). Cyberbullying is merely a continuation of traditional bullying executed through new means(Stoltz,2007). Among adolescents, involvement in bullying is associated with engagement in risky behavior and the presence of one form increases the likelihood of engaging in another.

In a study by Perren in 2010 among Swiss and Australian adolescents, victims of cyberbullying reported significantly higher levels of depressive symptoms, even when controlling for being victims of traditional bullying. In traditional bullying which

involves physical or verbal confrontation, victims of cyberbullying may not identify or know the bully personally. As such, according to the National Institute of Child Health, victims of cyberbullying feel more isolated, dehumanized and helpless. In the current study, the DASS scores of the victims were not significantly different across the different forms of bullying. This could be attributed to the study conducted in a public high school where access to the internet or possession of a cellphone may be a limiting factor.

Being a victim of bullying has negative short and long-term consequences. Negative peer relations such as lack of acceptance in the peer group and peer victimization are associated with loneliness, social dissatisfaction and social withdrawal. As evidenced by a study in the United States, peer victimization and exclusion may also increase children's depressive symptoms²¹.

Children and adolescents who are bullied have been found to have mental health problems, such as depression suicide ideation, hyperactivity, conduct and health problems¹. Several studies have been done in Western countries relating bullying and suicidality in adolescents. A meta-analysis done published in 2014 stated that involvement in bullying in any capacity (bully, victim, bully-victim) is associated with suicidal ideation and behavior. However, in the Philippines there are few studies conducted. Results of the present study show that victims of bullying have significantly higher DASS scores compared to non-victims of bullying.

An adolescent suffering from depression may predispose him/her to being a victim of bullying and being a victim of bullying predisposes adolescents to depression. In this study, subjects with a high DASS Score (Odds ratio: 20.54) are more likely to be victims of bullying compared to those with Low DASS scores.

Conclusion

The present study shows that the forms of bullying such as verbal-relational, physical and cyberbullying are present in a public high school setting in the Philippines, with a prevalence of 86%. The verbal-relational form of bullying has the highest prevalence followed by physical bullying then by cyberbullying. Victims of bullying showed high DASS scores compared to non-victims of bullying. Being a victim of bullying was significantly associated with a high risk

for depression, anxiety and stress among adolescents. Subjects with a high DASS Score were more likely (Odds ratio: 20.54) to be victims of bullying compared to those with Low DASS scores.

LIMITATION AND RECOMMENDATIONS

Previous studies have studied the association between victims of bullying and certain risk factors including parental set-up (intact or non-intact two-parent families), exposure to negative parenting behavior such as abuse and neglect, ADHD and autism and substance (alcohol, tobacco and illicit drug) use, school performance. These factors were not included in the present scope of the study.

The present study was conducted in public high school. It is recommended that further studies be also done in private school setting. The questionnaires were explained to address clarifications prior to the subjects answering them. On the victims of bullying identified, the school officials were informed of the prevalence of bullying in their school. The teachers were informed of the forms of bullying present and methods and programs to control bullying were suggested. Participation of the parents, the students, the school officials, the guidance counselor and the local government was encouraged in implementing the programs on bullying. On the victims of bullying identified, follow-up is recommended to evaluate the respondents individually for psychological problems.

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Guidelines for Adolescent Preventive Services: Screening Tool for A Student Wellness Program *

*Myrissa Lacuna- Alip, MD, MHA***

INTRODUCTION

Human development is “a process of enlarging people’s choices to lead a long and healthy life, to be educated and to enjoy a decent standard of living” (UNDP 1990). Basic services such as health, social welfare, education and housing are essential to achieve this.

Health is a very powerful element for social protection and inclusion. Good health enables individuals to work and participate fully in their communities, allow people to have better chances for employment and support themselves financially.

The World Health Organization (WHO) defined health as the state of complete physical, mental and social well being, it is not merely the absence of disease or infirmity.¹ It includes emotional stability, clear thinking, the ability to love, to create and embrace change, exercise intuition and experience a continuing sense of spirituality.²

Adolescence is a transition stage between childhood and adulthood. According to WHO, an adolescent is any person between the ages 10 and 19, an age range that falls within WHO's definition of young people, those between ages 10 and 24. Early stage of adolescence is from age 10-14 and older adolescence is from 15-19.

It is a stage when an individual undergoes many changes physically and emotionally. Hormonal changes occur during this stage of puberty. It is also in this stage when childhood values, attitudes and

behavior are modified to culturally acceptable adult practices. Behavior is an essential factor in adolescent health since such can cause non-communicable diseases later in life.

Most adult chronic illnesses start in childhood and adolescence, and this is due to risky behaviors. Therefore, reduction of illness in adulthood may be achieved by preventive measures reducing both behavioral and medical health risks in childhood and adolescents, at the personal and community level.

The hospital is a venue for empowering people to care for their health, achieve wellness and have security of life. Primary care physicians can play a critical role in preventing adverse outcomes and promoting healthy lifestyles.

Wellness is a lifestyle, a way of living to attain good health and this is observed throughout ones lifetime. It is the harmonious interlocking relationship among physical, emotional (mental), intellectual, social, environmental, and spiritual health dimensions. It is a self-directed evolving process through which a person becomes responsive to, so that he can make choices to achieve his full potential. It is an integrated method of functioning which is oriented towards maximizing the potential of an individual. High-level wellness means this is achieved while remaining in balance with the environment.⁴

An individual cannot be totally blamed for their health because the individual’s characteristics and behaviors are shaped by the conditions of the social, economic, and political resources at global, national,

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¹ (WHO, 1947) <http://www.who.int/about/en/index.html>

² Alliance for Integrated Medicine downloaded @ <http://www.meta-ehealth.com/site/office/index.jsp>

³ Difference Between Health and Wellness | Difference Between | Health vs Wellness <http://www.differencebetween.net/science/health/difference-between-health-and-wellness/#ixzz2s9L7pYDy>

⁴ Dunn (1960)

and local levels.⁵ Addressing the modifiable risk factors thus, will decrease the occurrence of disease.

Health promotion among adolescents can produce healthy outcomes, not just during this age but also until adulthood.

It is then the purpose of this paper to take a closer look into the Guidelines for Adolescent Preventive Services (GAPS): 1) Evaluate its manner of implementation; 2) explore the gaps in its implementation; and 3) attempt to give recommendations.

Rationale for this paper

In 2003, 40% of deaths in individuals 10-24 years old were from non-communicable diseases, one third of which were due to injuries, violence and vehicular accidents (Philippine Statistics Office 2003). Accidents and injuries accounted for the largest percentage of deaths among adolescents in the Philippines in 2005.

Diseases caused by smoking, risky sexual practices, alcohol, drug use and abuse have their roots in adolescence. In May of 2016, five passed-out and then died during a concert in a mall along Roxas Boulevard because of "drug-laced" drinks. Two were 18 years old, one was 22, and the other two were both 33 years old.

Obesity has increased the risk of lifestyle diseases like Type 2 diabetes mellitus, hypertension, and high cholesterol. The 2011 Global School-based Health Survey indicated that about 13% of adolescents in the Philippines are overweight and obese.⁷

Moreover, the suicide rate in the country is increasing. Records from the National Poison Management and Control Center of the Philippine General Hospital, showed that out of the 46 % of suicide cases recorded, 16% are from the 10 to 19 year-old bracket while 20 to 35 year age group comprise the remaining 30% .

In our community, the University of the Philippines, a student commits suicide mostly over unpaid tuition fees and failing grades. Still others succumb for reasons that are not clearly understood. Whatever the reason is, we can surmise that there is a cause for

concern. These incidents may be just the tip of an iceberg.

Data from the Office of Counseling and Guidance and the University Health Service showed 231 students who went for psychiatric consult during the academic year August 2015- August 2016. Seventeen had suicidal ideation, 133 were depressed, and 31 were anxious.

What does the University Health Service have to offer?

Studies have been done regarding health of the youth. Several schools participated in the "The Global School- Student Health school survey⁸ which was a cross-sectional study done in 2003, 2007, 2011, and 2015. Likewise, a study done by Peltzed and Pengpid, "Health risk behavior among in school adolescents in the Philippines"⁹ shared the same objective, that is, to provide trends regarding the various health risk behaviors.

The pre-enrollment medical examination offers an opportunity for early detection and screening of health risk behaviors.

In 2014, through the initiative of Dr. Joselyn C. Yotoko, Medical Specialist at the University Health Service, the hospital started to implement the use of Guidelines for Adolescent Preventive Services (GAPS, Index A) as a comprehensive clinical tool in adolescent health care.

The GAPS was developed by the American Medical Association for patients 11-21 years old so that risky behaviors are recognized and addressed early to prevent premature adult mortality. The reason behind the development of GAPS is the belief that lifestyle intervention at an early age can reduce morbidity and mortality and its primary goal is to improve health care delivery for adolescents.

GAPS consists of 24 recommendations (Annex 1) that encompass health guidance, screening and immunizations.¹⁰ It includes a questionnaire (Annex 2) that is given to freshmen during the pre-enrollment medical examination.

⁵ Social determinants of Health. WHO downloaded @ http://www.who.int/social_determinants/sdh_definition/en/conditions

⁶ Philippines National Health Statistics, 2005. Republic of the Philippines: National Epidemiology Center, Department of Health.

⁷ Philippines Global School Health Survey downloaded @ http://www.who.int/chp/gshs/2011_GSHS_FS_Philippines.

⁸ Global School-Based Student Health Survey Philippines 2011 Fact sheet downloaded @ http://www.who.int/chp/gshs/2011_GSHS_FS_Philippines.pdf

⁹ Peltzer, Karl, and Supa Pengpid. "Health risk behaviour among in-school adolescents in the Philippines: Trends between 2003, 2007 and 2011, a cross-sectional study." *International journal of environmental research and public health* 13.1 (2015): 73

¹⁰ Montalto, Norman J. "Implementing the guidelines for adolescent preventive services." *American family physician* 57 (1998): 2181-2191.

The GAPS questionnaire consists of 61 questions, addressing topics on tobacco, alcohol and other drug use, dietary behaviors, mental health development, and violence. Emphasized also are emotions such as depressed mood and others. Annex 3 illustrates the flow chart/ transaction process on GAPS implementation during the pre-enrollment examination at the UHS.

The Public Health Unit (PHU) personnel are in charge of screening information, measuring blood pressure, recording body mass index, providing health guidance and distributing age-appropriate information. The freshman then goes to the triage nurse who in turn decks the student to the primary physician. Physical examination is then done. All entries are reviewed and attention is focused on question numbers 63-68 (suicidal thoughts and intention plan). The students with suicidal thoughts are advised to go to the Office of Counseling and Guidance to be scheduled with a counselor. Only after this, are they given clearance for enrollment.

In addition, laboratory results and other significant risky behaviors are reviewed by the examining physician and basic counseling and education are done. Referral to other specialties may also be instructed when there is a need. The student is then given clearance for enrollment after going through the process.

Issues and Challenges

1. The GAPS encounter puts a premium on mental health. This is necessary since a state of well being empowers a student to realize his or her own potential, allows coping with the normal stresses of school life, promotes productive and fruitful work, and contributes to the welfare of the community at large. Poor mental health can have significant consequences on the larger aspects of the health and development of adolescents including its association with alcohol and drug use, early pregnancy, and other high risk behaviors.

The more health issues are present, the lesser the chance for the evaluation to be comprehensive. This is due to the fact that there is limited time per student because of the numerous number who are on queue for pre-enrollment examination, given that this is a requirement for all colleges and units, not to mention those who are seeking regular consultation for acute illnesses.

2. The primary physicians who did the initial GAPS are responsible for most of the medical care delivered to the students but they are largely unaware of the collated results of GAPS since it was started as well as its impact and monitoring.
3. There is no follow up interview as to the effect of any intervention given. Thus, outcomes are not complete, making an overall assessment difficult to accomplish.

Conclusions and Recommendations

The use of GAPS may help the primary physician at the UHS to screen and identify important health-related behaviors before they manifest as illness or injuries. The manner of response as to the various ways to implement it can present a challenge. Such issues should be subject to deliberation and further discussion so that the program can better serve its purpose.

During each student encounter, screening is done, physical examination performed, laboratory results evaluated, immunization schedule checked. Sufficient time should be insured so that objectives are met and behavior is modified.

It is imperative that during the first encounter, the process to provide relevant information is already put in place. This will provide sufficient motivation for the students to cooperate and participate. The end result will be an effective program that will be of benefit to the university. Healthy behaviors will empower the adolescent and their families to have more control over their well-being and reinforce positive lifestyles.

Health care systems should facilitate physician time with the patient, allowing for a more detailed history or for problem-focused health guidance. Health care providers should enhance their skills in relating to young people, detecting mental health problems early, providing counseling and referring them to the OSGC for cognitive-behavior therapy and other methods of treatment, or even referring to other agencies and professionals as necessary.

GAPS questionnaires answered by all incoming students, per school year, should be gathered, findings collated and conclusions disseminated to everybody concerned. Thereafter, follow-up interviews

¹¹ (WHO 2014) http://www.who.int/features/factfiles/mental_health/en/

should be done to assess improvements and effectiveness of the intervention. A periodic program evaluation should also be carried out so that revisions may be implemented. Only in this manner can a program be restructured, reorganized and redefined, the net outcome being sustainability.

Strategies should include: 1) Health education materials be made available during every individual encounter, as well as through the use of multi-media; 2) An immunization program for students should be in place, vaccines should be easily accessible for infections like rubella or hepatitis; 3) Counseling on risk behavior prevention with identification of adolescent concerns or problems are vital to instituting appropriate and timely intervention strategies; 4) Health education and health promotion goals should be established together with the client.

The GAPS undoubtedly will be beneficial to adolescents. The endeavor needs collaboration of units concerned with student affairs. Further, this will require ample time for patient-physician interaction, and the dedication of the health personnel. Dr. Joselyn C. Yotoko as the advocate of GAPS, need to insure that her colleagues have sufficient training and knowledge about its utilization. Finally, such a program should be viewed in the long term and its impact should be sustained.

ANNEX 1

Guidelines for Adolescent Preventive Services (GAPS).

STD=sexually transmitted disease; HIV=human immunodeficiency virus; ELISA=enzyme-linked immunosorbent assay.

Recommendation 1

From ages 11 to 21 all adolescents should have an annual routine health visit.

Recommendation 2

Preventive service should be age and developmentally appropriate, and should be sensitive to individual and sociocultural differences.

Recommendation 3

Physicians should establish office policies regarding confidential care for adolescents and the way parents will be involved in that care. These policies should be made clear to adolescents and their parents.

Recommendation 4

Parents or other adult caregivers of adolescents should receive health guidance at least once during early adolescence, once during middle adolescence and, preferably, once during late adolescence.

Recommendation 5

All adolescents should receive health guidance annually to promote better understanding of their physical growth, their psychosocial and psychosexual development, and the importance of becoming actively involved in decisions regarding their health care.

Recommendation 6

All adolescents should receive health guidance annually to promote the reduction of injuries.

Recommendation 7

All adolescents should receive health guidance annually about dietary habits, including the benefits of a healthy diet and ways to achieve a healthy diet and safe weight management.

Recommendation 8

All adolescents should receive health guidance annually about the benefits of exercise and should be encouraged to engage in safe exercise on a regular basis.

Recommendation 9

All adolescents should receive health guidance annually regarding responsible sexual behaviors, including abstinence. Latex condoms to prevent sexually transmitted diseases (including HIV infection) and appropriate methods of birth control should be made available with instructions on ways to use them effectively.

Recommendation 10

All adolescents should receive health guidance annually to promote avoidance of tobacco, alcohol and other abusable substances, and anabolic steroids.

Recommendation 11

All adolescents should be screened annually for hypertension according to the protocol developed by the National Heart, Lung, and Blood Institute's Second Task Force on Blood Pressure Control in Children.

Recommendation 12

Selected adolescents should be screened to determine their risk of developing hyperlipidemia and adult coronary heart disease, following the protocol developed by the Expert Panel on Blood Cholesterol Levels in Children and Adolescents.

Recommendation 13

All adolescents should be screened annually for eating disorders and obesity by determining weight and stature, and asking about body image and dieting patterns.

Recommendation 14

All adolescents should be asked annually about their use of tobacco products, including cigarettes and smokeless tobacco.

Recommendation 15

All adolescents should be asked annually about their use of alcohol and other abusable substances, and about their use of over-the-counter or prescription drugs, including anabolic steroids, for nonmedical purposes.

Recommendation 16

All adolescents should be asked annually about involvement in sexual behaviors that may result in unintended pregnancy and STDs, including HIV infection.

Recommendation 17

Sexually active adolescents should be screened for STDs.

Recommendation 18

Adolescents at risk for HIV infection should be offered confidential HIV screening with the ELISA and a confirmatory test.

Recommendation 19

Female adolescents who are sexually active and women 18 or older should be screened annually for cervical cancer by use of a Papanicolaou test.

Recommendation 20

All adolescents should be asked annually about behaviors or emotions that indicate recurrent or severe depression or risk of suicide.

Recommendation 21

All adolescents should be asked annually about a history of emotional, physical or sexual abuse.

Recommendation 22

All adolescents should be asked annually about learning or school problems.

Recommendation 23

Adolescents should receive a tuberculin skin test if they have been exposed to active tuberculosis, have lived in a homeless shelter, have been incarcerated, have lived in or come from an area with a high prevalence of tuberculosis, or currently work in a health care setting.

Recommendation 24

All adolescents should receive prophylactic immunizations according to the guidelines established by the federally convened Advisory Committee on Immunization Practices.

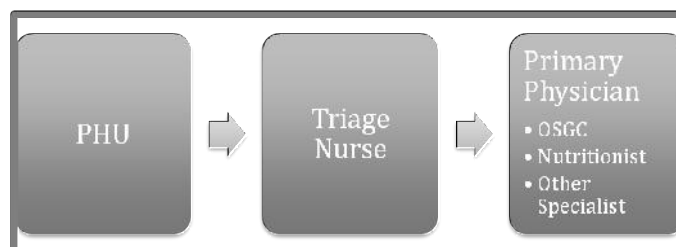


Figure 1. Process flow of consultation.

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Intensifying Health Promotion Efficiency through Relevant Flipchart Use: A Primary Health Care Learning Empowerment for Community Health Workers of the Municipality of Sto. Tomas, Batangas, Philippines*

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INTRODUCTION

Primary Health Care is the essential care based on practical, scientifically sound and socially acceptable method and technology made universally accessible to individuals and families in the community through their full participation and at a cost they and the community can afford to maintain in the spirit of self-reliance and self-determination. Last September, 1978 at Alma Ata, an international conference on primary health care was done and they declared that Health is a fundamental human right and that the attainment of the highest possible level of health is a most important world wide social goal and that the people have the right and duty to participate individually and collectively in the planning and implementation of their health care.

Community participation is a process by which individuals and family assume responsibility for their own health and those of the community and develop the capacity to contribute to their community development Advantages of this are: it addresses the felt needs of the people, it ensures social responsibility among the community, it ensures sustainability, cost sharing, enhancement of knowledge and encourages intersectoral or non-government and government agencies collaboration.

One of the elements of Primary Health Care is education wherein the community should be informed of the health problems and the methods of their prevention and control. This can be done by the community health workers, with proper training, in disseminating the health information to their respective community members effectively, through relevant and proper presentations.

In the other hand, everyone seems to be interested in making high-tech presentations with laptops and LCD projectors; however, the flip chart is still the most effective presentation especially when used in the far flung communities, done before small groups. Economically, flip charts do not need electricity, can be done easily, show one's creativity and allows spontaneity in improving and in delivering the lecture topics. Education in presentation training, like flip chart use, allow the community health workers build on their presenting skills, enjoy making better presentations, achieve their confidence in presentations, and teach them how to present successfully.

BACKGROUND OF THE PROJECT

In the late 2015, with the hope of having her Community Health Workers (CHW) know more updates and skills in Primary Health Care, especially in disseminating proper health information to their respective constituents, regarding prevention and control of common illnesses, the mayor of the Municipality of Sto. Tomas, Batangas, Philippines, in partnership with Investment Capital Corporation of the Philippines (ICCP) Foundation Group, Inc., Light Industry & Science Park III, and Corporate Social Responsibility of Manila Doctors Hospital (CSR-MDH), in cooperation of the Department of Family and Community Medicine-Manila Doctors Hospital (DFCM-MDH), started this endeavour. Early last 2016, after several meetings of conceptual planning between ICCP and DFCM- MDH, a project was organized for the Community Health Workers (CHWs) of the Municipality of Sto. Tomas, Batangas, Philippines.

*Community Project Entry, as part of Corporate Social Responsibility, Asian Hospital Management Awards

¹ From the Department of Family and Community Medicine, Manila Doctors' Hospital

THE PROJECT

The project is composed of Three (3) Phases, namely:

Phase I:

1. Objectives:
 - 1.1 To impart knowledge through lectures about all possible illnesses and diseases, commonly encountered in every community of the Municipality of Sto. Tomas, Batangas, Philippines, including their prevention and control.
 - 1.2 To do demonstrations on how to do proper Blood Pressure and Temperature takings.
 - 1.3 To demonstrate on how to take proper Heights and Weights and calculate for Body Mass Indexes (BMI)
 - 1.4 To have return demonstrations on how to do proper Blood Pressure takings, Body Temperature takings and correct calculations of BMI
2. Topics to be discussed: (See Attached CD of the full context of the lectures)
 - 2.1 Lecture Topics:
 - 2.1.1 Lagnat at Kombulsiyon (Fever and Convulsion)
 - 2.1.2 Tuberkulosis (Tuberculosis)
 - 2.1.3 Alta Presyon (Hypertension)
 - 2.1.4 Diabetes
 - 2.1.5 Pulmonya (Pneumonia)
 - 2.1.6 Mga Sakit sa Balat (Skin Diseases)
 - 2.1.7 Kalusugan sa Kapaligiran (Environmental Health)
 - 2.1.8 Paninigarilyo (Smoking)
 - 2.1.9 Pang-Unang Lunas (First Aid)
 - 2.1.10 Pansariling Kalugusan (Personal Hygiene)
 - 2.1.11 Roles and Responsibilities of Community Health Workers
 - 2.2 Workshops and Demonstrations
 - 2.2.1 Proper Blood Pressure Taking
 - 2.2.2 Proper Body Temperature Taking
 - 2.2.3 Determination of Body Mass Index

3. Persons Involved:
 - 3.1 DFCM-MDH Residents
 - 3.2 DFCM-MDH Consultants
 - 3.3 Community Health Workers of the Municipality of Sto. Tomas, Batangas, Philippines with their Coordinator
 - 3.4 ICCP Foundation Group, Inc. representative
 - 3.5 Light Industry and Science Park III representative
4. Duration of Phase I: 2 Days
5. Resources Needed: Lecture Manuals, BP apparatuses, Thermometers, Weighing Scales (Detecto), Pre and Post-tests questions, Evaluation forms, papers and pens, Laptops. LCD, Screen, Sound Systems
6. Venue and Food: c/o Light Industry and Science Park III and Municipality of Sto. Tomas

Phase II

1. Objectives
 - 1.1 To impart knowledge of more lectures about illnesses and diseases, including their prevention and control, as additional disease topics taken in Phase I.
 - 1.2 To explain how teaching can be effective through the use of flipcharts.
 - 1.3 To give and explain the importance and advantages of Flipcharts.
 - 1.4 To demonstrate on how to make flipcharts properly.
 - 1.5 To teach the proper ways of giving health promoting lectures to the community health workers, using their prepared flipcharts as return demonstrations.
2. Topics: (See attached CD to know the full context of the lectures)
 - 2.1 Additional Lecture of Topics:
 - 2.1.1 Pagtatae (Diarrhea)
 - 2.1.2 Rabies
 - 2.1.3 Leptospirosis
 - 2.1.4 Bakuna (Immunization)
 - 2.1.5 Dengue Fever
 - 2.1.6 Tigdas (Measles)
 - 2.1.7 How to Lecture Effectively Using the Flipcharts

- 2.1.8 How to Make Flipcharts Properly
- 2.2 Workshop and Return Demonstrations
 - 2.2.1 Making Flipcharts Properly
 - 2.2.2 Graded Return Demonstrations on Effective Lecturing with the use of Prepared Flipcharts
- 3. Person Involved:
 - 3.1 DFCM-MDH Residents
 - 3.2 DFCM-Consultants
 - 3.3 Investment Capital Corporation of the Philippines (ICCP) Foundation Group, Inc. representative
 - 3.4 Light Industry and Science Part III representative
 - 3.5 Community Health Workers of the Municipality of Sto. Tomas, Batangas, Philippines with their Coordinator
- 4. Duration of Phase II: 2 days
- 5. Resources Needed: Lecture Manuals, Evaluation Forms, Grading Sheets, Materials for Flipchart Making: 3 ft. x 2 inches pieces of wood or bamboos, Manila papers, Black, red, blue pentel pens, crayons, straw for tying use, LCD, Laptops, Sound Systems
- 6. Venue and Food: Investment Capital Corporation of the Philippines (ICCP) Foundation Group, Inc., Light Industry and Science Park III and Municipality of Sto. Tomas, Batangas, Philippines

Phase U3: Community Levels, in coordination with the different Barangay Councils of Sto. Tomas

- 1. Objectives
 - 1.1 To go and visit the different communities (29 out of 30) of the Municipality of Sto. Tomas, Batangas, Philippines.
 - 1.2 To assemble the target audience of underprivileged and marginalized members of each community that will be visited (These underprivileged and marginalized members are the members of the Pantawid Pamilyang Filipino Project (4Ps) of the Philippine Government. One community has no 4Ps members).
 - 1.3 To let the community health workers do their teachings with the use of their prepared flip charts about their respective pre-selected or assigned lectures in front of their respective community members (members of 4Ps)

- 1.4 To let the community members evaluate the lecturing of their respective community health workers as well as their flipcharts .
- 2. Topic of CHW lecture: Selected from their Health Promotion Lectures given during the Phase I and II, illustrated in their prepared flipcharts
- 3. Demonstration: Effective Lecturing/Teaching with the Use of their prepared Flipcharts
- 4. Persons Involved:
 - 4.1 DFCM-MDH Consultant
 - 4.2 ICCP/Light Industry & Science Park III representative
 - 4.3 Head or Coordinator of Community Health Workers
 - 4.4 Community Health Workers of the selected communities
 - 4.5 Community Councils
 - 4.6 The Marginalized and Underprivileged community members (4Ps - Pantawid Pamilyang Pilipino Project members of the government)
 - 4.7 The Municipal Mayor and his/her council
- 5. Duration of Visit: 1 scheduled day, good for 4-6 communities, until the total of 29 communities will be visited
- 6. Resources Needed: Prepared flipcharts, Evaluation/Grading Forms, pre & post test Questions, Coupon bands, pen/pencils
- 7. Venue and Food: Community Health Centers of the visited Communities

CARRYING-OUT OF THE PROJECTS

The project was carried out in collaboration and cooperation of the following:

- 1. Office of the Mayor of Sto Tomas municipality with the Municipal Health Office
- 2. Corporate Social Responsibility-MDH with the knowledge of the Hospital Director
- 3. Department of Family and Community Medicine-Manila Doctors Hospital
- 4. Investment Capital Corporation of the Philippines Foundation Group, Inc.

5. Light Industry and Science Park III
6. Barangay Councils of all Communities of Sto. Tomas
7. Community Health Workers Organization of Sto. Tomas

A. Phase I (2 Sessions)

Since there were more than 150 Community Health Workers (total 163 who underwent the training) of the Municipality of Sto. Tomas, the training sessions were divided into two (2). The Session I covered the first half of the CHWs and Session II was for the 2nd half of the CHWs

	Session 1	Session 2
1. Venue	Mountain Rock Resort Lipa, Batangas	NDN Hotel Sto. Tomas, Batangas
2. Date	January 15 & 16, 2016	February 26 & 27, 2016
3. Number of Participants	84 Participants	79 participants
4. Number of Communities represented	29 Communities	27 Communities
5. Topics of Lectures given	As shown under The Project	As shown under The Project
6. Workshops/ Demos	As shown under The Project	As shown under The Project
7. Pre-Test: Lowest: Highest: Post-Test: Lowest: Highest: Total Items;	55 (46%) 100 (84%) 50 (42%) 114(96%) 119	Below 60% 108 (91%) 112(94%) 119
8. Pictorials	See samples	See samples

Details of the Sessions

Session I

Date and Venue of Session I:

The lectures and training took place on January 15 and 16, 2016 at the Mountain Rock Resort in Lipa, Batangas

One hundred nineteen-item pre-test, containing the 13 topics included in the modules, were given to the participants before the lecture proper as Pre-Test and after the modules as Post-Test.

The training session was divided into 4 modules. Modules 1 to 3 were tackled on the first day of training while Module 4 was discussed on the second day. Each topic consisted of definitions, risks, diagnosis, complications, prevention and treatment. Using Filipino language, all topics were lectured by means of MS Powerpoint presentations flashed through a projector. (Please see attached CD for the Lectures). Lectures went through as follows:

Module 1 (January 15, 2016):

- Lecture 1 - Roles and Responsibilities of a Community Health Worker (CHW)
- Lecture 2 - Pang-Unang Lunas sa mga Medikal Emergencies (First Aid)

Module 2 (January 15, 2016):

- Lecture 3 - Altapresyon (Hypertension)
- Lecture 4 - Lagnat at Konbulsyon (Fever and Convulsion)
- Lecture 5 - Diabetes
- Lecture 6 - Tuberculosis (Tuberculosis)
- Lecture 7 - Mga Sakit sa Balat (Common Skin Diseases)

Module 3 (January 15, 2016):

- Lecture 8 - Pag-Iwas sa Paninigarilyo (Smoking)
- Lecture 9 - Tamang Paglilinis sa Katawan (Proper Personal Hygiene)
- Lecture 10 - Pangangalaga sa Kapaligiran (Environmental Health)
- Lecture 11 - Nutrisyon (Proper Nutrition)

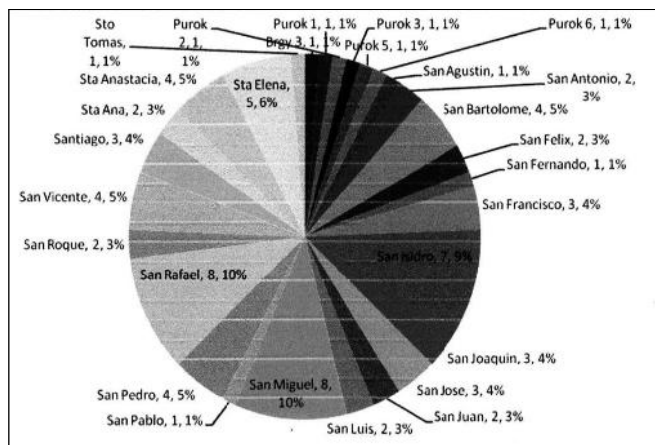
Module 4 (January 16, 2016):

- Lecture 12 - Vital Signs
 - Lecture 13 - Mga Nilalaman ng First Aid Kit
- Workshop on Vital Signs and Body Mass Index Determination One hundred nineteen-item post-test, same as the pre-test, were given to the participants after all the lectures and workshop.

Outcomes of the Training: Session I

Demographics; A total of eighty four (84) Community Health Workers attended the training. All trainees were females. The trainees came from twenty nine (29) different barangays as illustrated in Figure 1. Majority of the trainees was aged 40 to 49 years old followed by those whose age was between 50 to 59 years old (Table 1). Based on civil status, most of the trainees are married (Table 2) and majority have reached high school (Table 3).

Figure 1. Distribution of Trainees According to residence

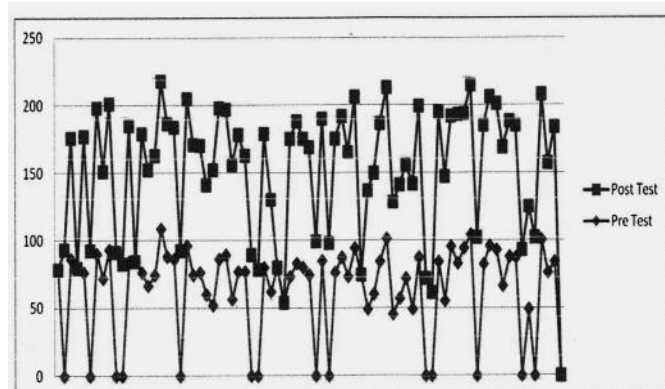


Pre-Test: A total of 64 trainees took the pre-test. Nine trainees was not able to reach the passing score (60). The rest passed the pre-test. The highest scored 108 (91%). (Figure 2)

Post-Test: A total of 72 trainees took the post-test. Six trainees who attended during the first day were not present during the second day. All the trainees passed the post- test. Four CHW scored the highest at 112 (94%). '

Workshop: All trainees who engaged in the workshop were able to do a return demonstration correctly.

Figure 2. Pre-Test and Post-Test Scores of Trainees (n=78)



Samples of Examination Test that was used for Pre-test and post-test

Table 1. Frequency Distribution of Trainees According to Age (n=78)

Age Range (in years)	Number of Attendees	Percentage
20-29	7	9%
30-39	13	17%
40-49	25	32%
50-59	21	27%
60-69	11	14%
70-79	1	1%
80-89	0	0%

Table 2. Frequency Distribution of Trainees According to Civil Status (n=78)

Civil Status	Number of Attendees	Percentage
Single	8	10%
Married	63	81%
Separated	-	-
Widow	7	9%

Table 3. Frequency Distribution of Trainees According to Educational Attainment (n=78)

Educational Attainment	Number of Attendees	Percentage
Grade School	1	1%
High School	59	76%
College	17	22%
Vocational	1	1%

Test Outcomes: A passing score of 60 (50.42%) was set for the 119-item pre-test and post-test.

B. Phase II (2 Sessions)

	Session 1	Session 2
1. Venue	Administrative Office Light Industry & Science Park III	Administrative Office Light Industry & Science Park III
2. Date	Nov. 4 & 5, 2016	Dec. 2 & 3, 2016
3. Number of Participants	73 participants	78 participants
4. Number of Communities Involved	27 (out of 30) communities	25 (out of 30) communities
5. Topics of Lectures given	See Attached CD	See attached CD
6. Workshops/ Demos	Group Flipchart making & Teaching Demo using made	Group Flipchart making & Teaching Demo with flipchart
7. Average Pre & Post-Tests (25 items each)	Pre-Test: 22 Post-Test: 24 See attached sample test	Pre-Test: 23 (92%) Post-Test: 94% See attached sample test
8. Evaluation	See Sample	See sample
9. Pictorials	See attached	See attached

DETAILS OF THE SESSIONS

(1) Session I:

Date and Venue

The lectures and training took place on November 4 and 5, 2016 at the Light Industry and Science Park III in Sto. Tomas, Batangas City.

Agenda

The training team agreed to an agenda prior to the training. The training sessions were divided into modules comprised of lectures, flip chart making workshop and the presentation of the trainees' outputs.

The Lectures and Training

A twenty-five item pre-test, containing the 5 topics included in the modules, were given to the participants before the lecture proper.

The training session was divided into 2 modules. Module 1 comprised the different lectures on 5 topics of communicable diseases which consisted of definitions, mode of transmission, signs and symptoms, treatment and prevention and a topic on primary prevention of illness through vaccination. Module 2 was about an effective teaching method through the aid of flip charts which was followed by the actual making of flip charts by the trainees. All topics were discussed using the Filipino language and lectured by means of MS Powerpoint presentation flashed through a projector. Lectures went through as follows:

Module 1 (November 4, 2016):

Lecture 1 - Rabies
Lecture 2 - Pagatae or Diarrhea
Lecture 3 - Dengue
Lecture 4 - Leptospirosis
Lecture 5 - Bakuna or Vaccination
Lecture 6 - Tigdas or Measles

Module 2 (November 4-5, 2016):

Lecture 7 - Isang Paraan sa Epektibong Pagtuturo (One Way of Effective Teaching)

Why the Flip chart?

Many consider that the flip chart is the most effective teaching tool because it helps one teach to all learning styles and gives options that slide show presentations simply can't provide. It provides color, words and images that can be in the minds of the learners, thus, can easily be remembered. Everyone

can read what are written on it, thus, the learners can get a chance to hear the information and say the information themselves, making the information stick to their minds.

As a teaching resource, it combines oral communication with visual appeal that can help teaching achieve a better impact in the learners' minds and help develop their perception and visual discrimination skills. It is a practical way that can also help the Community Health Workers in disseminating health information and improving health promotion in a simple and easier way. Flip charts can be edited, improved, rolled up for safe keeping when not in use, and light enough to carry when brought to far areas in the community, needing no laptops, LCD projectors and electricity.

Flip Chart Making Workshop was done and the trainees were divided into six groups with an average of 13 members per group. One facilitator was assigned to each group and they were tasked to make a flip chart on one lecture topic assigned to their group, which was from the list of the lectures given earlier.

Presentation of the group's output was done on the second day. Each group assigned amongst themselves reporters to present their work. They were graded according to organization and completeness of the content, legibility of the text, over-all knowledge of the topic and confidence of the lecturer.

Twenty five-item post-test, same as the pre-test, were given to the participants after all the lectures and workshop. The training and workshop was ended with recognition of the topnotchers for the pre- and post-tests. As well as the best group who garnered the highest score during the presentation of their flip charts.

Outcomes of the Training

Demographics: A total of seventy-three (73) Community Health Workers attended the training, almost all trainees were females. There was one male in the group. The trainees came from twenty-seven (27) different barangays of Sto. Tomas, Batangas City as illustrated in Figure 1. Majority of the trainees was aged 40 to 49 years old followed by those whose age was between 50 to 59 years old (Table 1). Based on civil status, most of the trainees are married (Table 2) and majority have finished high school (Table 3).

Figure 1. Distribution of Trainees According to residence

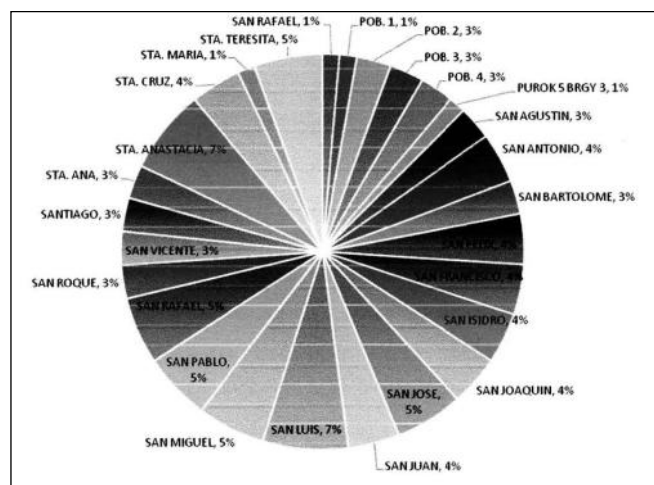


Table 1. Frequency Distribution of Trainees According to Age (n=84)

Age Range (in years)	Number of Attendees	Percentage (%)
20-29	1	1.37
30-39	11	15.07
40-49	30	41.10
50-59	25	34.25
60-69	6	8.22

Table 2. Frequency Distribution of Trainees According to Civil Status (n=71)

Civil Status	Number of Attendees	Percentage (%)
Single	8	11.27
Married	53	74.65
Separated	8	11.27
Widow	2	2.82

Table 3. Frequency Distribution of Trainees According to Educational

Educational Attainment	Number of Attendees	Percentage (%)
Grade School	2	3.08
High School	42	64.62
High School undergraduate	1	1.54
College	11	16.92
College undergraduate	7	10.77
Vocational	2	12.31

Test Outcomes: A passing score of 13 (52%) was set for the 25-item pre-test and post-test.

Pre-Test: A total of 72 trainees took the pre-test. Sixty-nine (95.83%) of the trainees passed the pre-test. Two trainees (2.78%) got the highest score of 22 out of 25 items.(Figure 2)

Post-Test: A total of 70 trainees took the post-test. Three trainees who attended during the first day were not present during the second day. All of the trainees who took the post-test had a passing score. Five of the trainees (7.14%) got the highest score of 24 out of 25 items. (Figure 3)

Workshop: Six groups presented their outputs in flip chart making through reporting. One group started with a skit to introduce their topic on Vaccines. The best group which gained the highest average score of 95% was the group who reported on Dengue.

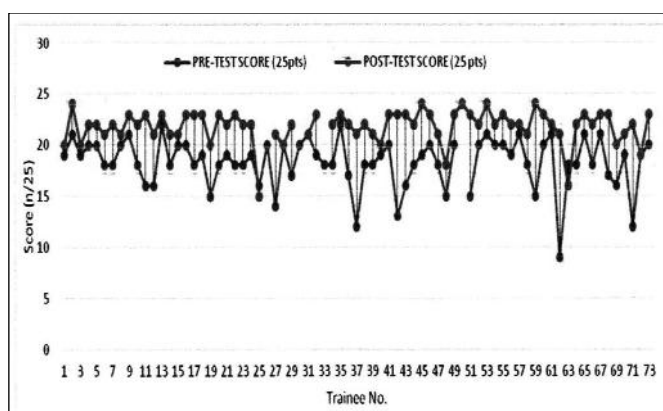


Figure 2. Pre-Test and post-Test Scores of Trainees (n=73)

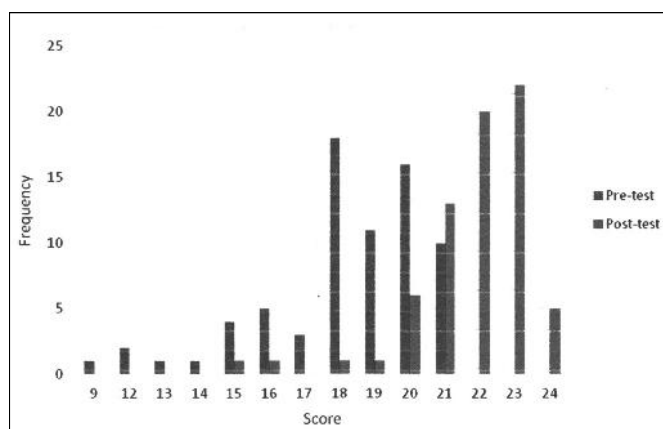


Figure 3. Comparison of Scores

Evaluation of the Program (See Evaluation Form in Appendix):

Trainees were asked to evaluate the program according to training, lectures, lecturer, support and venue. Seventy participants were able to submit their evaluation forms. According to their responses:

Over-all Training: 76% (n=53) = Satisfied

Lectures: 94% (n=66) = Very Satisfied

Lecturers' Performance: 89% (n=62) = Very Satisfied

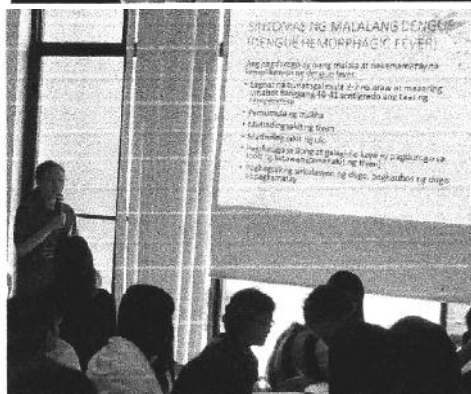
Local Government's Support: 90% (n=63) = Very Satisfied

Venue: 80% (n=56) = Very Satisfied

Participants were also asked to indicate topics they wish to be included for next sessions. The following were their common requested topics: cancer (cervical, lung, prostate), kidney diseases, goiter and family planning.

PICTORIALS

Module 1: Lectures



Module 2: Flip Chart Making Workshop



Presentation of their Output



Picture with the Participants and Organizers



The Mayor of the Municipality of Sto. Tomas, Mayor Edna Sanchez (middle, front row) and Mrs. Preciousa Vasquez-Balota, the representative of ICCP and Light Industry and Science Park HI, Extreme right, front row)

(2) Session II:

Date and Venue

The lectures and training took place on December 2 and 3, 2016 at the Light Industry and Science Park III in Sto. Tomas, Batangas.

Agenda

The training team agreed to an agenda prior to the training. The training sessions were divided into a lecture module, Flip chart making Workshop, and lastly the presentation of Outputs.

The Lectures and Training

Twenty five-item pre-test, containing the 6 topics included in the modules, were given to the participants before the lecture proper.

The training session was divided into 3 Modules. Modules 1 and 2 were tackled on the first day of training while Module 3 was completed on the second day. Each topic consisted of definitions, risks, diagnosis, complications, prevention and treatment of the 6 topics. Using Filipino language, all topics were lectured by means of MS Powerpoint presentations flashed through a projector. Lectures went through as follows:

Module 1: Lecture (December 2, 2016):

- Lecture 1- Rabies
- Lecture 2- Pagtatae or Diarrhea
- Lecture 3- Dengue
- Lecture 4- Leptospirosis
- Lecture 5- Bakuna or Vaccination
- Lecture 6- Tigdas or Measles

Module 2: Flipchart Making Workshop (December 2, 2016):

Lecture 7: Isang Paraan sa Epektibong Pagtuturo (One Effective Way of Teaching)

Flip chart Workshop was facilitated by the DFCM Staff.

The trainees were grouped into 6 groups and 1 facilitator was assigned to each group. They were required to create a flip chart and report it the next day. The goal of the activity was to foster team work, creativity, camaraderie, and allocation of work to the community health volunteers.

Presentation of Outputs from Module 1 (December 3, 2016):

Each of the 6 groups of trainees was allotted 30 minutes each to present their outputs. They were allowed to select 1-2 presenters for their reports. Evaluation of their outputs were done by DFCM Staff.

Pre-Test and Post-Test:

A twenty five (25)-item post-test, same as the pre-test, were given to the participants after all the lectures and workshop.

Outcomes of the Training:

Demographics: A total of seventy five (75) Community Health Workers attended the training. All trainees were females. The trainees came from twenty five (25) different barangays as illustrated in Figure 1. Majority of the trainees was aged 40 to 49 years old followed by those whose age was between 50-59 years old (Table 1). Based on civil status, most of the trainees are married (Table 2) and majority have reached high school (Table 3).

Figure 1. Distribution of Trainees According to Residence

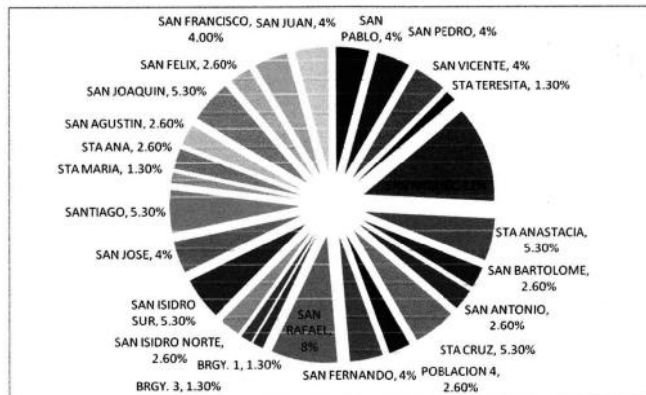


Table 1. Frequency Distribution of Trainees According to Age (n=75)

Age Range (in years)	Number of Attendees	Percentage
20-29	5	6.66%
30-39	9	12.00%
40-49	28	37.3%
50-59	22	29.3%
60-69	11	14.7%
70-79	0	0%
80-89	0	0%

Table 2. Frequency Distribution of Trainees According to Civil Status (n=75)

Civil Status	Number of Attendees	Percentage
Single	6	8.0%
Married	61	81.3%
Separated	1	1.3%
Widow	7	9.3%

Table 3. Frequency Distribution of Trainees According to Educational Attainment (n=75)

Educational Attainment	Number of Attendees	Percentage
Grade School	2	2.6%
High School	57	76%
College	10	13%
Vocational	6	8%

Test Outcomes:

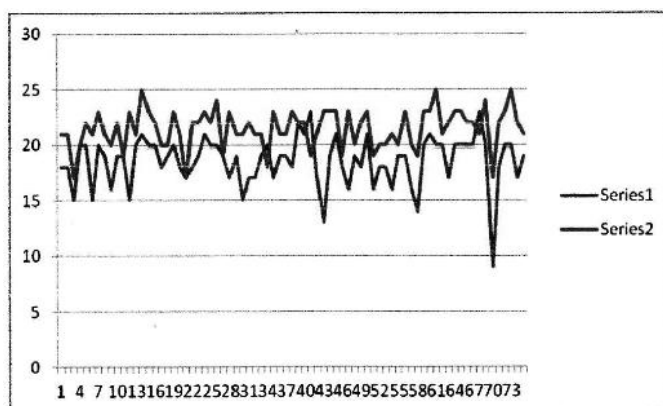
A passing score of 13 (50.42%) was set for the 25-item pre-test and post-test.

Pre-Test: A total of 78 trainees took the pre-test. One trainee was not able to reach the passing score and scored 9 (36%). The rest passed the pre-test. The highest scored 23 (92%). (Figure 2)

Post-Test: A total of 75 trainees took the post-test. Three trainees who attended during the first day were not present during the second day. All the trainees passed the post- test. Four CHW scored the highest (94%).

Workshop: All trainees who engaged in the workshop were able to do a flip chart and presented their corresponding lectures satisfactorily. The group who reported on *Tigdas* or Measles garnered the highest score in the evaluation of their output (Flip chart + Report)

Figure 2. Pre-Test and Post-Test Scores of Trainees (n=750)



C. Phase III: Barangay Level

A schedule of Barangay visits was made through the cooperation and coordination among the head of the BHWs, the representative of Light Industry and Science Park III, DFCM-MDH and the different Barangay Councils.

Barangay (Community) With Dates of Visit (Year 2017)	Topic of Lecture With Flip chart	No. of Participants (One Participant Represents 1 Family)	Evaluation Grades given by the residents (Average)	Average Test Scores (10 items)
Feb. 13: San Fernando	Leptospirosis	14	69.2	5.2
San Joaquin	Measles	32	92.6	7.8
San Agustin	Vaccination	30	93.5	7.2
Sta. Teresita	Dengue Fever	25	98.8	8.5
Sta. Cruz	Rabies	23	98.9	7.1

Feb. 16: San Isidro Sur	Measles	27	94.3	6.6
San Francisco	Tuberculosis	28	98.8	9.2
San Sta. Clara	Measles	41	97.2	6.8
San Isidro Norte	Measles	14	99.5	6.7
Feb. 20: San Juan	Diarrhea	37	97.9	8.3
San Jose	Leptospirosis	24	91.0	6.0
San Pablo	Vaccination	10	93.7	8.4
Sta. Ana	Rabies	16	88.4	8.7
March 9: San Miguel	Rabies	33	95.2	7.3
San Pedro	Diarrhea	28	92.1	8.0
San Roque	Measles	25	77.0	8.5
San Vicente	Diarrhea	36	97.5	8.4
San Bartolome	Diarrhea	24	96.6	7.8
Mar. 16: San Antonio	Diabetes	39	93.7	8.1
Sta. Maria	Hypertension	32	93.2	8.8
Sta. Elena	Tuberculosis	32	94.9	8.1
Poblacion 3	Leptospirosis	18	90.1	8.4
Poblacion 4	Leptospirosis	8	96.1	7.3
San Tiago	Rabies	41	98.7	8.7
San Rafael	Vaccination	56	84.0	7.1
Mar. 23: Poblacion 2	Environmental	32	93.9	9.3
Poblacion 1	Nutrition	19	76.7	8.6
San Felix	Leptospirosis	26	99.8	6.9
Sta. Anastacia	Leptospirosis	43	98.7	8.3
TOTAL: 29 Communities out of 30 (97%)		813		



D. IMPORTANT STATISTICS:

Total number of Community Health Workers: **274**

Total Number of Community Health Workers (CHWs) trained:

Session I = 84; Session II = 79; Total = 163 (60%)

Total number of Untrained Community Health Workers: **III (40%)**

Total Communities with CHWs were trained: **30 communities**

Total Communities of Sto. Tomas, Batangas, Philippines: **30 communities**

Total number of marginalized and underprivileged families

lectured by CHWs (1 participant represented 1 family): **813 families**

Number of members per family under 4Ps: **4 members**

Total Number of 4Ps family members: **3,252 members**

Total Flipcharts already prepared by each community: **2-12 flipcharts**

CONCLUSIONS

1. Teaching effectively as what is expected for the Community Health Workers regarding what they have attained in their training was one of their main problem, especially for the new ones. They had their share of being ashamed of, less confidence and lack of experience; however, they learned that proper preparation of their flipcharts as well as confidence are the necessary considerations for a teaching success with the help of their fellow CHWs.
2. With the proper return demonstrations that were conducted during the training, the CHWs were able to learn that teaching needs proper preparations not only the good knowledge of their health topics but also well-prepared flip charts and good delivery.
3. More than $\frac{1}{2}$ of the total CHWs of the Municipality of Sto. Tomas was trained and can Echo this to their fellow CHWs who were not able to attend.
 - a. Most of them were **Very Satisfied** with the Training, the Topic Lectures and the Lecturers, as well as the workshops & the Return demonstrations.
 - b. Most of them were **Very satisfied** with the Support of their Local Government for this kind of activity as well as for the Venue and Food.
 - c. Under Training Evaluation, most of the trainees were **Very Satisfied** of the Workshops and most of them were able to learn; in fact, wanted to have trainings like this in the future.
 - d. Most of them expressed their **Satisfaction** that the evaluations were also done in the Barangay or community level because these visits were not only relevant to their training but also for the own good especially that their community constituents were the ones who rated them on how they were effective in delivering the health promotion topics.
 - e. Most of them expressed their **Satisfaction** in Learning on how to make Flip Charts and know their uses & advantages.
4. Most of the CHWs who lectured and delivered the Health topics in their respective Health Centers were given **Very High Grades** from the 4Ps members who were their community members, meaning they were very efficient in health promotion using the flip charts effectively, and they learned and will share their knowledge also to their fellow community members, based on the Evaluations.

5. Properly prepared Flip charts with good qualities as taught to them during the training, are **effective means** in health promotion presentations especially to the community.
6. **THEREFORE, well-prepared relevant flip charts can help intensify health promotion efficiently especially in the far flung areas of the communities.**

RECOMMENDATIONS:

1. It is recommended that lectures, workshops and continuing education activities should be regular for the Community Health Workers (CHWs) so that a standard set of skills can be attained for them to be able to provide a defined set of services in the community, like health promotion efficiency.
2. Continuous recognition of the CHWs is an indispensable measure because by virtue of their role as a link between the healthcare system and the local community people, they can facilitate in the dissemination of widely efficacious interventions to populations that can either way be beneficial in terms of lessening healthcare costs and improving/maintaining good health of people.
3. Effective health promotion with the use of well-prepared flip charts should be continued also in the community level so as to continue the dissemination of health knowledge among the community members.
4. Continuation of the dissemination of health knowledge in the community level will also help in the lecturing/mentoring expertise of the CHWs. This will also augment their confidence, creativity, rapport with the residents, and overall presentation.
5. Flip chart making should be encouraged in every community CHWs so that they can have more resources in their every health promotion activity.
6. More trainings like this should be done for the remaining CHWs who were not able to attend the last training activity.
7. There should be a constant follow-up to be done by the CHWs coordinator in all communities to check the continuous making of the flip charts and the actual lecturing of CHWs to their constituents.
8. There should be updates to be given to the CHWs especially about illnesses that affect their communities with prevention and control.

APPENDIX I

Evaluation of Primary Health care Training for CHWs Sto. Tomas Batangas

Name: _____ Age/Gender: _____

Address: _____

Please check you selected answer in its appropriate box:

	Very satisfactory	Satisfactory	Not Satisfactory	Poor
I. Training				
1. Did the training able to achieve its objectives?				
2. Did the lectures help achieved the training?				
3. Did the training help you as a community Health Worker?				
4. Is the training important to you as a community health worker?				
5. Are the workshops done effective?				
6. How did you find your learning in this training?				
7. As a whole, how do rate the success of the training				
II. Lectures				
1. Are the given lectures important for you as community health worker?				
2. How effective this training in your work as a community health worker?				
3. Did this training answer your need of what you want to learn?				
4. Does this training can help you as a community health worker?				
III. Lecturers				
1. How effective are their teachings?				
2. How was your learning with their style of teaching?				
3. How effective were their ways of tackling the topics?				
4. How are you satisfied with their teachings?				
IV. Support				
1. Support of the local government				
2. How effective is their support?				
3. How about the quality of their support?				
V. Venue				
1. Proper for the training				
2. Food				
3. Lighting				
4. Ventilation				
5. Projections / Powerpoint				
6. Sound system				
VI. Topics you wish to be discussed next time:				

APPENDIX II

DEPARTMENT OF FAMILY & COMMUNITY MEDICINE MANILA DOCTORS HOSPITAL

EVALUATION FORM FOR EFFECTIVE TEACHING USING THE FLIP CHART BY BARAN- GAY HEALTH WORKERS DURING RETURN DEMONSTRATION

Address: _____

GROUP: _____ Date: _____

CRITERIA	PERCENTAGE (%)	GRADE
(1) Lecturer (40%):		
(a) Poise and Patience	8%	
(b) Appearance	8%	
(c) Style of teaching	8%	
(d) Quality of voice	8%	
(e) Confidence in teaching	8%	
(2) Flip chart (60%):		
(a) Well done and in sequence	10%	
(b) Readable letters	10%	
(c) Proper use of colours	10%	
(d) Use of pictures / symbols	10%	
(e) Simple and understandable	10%	
(f) Completeness of content	10%	
TOTAL	100%	

Evaluated By: _____

(Designation)

A Deadly Tear To Fear: An Interesting Case Presentation *

*Marianne Ginellee G. Faustino, MD**, Elmer M. Angus, MD¹*

ABSTRACT

Objectives: 1) To present a case of a patient with aortic dissection. 2) To show how the case arrived to its plausible diagnosis. 3) To discuss other illnesses discovered in the case.

Case Summary: This is a case of a 54-year old, female, Filipino, Catholic, who presented with severe chest pain, substernal in location, with pain intensity of 8/10 associated with diaphoresis and dyspnea leading to fainting spells. Initial impression was cardiogenic shock secondary to Non-ST elevated myocardial infarction. On physical examination, the patient was drowsy and in cardio-respiratory distress. She had symmetrical chest expansion and no retractions were noted. Clear breath sounds were noted in all lung fields. She had an adynamic precordium with normal rate and regular rhythm, however with distant heart sounds. There was no murmur, heave or thrill appreciated. Vital signs at the emergency room showed a blood pressure of 110/80 which eventually became 80/50 mmHg, respiratory rate of 22 cycles per minute, heart rate of 80-100 beats per minute and was afebrile. Patient was scheduled for a stat coronary angiography, however on further reassessment, repeat ECG showed resolution of the inferolateral wall ischemia but this could not explain her fluctuating blood pressure. When the patient underwent the scheduled bedside 2D echo, a moderate cardiac tamponade was discovered with a 4.5 cm aortic dissection. With these findings, patient underwent aortic repair, graft insertion with evacuation of hematoma. She was discharged stable and with no recurrence of chest pain.

Key Words: Aortic Dissection, Cardiac Tamponade, Transthoracic Echocardiogram (TTE), Transesophageal Echocardiogram (TEE)

*Second Place, Interesting Case Presentation Contest 2017, Philippine Academy of Family Physicians Manila Chapter

**Senior Resident, Department of Family and Community Medicine, Manila Doctors Hospital

¹ Adviser and Department Chairman, DFCM, MDH

INTRODUCTION

In just a blink of an eye, everything can change.

One minute you are enjoying your life, enjoying your youth, enjoying the company of your loved ones and the next minute, you could be on the brink of life and death— you could be fearing for your life.

Things will never be the same again.

Life is very unpredictable. Even if we want to take control of it, there are certain things that are just out of our hands. Just as in the case of this fifty-four year old female, life takes an unexpected turn in just a blink of an eye, as she is riddled with a devastating condition — a condition that would change not just her life, but her family's as well.

CLINICAL HISTORY

General Data:

This is a case of B.L., a 54-year old, female, married, Filipino, Catholic, residing in Manila, who was admitted last March 27, 2016.

Chief Complaint:

“Chest pain”

History of Present Illness:

Few minutes prior to admission, while accompanying her husband who was being seen at the emergency room for dizziness; the patient experienced sudden onset of severe chest pain, substernal in location, with pain intensity of 8/10 associated with diaphoresis and dyspnea leading to fainting spells. She was subsequently admitted due to persistence of symptoms.

Past Medical History

The patient is a known hypertensive for 3 years, with usual blood pressure of 120-140 systolic but she was non-compliant with her maintenance medications of Losartan 50mg once a day. She has no history of asthma or any childhood diseases. She was previously hospitalized due to intestinal amoebiasis but wasn't able to comply with the take home medications. She has no known allergy to any food or medication.

Personal and Social History

The patient is a chronic smoker of 5 pack years (up to present) and she is also an occasional alcoholic beverage drinker. She denies illicit drug use.

Family History

The patient has a family history of hypertension in the maternal side of her family. There is no family history of diabetes mellitus, bronchial asthma, heart, and kidney disease.

Physical Examination

Patient was drowsy and in cardio-respiratory distress, with an initial blood pressure of 110/80, respiratory rate of 22 cycles per minute, heart rate of 80 beats per minute and lips, tongue and buccal mucosa. There was no nasaoaural discharge, no tonsillopharyngeal congestion or cervical lymphadenopathies. She had symmetrical chest expansion and no retractions were noted. Clear breath sounds were noted in all lung fields. She had an adynamic precordium with normal rate and regular rhythm, however with distant heart sounds. There was no murmur, heave or thrill appreciated. She had a flat abdomen with normoactive bowel sounds and with no tenderness or organomegaly in all quadrants. She had grossly normal extremities with full and equal pulses. No neurologic deficits were noted at that time.

Initial Impression

The initial Impression at the ER level was cardiogenic shock secondary to Non-ST elevated myocardial infarction.

Course of Admission

At the ER, the patient's ECG revealed an inferolateral wall ischemia (Fig. 1) and her BP was noted to be 80/50; fast drip of 200 cc of PNSS was done and despite the fluid resuscitation, the patient remained hypotensive. Dopamine drip was started at 18 gtts/min and patient was then advised admission. Troponin I and CKMB were extracted which revealed a slight elevation of Troponin I (Table 1), and an x-ray of the chest was done. She was given 4 tablets of aspirin, sublingual Isordil, and IV morphine to relieve the chest pain.

The patient was then admitted and was referred to cardiology service for co-management. Due to drowsiness, sudden onset of headache and unresponsiveness, a plain cranial CT scan was done to rule out a CVD infarct but was noted to be normal. Isoket drip was started at 5cc/hr. The impression at that time was cardiogenic shock secondary to Non-ST elevated Myocardial Infarction. The patient was then prepared for an emergency coronary angiogram and was hooked to triple inotropes to increase her blood pressure. She was taken to the cathlab and coronary angiogram was done which revealed an 80% occlusion of the proximal

left anterior descending artery; thus an intra-aortic balloon was inserted to prevent ischemia or vasospasm. She was taken to the Coronary Care Unit for observation, with NGT inserted and maintained in adequate oxygenation.

Course in the Ward

On the first hospital day the patient was awake but was irritable. She was noted to have rhonchi bilateral and her urine output was noted to be decreased at 25cc/hr. A urinalysis was done revealing complicated UTI (Table 2) and her creatinine level was increasing by determinations (Table 3). The added impression at that time was a beginning urosepsis vs cardio-renal syndrome.

Her BP was stable at 110/60 and the cardiology service began downtitrating her ionotropes. However, the patient was still oliguric hence she was scheduled for a bedside KUB ultrasound and at the same time, referral to nephrology service was done for the management of urosepsis and increasing creatinine. All the while, the patient was referred for fluctuating BP from 80/50 to 250/120, heart rate was 100s. She was also diaphoretic and pale but there were no murmurs or muffled heart sounds. The ECG was repeated showing resolution of the inferolateral wall ischemia (Fig. 2) but this could not explain her fluctuating blood pressure. It became a challenge then to us as to dig deeper on what may have caused this.

When the patient underwent the scheduled bedside 2D echo, a moderate cardiac tamponade was discovered with a 4.5 cm aortic dissection. The family was told that the patient should be referred to Surgery service for an emergency pericardiostomy. During that time, the risks and benefits of the procedure were well explained to the family and the husband eventually consented. The big question on everyone's minds was did the emergency coronary angiogram with stenting of the LAD caused the cardiac tamponade or was there a more serious underlying cause. The consensus was that if the pericardial fluid drained was bloody, the consideration was iatrogenic or traumatic insertion of the coronary angiogram catheter and the surgeon would have to open the thoracic cavity to repair the damage.

The patient underwent an emergency subxiphoid pericardiostomy and drained 200 cc of serosanguinous pericardial fluid. Since there was blood in the drained fluid, there was then still a dilemma to open and repair the damage or not. Nonetheless, the surgeon opted for a more conservative approach since the fluid was not

as bloody as expected and attached a pericardiostomy tube for drainage.

Her BP became stable after draining the pericardial fluid and she was off from the triple ionotropes. What now then be the next move to know the cause of the tamponade?

On the 2nd hospital day, the patient underwent bedside Transesophageal Echocardiogram (TEE). The findings showed an extensive thoracic dissection from the sinu-tubular junction to the ascending aorta with moderate pericardial fluid with thrombosed circumferential intimal flap. It seemed as though she was having the aortic dissection at the emergency room which was why she was hypotensive but the thrombosed intimal flap prevented more blood from seeping out of the aorta hence saving her life. She tolerated the procedure but was noted to have BP fluctuations from 80/40 to 250/100. Again, Inotropes were then given and titrated to stabilize the BP. At this time, CBC results showed a decreasing hemoglobin and hematocrit hence 1 unit of pack RBC was transfused. The plan then, was to push through with the chest CT aortogram with contrast, then she would undergo hemodialysis to prevent further injury to the kidneys (which showed increasing creatinine levels) due to the contrast.

On the 3rd hospital day, she was taken to the Intensive Care Unit and chest CT aortogram was done which showed extensive aortic dissection just a day that passed. This prompted the surgery service to schedule the patient for an aortic dissection repair. A multidisciplinary family conference was held and was attended by all the specialties concerned: TCVS, family medicine, anesthesiology, cardiology service, interventional cardiologist, and nephrology service. It was explained to the family that there was an intimal break of the ascending aorta with spillage causing intramural hematoma and had been going on progressively. The plan was to do aortic repair using aortic graft before the tear would reach the femorals. The procedure was a very complicated one, and the risk of the patient dying on the operating table or after the operation was very high. The operative mortality was 60% with 40% recovery or survival. The mortality rate if there was no intervention was 95-100%. The urgency of the operation and the risks were thoroughly explained and the family decided to push through with the operation. Then, the anti-platelets were put on hold and the necessary blood products were procured. Bedside chest x-ray was done showing pulmonary congestion, yet her oxygenation status was adequate.

On the 4th hospital day, the patient underwent aortic repair, graft insertion with evacuation of hematoma (Figures 3-5). She underwent transfusion with 7 units of packed RBC, 12 units of platelet concentrate, 8 units of fresh frozen plasma, and 4 units of cryoprecipitate. The patient tolerated the procedure well with stable vital signs. Although she was intubated, she was awake and had spontaneous movement.

On the 5-7th hospital day, the patient was extubated and started on incentive spirometry. She was able to tolerate sitting down on the bedside chair. Since her BP was stable, she was transferred to regular room. It was this time that hemodialysis was done and her creatinine levels eventually decreased (Table 4). Her hemoglobin levels also increased.

On the 8th hospital day, patient was seen comfortable with no episodes of chest pain and dyspnea. Vital signs were stable but with febrile episodes. She was noted with hypokalemia which was corrected with oral K⁺ supplementation. Dopamine and Nicardipine were then discontinued and she was also referred to the Clinical Nutrition Management Service for nutritional evaluation. Removal of dialysis catheter was done. On chest auscultation, she was noted with rales on both lung bases thus, repeat CBC was done which showed increased WBC: 21.44, neutrophils: 74 and lymphocytes: 8.

On the 9th hospital day, she had watery bowel movement, > 10x with food particles. She was started on Hidrasec 1 tab TID and bioflora BID. She was noted with crackles on left base. Piptazo was started initially from 2.25g IV to 4.5grams IV q8. Present IV fluid was decreased to 40 cc/hour and amlodipine to 5mg/tab BID. No fever recurrence was noted then.

On the 10th hospital day, patient had no febrile episodes and loose bowel movement but with one episode of hematochezia. She was still noted to have occasional bibasal crackles with decreased breath sounds, left base but no chest pain and no dyspnea were noted. Patient was started with Rebamipide (Mucosta) 1 tab TID and Pantoprazole was shifted to 40mg IV q12. Oxygen via nasal cannula was discontinued. She was able to tolerate ambulation around the bed without any postural dizziness or cardiopulmonary symptoms, thus was allowed to transfer to a regular room.

On the 11th hospital day, while in a regular room, there were no chest pain and dyspnea; however, she had another episode of hematochezia. Rales with diminished breath sounds left base was found upon

auscultation and chest x-ray and left lateral decubitus were requested to evaluate for a possible left pleural effusion. She was also started on Metronidazole (Dazomet) 1 tablet TID due to a previous amoebiasis infection.

On the 12th hospital day, ultrasound of the left hemithorax was done, instead of the chest x-ray which revealed an interval increase in the amount of free pleural fluid collection occupying the left mid to lower hemithorax, with an estimated volume of about 298 cc from a previous of 20cc. Passive atelectasis of the adjacent lung was also appreciated. With approximately 200-300 cc of pleural fluid, TCVS service recommended conservative management as patient had no clinical symptoms wherein thoracentesis was warranted.

On the 14th-15th hospital day, patient had no recurrence of hematochezia and febrile episodes. Patient was supposedly for discharge but had to be deferred due to anemia. Latest CBC result showed decreased hemoglobin and hematocrit and increased platelet. She was transfused with 1 unit PRBC properly typed and cross-matched. Hematology referral was also suggested by other service due to presence of thrombocytosis.

On the 16th hospital day, repeat CBC showed hemoglobin of 109, hematocrit 33, white blood cell count of 16.85 and platelet count 148. Possible consideration for the increased platelet was reactive thrombocytosis due to inflammation.

On the 17th hospital day, patient was seen awake, comfortable with no subjective complaints. No recurrence of hematochezia, chest pain and dyspnea. She was then advised for discharged with home medications by all services.

CASE DISCUSSION

Aortic Dissection is a syndrome caused by an intimal and medial tear in the aorta with propagation of a false lumen within the aortic media (2). The intimal tear may be a primary event or secondary to hemorrhage within the media. The dissection may occur anywhere along the aorta and extend proximally or distally into other arteries (1,3,4). The wall of the aorta consists of 3 layers: the intima, media, and adventitia. The intima is the innermost layer; the media, the middle layer; the adventitia, the outer layer (7)(fig.6).

Up-to-date data on the epidemiology of aortic dissection are limited. However, in the Oxford Vascular study, the incidence of aortic dissection is estimated at six per hundred thousand persons per year. Many patients with aortic dissection die before presentation to a hospital or prior to diagnosis. There is a missed diagnosis in 38% of patients on initial evaluation. There is a high mortality rate wherein 25% of patients during the 1st 24 hours, 70% in the 1st week, 80% at 2 weeks for proximal dissections and 10% in distal dissections (1,3,4). Hence, early diagnosis is crucial and essential. Our patient was, in a sense, “lucky” to be inside a hospital when the onset of her symptoms occurred.

Aortic dissection can be divided into two types, which are the acute and chronic types, depending on the duration of symptoms. Acute aortic dissection is present when the diagnosis is made within 2 weeks after the initial onset of symptoms, and chronic aortic dissection is present when the initial symptoms are of more than 2 weeks in duration. About one third of patients with aortic dissection fall into the chronic category. The most common site of initiation of aortic dissection is the ascending aorta (50%)(4).

Anatomically, aortic dissection has been classified by two schemes. The DeBakey classification consists of the following three types: I, both the ascending and the descending aorta are involved; II, only the ascending aorta is involved; and III, only the descending aorta is involved (Fig. 7). The other classification is The Stanford, which consists of the following types: Type A, involving the ascending aorta regardless of the entry site location; and Type B, involving the aorta distal to the origin of the left subclavian artery (4)(Fig. 7). For our patient, there was a noted extensive thoracic aortic dissection with thrombosed circumferential intimal flap from the sinotubular junction to the descending thoracic aorta.

This incidence is higher in men than in women and increases with age (4,5). In the International Registry of Acute Aortic Dissection (IRAD) registry, the mean age was 63 years; 65% were men. The prognosis is poorer in women, as a result of atypical presentation and delayed diagnosis. Peak incidence occurs at age 50 to 65 or, for patients with congenital connective tissue disorders (eg, Marfan syndrome, Ehlers Danlos syndrome), at age 20 to 40. The most common risk factor associated with aortic dissection is hypertension, observed in 65-75% of individuals, mostly poorly controlled (5).

Pain is the most common presenting symptom of aortic dissection. The pain of an aortic dissection is midline and is experienced in the front and back of the trunk, depending on the location of the dissection (4). As seen in our patient, the onset of pain is typically catastrophic, and it reaches a maximum level suddenly. The pain could be sharp, ripping, tearing, or knife-like in nature, but the abruptness is the most specific characteristic of the pain. The pain of aortic dissection does not commonly radiate into the neck, shoulder, or arm, as is typical of the pain of an acute coronary syndrome. Chest pain is more common in Type A dissections while back or abdominal pain is more common in Type B dissections however, clinical presentations may overlap (1,2,4).

When examining the cardiovascular system one must search for the following: 1) signs relating to hemopericardium: pulsus paradoxus, faint or absent heart sounds, distended neck veins, shock, 2) signs relating to aortic root dilatation: wide pulse pressure, diastolic murmur over the aortic area, 3) compression of the true aortic lumen: systolic murmur over any part of the aorta, 4) pulse deficits: a difference of 20mmHg or more in blood pressure between arms, a weaker central or peripheral pulse compared to the contralateral side or palpable thrills or audible bruits over pulses (1,4).

Abdominal examination is essential to exclude other potential causes of the patient's symptoms such as pancreatitis, perforated hollow viscus and ruptured abdominal aortic aneurysm.

The diagnosis of aortic dissection begins with clinical suspicion, which is the most crucial step. The two important steps in the evaluation of patients with suspected aortic dissection are 1) to confirm the presence of dissection and 2) to differentiate between proximal and distal dissections. The diagnosis should be confirmed rapidly and accurately, preferably with an easily available noninvasive modality (4).

Retrograde aortography (Fig. 8) was the gold standard for assessing patients in the 1970s and 1980s, but it has been replaced by cross sectional imaging such as Computed Tomography (CT) scan, Magnetic Resonance Imaging (MRI), Transthoracic Echocardiogram (TTE), Transesophageal Echocardiogram (TEE), which performs better and has a better safety profile (1,2,9).

Although chest radiography and electrocardiography are often ordered in the emergency care setting, these tests cannot establish or exclude the diagnosis of dissecting aortic aneurysm (2,4,9).

Chest radiography lacks the specificity for a diagnosis of aortic dissection, though the classic radiographic sign that is suggestive of aortic dissection is the widening of the mediastinal shadow (Fig. 9), which has been reported in up to 50% of cases of aortic dissection. In our patient, no mediastinal widening was noted (Fig. 10). The mediastinum bulges to the right with dissection of the ascending aorta, and to the left with dissection of the descending thoracic aorta (1,2,3,4,9).

The other chest radiographic signs reported in patients with aortic dissection are altered configuration of the aorta, a localized hump on the aortic arch, a widening of the distal aortic knob past the origin of the left subclavian artery, aortic wall thickness indicated by the width of the aortic shadow beyond intimal calcification, displacement of the calcification in the aortic knob, a double aortic shadow, disparity in the sizes of the ascending and descending aortas, and the presence of a pleural effusion, most commonly on the left. These radiographic signs are suggestive of, but not diagnostic of, aortic dissection (4,9).

Also, ECG changes are nonspecific (chiefly, nonspecific ST-segment/T-wave changes) (4). It is also not helpful in distinguishing aortic dissection from acute coronary syndrome as it is only completely normal in 30% of patients with dissection. In the IRAD series 3% of all aortic dissection patients had ST elevation myocardial infarction pattern; 15% acute ischemic changes and 41% had non-specific ST segment and T wave changes (3,4,9).

If the history suggests aortic dissection, a diagnosis of acute coronary syndrome should not be made even if the ECG has obvious STEMI or NSTEMI patterns as antiplatelet treatment, heparin or thrombolysis may worsen the prognosis of the patient. It is always better to withhold these treatments when aortic dissection is considered and immediately arrange for urgent aortic imaging to clarify the diagnosis (3,4,8,9).

Imaging tests such as the CT scan, MRI, TTE and/or TEE are done once the patient is hemodynamically stable.

The key finding on contrast-enhanced images is the intimal flap separating two lumens (Fig. 11 and 12).

Multidetector computed tomography angiography is recommended by the European Society of Cardiology as the first line of investigation for patients with suspected acute dissection (1,9).

The MRI can detect aortic dissection accurately, can delineate the extent of the dissection, can demonstrate the site of the entry tear, can identify the arch vessels that are involved, and can assess the renal artery involvement (Fig. 13). Both the sensitivity and the specificity of MRI are in the range of 95 to 100% (4,9).

The TEE is widely available, is safe in experienced hands, and can be performed quickly and easily at the bedside. These advantages make TEE ideal for use in most patients with aortic dissections, including relatively unstable patients. The sensitivity of TEE has been reported to be as high as 98%, and the specificity ranges from 63 to 96%. Moreover, the TEE is able to identify the entry site of dissection; the presence of thrombus in a false lumen; abnormal flow characteristics; the involvement of coronary and arch vessels; the presence, extent, and hemodynamic significance of pericardial effusion; and the presence and severity of aortic valve regurgitation. The most important diagnostic finding of aortic dissection that can be seen on TEEs is the presence of an undulating intimal flap within the aortic lumen that differentiates a false lumen from a true lumen (1,3,4,9) (Fig. 14).

Surgery is the treatment of choice. Acute Type A aortic dissection has a mortality of 50% within the first 48 hours if not operated (9).

The International Registry of Acute Aortic Dissection has suggested that, if left untreated, proximal (Stanford type A or DeBakey type I or II) dissection carries a one-week mortality of 50-91% owing to complications such as aortic rupture, stroke, visceral ischemia, cardiac tamponade, and circulatory failure (4,5,9).

European Society of Cardiology recommends regular cross sectional imaging of the aorta, preferably with magnetic resonance angiography, at one, three, and 12 months after discharge and every six to 12 months thereafter, depending on aortic size.

Various experts also advocate the combined use of echocardiography with axial imaging for routine surveillance. All patients should receive lifelong anti-hypertensive treatment, including β blockers, with a target blood pressure of 120/80 mm Hg (1,4,5).

In the article published by the International Registry of Acute Aortic Dissections, establishing clear life style goals for patients with thoracic aortic disease is important in improving long-term health and reducing the risk of both fatal and nonfatal complications.

Having regular aerobic exercise, maintaining a low fat and low salt diet, and achieving ideal body weight are all connected to effectively controlling the blood pressure, cholesterol and associated aortic stress (10).

Cessation of smoking and avoidance of tobacco use is also critical. Tobacco use is linked not only with the development of thoracic aortic disease but is highly linked to aortic rupture. Avoidance of cocaine or other stimulating drugs such as methamphetamine is equally important as sudden surges in blood pressure and pulse attributed to such agents has been described as a trigger for aortic catastrophes (5,10).

Having a regular routine of aerobic exercise has multiple benefits in helping patients achieve ideal blood pressure, heart rate, and body weight. A lot of our patients enjoy sports such as basketball, tennis, biking etc., and would want to continue in such activities if possible (5,10).

Another important thing to stress is the importance of adherence to their medications. Such medications include beta blockers and other antihypertensive agents. Patients who suddenly discontinue their medications because they run out of stock or forget their medications at home when travelling, may find themselves in a hypertensive crisis with a potentially catastrophic result (5,10).

In terms of work, patients with thoracic aortic disease generally can function normally in most types of occupations provided that the job does not involve any heavy physical activity or manual labor. Finally, it is important that patients with thoracic aortic disease recognize that aortic disease is usually a lifelong condition that puts them at future risk for acute aortic syndromes. Even those who have received advanced surgical or endovascular therapy must understand that their aortic disease has not been "cured" by the interventions. Educating them about what to do in the event of the sudden onset of chest, back or abdominal pain, or the sudden development of an ischemic complication (i.e., neurologic or limb) and the critical nature of getting to an emergency department promptly, is of the utmost importance. It is similarly important that those who live with or care for such patients understand what

action needs to be taken should concerning symptoms arise (5,10).

As primary care physicians, it is part of our duty to establish these goals and instill these important points to our patients.

CONCLUSION

It is not often that we encounter cases of aortic dissection in our practice. However, as primary care physicians, our clinical eye, clinical judgment and skills will be put to the test in the proper identification and management of such a case when the need arises.

Residents in training in Family Medicine, like me, and other primary care physicians are called on to be equipped with the knowledge on how to deal with common as well as uncommon cases.

As with many other diseases, proper history taking is the most essential part of the assessment of a patient as it will be the patient's symptoms that will alert the physician to the possibility of aortic dissection. However, aside from obtaining adequate history, the physical examination of these patients needs to be thorough but also must be done quickly. Proper referrals must be made to ensure that the necessary steps are taken. One mistake or misstep can spell the difference between life or death for a patient, thus "a deadly tear" of the aorta is a "fear" to anyone's life - to remain silent in deep sleep forever.

APPENDIX

FIGURES

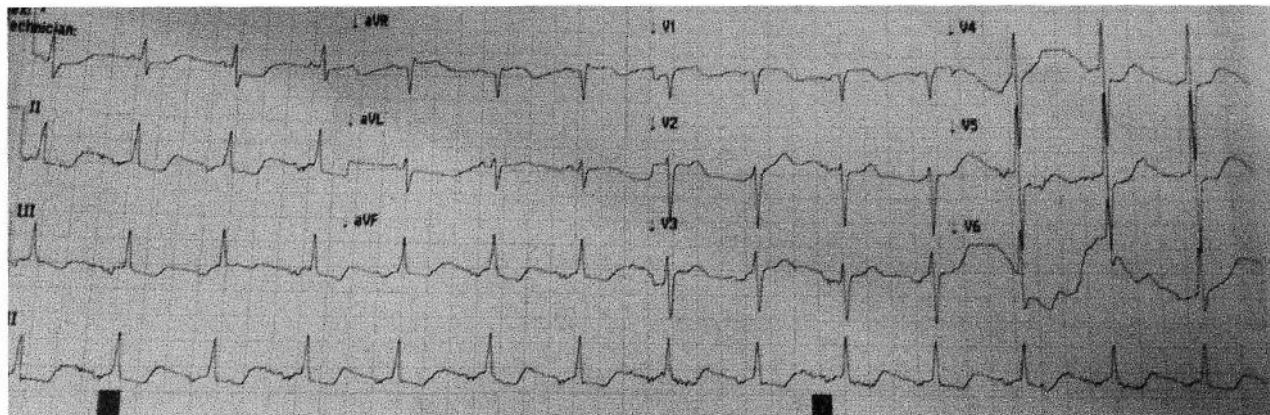


Figure 1. Patient's 12L-ECG tracing at ER level

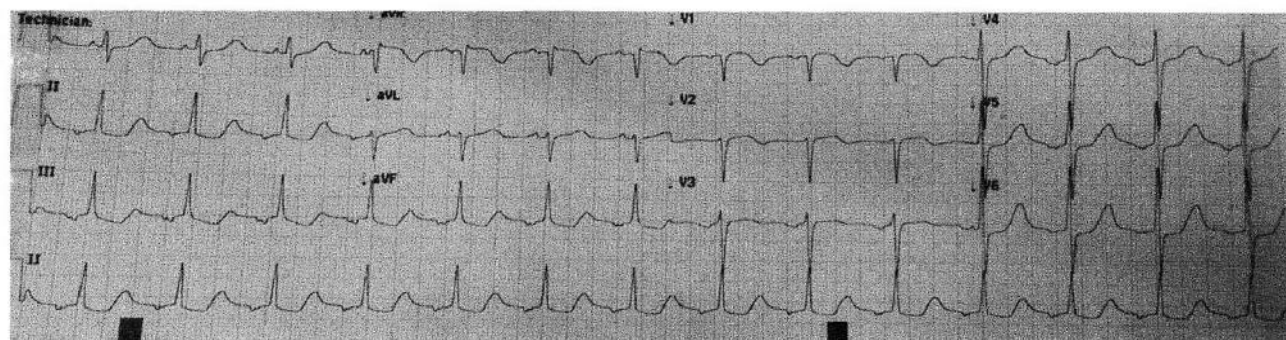


Figure 2. Patient's repeat 12L-ECG tracing



Figure 3. Aortic repair, graft insertion with evacuation of hematoma

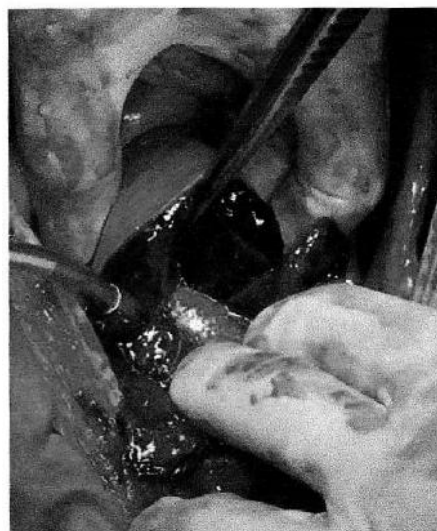


Figure 4. Aortic repair, graft insertion with evacuation of hematoma



Figure 5. Aortic repair, graft insertion with evacuation of hematoma

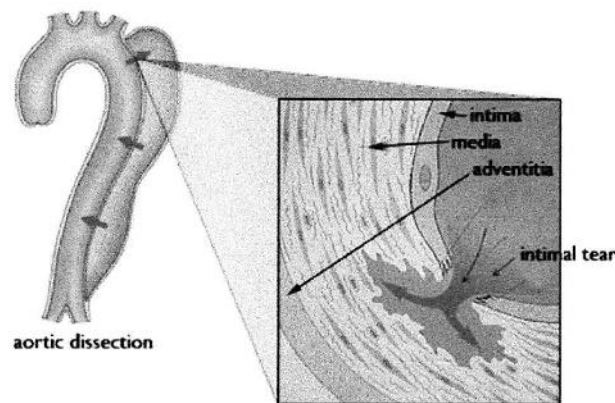
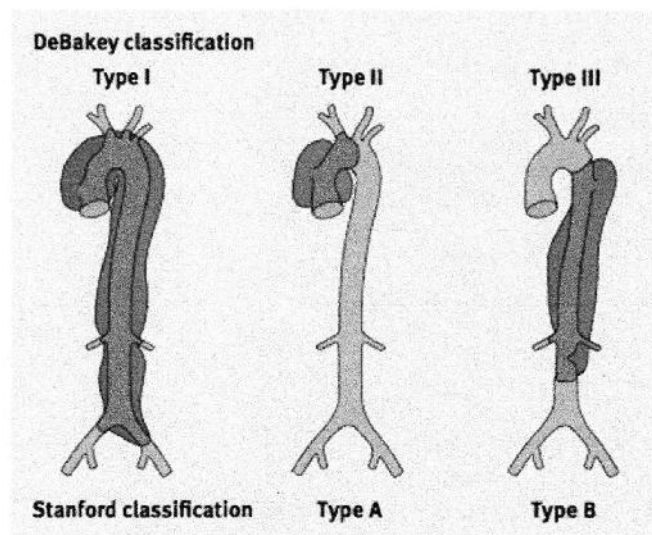
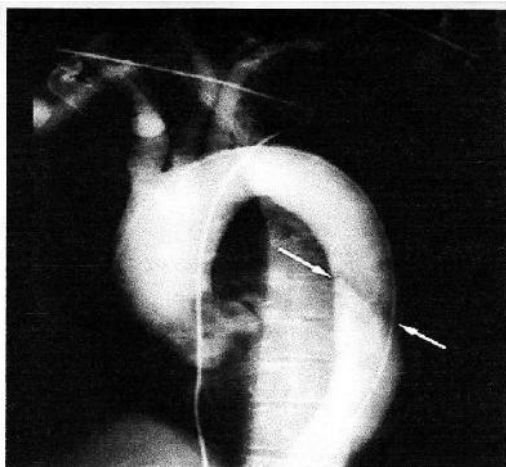


Figure 6. Layers of the aorta and intimal tear.

Source: Layers of the Aorta. From *The Marfan Syndrome*, by Reed E. Pyeritz, M.D., Ph.D. and Cheryl Gasner, M.N., C./F.N.P. Fifth Edition, July 1999, Revised September 2001.





Descending aortic dissection This aortogram demonstrates dissection of the descending thoracic aorta, arising immediately distal to the origin of the left subclavian artery. An oblique lucency is noted within the lumen of the aorta, which is a diagnostic feature (arrows). Courtesy of Jonathan Kruskal, MD.

Figure 8

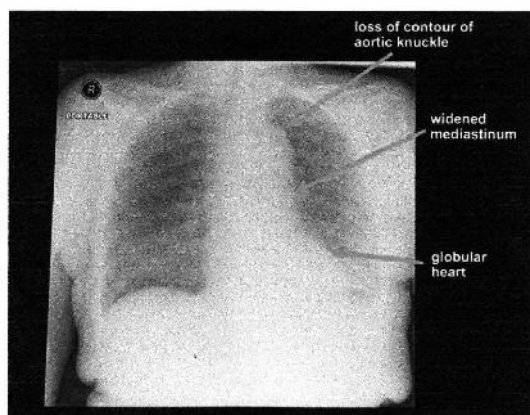


Figure 9. Chest x-ray showing widening of mediastinum

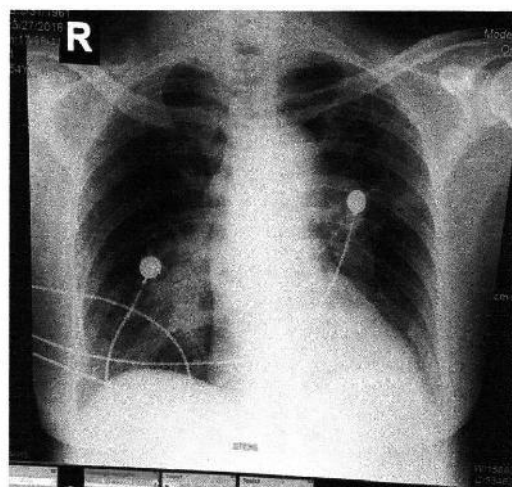
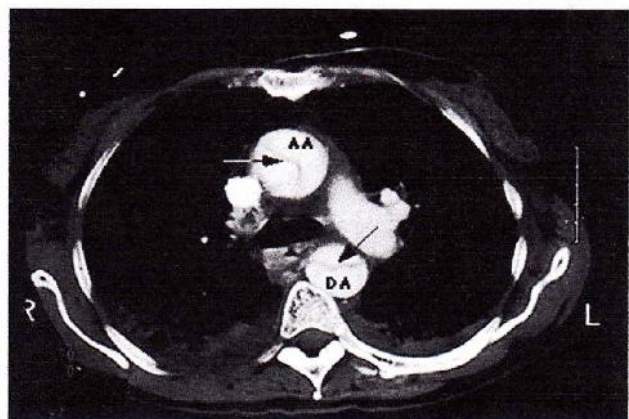


Figure 10. Ches x-ray of patient at ER level



Spiral CT of thoracic aortic dissection

Transverse plane through ascending (AA) and descending (DA) thoracic aorta showing the intimal flap (arrows) and both lumens of a type A aortic dissection. One cannot distinguish between the true and false lumens based on this view alone. Courtesy of Vassilios Raptopoulos, MD.

Figure 11

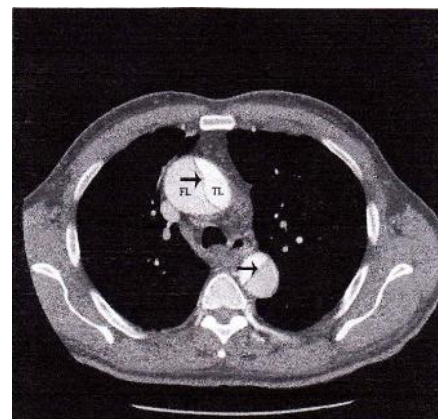
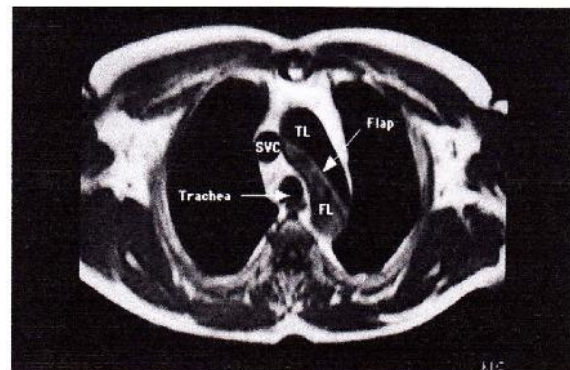
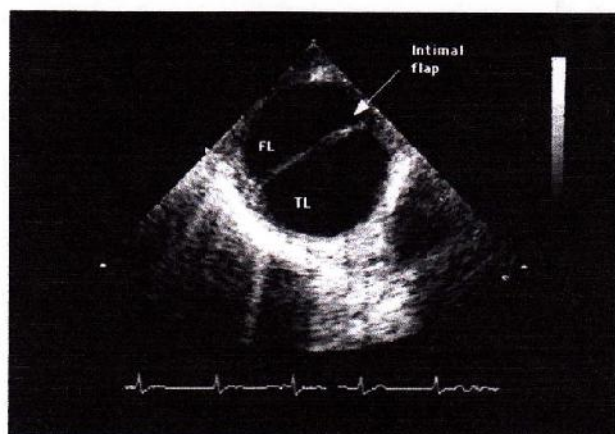


Figure 12. The arrows demonstrate the intimal flaps in both the ascending aorta (anterior) and the descending aorta (posterior) . TL is the true lumen as this has contrast within it whilst the darker false lumen (FL) does not.



Aortic dissection on MRI Spin-echo magnetic resonance imaging scan of an aortic dissection in the transverse plane at the level of the aortic arch. The true lumen (TL), false lumen (FL) and intimal flap can be easily identified. The trachea and superior vena cava (SVC) are also seen. Courtesy of Warren Manning, MD



TEE of aortic dissection Transesophageal echocardiography (0° crystal orientation) of type B dissection of the descending thoracic aorta. A thin intimal flap is clearly noted. FL and TL refer the false and true lumen, respectively. Courtesy of P Vignon, MD and Roberto Lang, MD.

Figure 14

TABLES

	Normal Values	
Trop I	0-0.034	0.035
CKMB	0-4.55	2.71

Table 1

URINALYSIS	
pH	6.0
Glucose	Negative
Protein	1.0
Blood	200
WBC	153.6
RBC	4047
Epithelial cells	41
Bacteria	92.1

Table 2

	Normal Values	March 27	March 28
BUN	2.5-6.4	5.5	12.4
CREA	46-92	116	155

Table 3

	March 29	March 30	March 31
BUN	9.6	9.8	10.2
CREA	233	89	103

Table 4

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Confusion in Deglutition: A Case of Botulinum Toxin Ingestion*

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ABSTRACT

Purpose: To report on a case of dysphagia secondary to botulinum toxin ingestion.

Method: Case report

Result: A 30-year-old female with no comorbidities, presented with dysphagia associated with ptosis and diplopia 12 hours after ingestion of double dead pork. Probable diagnoses of a neurologic, esophageal problem or a neoplasm were initially considered. Ancillary procedures to support diagnoses were performed including esophagogastroduodenoscopy, cranial CT scan and Facial and Extremity Nerve Conduction Velocity which all revealed unremarkable results. A possible polyneuropathy specifically foodborne toxicity was considered given a history of dysphagia, ptosis and diplopia with consumption of double dead pork. Confirmatory stool culture studies revealed *Clostridium botulinum*, hence appropriate antibiotics and supportive therapy were provided which led to the patient's recovery.

Conclusion: Early diagnosis and a high index of suspicion is important in cases with unfamiliar presentations, therefore a careful history and physical examination is warranted. Foodborne botulinum toxicity is a public health matter that should be addressed. Proper food handling and storage must always be practiced.

Key words: botulism, foodborne botulism, deglutition disorders, dysphagia, public health

*First place, Case Report Category, PMA Residents' Research Competition 2016

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INTRODUCTION

Dysphagia refers to difficulty in swallowing that may be caused by neurologic, congenital and developmental conditions, obstruction, muscular problems, psychologic causes or a combination of these. Foodborne botulism also presents with dysphagia and is clinically difficult to diagnose because of its extensive differentials. This report aims to remind physicians of a potentially fatal condition presenting with a nonspecific symptom as well as to promote safety and awareness of cases that are of public health concern that must be addressed immediately.

Case Report

A 30-year-old female had a two-day history of progressive dysphagia to both solids and liquids twelve hours after ingestion of pork. The pork was bought from a public market, noted to have an unusual foul stench but was still adequately refrigerated and thoroughly cooked after it was purchased. Associated symptoms include pooling of saliva and consequently, poor oral intake.

One day prior to consult, there was persistence of dysphagia with accompanying ptosis, diplopia, occasional difficulty of breathing and no bowel movement. There were no episodes of fever, headache, weakness, paralysis, numbness or change in sensorium. Persistence of symptoms prompted consult at the emergency room and was initially assessed by the otorhinolaryngology service.

On the day of admission, the patient was conscious, coherent and oriented, with no alteration in sensorium. Oral cavity examination showed no hyperemia, swelling or exudates. Initially, a probable retropharyngeal abscess or epiglottitis was considered as a cause of dysphagia. However, there was only pooling of saliva with no masses or swelling and fully mobile vocal cords. There was also absence of soft tissue swelling and widening of neck spaces on neck soft tissue lateral. Bilateral cranial nerve VI palsy as well as poor gag were noted on further examination. Manual Muscle Test showed 4/5 on all extremities and the patient had no sensory deficits and signs of meningeal irritation. Hence, the working impression was revised to Dysphagia secondary to 1) neurologic causes (cerebrovascular accident versus an intracranial mass) or 2) esophageal disorder.

On Cranial CT scan, there were no masses, hydrocephalus, acute infarct or hemorrhage. Esophagogastroduodenoscopy was essentially normal showing a distensible esophagus with good peristalsis.

Based on the aforementioned findings, a peripheral neuropathy was then considered, however, whether it was due to an immunologic (Miller-Fischer variant Guillain-Barre Syndrome, Myasthenia Gravis) versus a toxic (foodborne toxicity) cause was still in question. Findings on Nerve Conduction Velocity were inconclusive. It revealed normal results for both upper and lower extremities, orbicularis oculi showed low amplitudes and nasalis and frontalis muscles were nonreactive. On review of history, the patient experienced dysphagia after eating pork, with characteristics similar to those of double-dead meat. Physical examination findings such as bilateral nerve palsy and ptosis and ancillary tests which were negative for the aforementioned initial diagnoses supported the impression of a possible foodborne toxicity, particularly Botulism. Diagnosis was confirmed when stool culture revealed *Clostridium botulinum*. Final assessment was Dysphagia secondary to Acute Toxic Polyneuropathy (Foodborne Botulism); cerebrovascular disease, Myasthenia Gravis, Guillain Barre Syndrome ruled out. Benzathine Penicillin and Metronidazole were given to address the toxicity leading to gradual resolution of symptoms.

DISCUSSION

Foodborne botulism is a potentially life threatening condition although it is fairly rare¹¹. Between 1993 and 2008, fifty-eight foodborne botulism outbreaks were reported to the Centers for Disease Control and Prevention. Four hundred sixteen foodborne botulism cases were documented, two hundred five (49%) were associated with outbreaks¹². Last 2011, smoked seafood imported from the Philippines were recalled for potential contamination and following laboratory tests, products were eventually proven to be positive for botulinum toxin¹⁵.

Ingestion of a preformed toxin produced in food by *Clostridium botulinum* causes foodborne botulism. A highly poisonous toxin is produced when food is contaminated by *Clostridium botulinum* before preservation. Incubation period for foodborne botulism can range from 2 hours to eight days after ingestion. Sources of the toxin include smoked meat, canned and preserved food. Severity of symptoms depend on the dose of bacteria or toxin ingested³.

One source of foodborne botulinum toxicity is “botcha” or double-dead meat. It is meat taken from an animal who died from a disease then sold to consumers¹³. Among the illnesses that one can get from consumption of double dead meat are diarrhea, sepsis and even death.

The clinical picture of botulism toxicity shows an acute, afebrile, symmetrical and descending paralysis with no alteration in the level of consciousness, intact sensory functions and electrolyte values. More often, symptoms of diplopia, dysphagia, dizziness, blurred vision, dry mouth and constipation are present. In severe cases, botulinum toxicity may lead to respiratory failure from paralysis of muscles of respiration.

Differential diagnoses for foodborne Botulinum toxicity include: 1) Guillain-Barre Syndrome (GBS), specifically the Miller-Fischer variant which presents with ascending paralysis, loss of sensation, pain and triad of ophthalmoplegia, ataxia and areflexia⁷. GBS is diagnosed by an elevated CSF protein and abnormal nerve conduction and EMG studies, 2) Myasthenia gravis presents with fatigable muscle weakness and fluctuating proximal weakness⁷. Diagnosis is confirmed by Tensilon test and abnormal EMG and nerve conduction velocity test⁶.

Detection of botulinum toxin in serum, stool or vomitus helps confirm the diagnosis of botulinum toxicity. Although findings are nonspecific, electrophysiologic tests such as nerve conduction studies and electromyography may add to the diagnosis⁴. In foodborne botulism, nerve conduction studies yield normal results.

Primarily, supportive care, respiratory support and antitoxin administration is the current treatment for botulinum toxicity. Early application of botulinum antitoxin will not reverse symptoms but it can only limit the extent of paralysis. According to Swenson, JM, et al. Clostridium botulinum were tested by agar dilution for susceptibility to tetracycline, metronidazole, erythromycin, penicillin, rifampin, chloramphenicol, clindamycin, cephalothin, cefoxitin, vancomycin, sulfamethoxazole-trimethoprim, nalidixic acid, and gentamicin. At least 90% of the C. botulinum strains tested were susceptible to all drugs except sulfamethoxazole-trimethoprim, nalidixic acid, and gentamicin⁵.

Consumers should be proactive in identifying double dead meat. Characteristics of pork that the

consumers have to watch out for are the following: 1) meat is pale or taking on a bluish or greenish tinge, 2) meat smells bad with a stench stronger than the ordinary slaughtered meat, 3) not properly cleaned hair or skin, 4) meat easily crumbles, 5) sticky consistency¹³.

Prevention of foodborne botulism can be achieved through good practice in food preparation. WHO recommends 5 *Keys to Safer Food*: 1) keep clean, 2) cook thoroughly, 3) separate raw and cooked, 4) keep food at safe temperatures, and 5) use safe water and raw materials⁹. Intensive surveillance and response to foodborne botulism is warranted. It is the role of the general public to report cases of suspicious botulinum toxicity in order for the food item to be identified and removed from distribution and circulation without delay.

CONCLUSION

Foodborne botulinum toxicity is a serious condition that may often be missed as it presents with nonspecific symptoms. A careful history and physical examination as well as appropriate diagnostics are essential especially in cases with unfamiliar presentations. It is important to always keep botulism in mind when presented with patient with dysphagia. An early diagnosis and a high index of suspicion can be lifesaving.

Foodborne botulinum toxicity is a public health matter that should be addressed. Rapid recognition of source may prevent an outbreak from occurring. Strict regulations and screening of products that may be sources of the toxin should be vigilantly implemented. Prevention may be achieved through appropriate practices in food preparation and preservation which should be instilled to the public by information dissemination and education.

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Delayed Prosthesis Fitting in an Elderly with Congenital Lower Limb Deficiency: A Case Report*

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ABSTRACT

Congenital anomalies, including limb deficiency, affect approximately 7.9 million newborns annually. Fitting the prosthesis at an early stage will aid the patient to achieve two-legged standing, to develop reciprocating gait and to attain an optimal body image. A 64-year-old female diagnosed with congenital limb deficiency, right, using a customized shoe was admitted for prosthetic management at the study hospital.

Patient underwent inpatient prosthetic training with physical and occupational therapy. Psychological evaluation was done to assess for depression and anxiety and to determine the patient's response to the prosthesis. The Prosthesis Evaluation Questionnaire (PEQ), an instrument to measure prosthesis-related quality of life and functional outcome, was administered. 3D motion analysis was done to observe the temporospatial parameters of the patient's gait with and without the prosthesis.

The patient had generally positive response towards her prosthesis based on PEQ administered 1 month after the provision of prosthesis. Psychological evaluation showed that the patient had improved general outlook after the provision of the prosthesis. Patient had slower self-selected walking speed compared to transtibial amputee using prosthesis.

Early fitting and fabrication of prosthesis is recommended for the patient with congenital amputation. Studies showed that delayed fitting of prosthesis may decrease acceptance and use of prosthesis. However, provision of properly fitted prosthesis may still improve the quality of life of the patient who is already functionally independent without it. More than increase in physical activity, participation in leisurely activities that promote social interaction motivates elderly patients to use their prosthesis more often.

Key Words *elderly, congenital limb deficiency, leg prosthesis, delayed fitting*

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INTRODUCTION

Congenital anomalies, including limb deficiency, affect approximately 7.9 million newborns annually. In the Philippines, the burden of birth defects is not yet well established.¹ However, in the Philippine Birth Defects Registry Project of the Department of Health and Human Genetics-National Institutes of Health University of the Philippines Manila, musculo-skeletal congenital malformations ranked 7th among the identified top ten birth defects in 79 hospitals in the country in 1999-2000.² Out of the 450 patients admitted at the amputee ward of the Department of Rehabilitation Medicine (DRM) of the study hospital from 2011 to 2015, 17 patients had congenital limb deficiency. Among the 17, only 4 were adults while the rest were pediatric patients.³

The basic principle in prosthetic management in patients with congenital limb deficiency is to provide the prosthesis, which is appropriate for the developmental stage. It is recommended to start fitting the patient with lower limb prosthesis between the ages of 7 to 14 months. At this time, the patient is almost ready to pull up to stand.⁴ Fitting the prosthesis at this early stage will aid the patient to achieve two-legged standing, to develop reciprocating gait and to provide a complete body image. Even without formal prosthetic gait training, children generally do well with lower limb prosthesis.⁵

Previous studies have been done among elderly amputees to determine the criteria for prescribing prosthesis,⁶ factors that affect the use of the prosthesis,^{7,8} functional outcome after provision of prosthesis,⁹ as well as the level of satisfaction with prosthesis among elderly amputees.¹⁰ However, the reasons for amputation among those included in these studies are vascular diseases, trauma or malignancy.

Among the 18 to 84 years old who have had major upper- or lower-limb loss due to vascular disease, trauma, or malignancy included in the study of Pezzin in 2004, 94.5% had prosthesis and used it extensively (71 hours/week). Seventy six percent appeared to be satisfied with the overall performance of their prostheses. Frequency of prosthesis use and satisfaction with the device were significantly higher among those with shorter timing to first prosthesis fitting. There were no significant differences in prosthesis use, satisfaction, or assessment of prosthetists' quality based on amputation etiology or

amputation level.¹¹ In the study of Spruit-van Eijk et al, elderly patients who underwent prosthetic training have higher probability of using their prosthesis when they are able to ambulate independently after the transtibial amputation.¹² Studies among congenital amputees, on the other hand, included children or the younger age group.^{13,14}

Pezzin et al agreed with results of previous studies that suggest a strong negative association between timing to first prosthesis fitting and use of and satisfaction with the device. When prosthesis fitting is delayed patients seem to be less accepting of the prosthesis and use of prosthesis is also lesser.¹¹ This case report aims to explore the motivation and acceptance of prosthesis of an elderly with congenital amputation.

Case Report Proper

A 64 year old single female from Pandacan, Manila consulted at the outpatient clinic of the Department of Rehabilitation Medicine (DRM) of the study hospital last February 13, 2015 with a chief complaint of recurrent callous formation on the distal end of the stump of the right lower extremity. An informed consent was secured from the patient to report this case.

The patient was born with a congenital deformity of the right lower extremity, which is shorter compared to the left and an absent foot. She started to ambulate independently at the age of 2 years old, with weight bearing on the distal end of the right lower extremity. At home, the patient did not use any covering for the distal end of her leg. In the community, however, she would sometimes use a rubber slipper strapped on the stump. The patient was able to finish up to high school. She worked as manicurist and a hair-stylist. Her job entails standing for prolonged hours and sometimes walking long distances to provide service to her clients. At approximately 30 years old she was advised by her client to have a shoe customized to cover the distal end of the stump (Figure 1 and 2).



Figure 1. Customized shoe for the right foot



Figures 2. Patient using her customized shoe on the right foot, (A) anterior, (B) posterior, (C) right lateral views

When the patient was approximately 40 years old (between 1997-1999), the patient consulted a physician in the local health center in Pandacan, Manila, due to the ulceration around a callous on the distal end of her stump. She was referred to a surgeon who in turn advised revision of the stump. However, the patient did not consent for the said procedure. She was referred to Tahanang Walang Hagdan, Inc. (TWHI) for provision of lower limb prosthesis and to Philippine Charity Sweepstakes Office (PCSO) for funding. However, she did not undergo prosthetic training. The patient was able to use the prosthesis for only a month due to improper fit of the socket and heavy weight of the prosthesis. She noted that weight bearing was still on the distal end of the stump. She then returned to using a custom-made shoe for her right lower extremity.

In 2013, the patient experienced aching pain localized over the left knee after prolonged walking or standing. She again consulted in the local health center; impression then was beginning osteoarthritis of the left knee. The physician referred her to the Philippine School of Prosthetics and Orthotics (PSPO) for possible prosthetic management of the right lower extremity to provide a more even weight distribution. Upon assessment, she was prescribed with a transtibial prosthesis: patellar-tendon bearing bi-valve socket with provision to accommodate the stump, exoskeletal shank, and solid ankle cushion heel (SACH) foot (Figure 3). She also underwent prosthetic training on outpatient basis for one month. After the training, the patient was able to ambulate independently using the prosthesis without a gait aid. Patient was then lost to follow up because she noted improvement in her posture and ambulation.



Figure 3. Patient using the prosthesis from PSPO on the right lower extremity, (A) anterior, (B) posterior, (C) right lateral views

However, after one month of using the prosthesis everyday almost the whole day, patient experienced discomfort on the distal end of the stump. The patient could not walk more than 5 steps while using the prosthesis due to severe pain, 8/10 on the numeric pain rating scale, on the distal end of the stump. It was associated with a solitary, well-defined plaque with purulent discharge also on the distal end of the stump. She noted the socket of the prosthesis to be loose resulting to weight bearing on the distal end of the stump. She then stopped using the prosthesis and refrained from bearing weight on the end of the stump until the wound healed.

The patient again used the custom-made shoe during ambulation. However, the ulceration of the callus on her stump would recur. Hence the patient consulted at the out patient clinic of the of the study hospital last February 2015.

Patient's vital signs were essentially normal. Pertinent physical examination findings were: 14-centimeter leg length discrepancy, the right being shorter than the left. True leg length was measured at 85.5 centimeters on the left and 71.5 centimeters on the right. Bilateral femoral length was measured at 50 centimeters. On standing, distal end of the right leg was at the level of the distal third of the left lower leg (Figure 4).



Figure 4. Lower extremities in standing (lateral and anterior views, respectively).

On gross inspection posteriorly while standing on her left leg, shoulder asymmetry was noted, the right was lower than the left but without discrepancy in the muscle bulk. Pelvic obliquity was also noted, the right was also lower than the left. However, there was no noted head tilt towards either side. On sagittal view, no noted excessive kyphosis or lordosis. There was also no noted flexion or extension of the neck. Bilateral hips, knees and left ankle showed full joint range of motion. Left lower extremity had 5/5 muscle strength while the right had 4/5. There were no sensory deficits on both lower extremities. A 2 x 2 centimeter, solitary, well-defined plaque with purulent discharge was noted on the plantar surface of the distal end of the right stump (Figure 5). There were no gross deformities noted on the upper extremities and the left lower extremity. She ambulates independently without any gait aid on level surfaces and negotiates stairs with step over step gait pattern.

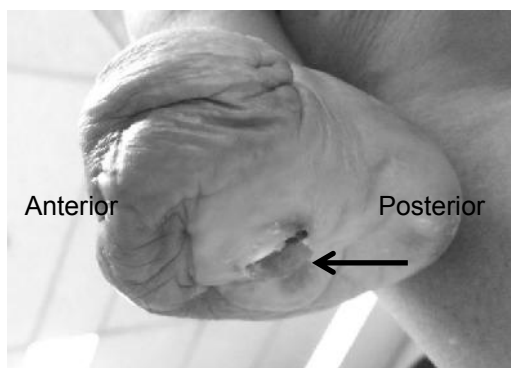


Figure 5. Arrow points to the callus on the plantar surface of the distal end of the stump

She was known to have dyslipidemia and maintained on simvastatin 10mg/tablet once a day. There is no known family history of congenital deformities, hypertension or diabetes. She is not a smoker and not an alcoholic beverage drinker. She lives with her 22-year-old adoptive daughter in a single-storey house with toilet and bath outside the bedroom. She does home-service hair-styling and owns a jeepney for rent.

Radiologic studies done last February 2015 showed widened distal tibia with note of cortical irregularities along the inferior border, which appeared to be the remnant tarsal bones, fused with and exhibited an ill-defined plane of differentiation with the distal tibia (Figure 6). There was also narrowing of the fibular diaphysis with associated tapering of the end.

Overlapping soft tissue density was seen in the distal leg, which may be compatible with the clinically apparent stump. The spine, upper extremities and left lower extremities showed unremarkable radiologic findings. Patient was diagnosed to have transverse tibia partial, fibula partial, tarsus total, metatarsus total, phalanges total, right based on the radiologic findings.

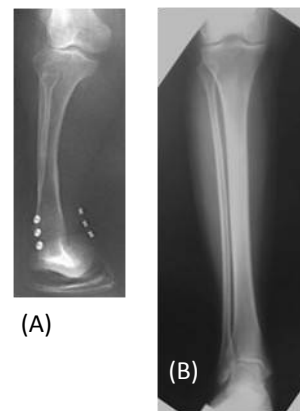


Figure 6. Radiographs of the lower extremities (A: right, B: left)

The following rehabilitation problems were identified: congenital deficiency of the right lower extremity causing a 14-centimeter leg length discrepancy and postural deviation, callus on the plantar aspect of the distal stump and pain over the same area, body image issues, and poor compliance to follow-up. Shown in Figure 7 is the patient's problems using the International Classification of Functioning, Disability and Health (ICF) framework of the patient.

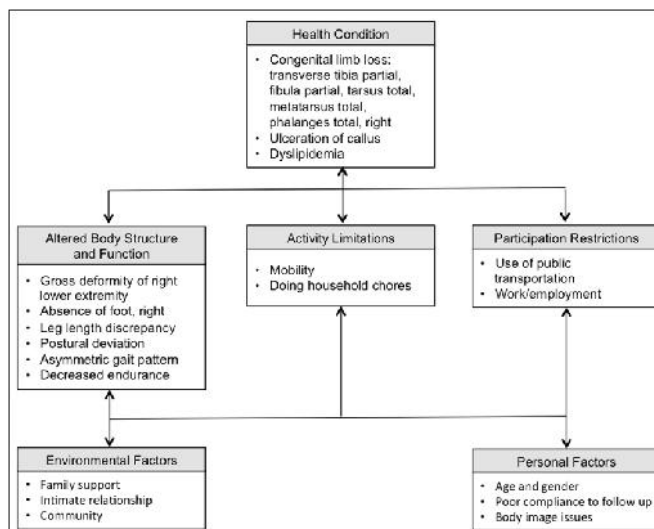


Figure 7. ICF Model

Patient was referred to DRM Psychology Section for psychological assessment prior to the acquisition of a new prosthesis. The initial evaluation indicated that the patient had signs of moderate depression. Although she reported that she has a positive outlook in life, her rating in the Zung's Depression Scale showed that she feels sad most of the time. Using the Taylor's Manifest Anxiety Scale, the patient showed moderate anxiety. She is mostly concerned with her daughter and their finances. Despite the signs of depression and anxiety, the patient was noted to have positive active coping style, high self-esteem, high level of motivation and had realistic expectations. She is confident that she will be able to perform tasks given to her and overcome possible challenges. She however perceived her disability negatively because she thinks persons with disabilities are being pitied on.

The patient was prescribed with below-knee prosthesis with the following components: solid ankle cushion heel (SACH) foot, pylon endoskeletal shank, bi-valve patellar-tendon bearing socket with provision to accommodate shape of the distal stump (Figure 8). This was fabricated at the DRM Prosthetics and Orthotics (P&O) Section.



Figure 8. Distal end of the stump, right lower extremity, (A) anterior and (B) medial views.

Prior to the fabrication of the prosthesis, the patient underwent pre-prosthetic training from May to June 2015 at the out patient clinic of the DRM Section of Physical Therapy for 4 weeks, 1 hour/session twice a week. Since the patient had good standing balance and tolerance and was already able to ambulate independently without an assistive device on level surfaces, ramps and stairs. Exercises were focused on mobilization of joints of both upper and lower extremities and the trunk, and endurance training.

While waiting for her prosthesis, the patient went back for follow-up at the PSPO. She reported that she was not able to use the previous prosthesis provided to her because of the improper fit of the socket after one month of daily use. Because she wanted to have 2 prostheses that she can use alternately, she was again prescribed with transtibial prosthesis: patellar-tendon bearing bi-valve socket with provision to accommodate the stump, exoskeletal shank, and solid ankle cushion heel (SACH) foot. Patient however, did not undergo prosthetic training in the said institution.

To facilitate comprehensive rehabilitation management, the patient was admitted at the amputee ward of the study hospital last July 30 to August 7, 2015. Patient was admitted to improve patient compliance to the rehabilitation management, which included physical therapy, occupational therapy, and psychological evaluation and therapy. The goals for admission were as follows: to provide the appropriate prosthesis design; to improve standing balance and tolerance while using the prosthesis, and to facilitate independent ambulation on even surfaces, ramps and stairs with prosthesis; to address body image issues; and to improve compliance with use of prosthesis.

Prosthetic check out was done with the following findings: the prosthesis can stand alone with proper alignment and adequate height, can easily be donned on by the patient, comfortable on standing and sitting with satisfactory antero-posterior and medio-lateral alignment. On standing, there was noted improvement in the shoulder asymmetry and pelvic obliquity previously noted. Patient reported weight bearing on the patellar tendon area of the right lower extremity. No pressure or pain was felt on the distal end of the stump. On walking, there was no noted pistoning or vertical translation of the prosthesis. Shown in Figure 9 is the patient using the prosthesis on anterior, posterior and right lateral views. While using the prosthesis, the patient was independent in transition from sitting to standing but she had fair standing balance and tolerance.



Figure 9. The patient wearing the transtibial patellar tendon bearing prosthesis, (A) anterior, (B) posterior, (C) right lateral views.

She underwent daily 1-hour physical therapy focusing on improving her standing balance and tolerance from fair to good. This was progressed to ambulation training between parallel bars, onto even surfaces outside of the parallel bars, ramps. She was also trained to negotiate stairs using step-by-step gait pattern. Proper posture while standing and walking was also emphasized.

She also underwent daily 1-hour individual, and a weekly group occupational therapy. This focused on retraining in performance of activities of daily living (ADLs) while using prosthesis, proper donning/doffing of prosthesis and lower garments while using the prosthesis, and proper care of the prosthesis.

Daily 1-hour counseling with the psychologist was also provided during her inpatient rehabilitation, which focused on addressing the patient's depression and anxiety. Patient developed a more positive attitude once she received her prosthesis and actively participated in therapy. A visit from her daughter also helped her become more relaxed and thus more compliant to therapy.

To assess for the patient's psychological response to her new prosthesis, she was again referred to psychology for reevaluation after one month of prosthetic use. It was observed that patient's mood has changed since the last assessment. She had a lower score on the Zung's Depression scale. However, she stated that she was still anxious but was now concerned about her daughter more than her prosthesis. Patient valued her independence and ability to achieve her goals. She reported improvement in her mobility and ability to participate in leisurely activities. Being able to walk around more with her daughter and to interact with more neighbors has influenced her satisfaction towards her prosthesis. She also reported positive comments from her clients and neighbors regarding the change in her gait, posture and over-all appearance. The comments, more than the improvements, made her appreciate her prosthesis more.

The Prosthesis Evaluation Questionnaire (PEQ)¹⁵, is a validated questionnaire composed of multiple questions and 9 validated scales which include: ambulation, appearance, frustration, perceived response, residual limb health, social burden, sounds, utility, and well-being. All scales were scored so that 100 indicated the best outcome. The PEQ was administered to the patient after 1 month of using the prosthesis. She had generally positive response

regarding her prosthesis over the past 4 weeks. This time she scored high (greater than 50) on all the scales: ambulation (79.83), appearance (65), frustration (100), residual limb health (83.5), social burden (83), sound (100), utility (60.38), and well being (73) (Appendix B). However, the perceived response scale was still not included because more than half of the questions had "no response" (NR) scores thus making it invalid. Results of the PEQ are summarized in Appendix A.

Last September 11, 2015, a quantitative gait analysis was done using Optitrack System at the Motion Analysis Program of the Department of Orthopedics with the patient using the custom made shoe and using prosthesis. With the patient using the custom-made shoe, the measured speed was 0.55 meters/second, step length was 0.35 ± 0.24 meters on the left and 0.30 ± 0.29 meters on the right with the custom made shoe, and stride length was 0.65 ± 0.19 meters (Table 1).

Table 1. Gait Analysis: using the custom-made shoe done last September 11, 2015

Measure + Std Dev	Left	Right
Step Length (meter)	0.35 ± 0.24	0.30 ± 0.29
Steps/Minute	205.94 ± 18.06	124.36 ± 86.32
Strides/Minute	49.57 ± 1.30	54.04 ± 14.60
Speed (meters/second)	0.55	
Stride Length (meter)	0.65 ± 0.19	

With the patient using the prosthesis, the measured speed was 0.42 meters/second, step length was 0.26 ± 0.04 meters on the left and 0.41 ± 0.05 meters on the right with the prosthesis, and stride length was 0.67 ± 0.08 meters (Table 2).

Table 2. Gait Analysis: with prosthesis done last September 11, 2015, 1 month after prosthetic training

Measure + Std Dev	Left	Right
Step Length (meter)	0.26 ± 0.04	0.41 ± 0.05
Steps/Minute	83.10 ± 5.69	71.06 ± 5.16
Strides/Minute	37.89 ± 1.55	38.58 ± 2.57
Speed (meters/second)	0.42	
Stride Length (meter)	0.67 ± 0.08	

DISCUSSION

In patients with congenital amputation limb deficiency, prosthetic management is more than providing the proper prosthesis for the patient. It is very important to provide prosthetic care that will promote normal sequence of development of the patient. Timing of fitting of prosthesis is important and is usually recommended to start as early as the child pulls up to stand, around the age of 7 months.¹⁴ The psychological impact of the child's deformity on the family should also be addressed. Very young children may not have awareness of their disability but may learn about it through their family's reaction. Because of their disability, people around them tend to treat them differently. According to the patient, she has accepted her disability because her family and close relatives did not treat her differently. She became independent in performing activities of daily living, was able to care for her daughter and was able to work despite her disability. Patient however, grew up avoiding gatherings and occasions because she was preoccupied with other people's opinion of her. She was only able to obtain her first lower limb prosthesis when she was already an adult, at around 40 years old. Almost 15 years later, she again had another prosthesis made despite not being able to use the first one. The patient was noted to have poor compliance to follow up. Whenever she had a problem with her prosthesis, she would just stop using it.

Bilodeau et al studied 65 unilateral vascular amputees 60 years old or over to determine the factors that influence the use of disuse of prosthesis by the elderly amputee.⁷ They explored the influence on the use of prosthesis of the following factors: age, gender, level of physical disability, cognition, self-perceived health and the amputee's satisfaction towards the prosthesis. Elderly amputees may have medical and mental problems that could lead to lower potential for prosthetic management and rehabilitation. They reported that 81% of the subjects wore their prosthesis everyday and 89% among them wore it 6 hours or more per day. Among the factors studied, physical independence had the highest correlation with use of prosthesis. Patients use their prosthesis more often as they become more independent. Similar to other studies, they concluded that age was negatively associated with use of prosthesis. The older patients tend to use their prosthesis or do not use it at all.¹⁶

In contrast to the patient's case, she was already independent prior to using the prosthesis. The patient was already an adult, ~ 40 years old, when she sought prosthetic management. Probably, physical independence was not the motivation for the patient to procure and use her prosthesis. Although the patient was diagnosed to have depression and high level of anxiety, it was reported by Bilodeau et al that depression was not significantly associated with the use of prosthesis.⁷

Legro et al explored the issues of importance reported by persons with lower limb amputations and prostheses using the PEQ. The author concluded that ambulation was the most important function of the prosthesis and the way it fit the residual limb is the most important characteristic of the prosthesis.¹⁵ The responses on PEQ of the patient was similar to the study, wherein she had more positive reaction towards the fit of her prosthesis especially now that the callus is gradually improving.

Murray and Jezz studied the correlation between body image and prosthesis satisfaction in the lower limb amputee. They concluded that body image and prosthesis satisfaction had a close relationship among lower limb prosthesis users.¹⁶ There were also gender variations in this relationship. Functionality influenced the prosthesis satisfaction among male amputees. On the other hand, the aesthetic components influenced the females' prosthesis satisfaction.¹⁶

Scientific evidence has supported that physical activity can prevent and treat disease. It is important in healthy individuals because it promotes a sense of well-being. Among amputees, use of prosthesis can allow or improve physical activity. Deans et al explored the relationship between physical activity and the perceived quality of life among lower limb amputees due to peripheral vascular disease. They observed a relationship between physical activity and the accompanying perception of increased quality of life but there was a weaker-than-expected relationship between the two. They noted however that maintaining social interaction, especially in the elder amputees, had stronger relationship with improved quality of life.¹⁸ These patients are motivated to participate in rehabilitation so long as it can promote and maintain social interaction. This could also be true for the patient. Although she was functionally independent without a lower limb prosthesis, she is highly motivated to acquire and use her prosthesis now so she could participate in leisurely activities with her daughter and her neighbors.

CONCLUSION AND RECOMMENDATION

Early fitting and fabrication of prosthesis is recommended for the patient with congenital amputation. However, some patients may already learn to adapt to their disability and become independent despite the amputation. This influences the level of acceptance of the prosthesis. Studies showed that delayed fitting of prosthesis may decrease acceptance and use of prosthesis. However, provision of properly fit prosthesis may still improve the quality of life of the patient who is already functionally independent without it. More than increase in physical activity, participation in leisurely activities that promote social interaction motivates elderly patients to use their prosthesis more often. The patient will still benefit from a comprehensive rehabilitation management, which includes appropriate and properly fit prosthesis, physical and occupational therapy, and psychotherapy.

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Appendix A: Prosthetic evaluation questionnaire administered 4 weeks after using the prosthesis, administered last September 2, 2015.

Validated Scale Name	Questions	Score	
Ambulation (AM)	13A	80	
79.83	13B	78	
	13C	79	
	13D	82	
	14E	NR	Not tried walking uphill
	14F	NR	Not tried walking downhill
	14G	80	
	14H	80	
Appearance (AP)	3J	48	
65	3M	100	
	3N	NR	Prosthesis has no cover
	4O	0	
	4P	12	
Frustration (FR)	10B	100	
100	10C	100	
Perceived Response (PR)	10A	100	
Not valid since more than half of the items are scored NR.	11D	NR	She has no partner
	11E	NR	She has no partner
	11G	82	
	12H	NR	No other close family member aside from daughter
Residual Limb Health (RL)	4Q	100	
83.5	4R	76	
	4S	100	
	5T	100	
	5U	100	
	5V	25	
Social Burden (SB)	12I	100	
83	12J	100	
	12K	49	
Sounds (SO)	3K	100	
100	3L	100	
Utility (UT)	1B	50	
60.38	1C	100	
	1D	48	
	2E	100	
	2F	11	
	2G	51	
	2H	75	
	2I	48	
Well Being (WB)	16C	73	
73	16D	73	

Dysembryoplastic Neuroepithelial Tumor: A Case Report *

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Abstract

This reports a case of dysembryoplastic neuroepithelial tumor (DNET) in a 5-year old male presenting with visual hallucination and seizures. Diagnostic workup revealed a homogenous cystic tumor located in the right temporo-parietal area which was considered as a low grade glioma. The patient underwent endoscopic third ventriculostomy with complete tumor excision and biopsy, revealing DNET. Findings were confirmed by immunohistochemical staining with glial fibrillary action protein (GFAP), Alcian blue and synaptophysin.

DNET is a recently described intracranial tumor under the World Health Organization classification of central nervous system (CNS) tumors. It is a unique entity of neuroglial tumors with excellent prognosis. Its worldwide incidence among all neuroepithelial tumors is 1.2% in patients under 20 years and 0.2% among patients over 20 years.

This is the first case of DNET in the country as well as in our institution. Key points on the clinical manifestation, approach to diagnosis, distinctive radiologic and histopathologic characteristics, and management are discussed.

Keywords: dysembryoplastic neuroepithelial tumor, DNET

^{*}Third place, Case Report Category, PMA Residents' Research Competition 2016

¹From the Philippine Children's Medical Center

INTRODUCTION

Dysembryoplastic neuroepithelial tumors (DNET) are a group of benign mixed neuroglial tumors with 0.6% prevalence among 340 reported cases of primary CNS tumors occurring in children below 18 years of age.^{1,2}

These tumors are usually found in the temporal lobe area in 84% of cases, followed by occipital and parietal areas. They are surgically curable with almost no seizure and tumor recurrence.³

Case Report

This presents the case of a 5 year old Filipino male from Pampanga, Roman Catholic, born on December 27, 2010; admitted for the second time in our institution on May 7, 2016 for seizure.

Five months prior to admission, the patient experienced visual hallucinations with no other associated symptoms such as headache, irritability, projectile vomiting, or seizures. He was active and had good appetite; hence no consult or any medications were taken. Four months prior to admission, he had sudden onset of seizure characterized as tonic flexion of both upper extremities, stiffening of both lower extremities, with associated upward rolling of eyeballs, circumoral cyanosis, and drooling lasting for 10-15 seconds. Seizures occurred at an average of six episodes a day, lasting for 10-15 seconds, occurring at hourly intervals. There were no consultation nor was given any medication. Seizure episodes persisted until three months prior to admission, prompted the parents to consult at a tertiary hospital. He was managed as a case of acute symptomatic seizure, and was started on valproic acid at 13 mg/kg/day with good compliance. Electroencephalogram (EEG) revealed generalized activity with right hemispheric focus, which was consistent with seizure disorder. Cranial computed tomography (CT), plain and with contrast, demonstrated a round, well defined, unilocular cystic lesion over the right basal temporal lobe, generalized activity with right hemispheric focus, which was consistent with seizure disorder. Cranial computed tomography (CT), plain and with contrast, demonstrated a round, well defined, unilocular cystic lesion over the right basal temporal lobe, effacement of the right sylvian cistern. There was no cerebral edema or midline shift. The radiologic impression was neuroglial cyst vs

vs infectious cyst vs cystic astrocytoma with opacification of paranasal sinuses. (Appendix 1, Figure 1) On cranial magnetic resonance imaging (MRI), plain, and with contrast, there was a non-enhancing hyperintense mass measuring 5.4 cm x 3.6 cm x 2.7 cm over the right middle cranial fossa. Effacement of both sulci and temporal horns in this area was seen, with no radiologic findings of cerebral edema and midline shift. The radiologic impression was a non enhancing mass, right temporal lobe and hippocampus, without diffusion restriction, mild mass effect, polysinusitis. Magnetic resonant (MR) spectroscopic findings were compatible with a neoplasm, possibly low graded gliosis. (Appendix 2, Figure 2)

The patient was referred in our institution for further evaluation and management.

Review of systems showed weight gain and increase in appetite. The patient did not have any fever episodes during the course of illness. He also did not have pallor, jaundice, cyanosis, or any rashes. No eye or ear changes. No pulmonary symptoms such as difficulty of breathing, chest pain, or cough. No cardiovascular symptoms such as dyspnea, orthopnea, palpitations. No abdominal symptoms such as abdominal pain, vomiting, diarrhea or constipation. No genitourinary symptoms such as dysuria, polyuria, oliguria, or edema. He also did not present with musculoskeletal symptoms such as arthralgia and myalgia.

The patient has been admitted previously at our institution for elective craniotomy and excision of tumor; however the surgical procedure was deferred due to pneumonia. No previous surgery or any known allergies to food or medications were reported.

The patient's family history has been unremarkable for presence of malignancies, febrile convulsions, seizure or epileptic disorders, and other medical conditions such as hypertension, diabetes, thyroid disorders and bronchial asthma.

The patient was born to a then 26 year old gravida 2, para 1 (1-0-0-1), non smoker, non alcoholic beverage drinker. The mother had regular pre-natal check-ups at a private clinic, with an OB-GYN, starting at three months age of gestation. She had regular intake of multivitamins and ferrous sulfate, with no known maternal exposure to radiation and viral exanthem during the course of her pregnancy. The mother had a history of palpitations occurring at five months age of gestation and was managed as a gravidocardioc

patient, functional class I. She claimed taking unrecalled cardiac medications from the 5th until 8th month gestation. During the course of pregnancy, the mother did not have any history of spotting or vaginal bleeding, and premature contractions.

The patient was delivered full term via classical cesarean section at a polyclinic, assisted by an OB-GYN. The patient had good activity and cry immediately upon delivery. There was history of meconium staining or cord coil. No signs of cyanosis or jaundice. Birth weight was 2.27 kg. Routine newborn care was done. Newborn and hearing screening tests were both normal.

The patient was started on a milk formula at 1:1 dilution, 3 ounces every 4 hours. Currently, the patient is on follow-up milk and consumes an average of 15 bottles (8 ounces) per day. Complimentary feeding started at six months of age with rice cereals. At present, he prefers having egg, chicken, and fried foods.

The patient is currently enrolled as a nursery student, and has achieved the following developmental milestones:

GROSS MOTOR: Achieved head control and rolling over to side at 3-4 months of age. He was able to walk alone at twelve months of age.

FINE MOTOR: Grasps objects at four months, and eventually able to do pincer grasp at 6-7 months of age. At six months, he started pointing at objects as a form of gesturing. At around four to five years of age, he was able to establish left handedness and was able to write his full name.

LANGUAGE: Can identify and speak out alphabets and numbers as well as primary colors. He also speaks in 4-5 sentences at a time.

SOCIAL-ADAPTIVE: Currently can feed and dress himself. Toilet training was achieved at 4 years of age.

The patient's father is a 34 year old contractual laborer, while his mother is a 31 year old house wife. He is the younger of two children. Their immediate family currently lives in a well-lit, well-ventilated concrete bungalow with two other household members. Their house is not located near any creek or factory. Garbage is collected on a weekly basis. The family purchases ready stored mineral water from their local

water supplier. Currently, there are no household members who have any infectious illnesses, viral exanthem, and no known TB exposure. There is also no smoker within the household.

On admission, the patient was awake, active, and able to follow command. Vital signs were as follows: blood pressure of 90/60 mmHg; heart rate of 100 beats per minute, regular rhythm; afebrile at 36.2; respiratory rate of 20 cycles per minute. The patient weighed 36 kilograms (z score >3, overweight for age), and had a height of 106 centimeters (z score 0, normal for age). The head was normocephalic, with a head circumference of 55 centimeters (p 2 – 50). There were no palpable lesions or masses. The patient had anicteric sclera, with pink palpebral conjunctivae and no eye discharge. Ears were equal in size with no external lesions or skin tags. There was no ear discharge, with minimal retained cerumen along the external auditory canal. The tympanic membrane of both ears had no effusion, erythema, bulging, or perforation. Nasal septum was at midline. There was no nasal discharge, congestion, or polyps. There was also no alar flaring. Lips and oral mucosa were moist, with no noted external lesion or oral ulcers. No dental caries were noted. There was no tonsillopharyngeal congestion or exudates seen. No visible veins, neck mass, or cervical lymphadenopathy.

The chest had no gross deformities or lesions. It was symmetric in expansion, no subcostal or intercostal retractions. Palpation and percussion findings were unremarkable. Clear breath sounds were appreciated on all lung fields. The patient had an adynamic precordium, with no heaves or thrills. The point of maximal impulse was palpated over the 4th-5th intercostal space, left midclavicular line. Heart sounds were distinct with a regular rate and rhythm. There were no murmurs or extra heart sounds appreciated. The abdomen appeared globular, with no visible veins or other lesions. Bowel sounds were normoactive. There were no palpable masses or organomegaly. The abdomen was tympanitic on all quadrants. Genitalia were grossly male, with bilaterally descended testes. All extremities appeared symmetric. No gross deformities, joint swelling, or other lesions noted. They were warm and had full equal pulses, with capillary refill time of less than 2 seconds.

Neurologic examination upon admission was unremarkable. The patient was awake, conversant, oriented to person, place and time; and preferred to be with the mother most of the part of the

examination. Cranial nerve I was not assessed. Pupils measured 2-3 mm and were both briskly reactive to light. Accommodation to light was also noted in both pupils. Extraocular movements of both eyes were full and intact. He had good masseter tone and had no facial asymmetry. Gross hearing was also intact. He had intact gag reflex and tongue was in midline. He had symmetric tone and range of movement when he was asked to turn his head from side to side and against resistance. All extremities were equal in muscle bulk, with good tone, and a motor testing of 5/5 (able to move against gravity and against resistance). No sensory deficits were noted. No nystagmus, dysmetria, and dysdiadochokinesia. The patient was normoreflexive (+2) on all deep tendon reflexes. Autonomic functions were also intact. There was no Babinski reflex or ankle clonus elicited. No meningeal signs such as nuchal rigidity, Kernig's or Brudzinski's signs.

The patient was worked up for possible causes of seizure. EEG prior admission showed generalized activity with right hemispheric focus. Cranial CT scan and MRI plates showed the presence of a non enhancing tumor at the right temporo-parietal area.

The patient underwent endoscopic third ventriculostomy of the right temporoparietal area, with complete tumor excision and biopsy (Appendix 3, Figure 3). Histopathology showed findings suggestive of dysembryoplastic neuroepithelial tumor (Appendix 4, Figure 4). Immunohistochemical staining with glial fibrillary acidic protein (GFAP), Alcian blue, and synaptophysin confirmed the diagnosis (Appendix 5, Figure 5). No post operative complications were observed, and the patient was discharged stable after a week. He is on regular follow-up with Child Neurology and Neuro-Oncology services upon discharge.

Case Discussion

Our patient came in with a chief complaint of an unprovoked seizure. The presence of associated signs and symptoms may help determine whether this is a primary seizure disorder, or a seizure with an underlying cause. Visual hallucination was noted prior to the unprovoked seizure. In addition, seizure episodes presented in a stereotypical manner, suggesting there may be an underlying cause. The physical and neurologic examination findings did not present any signs of deficit, indicating the need for ancillary work up to narrow our differential diagnoses.

In order to determine if the underlying cause of a seizure is metabolic or structural, we use the aid of laboratory workup. Metabolic causes may be due to hypoglycemia, or electrolyte imbalances. In our patient, no derangements from these parameters were noted based on the pre-operative workup. Structural causes may branch out into the following: 1) congenital malformations; 2) hydrocephalus; and 3) tumor growth. Diagnostic imaging confirmed the presence of a tumor, located approximately at the right temporo-parietal area. Temporal lobe tumors are difficult to diagnose and localize. These tumors present with a variety of clinical presentation as compared to other intracranial lesions. Nonetheless, tumors arising from the temporal lobe area commonly present with seizures as recorded in 80% of primary CNS tumors.⁴ Other associated symptoms arising from temporal lobe tumors include auras, somatosensory and other special senses phenomena which may include visual hallucinations, especially when the tumor compress or arise from the inferior temporal gyrus.⁴ Visual hallucinations arising from occipital lobe lesions may produce sharper images as compared to that of the temporal gyrus. This finding gave us an impression that the possible tumor found in our patient may still be temporal in origin, more than occipital.

Common primary CNS tumors that have a temporal lobe predilection include ependymomas and gangliogliomas. Ependymomas in the pediatric population often occur in the supratentorial region, arising from the lateral or third ventricles. Most common clinical presentation include headache, nausea, vomiting or vertigo, secondary to increased intracranial pressure (ICP) from obstruction of cerebrospinal fluid flow through the ventricles or brain stem. In our patient, signs of increased ICP were not noted, hence ruling out this diagnosis. Gangliogliomas are a mixed type of tumor generally occurring during the first three decades of life. They are commonly found in the medial temporal lobe described as well circumscribed masses that have calcium-containing cystic structures which enhance on neurologic imaging. Seizure is the most common presenting symptom due to its medial temporal lobe predilection. This diagnosis was ruled out in our patient, on the basis of a non enhancing lesion appreciated on neuroimaging.

Other possible differential diagnosis would be astrocytomas since they make up 25% of low-grade CNS tumors in the pediatric age group.⁵ Clinically, it is difficult to deduce the presence of DNET from common low-grade gliomas, such as pilocytic

astrocytomas and fibrillary astrocytomas, since they generally present with localizing symptoms depending on the tumor location. The aid of histopathology and immunochemical staining comes into play in arriving at the diagnosis. In our patient, the gross characteristic of the resected tumor did not have a clear delineation between the intracranial mass and normal brain parenchyma. The mass seemed to have expanded the temporal gyrus, with the adjacent gray matter thickened. These gross pathologic findings are common features for DNET.^{1,5} On further microscopic findings, mixed neuroglial elements that gave an appearance of “floating neurons” were appreciated, hence guiding which immunohistochemical staining will be appropriate to utilize. A positive Alcian blue, synaptophysin, and glial fibrillary acidic protein (GFAP) confirmed the diagnosis of DNET.

Dysembryoblastic neuroepithelial tumors are a rare, slow-growing group of CNS tumors recently categorized under neuronal and mixed neuronal-glial type in the 2007 and 2016 World Health Organization (WHO) tumor classification of primary CNS tumors. Worldwide, it only occurs in about 0.2 - 1.2% among children and young adults below 20 years of age.¹ In our country, no data regarding this case has been recorded.

According to Suh, DNETs were initially believed to be a hamartoma grossly in nature but recent identification of genetic alterations in DNETs indicate that this tumor is more of a neoplastic condition.² The histogenesis of DNETs still remains unknown. The developmental origin from the secondary germinal layer has been proposed by Dumas-Duport and colleagues, based on the mixed cellularity of DNETs, their prevalence in the temporal lobe, and their association with focal cortical dysplasia.⁶ Another study by Bodi, et al suggested that DNETs could have originated from pluripotent precursor cells based on ultrastructural findings of oligodendro-like cells showing neuronal and glial differentiation. This hypothesis is supported by the immunoreexpression of both nestin and MAP-2 in these cells. These markers have also been identified early in neural and glial precursor cells during human development, hence a predilection for the younger age group.⁷

Chassoux, et al as well as Devaux, et al. further discussed that DNETs are found in approximately 17.8%–20% of patients who undergo surgical resection for chronic epilepsy.^{8,9} They are actually the second most common tumors in surgically resected

cases for intractable epileptic seizures. DNETs comprised 87% of 31 cases with tumor-associated, temporal lobe epilepsy, as discussed by Kirkpatrick, et al.¹⁰ Among the pediatric age group, the frequency of DNETs was reported to be 0.6% among 340 primary CNS tumors and an estimated prevalence of 0.8% in 233 children with hemato-oncologic problems, in general, as discussed by Suh.¹

Chang et al stated that among patients found to have DNETs, partial complex seizures are the most common clinical manifestation, followed by generalized tonic-clonic, simple partial, and partial seizures with secondary generalization.¹¹ An additional neurologic symptom is headache only. Over 90% of patients with DNETs have epilepsy before the age of 20 years.¹¹ Patients generally do not have neurological deficits or evidence of elevated intracranial pressure. Males are more frequently affected, and tumors have a predilection for the temporal lobe, followed by the frontal and parietal or occipital lobes. Multifocal DNETs affecting the different sites in the CNS have also been reported in other studies. There have also been unusual locations for DNETs, which include the septum pellucidum, caudate nucleus, thalamus, pons, cerebellum, brainstem, and ventricles as described in surgical studies by Cervera-Pierot et al and Onguru et al.^{12,13}

Though a rare type of tumor, dysembryoblastic neuroepithelial tumors are part of the top three differentials causing seizures. On neuroimaging, DNETs have distinct features that would give clue to the diagnosis. According to Fernandez, et al, these tumors usually present with “septated” appearance best seen on high resolution MR imaging. Another distinct radiologic feature that may aid in the diagnosis is the “comical tail” which denote the involvement of epithelial tissues with neuroglial component.¹⁴ In our patient, the tumor presented as a non-enhancing lesion, both on cranial CT scan and MRI, hence it was initially considered as a low-grade glioma.

The clincher to the diagnosis, however, is still the histopathologic and immunohistochemical findings. Dysembryoblastic neuroepithelial tumors are usually described as complex multinodular lesions, consisting of glial nodules, associated with a specific glioneuronal element with or without focal cortical dysplasia.¹⁵ In the case of our patient, microscopic examination showed hypercellular lesions with a multinodular architecture, and a low- to high- cellularity gradient. Neurocytic-like cells with axon bundles are found bordering

the microcytic spaces, hence giving a “floating neuron” look. Confirmation is made by immunohistochemical staining with Alcian blue, Synaptophysin, and GFAP. “Floating neurons” found within the glioneuronal element of the tumor have been found out to express neuronal markers such as the synaptophysin neurofilament. However, majority of oligodendrolikeness cells have been found strongly positive for S-100 protein and Oligo-2 markers, but are generally negative for glial fibrillary acidic protein (GFAP). Hence, other histopathologic clues that would aid in clinching the diagnosis would also be the predilection of other glial nodules to GFAP since a number of these structures contain GFAP-positive astrocytes.^{1,2} In our patient, immunohistochemical results were positive in all immunohistochemical staining.

The importance of early identification and diagnosis of the disease is of high value, since timely surgical intervention lead to an excellent outcome. Surgery, alone leads to an almost 95% excellent prognosis, with no seizure recurrence within 5 years, post-operatively.¹⁶ The revised WHO tumor classification categorizes central nervous tumors according to grading and staging in order to guide practitioners in the diagnosis and management of these tumors (Appendix 6). Tumor grading is usually based on the degree of endothelial proliferation, mitotic changes, presence of necrosis, and presence of giant cells, hyperchromic nuclei, and pleomorphic cells. In addition, staging CNS tumors utilizes postoperative MRI of the tumor resection site, done within 24-48 hours after surgery. Postoperative imaging is necessary to determine the extent of resection and to discern any residual tumor. Generally, tumor dissemination and leptomeningeal involvement are also investigated as part of staging after resecting primary CNS tumors. If these are suspected, MRI of the entire spine and cerebrospinal fluid (CSF) analysis are considered.⁵ Tumor seeding and leptomeningeal involvement are usually uncommon in DNET. Being classified under Grade I, dysembryoplastic neuroepithelial tumors can be treated by surgery alone. The need for chemotherapy or short course radiation therapy is of little value to the contribution of the overall survival of the patient, as compared to other intracranial lesions.^{6,16}

Dysembryoplastic neuroepithelial tumors have an overall excellent prognosis. Among the cases reported by Chang et al and Ranger and Diosy, seizure episodes did not recur during the postoperative period. No malignant transformations or metastasis

were observed after complete tumor resection.^{10,11,16} In our patient, no seizure recurrence was observed during the immediate post-operative period, as well as on follow-up. No significant signs of developmental delay or regression were also observed. Currently, the patient is back to his hometown, and has been doing his regular routine of activities.

SUMMARY

We report a case of dysembryoplastic neuroepithelial tumor in a 5-year old male who initially presented with visual hallucination and seizure. Neurologic examination findings were unremarkable. Radiologic and histopathologic work ups are indeed crucial in clinching the diagnosis. Timely surgical management is still the definitive management with 95% excellent prognosis and no seizure recurrence.

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APPENDIX

APPENDIX 1: Plain and Contrast, Cranial CT Scan Imaging of the Patient

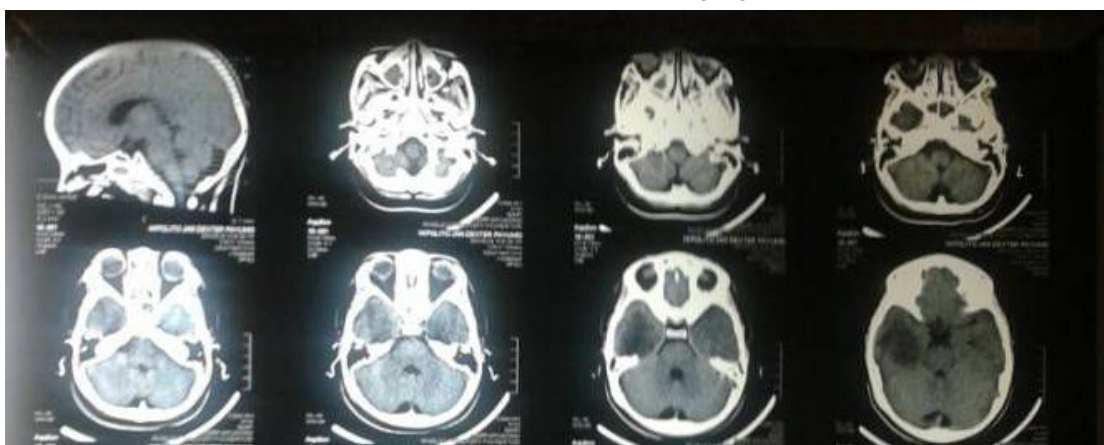


Figure 1a - Plain cranial CT images of our 5-year old patient showing a non enhancing lesion over the right temporo-parietal area as identified by the red arrows.

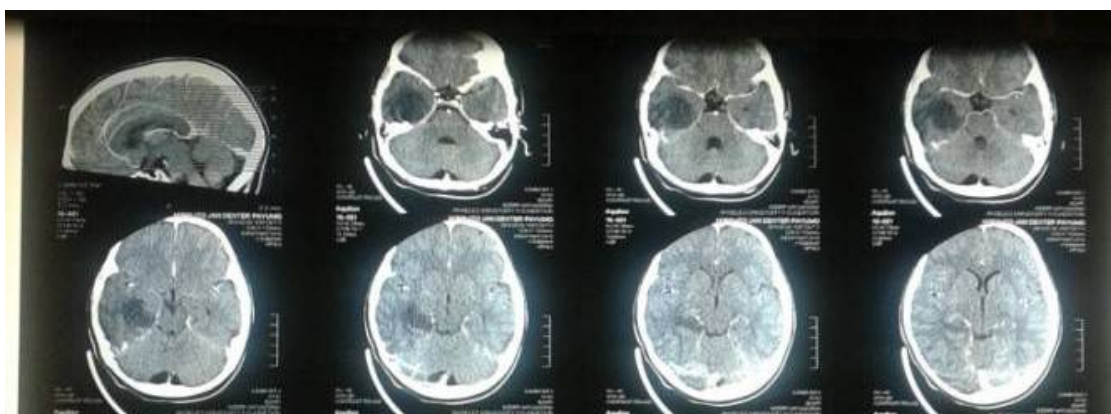


Figure 1b - Contrast cranial CT images of our 5-year old patient showing a non enhancing lesion over the right temporo-parietal areas identified by the red arrows.

APPENDIX 2: Plain and Contrast, Cranial MRI Imaging of the Patient



Figure 2a - Plain cranial MRI images of our 5-year old patient showing a non enhancing lesion over the right temporo-parietal area as identified by the red arrows.

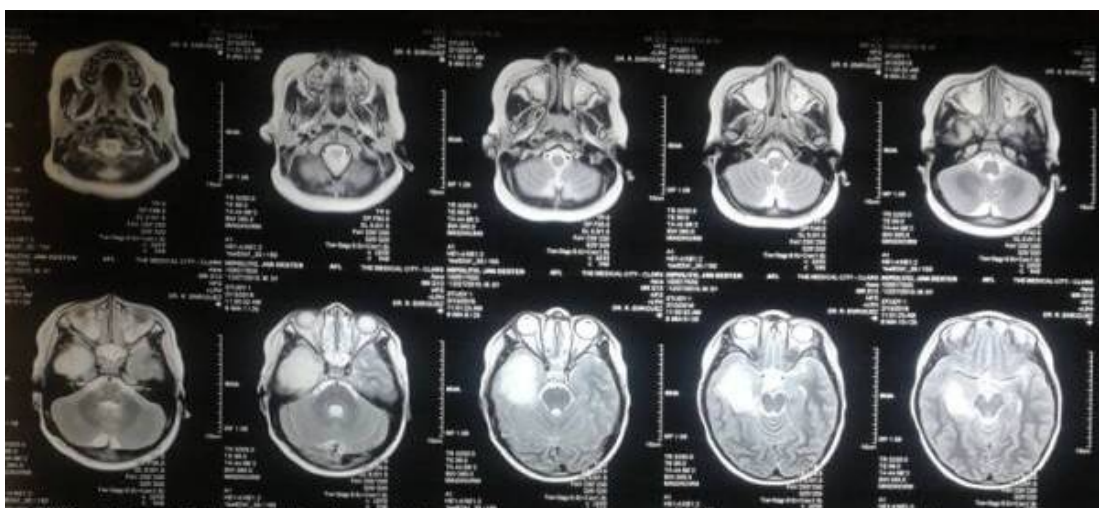


Figure 2b - Contrast cranial MRI images of our 5-year old patient showing a non enhancing lesion over the right temporo-parietal area as identified by the red arrows.

APPENDIX 3: Gross Finding of the Tumor Resected from the Right Intracranial Temporoparietal Area

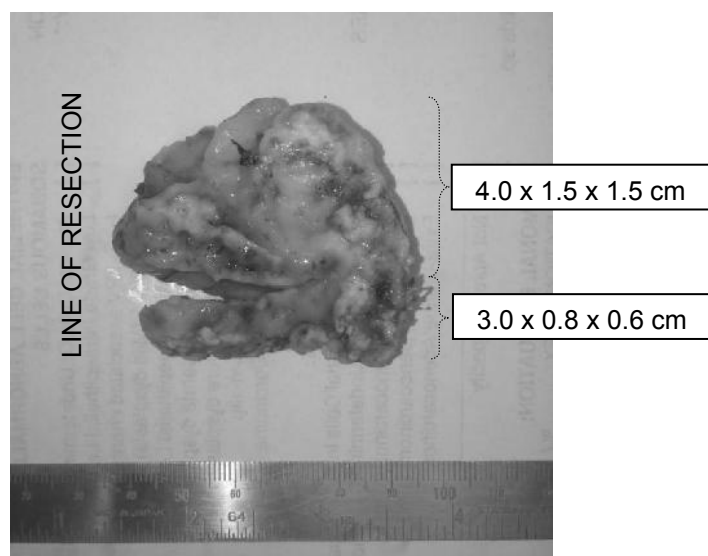


Figure 3 – Tumor resected from the right intracranial, temporoparietal area. The tumor was divided in a sagittal direction from the midline. It grossly appears as a yellowish, L-shaped intracortical mass measuring 4.0 x 1.5 x 1.5 cm along the longer arm and 3.0 x 0.8 x 0.6 cm along the shorter arm. Along the line of resection, a smooth, cream white surface is appreciated.

APPENDIX 4: Histopathology of the Tumor

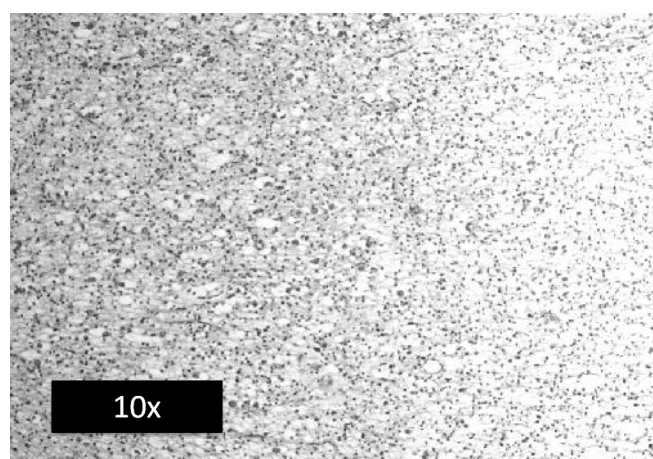


Figure 4a - Microscopic examination shows a nodular intracortical lesion, showing a low- to high-cellularity gradient, which is more evident with 10x magnification

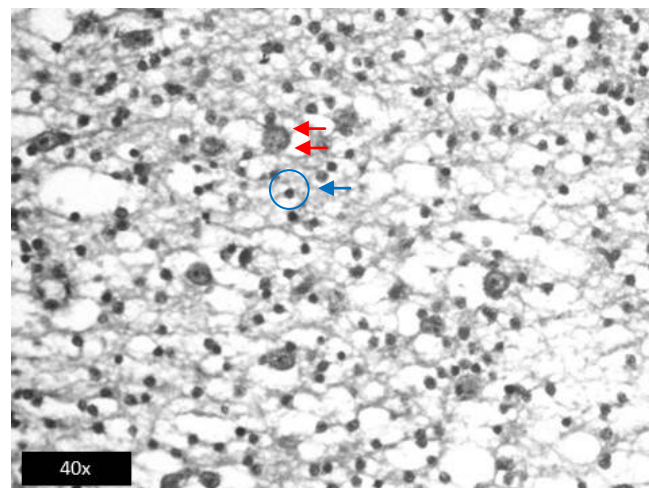


Figure 4b- Showing neurocytic-like cells (red arrow) with axon bundles bordering microcystic spaces in which larger ganglion cells lie, giving it a “floating neuron” effect.

Showing the nuclei of the tumor cells (blue arrow) show no pleomorphism, atypia, or hyperchromasia.

APPENDIX 5: Immunohistochemical Staining of the Tumor

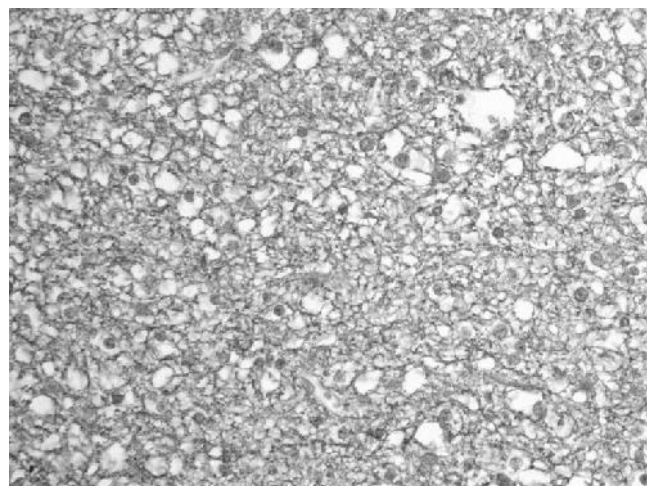


Figure 5a – The following sample has been stained with **glial fibrillary acidic protein (GFAP)**.

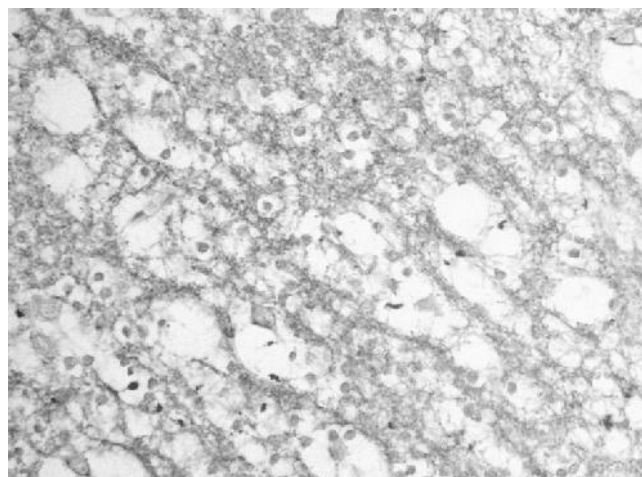


Figure 5b – The following sample has been stained with **synaptophysin**. This immunohistochemical stain highlights oligodendrocyte-like cells, neurons, and parenchyma showing off a granular cytoplasmic pattern

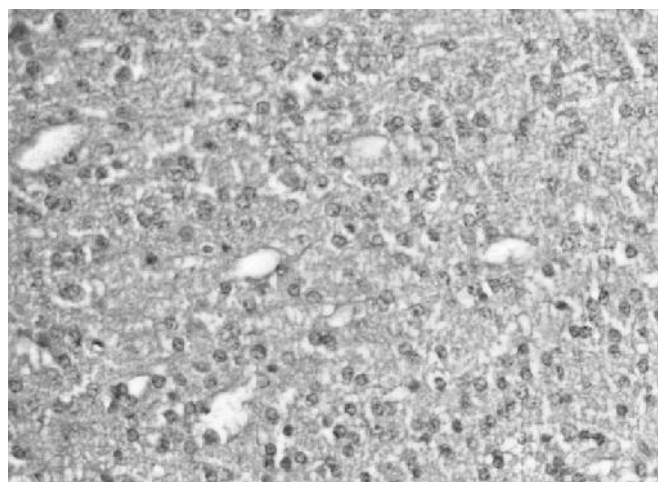


Figure 5c – The following sample has been stained with **Alcian blue**. It highlights mucin-filled cysts. This slide shows uniform oligodendroglioma-like cells in a mucin-rich background.

APPENDIX 6: WHO Classification and Grading of Selected CNS Tumors

WHO grades of select CNS tumours				
Diffuse astrocytic and oligodendroglial tumours				
Diffuse astrocytoma, IDH-mutant	II		Desmoplastic infantile astrocytoma and ganglioglioma	I
Anaplastic astrocytoma, IDH-mutant	III		Papillary glioneuronal tumour	I
Glioblastoma, IDH-wildtype	IV		Rosette-forming glioneuronal tumour	I
Glioblastoma, IDH-mutant	IV		Central neurocytoma	II
Diffuse midline glioma, H3 K27M-mutant	IV		Extraventricular neurocytoma	II
Oligodendroglioma, IDH-mutant and 1p/19q-codeleted	II		Cerebellar liponeurocytoma	II
Anaplastic oligodendroglioma, IDH-mutant and 1p/19q-codeleted	III			
Other astrocytic tumours			Tumours of the pineal region	
Pilocytic astrocytoma	I		Pineocytoma	I
Subependymal giant cell astrocytoma	I		Pineal parenchymal tumour of intermediate differentiation	II or III
Pleomorphic xanthoastrocytoma	II		Pineoblastoma	IV
Anaplastic pleomorphic xanthoastrocytoma	III		Papillary tumour of the pineal region	II or III
Ependymal tumours			Embryonal tumours	
Subependymoma	I		Medulloblastoma (all subtypes)	IV
Myxopapillary ependymoma	I		Embryonal tumour with multilayered rosettes, C19MC-altered	IV
Ependymoma	II		Medulloepithelioma	IV
Ependymoma, RELN fusion-positive	II or III		CNS embryonal tumour, NOS	IV
Anaplastic ependymoma	III		Atypical teratoid/rhabdoid tumour	IV
Other gliomas			CNS embryonal tumour with rhabdoid features	IV
Angiocentric glioma	I		Tumours of the cranial and paraspinal nerves	
Chordoid glioma of third ventricle	II		Schwannoma	I
Choroid plexus tumours			Neurofibroma	I
Choroid plexus papilloma	I		Perineurioma	I
Atypical choroid plexus papilloma	II		Malignant peripheral nerve sheath tumour (MPNST)	II, III or IV
Choroid plexus carcinoma	III		Meningiomas	
Neuronal and mixed neuronal-glia tumours			Meningioma	I
Dysembryoplastic neuroepithelial tumour	I		Atypical meningioma	II
Gangliocytoma	I		Anaplastic (malignant) meningioma	III
Ganglioglioma	I		Mesenchymal, non-meningothelial tumours	
Anaplastic ganglioglioma	III		Solitary fibrous tumour / haemangiopericytoma	I, II or III
Dysplastic gangliocytoma of cerebellum (Lhermitte-Duclos)	I		Haemangioblastoma	I
			Tumours of the sellar region	
			Craniopharyngioma	I
			Granular cell tumour	I
			Pituitary tumour	I
			Spindle cell oncocytoma	I

Source: Louis DN, Ohgaki H, Wiestler OD, Cavenee WK (2016). World Health Organization Histological Classification of Tumors of the Central Nervous System. France: International Agency for Research on Cancer. Retrieved from <http://braintumor.org/wp-content/assets/WHO-Central-Nervous-System-Tumor-Classification.pdf>

