

INFLAMMATORY CONDITION OF THE LARYNX VERSUS A NEOPLASTIC LARYNGEAL MASS: A DIAGNOSTIC DILEMMA

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ABSTRACT

OBJECTIVE: This case report aims to present a case of a 56 year old male presenting with a progressive respiratory impairment, its atypical clinical manifestations, diagnostic dilemma and management.

STUDY DESIGN: Case Report

SETTING: Tertiary Hospital

PARTICIPANT: Single patients

RESULT: This case study described the management and unpredicted outcome of a patient presenting with a laryngeal swelling which lead to a diagnostic dilemma between imaging studies and its microbiologic findings.

CONCLUSION: This paper presented a case of a 56 year old immunocompromised patient presenting with an acute upper airway obstruction secondary to a *Pseudomonas* infection. Repeated direct laryngoscopy with biopsy procedures confirms the presence of the infection despite the CT scan and MRI findings presenting with a soft tissue neoplasm. Prompt tracheostomy tube insertion done was used to secure the airway with adequate antibiotic use prompting gradual resolution of symptoms.

KEYWORDS: laryngeal infections, laryngeal neoplasm, laryngeal swelling, *Pseudomonas aeruginosa* infections, dyspnea, stridor

“Inflammatory condition of the larynx versus a neoplastic laryngeal mass: A diagnostic dilemma”

Inflammatory conditions of the larynx are infamous "copycats" of neoplastic conditions of the larynx. Patients typically present with a classical picture and symptoms identical to those seen in a neoplastic setting, these include dyspnea, hoarseness, painful swallowing, weight loss, and a history of tobacco and alcohol abuse¹. This may cause a medical dilemma in the management of a patient and may mislead proper management. Dyspnea is defined as a subjective experience of breathing discomfort¹² that can be caused by narrowing of the airways secondary to an inflammation or by a presence of an obstructing mass which may necessitate the need for an emergency airway management.

OBJECTIVE

This case report aims to present a case of a 56 year old male presenting with a progressive respiratory impairment, its atypical clinical manifestations, diagnostic dilemma and management.

CASE REPORT

A case of a 56 year old, Filipino, male, was admitted with a history of difficulty of breathing. A day prior to admission, patient started experiencing productive cough associated with occasional episodes of difficulty of breathing, hoarseness and throat

itchiness. No other associated symptoms were noted like fever, sorethroat or difficulty of swallowing. No medical consult was done nor medications taken. Progression of the difficulty in breathing and hoarseness now associated with stridor prompted his consult at the emergency department where the patient was admitted with an admitting impression of community acquired pneumonia.

Patient was previously diagnosed with Hurthle cell adenoma of the thyroid and underwent total thyroidectomy (2008). He is a known hypertensive and diabetic with a heredo-familial predisposition to maternal hypertension and diabetes; he is a non-smoker and an occasional alcoholic beverage drinker.

On physical examination, his vital signs were BP=130/90mmHg, HR=98bpm, RR=24cpm, T=37.5C. Patient was conscious and coherent. Pink palpebral conjunctivae without naso-aural discharge. There was adynamic precordium with a normal heart rate and regular rhythm. Chest has symmetrical expansion, tachypneic with minimal bibasal rales. The rest of the initial physical exam was unremarkable. He was subsequently referred to an ENT where physical examination and indirect laryngoscopic assessment revealed a hyperemic pharyngeal wall with marked swelling of the aryepiglottic folds and a compromised glottic opening (<3mm). Patient was eventually subjected to an 'E' tracheostomy tube insertion to secure the airway.

Initial laboratory diagnostics revealed hemoglobin of 141g/dL, hematocrit of 0.42

and a leukocytosis (14×10^3) with a neutrophilic predominance (0.70) [Appendix A]; fasting blood glucose revealed hyperglycemia (9.2mmol/L). On chest radiography, the patient was noted with streaky, hazed infiltrates in both infrahilar areas (To consider an interstitial process). A contrast-enhanced CT scan of the neck was done with an impression of an ill-defined soft tissue mass with cystic foci along the posterior transglottic region, larger on the right side, with laryngeal thickening or swelling as well as obstruction (To consider an inflammatory process with abscess formation against a laryngeal neoplasm). No bony or cartilage destruction was seen. He was also noted with enlarged lymphadenopathies on the left upper and lower carotid regions on CT [Appendix B].

An esophagoscopy and direct laryngoscopy with biopsy was done and showed a hyperemic pharyngeal wall with swelling of the aryepiglottic folds, true and false vocal cords; glottic airway was obliterated; no definite laryngeal mass or abscess formation was seen while esophagoscopy showed normal findings [APPENDIX C]. A laryngeal specimen was taken for histopathological evaluation which revealed no evidence of malignancy; similar specimen was sent for gramstain, culture and sensitivity and showed heavy growth of *Pseudomonas aeruginosa* [Appendix B]. Patient was started on Imipenem which prompted gradual improvement of symptoms. Blood culture and sensitivity tests showed no growth of microorganisms.

Due to a CT scan consideration of a soft

tissue pathology, an MRI of the neck was done which revealed an ill-defined obstructing, solid mass along the posterior supraglottic and glottic regions, with compression of the hypopharynx (probably neoplastic rather than an inflammatory process); similar nodules or enlarged lymph nodes were noted along the left side of the neck and lower carotid region probably metastatic (thyroid or larynx) [Appendix D].

A repeat esophagoscopy and direct laryngoscopy was done and revealed similar findings of hyperemic pharyngeal wall and an obliterated glottic airway; however, a laryngeal swelling was seen at the anterior commissure of the glottis; still no definite mass or abscess formation was seen; biopsy revealed a necrotizing inflammation of the glottis and subglottis with mild dysplasia (consider pseudotumor) while a separate specimen was obtained from the larynx and hypopharynx which showed chronic inflammation with moderate to severe dysplasia. [Appendix E].

After a week of antibiotic therapy, patient exhibited gradual resolution of symptoms and was discharged; upon follow-up two months post-operatively he was decanulated from his tracheostomy tube which he tolerated well.

DISCUSSION

We are presented with a 56 year old male who was admitted with a history of an acute airway compromise. Causes of an acute

airway compromise. Causes of an acute airway compromise varies, it may be due to an obstructing mass (neoplasm or abscess) or by a narrowing along the airway secondary to an inflammation. The most common etiology of an airway compromise in the elderly is neoplasm rather than inflammatory and such conditions usually exhibit gradual presentation of symptoms. The location of these may be classified as an upper or a lower airway obstruction. Upper airway obstructions include those originating outside the thorax or above the sternal angle (nasopharynx, oropharynx and the larynx); while lower airway obstructions include airway structures below the larynx.¹⁵ Upper airway obstructions may present with an audible stridor, however it is equally important that obstructions from all levels of the airway should be considered. A patient initially presenting with acute symptoms of fever, cough, colds, hoarseness followed by an acute airway compromise may be suspected of an infectious cause.

Initial laboratory diagnostics revealed normal hemoglobin and hematocrit levels while patient was noted with leukocytosis with neutrophilic predominance and this may support the existence of an infection. Moreover, fasting blood glucose revealed hyperglycemia, which contributes to immunosuppression thus placing the risk for developing opportunistic infections. Similarly, on chest radiography, the patient was noted with streaky, hazed infiltrates in both infrahilar areas of the lungs consequently associating the initial impression of a community acquired pneumonia. Laboratory findings at this time

likely points to an infection of the lungs as evidenced by the chest radiographs and blood tests. However, the symptom of stridor may not be explained by the chest x-ray.

Initial indirect laryngoscopic findings revealed that the glottic airway was inadequate, thus tracheostomy was done. A person presenting with an acute airway compromise demands prompt medical attention and rapid assessment in order to establish the need to secure the airway. Tracheostomy is an emergency procedure done to relieve airway compromise that may be due to an obstruction. It is performed by creating an anterior opening at the trachea and inserting and anchoring a tracheostomy tube into it. Its principle is to bypass any obstruction occurring in the supralaryngeal and laryngeal areas thus restoring airflow.

Acute airway diseases such as laryngotracheobronchitis and epiglottitis of which both conditions may lead to fatal respiratory compromise. Laryngotracheobronchitis, more commonly referred to as “croup”, refers to the inflammation or irritation of the larynx and trachea and bronchial passageways. The inflammation is usually due to viral invasion especially that of the Parainfluenza type1. However, this could also be caused by other viruses or rarely by a bacterial infection. It is more prevalent in infants and children between 3 months to 3 years old, most common in males, but may occur at any age. It is usually accompanied by a barking cough and lasts for about 5 days but may persist for 10 days if not given medical attention. The main features of

This condition include stridor, hoarseness, brassy cough, fever and dyspnea. If left untreated, the swelling may extend to the epiglottis which could develop to epiglottitis^{12,13}. Acute epiglottitis is another form of infection of the larynx (epiglottis), it is usually caused by *Haemophilus influenzae* type B (HiB) and may present similarly with stridor, dyspnea, hoarseness, chills, drooling, dysphagia and cyanosis. However, these symptoms were not completely consistent in this patient.

CT scan findings showed a laryngeal mass and a compromised airway. However, direct laryngoscopic findings proved otherwise and showed only laryngeal swelling without a definite mass. MRI confirmed that the soft tissue laryngeal mass seen on CT scan was solid indeed.

The dilemma now raises the question if this is a laryngeal neoplastic process? In order to confirm on the diagnosis based on the suspicion of a solid or a soft tissue mass on CT scan and MRI, repeat esophagoscopy and direct laryngoscopy with biopsy was done. Similarly, the endoscopy yielded similar findings of diffused swelling of the laryngeal structures. Histopathologic report of the biopsy showed chronic inflammation and infection rather than neoplastic.

Radiographic presentation of an inflammatory process versus a neoplasm both present with varying degrees of radioopacity depending on the vascularization of the tissues malignant processes may exhibit parastructural

invasion characterized by hyperdensity of the affected area on a contrast enhanced CT compared to an infectious process (abscess) which may show lesser radioopacity. Theoretically, MRI has a higher diagnostic value on tissue imaging with excellent soft tissue contrast as compared with CT⁹, hence, we usually consider MRI to be of higher specificity in detecting or discriminating different laryngeal tumors. Neither CT nor MRI findings are histologically specific, and similar appearances can be found with hemorrhage, edema, inflammation or fibrosis. Therefore, examination should be correlated with clinical history⁹. Direct laryngoscopy confirmed laryngeal swelling without definitive mass in this patient.

The laryngeal specimen obtained from the patient revealed heavy growth of *Pseudomonas* organism. This finding raise question of where or how could this patient might have acquired the organism? Laryngeal infections related to *Pseudomonas* are unclear as it is unusual. *P. aeruginosa* is a Gram negative, aerobic, coccobacilli and a common human saprophyte, and it rarely causes disease in healthy persons. Most infections by this organism occur in compromised hosts and the most common conditions associated with *pseudomonas* infection include bacteremic pneumonia, sepsis, burn wound infections, meningitis⁸. However, presence of this organism is uncommon in the larynx and blood cultures obtained from the patient turned-out to be negative. Moreover, the presence of diabetes predisposes the patient in an immunocompromised state which eventually leads to the patient acquiring the *pseudomonas* infection.

Two studies reviewed identified pseudomonas infection being inoculated in the larynx by transmission through fomites (endoscopes, laryngoscopes and laryngeal mirrors)^{6,7}. However, Pseudomonas infection and neo-plasm in the larynx is possible and may co-exist. Is this a case of infection and neoplasm that existed at the same time? Vieira (2008) documented a pseudomonal infection which thrived in a malignancy in a larynx⁵; and that immunosuppression, such as in this diabetic patient could be factor why or how the patient acquired the infection.

Furthermore, the subsequent resolution of the mucosal swelling after a week of antibiotic regimen with Imipenem, a broad-spectrum intravenous beta-lactam antibiotic with an important activity against Pseudomonas¹⁰, downplayed the suspicion of a neoplastic process. Then, is dysplastic changes a sign of a neoplasm presented with pseudomonas infection with this patient? Subsequent follow-up of the patient showed improvement of the swelling in the larynx and was well able to tolerate decannulation of his tracheostomy tube.

A study done by Nakagwa (2007)³ described the clinical mimicry of laryngeal infections wherein a rare laryngeal carcinoma presented as a pre-laryngeal large abscess, characterized with a markedly swollen false vocal fold. CT scan indicated destruction of the thyroid cartilage. While biopsies from the abscess did not reveal malignancy however, the malignancy was confirmed by laryngomicrosurgery. The abscess was thought to be formed not by direct extension and necrosis of

the tumor, but by the leakage of air and mucus through the fistula on the destroyed thyroid cartilage³. In this case, repeated direct laryngoscopy with biopsy and esophagoscopy showed inflammatory swelling without evidence of mass or abscess formation.

In another study done by Remacle (1989) he reported a case of laryngeal abscess due to Pseudomonas aeruginosa of the pre-epiglottic space with destruction of the epiglottis and granulomatous reaction of the epiglottic endolaryngeal side. The differential diagnosis of the endoscopic image included neoplasm, granulomatous diseases and laryngeal abscess. Biopsies revealed the diagnosis of laryngeal abscess². Non-neoplastic masses of the larynx caused by infections may be commonly due to tuberculosis, candidiasis or histoplasmosis⁴. The repeated direct laryngoscopy with biopsy confirms the presence of infection or inflammation despite CT scan and MRI findings.

CONCLUSION

In conclusion, this is a case of a 56 year old immunocompromised patient presenting with an acute upper airway obstruction secondary to a Pseudomonas infection. Repeated direct laryngoscopy with biopsy procedures confirms the presence of the infection despite the CT scan and MRI findings presenting with a soft tissue neoplasm. Prompt tracheostomy tube insertion done was used to secure the airway with adequate antibiotic use prompting gradual resolution of symptoms.

RECOMMENDATION

It is therefore recommended that this study increase the awareness of clinicians and that it is possible that pseudomonal infections of the larynx may mimic laryngeal neoplasms which could cause life-threatening upper airway obstruction. Furthermore, diagnostic imaging studies such as CT scan and MRI should be correlated clinically with a well-documented and a complete and thorough physical examination and that a prompt referral to a specialist should be done to provide early intervention to the patients' condition.

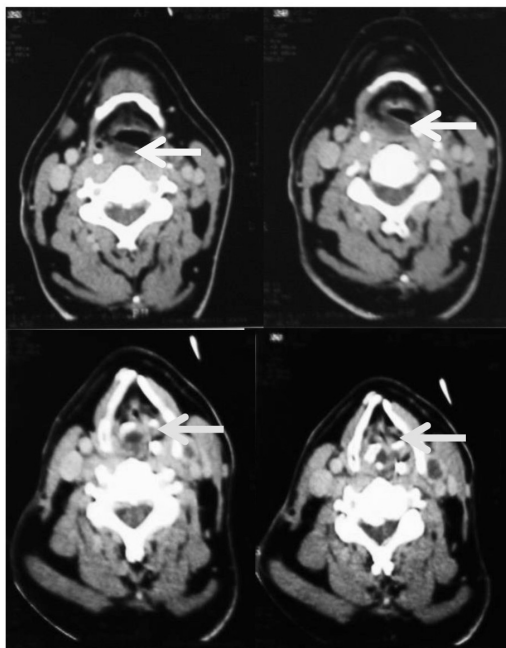
APPENDIX A

Laboratories

	8/12/12	8/15/12	8/21/12	8/23/12	8/23/12	8/26/12	9/2/12	9/9/12	9/9/12
Hemoglobin	141	136	138	131	133	134	127	129	134
Haematocrit	0.42	0.39	0.42	0.39	0.42	0.39	0.38	0.40	0.41
WBC	14.0	14.7	10.2	9.4	12.2	9.7	7.2	6.2	9.1
Neutrophil	0.70	0.73	0.73	0.58	0.61	0.63	0.69	0.56	0.80
Lymphocyte	0.15	0.21	0.20	0.22	0.20	0.19	0.29	0.31	0.13
Monocyte	0.01	0.03	0.07	0.01	0.11	0.11	0.02	0.14	0.04
Eosinophil	0.09	0.03	0.0	0.07	0.06	0.06	0.02	0.0	0.02
Basophil	0.02	0.02	0.0	0.01	0.02	0.0	0.0	0.0	0.02
Platelet	285	351	319	267	298	279	223	289	240
Na (mmol/L)	135.2								
K (mmol/L)	3.78								
Cl (mmol/L)	102.6								
Crea (umol/L)	101.8								
FBS (mmol/L)	9.2								
ALT/SGPT (U/L)	40								
AST/SGOT (U/L)	72								
Cholesterol (mmol/L)	3.9								
Triglyceride (mmol/L)	0.37								
HDL (mmol/L)	1.93								
LDL (mmol/L)	1.8								
Uric acid (umol/L)	325.55								

APPENDIX B

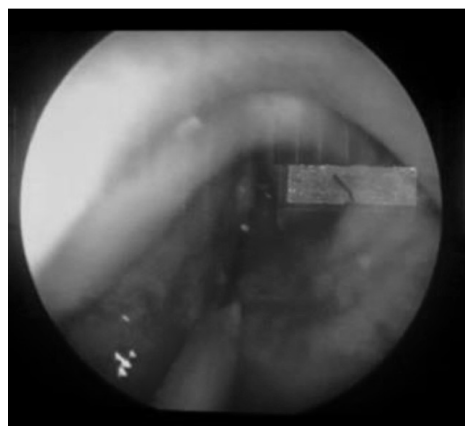
CT scan of Neck (with contrast)



1. Ill-defined soft tissue mass (1.5x2.0x3.0cm) with cystic foci along the posterior transglottic region, larger on the right side with laryngeal thickening/swelling as well as obstruction. To consider: A) Acute inflammatory process with abscess formation, B) Neoplasm. Advise correlation with laryngoscopy.
2. Left-sided enlarged lymph nodes (lymphadenitis or neoplastic) on the left upper and lower carotid regions (1.5x1.2cm to 3.0x2.8cm)
3. Tiny cystic foci in the left laryngeal bed with fibrosis (S/p thyroidectomy)
4. S/p NGT and tracheostomy insertion.

APPENDIX C

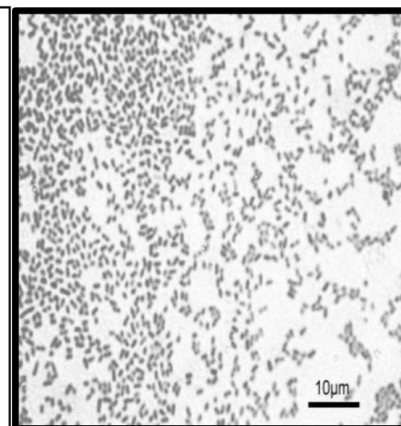
Esophagoscopy and Direct laryngoscopy with biopsy

**Tracheal cartilage biopsy**

No evidence of malignancy

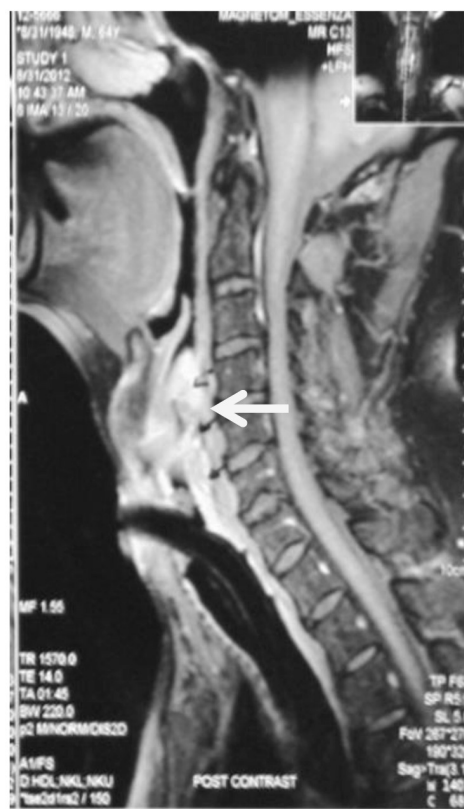
Laryngeal aspirate: GS= Gram (-) bacilli and Gram (-) cocci in pairs

CULTURE: *Pseudomonas aeruginosa* (Heavy growth)



APPENDIX D

Magnetic Resonance Imaging (Neck)

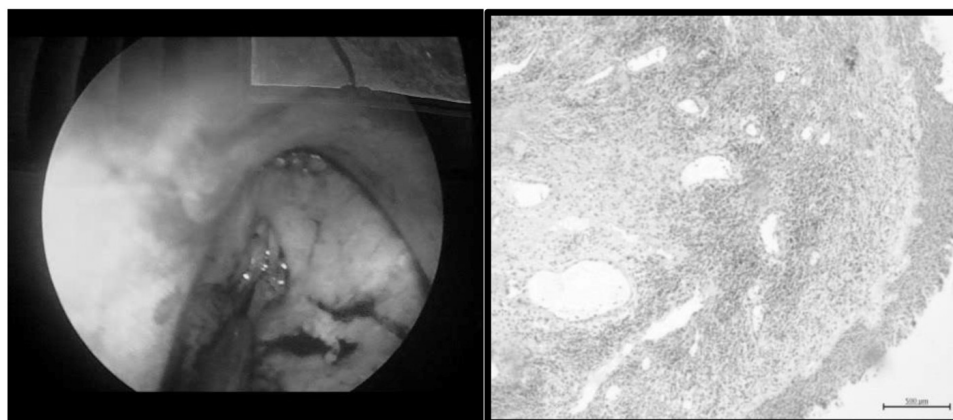


Ill-defined obstructing, inhomogeneously enhancing solid mass (2.0x2.5x3.0cm) along the posterior supraglottic and glottic regions, larger on the right side with focal compression of the hypopharynx, probably neoplastic rather than due to an inflammatory process.

1. Secondary non-specific thickening of the infraglottic mucosa
2. Nodules or enlarged lymph nodes, along the upper posterior cervical space and lower carotid region on the left side of the neck probably metastatic (thyroid or larynx) and lower carotid region (2.0x1.5cm to 3x2.5cm)
3. Residual nodular tissue in the left thyroid bed (3x2cm) (recurrent tumor, Hurthle cell or fibrosis) – S/p Thyroidectomy; right thyroid not visualized
4. Severely-narrowed laryngeal opening

APPENDIX E

Esophagoscopy and Direct laryngoscopy with biopsy



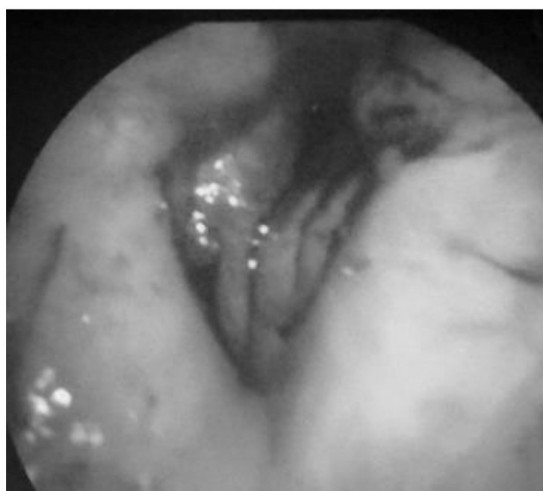
Surgical Pathology Report: Necrotizing inflammation with mild dysplasia

Consider inflammatory pseudotumor, Glottis and Subglottis

Chronic inflammation with moderate to severe dysplasia, larynx and
hypopharynx

APPENDIX F

Flexible endoscopy



Swelling of arytenoids with compromised airway

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