

Trans-cervical ultrasound guided needle decompression of combined laryngocele presenting as acute airway obstruction - a novel approach to a rare condition

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Introduction

The laryngocele, or laryngocele ventricularis as it was first documented, was clinically described by Larrey, a surgeon in Napoleon's army, in 1829 as a compressible pouch related to the thyrohyoid membrane. It was later re-described in its current form and coined laryngocele by Virchow in 1867. A laryngocele is formed by the dilatation of the laryngeal saccule which is an appendix of the laryngeal ventricle and is anatomically located between the false cord and inner surface of thyroid cartilage. This structure communicates with the laryngeal lumen and by definition is filled with air. Developmentally the saccule develops as an out pouching of the laryngeal cavity during the middle of the first trimester of fetal development and is relatively large at birth though continues to regress in size. It is lined by pseudostratified ciliated columnar epithelium and contains numerous mucous glands which produce secretions to keep the true vocal cord moist and lubricated.

Three types of laryngocles have been reported, internal, external and combined, and are named based on their relationship with the thyrohyoid membrane. As the saccule increases in size, it extends medial and superior along the thyroid cartilage until it reaches the thyrohyoid membrane. If the sac remains within the larynx and does not traverse the thyrohyoid membrane is deemed an internal laryngocele. When the sac pierces the thyrohyoid membrane and protrudes into the neck it becomes an external laryngocele. If the sac rests both medial and lateral to the thyrohyoid membrane it is then termed a combined, or mixed, laryngocele. The combined laryngocele is the most commonly diagnosed of the three types and it is estimated that eighty to eighty-five percent of laryngocles are unilateral with no predominance of left vs right side.

The exact incidence of laryngocle is unknown, though it is estimated to occur in 1 out of 2.5 million persons per year globally. It is found to be far more common in males with a 5:1 male to female ratio and its peak incidence is in the 5th to 6th decade of life.



Case

A 72 year old male presented to a rural emergency room with shortness of breath and describing a globus sensation with fullness in his left neck. A computed tomography (CT) scan of the neck was obtained and the patient was found to have a large combined internal and external laryngocele obstructing much of his upper airway (picture 3). He was appropriately stabilized and subsequently transferred to our tertiary care facility where flexible fiberoptic laryngoscopy was preformed and a large mucosally covered mass obstructing the view of the laryngeal introitus was discovered (picture 1). Further physical examination of the left neck revealed a soft, compressible mass adjacent to the laryngeal superstructure, consistent with the known external component of the laryngocele. At the time of examination the patient was symptomatic with stridorous respirations and therefore a bedside endoscopic video assisted trans-cervical ultrasound guided needle decompression of the laryngocele was undertaken.

Utilizing two separate clinicians, the mass was visualized in realtime both internally, via transnasal laryngoscopy, and externally via ultrasound. The skin overlying the ideal penetration point was first cleansed with betadine and locally anesthetized with 1% lidocaine with epinephrine. Observing sterile technique, a 25 gauge catheter-less needle, aixed to a 30 cubic centimeter (cc) syringe via short intravenous extension tubing, was directed under realtime ultrasound guidance into the large external component of the combined laryngocele. A third clinician then aspirated the mass via the syringe until the external component was found to have collapsed via realtime ultrasound imaging. The needle was then advanced through the thyrohyoid membrane into the internal component of the combined laryngocele and it was again aspirated. The mass was noted to fully collapse via ultrasonographic findings as well as direct visual confirmation via transnasal laryngoscopy. Ultimately the laryngeal introitus was plainly visualized (picture 2) and the patient's symptoms spontaneously resolved. In all, a total of 90 cc of air was removed from the laryngocele.

The patient was observed for several days and gradually had a recollection of air and increase in symptoms. At that time he was then taken to the operating room where the aforementioned procedure was repeated to allow unobstructed visualization of the larynx and easy endotracheal intubation. A formal approach to include tracheotomy with trans-cervical decompression and excision of left external/internal laryngocele with left lateral thyrotomy was then completed. The patient recovered uneventfully in the hospital and was subsequently decannulated two weeks post surgery without complication.

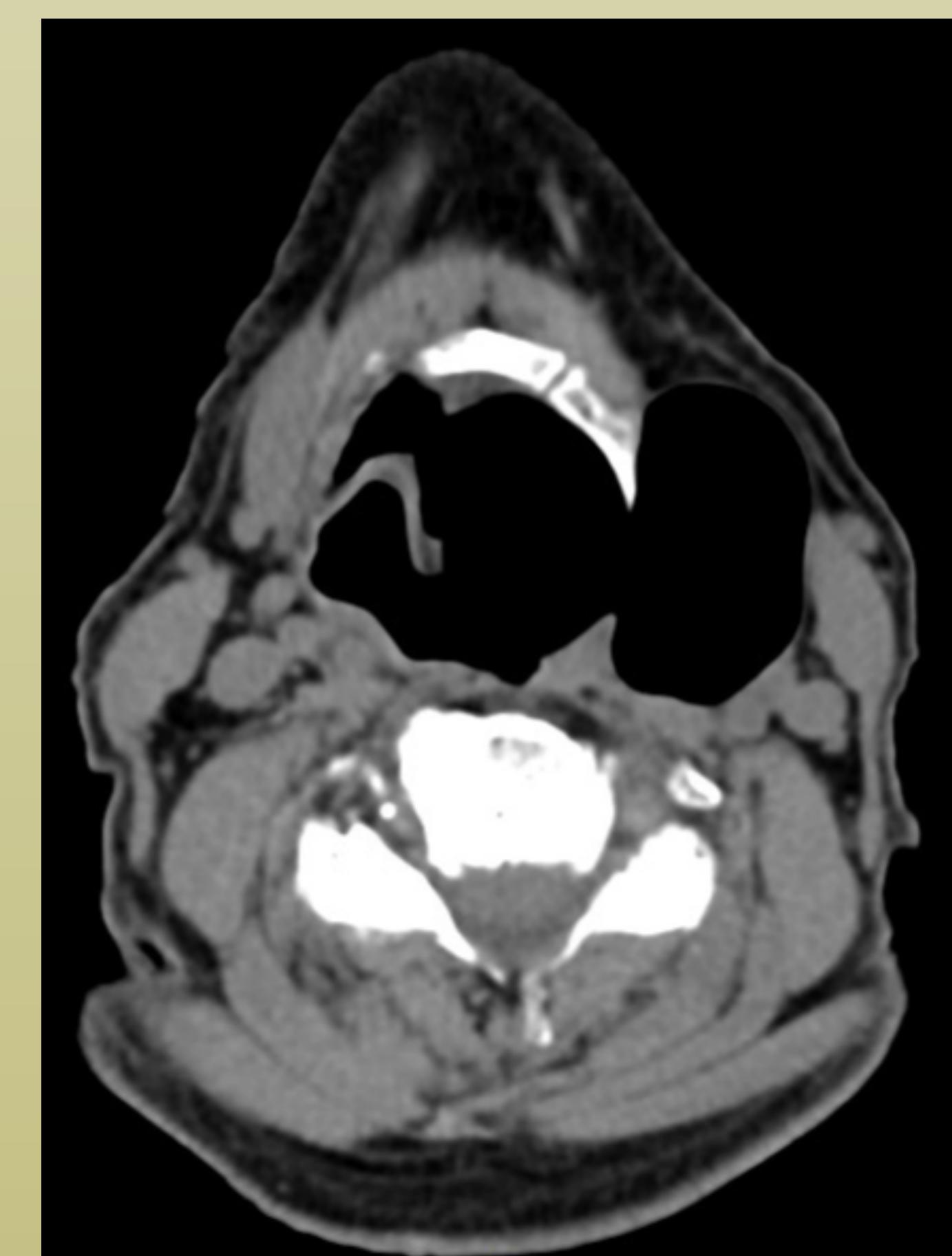
Upon repetitive outpatient follow up no visual or symptomatic recurrence has been noticed, now one year post operatively.

Discussion

Historically patient's with obstructing laryngocles have been managed with emergent intubation and/or tracheotomy. As thoroughly documented throughout the literature, emergent airway management carries with it a significant risk in morbidity and mortality. This novel approach negates the need for traditional emergent airway management and allows the patient to control their own airway while simultaneously relieving the patient of said obstruction. As with any procedure this too carries potentially significant risks, which can include airway compromise, hemorrhage, and/or infection. Due to the uniqueness of the procedure it also requires clinicians who are familiar with the relevant anatomy as well as with performing ultrasound guided procedures.

In the future, this technique likely has application in patients suffering from obstructing internal laryngocle alone. The procedure has potential limitations when applied to laryngomucoceles or laryngopyoceles as the contents may be to thick for easy aspiration via a small needle and increasing the diameter of the needle will likely have a direct increase in the risk of complication.

Upon an exhausting review of the available literature it was not found where this method had previously been described and therefore we feel it to be the first report of an endoscopic video assisted trans-cervical ultrasound guided needle decompression of an obstructing combined laryngocle.



Abstract

A laryngocle is an inherently rare entity, only occurring in an estimated 1 out of 2.5 million people per year. The classical presentation is that of a benign dilatation of the laryngeal saccule occurring in patients who routinely increase their intra-laryngeal pressure, such as in glass blowers, those with chronic cough, or in patients who play wind instruments. It has been reported that large internal and/or combined laryngocles can be a source of acute upper airway obstruction; however, in the reported cases, affected patients are able to be intubated or undergo emergent tracheotomy in an effort to bypass the obstruction. This report is the first to describe a patient with a large obstructing combined internal/external laryngocle urgently managed with endoscopic video assisted trans-cervical ultrasound guided needle decompression of the laryngeal saccule providing relief to the patient's obstructive symptoms without need for further intervention thru intubation or tracheotomy. This discussion will address traditional management of laryngocle, including those presenting with acute airway obstruction, together with a description of this novel technique.

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