Case Report

Intravenous Neck Injections in a Drug Abuser Resulting in Infection of a Laryngocele

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A pyolaryngocele is an uncommon complication of a laryngocele that has become infected. We present a case of a pyolaryngocele that was probably due to repeated injections in the neck veins. The pathogenesis, clinical features and management are discussed in detail. [*Asian J Surg* 2005;28(1):41–4]

Key Words: pyolaryngocele, laryngocele, laryngeal carcinoma, neck mass, surgical management

Introduction

Pyolaryngoceles are considered a clinical rarity and only 34 cases have been published up to the time of writing. Abnormal dilatation of the saccule forming an air sac in contact with the laryngeal opening is called a laryngocele. A laryngomucocele is a laryngocele filled with mucus. An infective process occurring within a laryngomucocele is called a pyolaryngocele. We present a case of pyolaryngocele in an intravenous drug abuser who injected into neck veins. He presented with a neck swelling and subacute airway obstruction.

Case report

A 40-year-old Sikh male lorry driver presented with a progressively enlarging, painless left neck mass over a 2-month period. Subsequently, he developed hoarseness followed by worsening stridor over the next month. There was associated low-grade fever for which he was prescribed oral antibiotics. However, this did not resolve his symptoms.

In the previous year, he had noticed a similar swelling, but that had resolved spontaneously after a course of antibiotics without any complications. A point of interest was that he had been an intravenous drug abuser for more then 10 years and had injected drugs directly into the major vessels of the neck (jugular veins) and lower limbs (femoral veins), as all other peripheral veins were already difficult to access.

A soft, cystic swelling measuring about 5 × 4 cm was palpable on the left lateral aspect of the neck anterior to the sternomastoid but displacing the muscle posteriorly. The mass and the skin overlying it did not show any signs of inflammation, but there was tenderness on deep palpation.

Laryngeal endoscopy revealed a smooth bulging mass in the left supraglottic region, which probably arose from the ventricle, extending superiorly. This caused the epiglottis and the laryngeal inlet to be pushed to the right and resulted in partial obstruction of the airway. The appearance of the true cords as well as the subglottic region was normal except that movement of the left vocal cord was hindered due to the presence of the mass.

Routine blood investigations were essentially normal except for leucocytosis; hepatitis and retroviral screening were also negative. Computed tomography (CT) showed a fluid-filled mass arising from the larynx and extending through the thyrohyoid membrane into the external soft tissue plane (Figures 1 and 2).

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He was started on intravenous antibiotics and surgery was performed after 48 hours as there was no clinical improvement. During the watchful waiting period, there was no further deterioration in airway obstruction. Diagnosis of a pyolaryngocele was made and the mass was excised using a transcervical approach. The mass was separated from the surrounding structures up to the thyroid cartilage. The upper half of the ala of the thyroid cartilage was excised to gain access to the internal component. The entire sac was removed without breaching the laryngeal mucosa or damaging the superior laryngeal neurovascular bundle. Direct laryngoscopy after closure of the external wound showed that the larynx and the surrounding structures had almost retained their normal anatomy except for minimal oedema over the left supraglottic area.

On opening the sac, we found it filled with thick yellowish material (Figure 3). Histological examination showed a fibrous-walled cyst filled with leucocytic material. There was no evidence of malignancy. Material sent for cultures and test for acid-fast bacilli was negative. The postoperative period was uneventful and the patient was well on subsequent follow-up, with no evidence of recurrence.

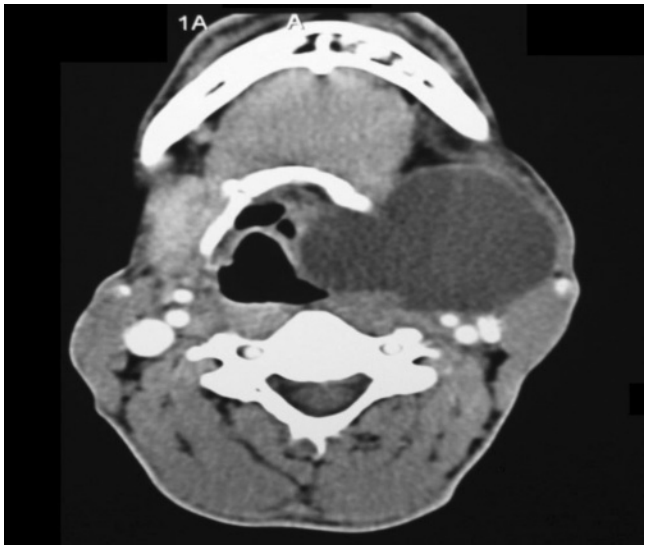

Figure 1. Axial computed tomography scan of the neck showing a fluid-filled mass arising from within the larynx extending to the laterocervical region of the neck and pushing the sternocleidomastoid posteriorly and shifting the larynx to the contralateral side.

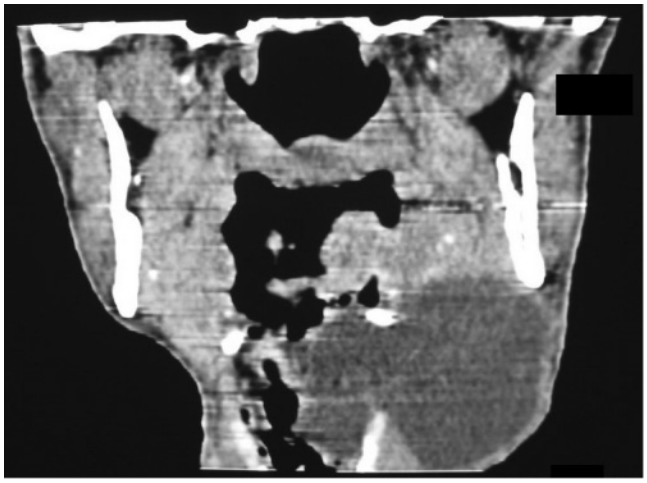

Figure 2. Coronal computed tomography scan showing the mass arising from the left ventricle of the larynx passing through the thyrohyoid membrane to reach the lateral aspect of the neck.

Discussion

The laryngeal ventricle has been described as a horizontally arranged, elliptical orifice extending from the notch in the thyroid cartilage to the anterior edge of the arytenoid cartilage. The extension from its base is called the saccule or appendix of the ventricle.[1] It lies between the medial surface of the thyroid lamina and the ventricular fold. When the saccule dilates excessively, rising higher than the upper border of the thyroid cartilage, it forms a laryngocele.[2] Virchow coined the term laryngocele in 1867, but Dominique Larrey reported this condition as early as 1829.[3] Laryngoceles can be internal, external or mixed. An internal laryngocele is confined to the interior of the larynx and extends posterosuperiorly into the false vocal cord and aryepiglottic fold. An external laryngocele extends superiorly to appear as a lateral neck mass through the opening in the thyrohyoid membrane for the superior laryngeal neurovascular bundle. It is called a mixed laryngocele when both features are present. The incidence of laryngoceles is estimated at 1 in 2.5 million persons per year, with internal laryngoceles accounting for 30%, external 26% and mixed 44%.[1,3–5] Of these lesions, 15% are bilateral and approximately 10% become infected to form a pyolaryngocele.[6]

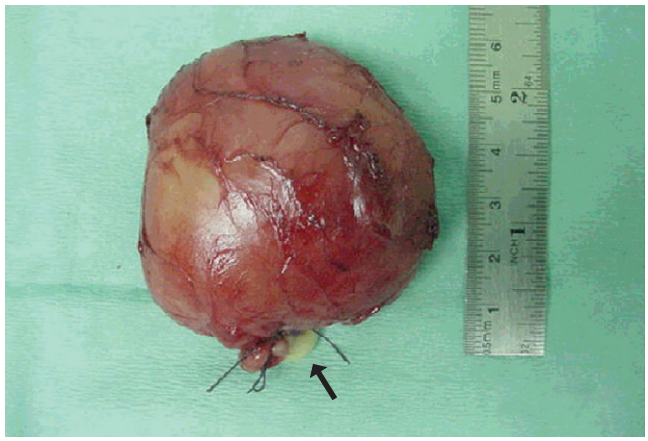

Figure 3. The sac removed in its entirety. Thick yellowish discharge can be seen oozing from the sac (arrow).

The most important factor in the aetiology of a laryngocele is a dilated saccule,[1,3,7] though there may be other factors contributing to the aetiology, such as laxness of the thyrohyoid membrane, weakness of thyroaryepiglottic muscles, and thinness of the periventricular connective tissue.[1] Increased endolaryngeal pressure, as seen in glass blowers, wind instrumentalists, singers and voice abusers such as vendors and drill instructors, may contribute to the formation of a laryngocele.[1,4] It is widely accepted that an increase in the intraglottic pressure during exhalation results in increased pressure within the ventricles, causing them to progressively dilate.[1,3] However, local laryngeal pathology may be the determinant of the pathogenesis of the disease, including chronic inflammation, vocal cord surgery, laryngeal trauma and carcinoma.[1,3,8] This association is clearly evident from the simultaneous presence of laryngeal carcinoma and laryngoceles described by Marschik in 1927.[2] The incidence of laryngeal carcinomas in laryngoceles varies between 0.16% and 18%.[9] Whether a tumour involving the ventricle and causing obstruction of the neck of the saccule results in a laryngocele or a pre-existing laryngocele that may cause chronic inflammation results in squamous metaplasia and carcinoma, the close relationship between laryngocele and laryngeal cancer is undeniable.[9,10] Hence, a detailed inspection of the ventricle is warranted in any patient presenting with a laryngocele, to exclude occult carcinoma.

Constriction of the neck of the saccule may give rise to the formation of a laryngomucocele. DeSanto described the progression from a simple laryngocele to a pyolaryngocele.[2] For this to occur, there needs to be a pre-existing laryngocele that, due to stasis of glandular secretions, has resulted in a laryngomucocele. Mucus stasis and altered mucociliary clearance could lead to bacterial infection resulting in a pyolaryngocele. It is probable that our patient had a pre-existing asymptomatic laryngocele that became secondarily infected due to contamination from needle insertion. We were not able to culture any organisms from our patient, but this can be explained by the fact that he had already been on antibiotics prior to admission to our centre and he was also started on broad-spectrum antibiotics before surgery. Common bacteria implicated in pyolaryngocele are *Staphylococcus aureus*, haemolytic *Streptococcus* B, *Escherichia coli* and *Pseudomonas aeruginosa*.[1]

The presenting features may vary significantly depending on the size of the laryngocele itself. They include hoarseness, cough, foreign body sensation in the throat, varying degrees of airway obstruction, stridor, dysphagia, pain and, if it is of the external variant, an anterolateral neck mass.[4,7,10] Sometimes, diagnosis is made using a simple test to look for a lateral neck mass anterior to the sternomastoid that increases in size with the Valsalva manoeuvre and causes a hissing sound when compressed during exhalation, the so-called Bryce's sign. Hoarseness seems to be the predominant symptom in most cases in the literature, rather than airway obstruction. Although we expect a large pyolaryngocele to cause significant airway obstruction, this was not seen in our patient. With careful observation, antibiotics and maybe even with repeated aspiration, a tracheostomy can be avoided.[4,7]

CT scan is indicated to confirm the diagnosis; it also defines tumefaction content and the relationship with the laryngeal ventricle and thyroid membrane and may detect the presence of a carcinoma. Radiological signs of inflammation such as thickening of the walls or rim enhancement of the laryngocele may be demonstrated in pyolaryngocele. CT scan also helps to differentiate the mass from other neck masses such as cystic hygroma, thyroglossal duct cyst, branchial cysts, paraganglioma, schwannoma, lipoma, parapharyngeal abscess and cervical lymphadenopathy. Neck ultrasound may be useful in determining the content and dimensions of the mass and also help in aspiration of purulent content.[1,7]

Although various treatment options have been advocated in the literature, there are basically two approaches, endolaryngeal and transcervical. The endolaryngeal approach is limited to small and moderate-sized internal laryngoceles. However, in pyolaryngoceles, an external approach is more popular, although endoscopic management has been described for combined laryngocele.[4] The transcervical technique described by Stell et al was used in our patient.[5] Through a collar incision, the sac was identified and exposed up to the thyroid cartilage. The perichondrium was elevated and the upper half of the ala of the thyroid cartilage was excised to facilitate removal of the sac from the saccule. The perichondrium was then replaced over the defect and the wound was closed.

The preoperative evaluation in this patient identified evidence of an infected laryngocele. This enabled appropriate surgical treatment to be performed, safely removing the cyst as opposed to incision and drainage, which would have left the cystic structures in place, increasing the risk of recurrence.

Conclusion

In a patient presenting with fever, hoarseness, neck mass and stridor, though rare, the possibility of an infected laryngocele

should be kept in mind. In this case, the history of injecting drugs into the neck veins may have contributed to the infection in an asymptomatic pre-existing laryngocele. The preoperative evaluation and CT scan were useful in confirming the diagnosis of an infected laryngocele and, thus, enabled us to make the appropriate surgical decision. A tracheostomy may not be indicated in all cases, depending on the severity of airway obstruction. Other methods such as aspiration can be used to reduce the swelling initially to avoid a tracheostomy. Surgery remains the definitive management for this condition at present.

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