

Case Report

CO₂ laser: a novel approach for vallecular cyst excision in pediatric population

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ABSTRACT

In the pediatric population, vallecular cysts are most commonly found at the base of the tongue and the vallecula. They may present with sudden, life-threatening airway obstructions due to their anatomical position. A 4-year-old presented with a change in voice from the past 2 months and was diagnosed with a vallecular cyst. The patient was planned to undergo CO₂ laser micro-laryngeal surgery due to its precision and accuracy. In postoperative studies, the emerging CO₂ laser technology demonstrated superior results. In particular, in complex cases, this innovative approach has the potential to achieve the desired results.

Keywords: Vallecular cyst, Ductal cyst, Base of tongue cyst, Mucous retention cyst

INTRODUCTION

Vallecular cyst also known as ductal cyst, base of tongue cyst, or mucous retention cyst is uncommon but not entirely a rare condition, which is usually presented by stridor.¹⁻³ It is usually formed by the obstruction of the collecting ducts of the submucosal gland.¹ They usually arise from the lingual surface of the aryepiglottic fold or the ventricle and the pyriform sinus.² The incidence of laryngeal cysts is 5% out of which vallecular cysts make 10.5% of all congenital laryngeal cysts. They are reported to be distended ducts and not sacs due to their histological description- which is usually of typical squamous, respiratory epithelium and not of acinar type.¹ In children vallecular cysts are most commonly found at the base of the tongue and the vallecula.¹ Due to their anatomical position, they can present with sudden life-threatening airway obstructions.² They can be presented by a myriad of symptoms like stridor, frequent URTI, failure to thrive, apnea, hoarse cry, difficulty to thrive, and voice change.^{1-3,8,14} Stridors in an infant can present with various pathologies like laryngomalacia,

tracheomalacia, vocal cord paralysis, and subglottic stenosis.⁹

Congenital vallecular cysts have an incidence of 1.8-5.3 cases among 10000 births.^{6,9}

CASE REPORT

A 4-year-old female child presented with a main complaint of change of voice from the past 2 months not associated with a history of difficulty to thrive, post-feed vomiting, or difficulty swallowing. On examination, incidental finding of vallecular cyst was noted which was easily visible when the patient was asked to open her mouth and was further confirmed with fiberoptic laryngoscopy. Upon further examination, she was associated with inspiratory stridor without any chest or substernal retractions. The patient was maintaining 99% SpO₂ on room air. The patient wasn't cooperative for any preoperative imaging investigations so CT scan/ MRI scan reports are unavailable. Elective CO₂ laser excision of the vallecular cyst was planned after a detailed

discussion with the patient's family. Intubation was done using a fiber optic video laryngoscope which confirmed the location of the cyst and allowed safe passage of the endotracheal tube without damaging any surrounding structures.

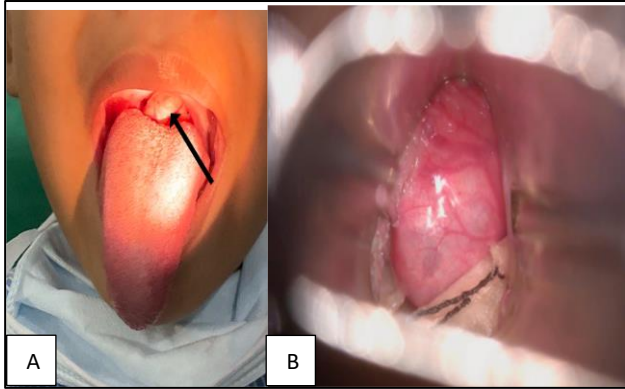


Figure 1 (A and B): Preoperative visualization upon examination and direct laryngoscopic image.

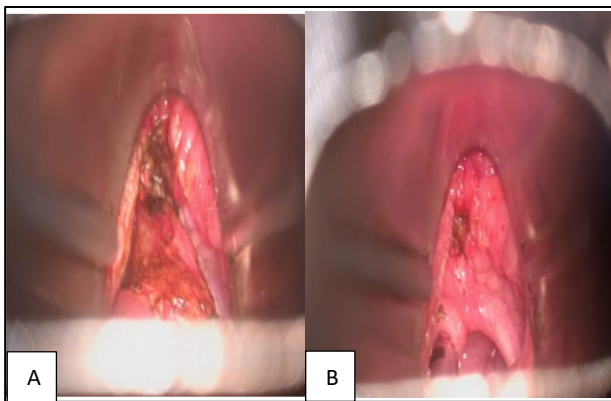


Figure 2 (A and B): Intra-op CO₂ excision.

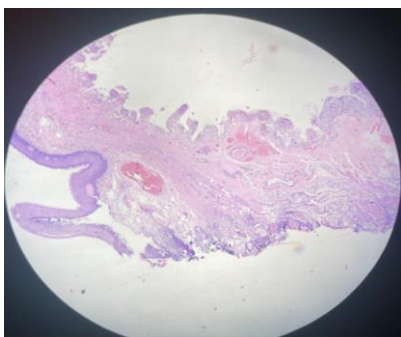


Figure 3: Pseudostratified columnar epithelium with dense lymphocytic infiltrate.

A direct laryngoscopy was done and fixed with a chest piece. Upon complete visualization of the cyst, CO₂ LASER was used to excise the cyst in toto. The entire procedure was completed in an hour timespan with the patient noting immediate improvement in voice postoperatively. The patient had minimum pain

perception and was on an oral diet 4 hours after the procedure. A follow-up fiberoptic laryngoscope was done 7 days after the procedure which showed complete recovery in the surgical site region without any evidence of scarring/iatrogenic trauma in the region.

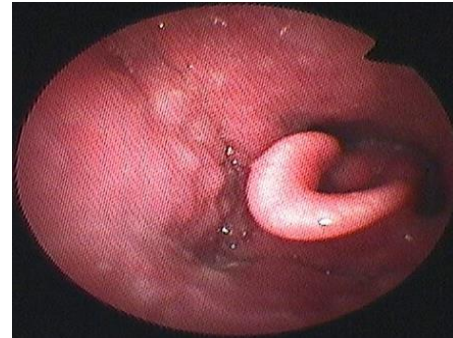


Figure 4: Post operative FOL image.

DISCUSSION

A vallecular cyst is a translucent smooth unilocular mass that contains clear non infected fluid.^{3,11} These lesions are usually fluctuant and mucocoele may appear at palpation of vallecular cysts which are benign and are not associated with other anomalies or syndromes. They can infect and lead to acute epiglottitis with or without abscess.⁴ They can occur at any part of the larynx except the free edge of vocal cords.⁵

Vallecular cysts displace the epiglottis posteriorly and inferiorly which is why it presents as an episode of apnea and cyanosis which inevitably leads to increased inspiratory negative pressure and presents as the development of laryngomalacia due to supraglottic prolapse.^{3,4,11}

The earlier techniques consisting of the transoral medial glossectomy approach and trans hyoid approach have increased the risk of prolonged intubation and the need for postoperative tracheostomy and very rarely cutaneous fistula.¹ Infants are usually diagnosed between birth and 16 weeks of age.² Delayed diagnosis leads to progressive worsening of swallowing dysfunction, aspiration and airway obstruction.² Airway obstruction can present as choking, postprandial vomiting, coughing, and hoarse crying.^{3,4}

Diagnosis is made through direct visualization-where fiber-optic nasolaryngoscopy is a good instrument and now is also considered a gold standard.^{3,6} FOL, CT, MRI, and USG of the neck would be a useful assessment of the vallecular cyst.³

CT scan would suggest an ovoid non-enhancing lesion at the level of the epiglottis but MRI is the radiologic test of choice as it determines the size of the cyst.^{3,10} Histopathological examination would involve

pseudostratified columnar epithelium with dense lymphocytic infiltrate within the subepithelium.³ It is important to consider this condition in the differential diagnosis when the infant presents with difficulty breathing, failure to thrive.^{2,3} Intubation is difficult and may cause aspiration of its contents without visualization and hence intubation under complete visualization is the preferred technique.⁴

Surgical approaches are considered as the best methods and complete removal is the treatment of choice in congenital laryngeal cysts.^{8,9} Treatment includes cyst aspiration, marsupialization, deroofting of the cyst, and complete excision and vaporization.^{3,4} External approaches are required only when there are recurrent lesions and the cyst needs to be removed completely.³

A direct transoral approach is recommended as it is a safe and reliable method.³ Compared to other techniques, cold steel surgery carries the drawbacks of increased bleeding, incomplete tissue excision, compromised visualization due to blood, and a higher possibility of secondary hemorrhage. And on the other hand, along similar lines Endoscopic ablation has minimum postoperative edema, early extubation, and recovery periods but has Limited exposure, difficulty in bleeding management, and a need for adequate equipment, bulky nature of the instrument, is expensive and the risk of thermal or airway injury is the principal disadvantage of such procedures.^{4,10}

Use of CO₂ laser is recommended because they are less invasive, offer a remote access and healing is fast compared to other lasers used in ENT.^{3,4} They have ablative and hemostatic properties which allow control over the depth of penetration into the tissue. Equipped with unparalleled precision the scanner provides char-free ablation, vaporization, excision, or incision of soft tissues.¹⁴

CONCLUSION

The confined operating field within the larynx and the crucial need to avoid bleeding posed significant hurdles during this delicate surgery. But the unique characteristics of a CO₂ laser were apt for such complex surgeries. Its ability to vaporize tissue with minimal thermal spread reduced collateral damage, while its cauterizing effect effectively suppressed bleeding. In this complex case, these advantages have led CO₂ laser microlaryngoscopic to be the most suitable option for achieving the desired results in the pediatric and adult population.

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