

Larynx Microsurgery in Saccular Cysts and Laryngoceles

Carlos S Ruggeri* and Dora Cristina Latourrette

Head and Neck Section of the Otorhinolaryngology Department of the Hospital Italiano of Buenos Aires, Argentina

***Corresponding Author:** Carlos S Ruggeri, Head and Neck Section of the Otorhinolaryngology Department of the Hospital Italiano of Buenos Aires, Argentina.

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Abstract

Objective: To determine the efficiency of different microsurgical approaches in treating patients with saccular cysts and internal or mixed laryngoceles.

Design: Descriptive and retrospective

Methods: Patients who had internal or mixed laryngoceles and saccule cysts and were treated with endolaryngeal microsurgical techniques between October 2009 and May 2019 were selected.

The surgeries consisted in marsupializing the cysts towards the air space of the larynx or removing them completely.

Cold instruments for laryngeal microsurgery, 24cm monopolar electro-surgical unit and CO₂ laser were used.

The surgery was considered successful when the patient had no more symptoms and when no laryngoceles or cysts were detected in the controls.

Results: Nine patients were treated for internal or mixed laryngoceles and saccular cysts.

Three had right internal unilateral laryngoceles, two had bilateral mixed laryngoceles with a small external component, and four had saccular cysts.

The most frequent reason for consultation was dysphonia, and one patient had an acute laryngeal obstructive syndrome that required urgent intubation and hospitalization in an intensive care unit.

In seven patients, the saccular cyst and laryngocele were completely resected, and in two others, the marsupialization microsurgical technique was performed.

One patient had no improvement in his symptoms due to persistent laryngocele.

Conclusions: The efficacy of the different laryngeal microsurgery techniques used to treat saccular cysts and laryngoceles was very good, reaching an effectiveness rate of 88.88%.

Superpulsed CO₂ laser larynx microsurgery is the ideal technique due to its effectiveness and low morbidity for treating saccule cysts and internal or mixed laryngoceles with a small cervical component.

We believe that complete resection of the saccular cyst or laryngocele decreases the possibility of recurrence.

Keywords: Larynx Microsurgery; Saccular Cysts; Laryngocele; CO₂ Laser

Introduction

Saccular cysts and laryngoceles are originated from the saccule, located in the anterior sector of the laryngeal ventricle, and can be extended towards the supraglottis, medially towards the glottic lumen, and laterally towards the paraglottic space and/or the neck.

Some may be asymptomatic but if they grow or expand due to the accumulation of mucous or mucopurulent secretions, they can produce different degrees of inspiratory dyspnea.

Treatment is surgical and can be performed through an external or transoral approach, depending on the location and size of the cysts and the experience of the surgical team.

In internal or mixed laryngoceles with little cervical extension, microsurgical techniques performed transorally are the choice to treat these tumors [1].

Objectives

To determine the efficiency of different microsurgical approaches in treating patients with saccular cysts and internal or mixed laryngoceles.

Methods

A descriptive and retrospective study was done.

Patients who had internal or mixed laryngoceles and saccule cysts, who were treated with transoral laryngeal microsurgery techniques in the otorhinolaryngology service of the Hospital Italiano de Buenos Aires between October 2009 and May 2019, were selected.

Laryngocele was defined as an abnormal dilatation of the saccule located in the laryngeal ventricle. They can be internal, located within the ventricular band in the paraglottic space, medial to the thyrohyoid membrane, or mixed when they extend superiorly and protrude through the thyrohyoid membrane towards the neck.

Saccular cysts also arise from the saccule, which contains mucous glands and can extend into the paraglottic space and also towards the aryepiglottic fold.

The difference between both lesions is that laryngoceles have communication with the air space of the larynx (Figure 1).

Figure 1: Computed tomography: right internal laryngocele is observed (communication of the air sac with the lumen of the larynx).

All patients were evaluated by rhinofibrolaryngoscopy or videostroboscopy of the larynx, and computed tomography (CT) and magnetic resonance image (MRI) of the neck with contrast.

All patients were operated under general anesthesia by transoral approach and remained hospitalized in a common room or in the intensive care unit.

A Kleinsasser-type suspension laryngoscope of different diameters and bivalve laryngoscope, a microscope with a 400 mm lens at different magnifications, conventional instruments for laryngeal microsurgery, a 24 cm monopolar electrocautery, and a CO₂ laser with superpulse in continuous mode were used.

Protected endotracheal tubes were used in surgeries performed with CO₂ laser or monopolar cautery, and during anesthesia an O₂ concentration of less than 30% was used to reduce the chances of ignition.

The equipment used to perform the microsurgery varied in relation to the time: cold instruments and monopolar electrocautery were used before 2013 and then we added the CO₂ laser.

The surgeries consisted of marsupializing the lesions, resecting the ventricular band and communicating them with the air space of the larynx, or removing the entire cystic sac.

To make the incision, resection of the ventricular band and dissection of the air sac, a 24 cm monopolar electrocautery with intensity 12 or CO₂ laser with superpulse in continuous mode at 5 watts were used. If greater coagulation was needed, the laser was defocused (Figure 2, 3).

Figure 2: Saccular cyst: A-B: MRI where a cystic lesion with mucus content located in the right ventricular band is observed, C: Endoscopic view of saccular cyst, D: Total resection with CO2 laser: incision in the ventricular band, E: Resection of the ventricular band and cyst: mucus drainage is observed, F -G: Complete resection of the saccular cyst: the paraglottic space and the intact vocal cord are observed after resection.

Figure 3: Posterolateral saccular cyst: A-B-C: CT showing a saccular cyst with location in the paraglottic space, aryepiglottic fold and preepiglottic space, D: Dissection and complete resection of saccular cyst.

Controls were performed by rhinofibrolaryngoscopy, videostroboscopy of the larynx and computed tomography of the neck.

The surgery was considered successful when the patient had no more symptoms and when no laryngoceles or cysts were detected in the controls, performed through the studies mentioned above.

Results

Nine patients were treated for internal or mixed laryngoceles and saccular cysts between October 2009 and May 2019.

Five were women and four men, the youngest was 54 and the oldest 84 years old, the average age was 68 years.

Three had right internal unilateral laryngoceles, two mixed bilateral laryngoceles with a small external component, and three of the five were mucoceles or mucopioceles.

Four presented saccular cysts, two left and two right. All four were located in the ventricular band, three extended to the paraglottic space and one to the aryepiglottic fold. All had mucus content.

The reasons for consultation were dysphonia (6/9), pharyngeal discomfort (4/9), mild dyspnea (1/9) and acute laryngeal obstructive syndrome that required urgent intubation and admission to the intensive care unit (1/9).

Videoscopic studies were performed in all patients and a medial displacement of the ventricular band or bands or aryepiglottic fold, covered by normal mucosa, was observed. The location and content of the cystic lesions were determined by CT and MRI.

A single patient had as associated pathology: a carcinoma in situ together with a bilateral oncocytic cystadenoma (histopathological study findings).

In all of them the ventricular band was resected, in 7 the cyst sac was also removed and in two only a marsupialization was performed. Bilateral laryngoceles were treated at the same surgical time (Figure 4).

Figure 4: Bilateral laryngocele: A-B-C: Computed tomography, D: Endoscopic view of bilateral laryngocele (left at the level of the ventricle, right at the ventricular band). Transoral microsurgery with CO2 laser: E-F-G: Incision and resection of right ventricular band, H-I: Medial traction with forceps and complete resection of the cystic sac dissecting it from the paraglottic space, J: Left laryngocele resection, K: Bilateral complete resection of laryngoceles, L: Posoperative endoscopic view.

The patients were hospitalized for 24 hours, except for the patient with acute respiratory obstruction who was extubated after microsurgery and remained hospitalized for 3 days.

We had no intra or postoperative complications, and no patient required tracheostomy.

One of the patients with bilateral laryngoceles who was marsupialized had a postoperative inflammatory granuloma at the site of the marsupialization, and required further microsurgery to remove it.

It was the only one that did not improve his symptoms and in which the laryngoceles persisted. He did not want to have surgery again.

The other patients improved their symptoms and did not have persistent laryngocele or saccular cyst.

The average follow-up time was 3 years.

Discussion

The sacculle is a normal structure of the larynx that originates as a diverticulum in the anterior sector of the ventricle and extends superiorly between the ventricular band and the thyroid cartilage. It has a pseudostratified ciliated squamous epithelium with mucous glands and communicates through a hole with the endolarynx.

The walls of the sacculle have delicate muscles, when they contract they move the mucus towards the laryngeal lumen that would have a lubricating function. When the communication with the endolarynx is narrowed or closed, the saccular cyst would be produced.

Due to their location, they can be posterosuperior, present in the ventricular band and extend to the aryepiglottic fold, or anterior and extend medially and posteriorly, obliterating the laryngeal ventricle. Like the laryngoceles can be internal or mixed [2-4].

Laryngoceles are air dilations of the sacculle that expand in the paraglottic space and can displace the ventricular band medially (internal laryngocele) and/or protrude over the thyrohyoid membrane, displacing it within the neck (mixed laryngocele). Pure externals would not exist since they always have an internal component.

If the saccular cyst or laryngocele is filled with mucus or pus, it is called a laryngomucocele or pyocele [5].

In our study, laryngoceles (5/9) predominated over saccular cysts and two of them were bilateral.

The incidence of sacculle cysts and laryngoceles is 1 person every 2,500,000 per year and they represent approximately 5% of benign laryngeal pathologies [5,6].

There are three etiologies described to explain the origin of laryngoceles and saccular cysts: congenital, increased intralaryngeal pressure (patients who play wind instruments, phonate with ventricular bands, have chronic cough, etc.), or mechanical obstruction of the ventricle (tumors).

Celin., *et al.* [7] describe an incidence of laryngoceles in patients with laryngeal cancer of 19% to 28.8%. The greater frequency

may be due to the fact that the tumors cause a valvular obstructive mechanism in the ventricle, although some postulate that the chronic irritation of the laryngocele could cause cancer.

It can also be associated with other lesions of the larynx [8] and neck surgeries, which in cases of partial laryngectomy are attributed to a partial resection of the ventricle [9,10].

Only two patients in our study had a history that could explain the formation of the laryngocele: vocal hypertonia (phonation with the ventricular bands), which due to an obstructive valve mechanism can produce distension of the sacculae, and in another there was a history of treatment with concurrent chemoradiation therapy due to laryngeal cancer on the same side.

The histopathological study of these lesions should always be performed to detect concomitant pathologies. As laryngocele and sacculae cyst have the same epithelial lining, they cannot be differentiated for this exam.

A single patient in our study had associated pathology: carcinoma in situ together with a bilateral oncocyctic cystadenoma, in the others the histological study reported respiratory epithelium with chronic inflammation.

Many laryngoceles and sacculae cysts can be asymptomatic, when they produce symptoms the most frequent are dysphonia, foreign body sensation, cough and in cases of mixed laryngoceles the presence of a lateral neck tumor.

Progressive dyspnea and acute laryngeal obstructive syndrome are uncommon but can occur and may require emergency tracheostomy or intubation [11,12].

Two patients in our series had inspiratory dyspnea, in one it was resolved with the scheduled excision of the laryngocele, and in another who had an acute laryngeal obstructive syndrome, an emergency orotracheal intubation had to be performed and the patient was able to be extubated after laryngeal microsurgery, avoiding a tracheostomy.

The treatment of laryngoceles and saccular cysts is surgical, in small and asymptomatic lesions, observation and periodic control may be an option.

Transoral surgery with a microscope is the most used in internal or mixed cysts with little cervical extension. In laryngoceles that have a significant external cervical component, the external or combined approach (transoral and external) is recommended [13].

The laryngeal microsurgery techniques can be marsupialization or complete cyst resection.

When we marsupialize the laryngoceles, we prefer to vaporize a part of the cystic sac with CO₂ laser.

The greatest advantage of the superpulse CO₂ laser is better hemostasis (it becomes defocused) and less damage to surrounding tissues [14].

If the dissection extends posteriorly and laterally, care must be taken with the branches of the superior laryngeal artery and the superior laryngeal nerve. If bleeding occurs, clips can be placed or hemostasis can be performed with electrocautery.

In a review of publications between 1994 and 2013, using the keyword laryngoceles (Pub-Med, the Cochrane Library, the JBI Library of Systematic Reviews), 50 articles were found that described 86 patients with laryngoceles, 41 were case reports and 9 case series [15].

Twenty-three patients were excluded, 15 because they were not treated with surgery and 8 because they were associated with tumors and received specific treatment for them.

A tracheostomy was performed as part of the surgery in 11/63 (17.5%) and in 6/63 (9.5%) as an emergency due to acute laryngeal obstructive syndrome.

Most of the patients with internal laryngoceles (31/42: 73.8%) were treated with laryngeal microsurgery. CO₂ laser was used to perform complete resections in 24 cases and cold instruments in two. The microsurgical technique of marsupialization was used in two.

We believe that complete resection of the saccular cyst or laryngocele decreases the possibility of recurrence.

The use of the superpulse CO₂ laser facilitates surgery, especially in lesions that extend to the paraglottic or preepiglottic space, as

evidenced in our study by the high rate of success that we had with the microsurgical techniques used and without having had complications.

Devesa, *et al.* [16] also consider that laryngeal microsurgery with CO₂ laser is a good alternative in the management of this lesion.

The microsurgical technique of marsupialization has the risk of greater recurrence because during the healing process new mucocoeles or cysts can form from the remains of the sac.

We believe that this technique, because it is simpler and faster, can be useful only in patients with comorbidities and in cases of bilateral laryngoceles, so as not to stage the surgery in two stages and to reduce the risk of injuring both superior laryngeal nerves.

One of the two patients we treated with the marsupialization technique did not improve his symptoms and the bilateral laryngocele persisted. He had a granuloma that was resected in a new surgery. Possibly the postoperative inflammation and the partial resection of the laryngocele favored the closure of the communication with the larynx.

None of our patients required a tracheostomy as part of the surgical procedure, nor for postoperative obstructive complications.

External surgery in cases of mixed laryngoceles with a significant cervical component can be performed through the thyrohyoid membrane, by thyrotomy resecting the upper third of the thyroid cartilage, or by a thyrotomy in V [17].

The two patients we treated with mixed laryngoceles had a small external component, which we were able to manage transorally.

Conclusions

- The efficacy of the different laryngeal microsurgery techniques used to treat saccular cysts and laryngoceles was very good, reaching an effectiveness rate of 88.88%.
- Superpulse CO₂ laser microsurgery of the larynx is the ideal technique due to its effectiveness and low morbidity for treating saccule cysts and internal or mixed laryngoceles with a small cervical component.
- We believe that complete resection of the saccular cyst or laryngocele decreases the possibility of recurrence.

Declaration of Conflicts of Interest

We have no conflicts of interest.

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