THE LARYNGOCELE

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THE term laryngocele is given to the air-containing sac arising in relation to the larynx. Other than the very few traumatic cases, the laryngocele is related to the laryngeal saccule.

Virchow, in 1863, was the first to use the term laryngocele ventricularis to describe simple enlargement of the saccule of the ventricle.

Larrey, in 1829, noted that "bilateral air-containing tumours of the neck were frequent in Egypt among the moezzens who shouted The Koran from the roofs of mosques".

Shambaugh and Lewis, in 1915, considered laryngocele as air-containing sac related to elongation of the saccule and possibly dilatation.

Allman and Cordray (1942) considered laryngocele the air-containing sac related to the saccule of the ventricle of Morgagni.

Campbell (1946) described the case of a sac containing both air and fluid related to the larynx and he called it a laryngocele.

Butler (1950) describes laryngocele as an air-containing sac frequently associated with conditions causing increased intra-laryngeal pressure.

Harrison (1950) defines laryngocele as "an anomalous air sac which develops from the saccule of the laryngeal ventricle and is lined by mucous membrane".

Lund (1960) described a case of air-containing sac and called it laryngocele.

Borsanyi (1961) defines the term laryngocele as "refers to cystic dilatation of the appendix or the saccus of the ventricle".

Lawson (1950) described two cases of laryngocele and both were air-containing sacs.

Contrary to what is considered by the different authors up till now, the term laryngocele should be given to any cystic swelling related to the larynx whether this cyst contains air or fluid. We should say, then, an aerocele to the air-containing sac, and mucocele, or laryngeal cyst to the fluid-containing one.

In the last few years the author has met with five cases of laryngocele and this collection stimulated thorough study of the condition. These cases are described briefly; only Case 1 in some detail.

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Case Reports

Case No. 1.

S.M., a male aged 55 years, came to hospital on 14 August 1960, with bilateral neck swelling and respiratory obstruction that needed urgent tracheostomy. He had change of voice with slight respiratory distress for 1 year before admission. Examination revealed that there is a swelling in the upper anterior triangle of the left side of the neck, the size of an almond, which becomes larger if he closes the tracheostomy opening and tries to cough or speak in a loud voice. This swelling does not subside by itself when he stops his effort, but he can compress it manually with a gurgling sensation and it never disappears completely by compression. There is a similar but much smaller swelling in the right side at the same situation and of the same characteristics. No other masses are present in the neck. By indirect laryngoscopy there is a swelling occupying the left aryepiglottic fold filling it and the left ventricular band and encroaching on the left pyriform fossa; its surface is smooth, reddish in colour and it occludes the laryngeal inlet almost completely except for a small posterior chink. Radiograms show two external air-containing sacs one on either side of the larynx, and a small spherical cyst about 2 cm. in diameter within the larynx with its lower margin just above the level of the vocal cords (Figs. 1, 2, 3 and 4).



FIG. 1.
Case 1, bilateral laryngeal aeroceles lateral view.

Operation was done through a transverse incision at level of the upper border of the thyroid cartilage. The left sac was exposed and dissected from the fundus towards the neck; the median thyrohyoid ligament was then cut, the thyrohyoid membrane was cleaned and a wide neck of the sac was found just

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FIG. 2.
Case 1, one sac injected with lipiodol.

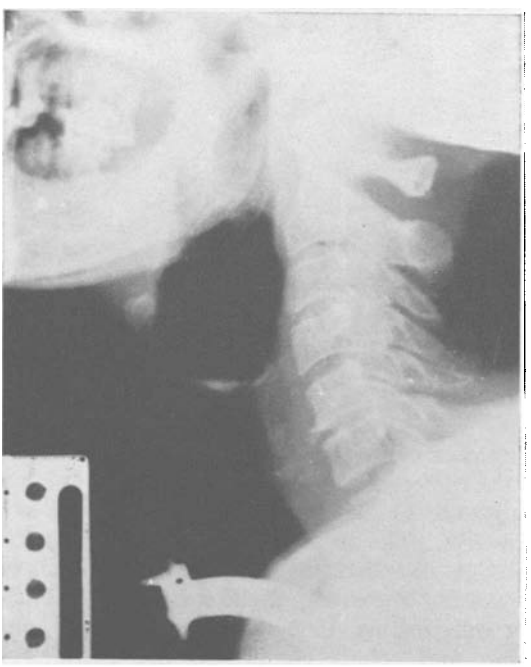


FIG. 3.
Case 1, sac evacuated, and inflated by the patient.

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lateral to the median thyrohyoid ligament, the opening in the membrane was extending laterally to a small distance from the internal laryngeal vessels and not reaching the hiatus through which the vessels are passing; those were easily separated from the sac. The right sac was then dissected from the neck towards the fundus. It was noticed that the dissection from the neck to the fundus is much easier and takes less time than the reverse. The inner cyst was then dissected out through the thyrohyoid membrane after removal of 1 cm. breadth of the upper edge of the left thyroid ala. The cyst wall was found



FIG. 4.
Case 1, both sacs with residual lipiodol.

adherent to the mucosa of the ventricle and the air sac was seen freely communicating with the lumen of the ventricle through a wide neck at its anterior end. The cyst ruptured during separation from the wall of the ventricle but was completely removed. The air sac was excised at its junction and the gap in the mucosa closed in two layers (Fig. 5). Histological examination of the removed sacs revealed: "The lining of the sac is formed of ciliated epithelium containing goblet cells resting upon mucous membrane containing lymphoid tissue and mucous and serous glands. In the extra-laryngeal part same structure of mucosa found with a thick fibrous layer outside, which gradually gets thinner towards the fundus."

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Case No. 2.

M.D., a 15-year-old boy, came to hospital to find out a cause for abnormal thickening of the neck while coughing or straining. Clinical examination revealed the presence of bilateral soft swelling in the anterior triangle of the neck on both sides while straining. The swelling disappeared with normal respiration. Indirect laryngoscopy revealed no change in the larynx. X-ray examination revealed the presence of bilateral laryngeal aerocele (Figs. 6 and 7).

The patient refused operation as he considered himself symptomless and did not care about the neck swelling.



FIG. 5.
Case 1, photograph at operation, two sacs seen.

Case No. 3.

A.A.M., a farmer aged 55 years, complaining of change of voice for 1½ years. Respiration began to be distressed during the last month to a degree that he needed tracheostomy. He had no dysphagia. On examination nothing was detected externally. Mirror examination showed a swelling distending the right ventricular band and extending into the aryepiglottic fold and hiding the right vocal cord; mucosa over it is intact and of normal colour. X-ray examination revealed the presence of an internal laryngeal aerocele (Fig. 8). Operation was done through a transverse neck incision; a sac was found communicating with the ventricle by a narrow neck. It was excised and contained partly air and partly turbid fluid. The wall was found lined with ciliated columnar epithelium.

Case No. 4.

H.A.A.G., a male aged 50 years, complained of change of voice for the last few months. Examination revealed the presence of a cystic swelling in the

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FIG. 6.
Bilateral laryngeal aerocele, antero-posterior. Case 2.

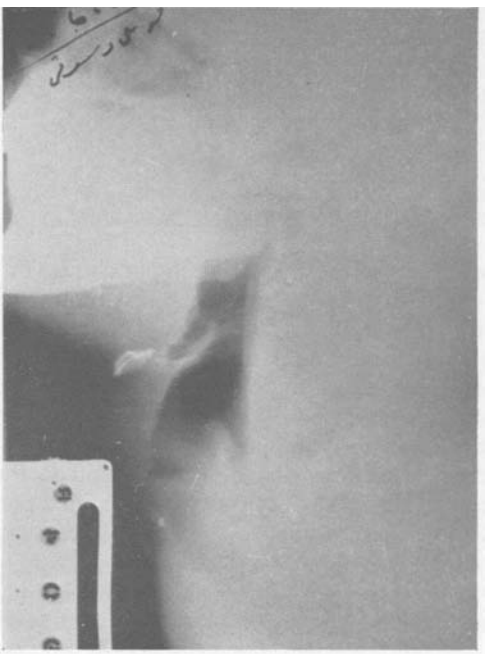


FIG. 7.
Bilateral laryngeal aerocele, lateral posterior. Case 2.

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right side of the neck deep to the upper part of the sternomastoid (Figs. 9, 10 and 11). Mirror examination showed a smooth swelling distending the right ventricular band and extending into the aryepiglottic fold; the right vocal cord is mobile. At operation a transverse collar incision was done at level of



FIG. 8.
Case 3, internal laryngocele.

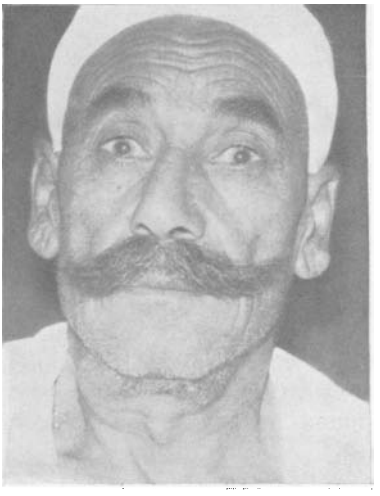


FIG. 9.
Case 4, right laryngeal cyst, photograph of patient.

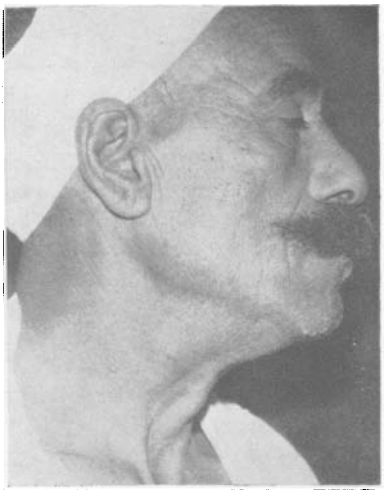


FIG. 10.
Case 4, right laryngeal cyst, photograph of patient, lateral view.

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upper border of the thyroid cartilage and extending more to the right side. The neck of attachment of the external cyst was found just lateral to the median thyrohyoid ligament; this ligament was cut and the cyst was dissected easily from the neck of attachment towards the fundus; the neck was then followed through the thyrohyoid membrane and the internal part removed. The cyst wall was found lined with ciliated columnar epithelium.

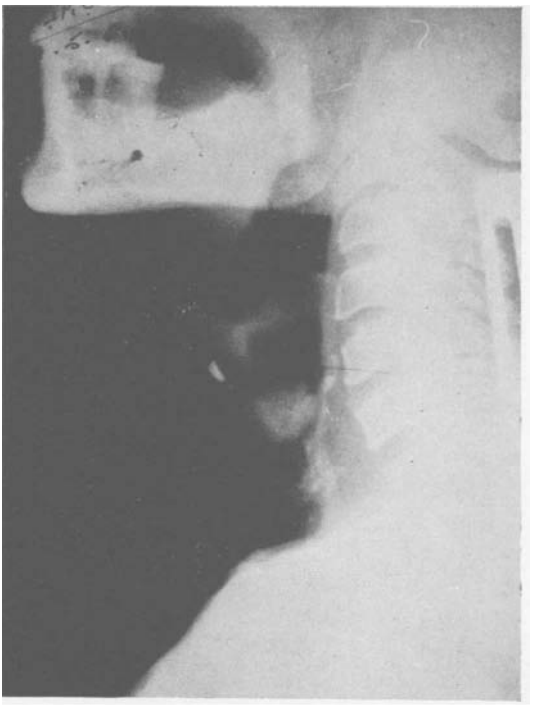


FIG. 11.
Case 4, right laryngeal cyst, X-ray, lateral.

Case No. 5.

S.El B., a male aged 27 years, occupation farmer, complained of change of voice for the last 1½ months with the appearance of a painless swelling below the mandible on the left side. Mirror examination showed a swelling filling the left vallecula and left pyriform fossa, pushing the larynx towards the right side. The swelling is bluish in colour, surface is smooth and traversed by evident blood vessels. It has a well-circumscribed margin anteriorly and medially, but its lateral margin merges into the lateral pharyngeal wall. X-ray examination revealed the presence of a large laryngeal cyst (Fig. 12). Operation was done just as in Case 4, and the cyst was found lined with ciliated columnar epithelium.

Discussion

All authors agree that there are three types of laryngoceles: internal,

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external, and combined. Borsanyi (1961) believes that the internal type is the commonest, while Richards (1951) believes that the commonest is the purely external. According to what we have seen in eight cases in our department (including five personal cases and three cases of other colleagues) only one case was purely internal and the other seven were combined external and internal.



FIG. 12.
Case 5, X-ray, cyst injected with uroselectan.

Clinical Picture

In our series the commonest complaint was change of voice, next is the neck swelling which increases with straining. Two cases came with respiratory obstruction, no one complained of dysphagia.

Borsanyi summarizes the symptoms as:

1. Asymptomatic.
2. Respiratory obstruction.
3. Change of voice.
4. Neck swelling enlarging with coughing.
5. Headaches and local discomfort from pressure on large vessels.
6. Cough and expectoration from collected fluid in the sac.

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Lawson gives the symptoms of distress as:

1. Distension of the sac internally into the larynx gives rise to dyspnoea.
2. Difficulty in reducing the distended sac due to valvular action on its neck.
3. Infection of sac.
4. Effects of patient's occupation on the sac.

Treatment

Treatment is operative.

The author prefers a transverse skin incision at level of the upper border of the thyroid cartilage. As the neck of the sac is always near the middle line, this incision will give an easy access. The author also found that cutting of the median thyrohyoid ligament will allow the thyroid cartilage to be separated from the hyoid bone for a sufficient space, about $1\frac{1}{2}$ cm.; this will allow more exposure of the neck of the sac which can be followed up internally. This manœuvre will make it not necessary to split the thyroid which Lawson does. As for dissection of the sac Lawson believes that dissection is easier from the fundus to the neck and not the reverse. He also recommends a two-stage operation with 8 weeks' interval in bilateral cases. Richards (1951) also does the dissection from the fundus towards the neck and in a case of a combined external and internal cyst recommended doing it at two stages with 4 months' interval. In Case 1 of our series, there was a bilateral sac and an internal cyst related to the left one; the left sac was dissected from the fundus towards the neck, and the right one from the neck towards the fundus, so that we had a chance of comparison in the same case, and we found that definitely the dissection from the neck to the fundus is much easier than the reverse. We do not see any reason for doing a two-stage operation either in bilateral cases or in cases of combined external and internal sacs and we prefer doing a one-stage operation.

Aetiology

As for aetiology of laryngocele, the author believes that both the aeroceles and the laryngeal cysts are of the same origin. A preformed congenitally present sac must be present from the start communicating with the ventricular appendix. This will remain symptomless till some predisposing cause makes it evident; for example, in persons whose job requires increased intra-laryngeal pressure, more distension of the sac will take place and gradually it will increase in size till it becomes evident. It is very difficult to accept that distension of the laryngeal appendix can penetrate through the intact thyrohyoid membrane instead of extending

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locally in the ventricular band or aryepiglottic fold. In Case 2, the bilateral aerocele was almost symptomless. Borsanyi mentioned that cases of congenital origin were described in young children from 9 weeks to 13 years of age. Butler (1950) described an aerocele accidentally found during dissection of a dead body of a male aged 78 years and considered it a congenital laryngocele. In the author's opinion over-distension of the congenitally preformed sac will make it clinically manifest. Obstruction of the communication with the ventricle, if partial, will make a valvular effect and this will allow the air entry to the sac much easier than the air exit, and the sac will distend and get larger and become clinically manifest. If the obstruction of the connection, however, is complete, it will produce a laryngeal cyst. Leborgne mentions that associated laryngocele and cancer of the larynx may be as high as 10 per cent. or more. Schall (1944) describes a case of laryngocele associated with cancer of the larynx. Lund (1960) mentions a case of cancer diagnosed 4 months after removal of the laryngocele. In the author's opinion, in all these cases of associated cancer and laryngocele, the congenital sac has been present beforehand and made manifest after obstruction of communication with the ventricle by the newly developed cancer at this situation. The cancer may not be diagnosed early as it may be inside the ventricle and only detected when it gets large enough to be diagnosed long after removal of the sac.

What makes us believe that the laryngeal cysts are also laryngoceles and were originally undiagnosed aeroceles, is the respiratory ciliated epithelium which lines them (Cases 4 and 5 in our series). In El-Hakeem's (1951) case the lining showed "elongated columnar epithelium, some parts of the epithelium appear to be ciliated". In Richards' case the inner sac is lined by "normal respiratory epithelium". In Borsanyi's case the lining was "ciliated respiratory epithelium". In Richards' case there is partial obstruction of the connection that is beginning to become more complete, and the sac contained both fluid and air, and the lining is still ciliated respiratory epithelium; same with Case 3 in our series.

Conclusion

A study of laryngoceles based on eight cases seen in Ain Shams University Hospital: El-Hakeem (1951), El Mofty (1959), El Shafei (not published yet), and five personal cases, and revision of the literature.

The usual term "laryngocele" given to the air sacs related to the larynx should be "laryngeal aerocele" as laryngocele includes also the cysts.

Laryngoceles are originally congenital preformed symptomless sacs communicating with the ventricular appendix, and made clinically manifest by obstruction of the connection; incomplete obstruction produces an aerocele while complete obstruction produces a laryngeal

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cyst or mucocele, secondary infection of the mucocele will give a pyocele (El Shafei's case).

At operation the transverse incision is preferred.

The median thyrohyoid ligament is cut early in the operation to give a wider field and is stitched back at the end.

Dissection of the sac is carried on from the neck to the fundus and not the reverse.

A one-stage operation is done in bilateral cases and in cases of combined external and internal laryngoceles.

REFERENCES

ALLMAN, C. H., and CORDRAY, D. P. (1942) *Ann. Otol.* (*St. Louis*), **51**, 586.
BORSANYI, S. J. (1961) *Laryngoscope* (*St. Louis*), **71**, 1561.
BUTLER, H. (1950) *J. Laryng.*, **64**, 625.
CAMPBELL, M. D. (1946) *Arch. Otolaryng.*, **44**, 219.
EL-HAKEEM, A. (1951) *J. Laryng.*, **65**, 41.
EL MOFTY, A. (1959) *J. Laryng.*, **73**, 768.
HARRISON, K. (1950) *J. Laryng.*, **64**, 777.
LARREY, D. J. (1829) *clinique chirurgicale, excercée particulièrement dans les camps et les hôpiteaux militaires depuis 1792 jusqu'en 1829*. Paris. **2**, 82.
LAWSON, H. P. (1950) *J. Laryng.*, **64**, 779.
LUND, W. S. (1960) *J. Laryng.*, **74**, 260.
RICHARDS, L. (1951) *Ann. Otol.* (*St. Louis*), **60**, 510.
SCHALL, L. A. (1944) *Ann. Otol.* (*St. Louis*), **53**, 168.
SHAMBAUGH, G. E., and LEWIS (1915) *Ann. Otol.* (*St. Louis*), **24**, 129.

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