Online Case Report

A third branchial pouch cyst presenting as stridor in a child

JOSEPH WASSON, SEAN BLANEY, RICARD SIMO

Department of Otolaryngology, Guy's Hospital, London, UK

We present a rare case of a third branchial pouch cyst in an 18-month-old child, presenting with stridor and a lateral cervical cystic mass. Differences in the anatomical course of third and fourth branchial cysts, and histological differences between branchial pouch and branchial cleft cysts are discussed.

Keywords: Branchial – Cyst – Stridor – Child

Branchial anomalies are a consequence of abnormal development of the branchial apparatus during embryogenesis. Persistence of branchial apparatus remnants will result in anomalies such as cysts, sinuses or fistulas.¹ Congenital anomalies of the third and fourth branchial clefts and pouches are uncommon, with third branchial anomalies representing only 2% of all branchial anomalies.² We present a case of a third branchial pouch cyst, presenting as stridor in an 18-month-old boy.

Case report

An 18-month-old Caucasian boy, who had suffered intermittent episodes of noisy breathing since birth, presented with a 4-month history of biphasic stridor, a left neck cystic mass and failure to thrive. The child was born at term with no complications and was otherwise well. Examination revealed a fluctuant swelling in the upper mid third of the neck, arising deep to the sternomastoid,

Figure 1 Comparative pre-operative (A) and postoperative (B) microlaryngoscopy.

Correspondence to: Joseph Wasson, 15 West Way, Carshalton Beeches, Surrey SM5 4EJ, UK
M: +44 (0)7870 210513; E: josephwasson@hotmail.com

Figure 2: Diagrammatic representation of the anatomical relations to the branchial cyst.

bulging into the anterior triangle, lateral to the thyroid. Otolaryngological examination was otherwise normal. An ultrasound scan confirmed a 35 x 20 mm fluid-filled cyst, extending medially but not crossing the midline.

Micro-laryngoscopy revealed a submucosal cystic lesion, arising from the anterior aspect of the left pyriform fossa, displacing the epiglottis and larynx over to the right (Fig. 1). The cyst was excised through a left transverse cervical incision. Subplatysmal flaps were elevated superiorly and inferiorly to expose the lateral limit of the cyst. The cyst was carefully mobilised, taking care to identify and preserve the marginal mandibular, superior laryngeal and hypoglossal nerves. Anatomically, the cyst occupied a space, which arose from the anterior aspect of the left pyriform fossa. It passed through the thyrohyoid membrane, situated anterior to the superior laryngeal nerve, inferior to the hypoglossal nerve and terminated lateral to the thyroid gland (Fig. 2). The cyst was removed *in toto*, without capsule rupture. A postoperative micro-laryngoscopy demonstrated centralisation of both epiglottis and larynx (Fig. 1). Following extubation, stridor had resolved and the child was discharged home, 2 days after surgery. Histology revealed a thin-walled cyst, lined by part squamous epithelium and part respiratory epithelium, consistent with a branchial cyst.

Discussion

The primitive pharynx or branchial apparatus has external ectodermal branchial clefts and internal endodermal branchial pouches separated by mesodermal

branchial arches. Fourth branchial arch structures, therefore, separate the third branchial pouch and cleft, from the fourth branchial pouch and cleft. The superior laryngeal branch of the vagus is one such fourth branchial arch structure, and it is this, which is key in differentiating a third from a fourth branchial anomaly.^{3,4} Accurate distinction between third and fourth branchial cysts is difficult, as they are both uncommon, arise from the pyriform fossa and present similarly.³ To differentiate between the two, one must identify the precise anatomical position of the branchial cyst.

Anatomical course of a third branchial cyst or sinus would originate from the anterior aspect of the pyriform fossa, pierce the thyrohyoid membrane, pass anterior to the superior laryngeal nerve, then inferior to the hypoglossal nerve before terminating lateral to the thyroid gland. This was the anatomical course taken by the branchial cyst in our case. A fourth branchial cyst or sinus would alternatively emerge from the posterior aspect of the pyriform fossa, between the thyroid and cricoid cartilages and pass posterior to the superior laryngeal nerve. Descending superficial to the recurrent laryngeal nerve, it would terminate in the thyroid or paratracheal position.^{2,3}

Third and fourth branchial pouch anomalies most commonly present with isolated neck cysts or recurrent abscesses.³ Although neonates and children presenting with stridor associated with a cystic neck mass have been previously described in the literature,^{2,4} it remains a rare occurrence.

Diagnosis of a branchial cyst requires a high index of suspicion. The presence of a fluctuant cervical mass can be confirmed to be cystic with the use of ultrasound, but is limited in identifying the medial extremity and precise anatomical position of the cyst. Computerised tomography (CT) is the investigation of choice for displaying both location and extent of pyriform fossa anomalies.⁴ However, an 18-month-old child requires a general anaesthetic to perform a CT and, since an urgent microlaryngoscopy was required in this case, it was decided to proceed without scanning. Pharyngoscopy, to visualise pyriform fossa involvement remains an important part of diagnosis, but ultimately, exact diagnosis requires surgical exploration.³

Before surgical intervention for a branchial cyst can occur, any acute infection must first be treated with either intravenous antibiotics or incision and drainage of acute abscesses.³ Complete surgical excision, including resection of the pyriform fossa attachment, is the treatment of choice for third and fourth branchial cysts and minimises recurrence.¹

Histological analysis of the branchial cyst, will give an indication as to whether it is of cleft or pouch origin. A

cyst derived from a branchial cleft will be lined by squamous epithelium; one derived from a branchial pouch will be lined by respiratory epithelium, but may undergo squamous metaplasia after recurrent infections.⁵ The anatomical course and histological findings of the cyst in our case is thus indicative of a third branchial pouch cyst.

References

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