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Case Report

A case of third branchial cleft cyst

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ABSTRACT

Branchial cyst or congenital cystic lesions of neck originate from branchial clefts, the 2nd branchial cleft cyst being the most common and 3rd and 4th being missed. Hence, they are often misdiagnosed as lymph nodal masses, cold abscess. We are reporting a case of 3rd Branchial cleft cyst, of a 12-year-old boy who presented with left sided recurrent painful cystic mass at the level of hyoid bone going down to the level of pyriform fossa. All the tests for tuberculosis were negative. USG neck revealed loculated thick walled cyst from SCM to lateral part of pharynx. CECT revealed a thick-walled cyst extending from the anterior border of the sternocleidomastoid going down obliquely below the level of thyrohyoid membrane to pyriform fossa. Exploration revealed a thick walled infected cyst, pushing left upper pole of thyroid medially and anterior to left sided superior laryngeal nerve. The cyst was going downwards medially below the level of thyrohyoid membrane. The cyst was excised completely. Histopathology revealed the findings of squamous epithelial lining of cyst wall and cholesterol crystals within. Detailed anatomy on CECT, surgery and histopathology confirmed 3rd arch Branchial cyst.

Keywords: Branchial anomalies, Branchial arches, Third branchial cleft cyst

INTRODUCTION

The most distinctive feature in the development of the head and neck is the presence of pharyngeal arches (the old term for these structures is Branchial arches because they somewhat resemble the gills of a fish). These arches appear in the fourth and fifth weeks of development and contribute to the characteristic external appearance of the embryo. Initially they consist of bars of mesenchymal tissue separated by deep clefts known as pharyngeal clefts. Simultaneously, with development of the arches and clefts, a number of outpocketings, the pharyngeal pouches, appear along the lateral walls of the pharynx, the most cranial part of the foregut. The pouches penetrate the surrounding mesenchyme, but do not establish an open communication with the external clefts.[1]

Development of human head and neck is contributed extensively by branchial arches and pouches. The branchial Apparatus consists of a series of six mesodermal arches that are separated from each other externally by ectodermally lined branchial clefts (grooves) and internally by endodermally lined pharyngeal pouches, however the 5th arch does not contribute to development in humans.[2]

Branchial anomaly is a common neck pathology seen. Approximately, 17% of all pediatric cervical masses are due to branchial anomalies.[3]

Proper diagnosis and appropriate surgical management depend on thorough understanding of embryology and anatomy, and high index of suspicion. The initial surgery is crucial since the recurrence rate after incomplete surgical excision can be as high as 22%.[4,5]

Objective of this report was to report a case of third branchial cleft cyst of in a 12-year-old boy.

CASE REPORT

A 12-year-old boy presented with a mass in the left upper neck appearing repeatedly. There was a history of chronic recurrent fever and cough from childhood coinciding with appearance of swelling. There were no constitutional symptoms like evening rise of temperature, night sweats, weight loss or history of TB in the family.

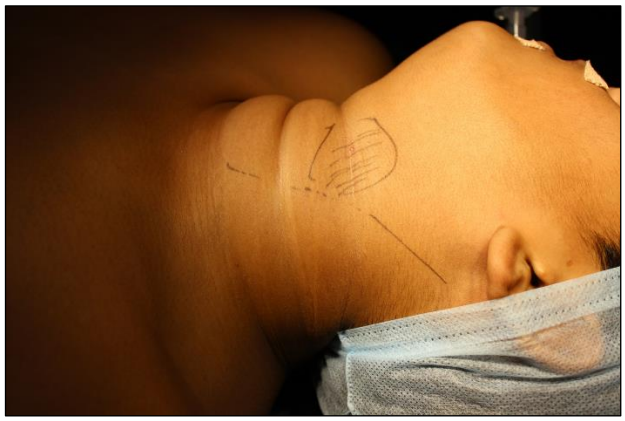

Figure 1: Cystic swelling on left side of hyoid bone.

Examination revealed a well built, well-nourished boy with a cystic swelling on the left side of the hyoid bone (Figure 1). The swelling had vague margins and was deep to the strap muscles of the neck.

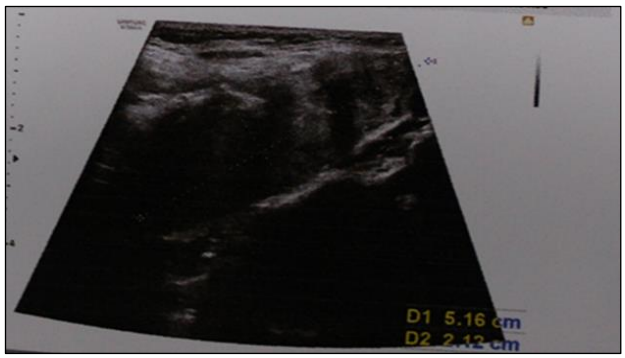

Figure 2: USG image - loculated thick walled cyst.

The lateral border of the swelling was abutting the anterior border of the Sternocleidomastoid. Thyroid was in its Normal place and there were no other masses. USG Neck revealed Loculated thick walled cyst from SCM to lateral part of Pharynx (Figure 2). Mantoux- no erythema, no induration, TB PCR- Negative, Gene Xpert- no MTB detected, plain radiograph chest- NAD, serum ADA- 21.3 IU/L. An attempt to FNAC was also done which was non-contributory.

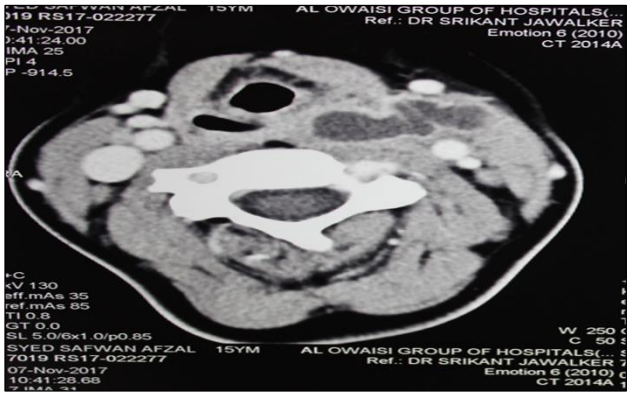

Figure 3: CECT axial section - lesion extending from sternocleidomastoid to pyriform fossa medially between internal and external carotid arteries.

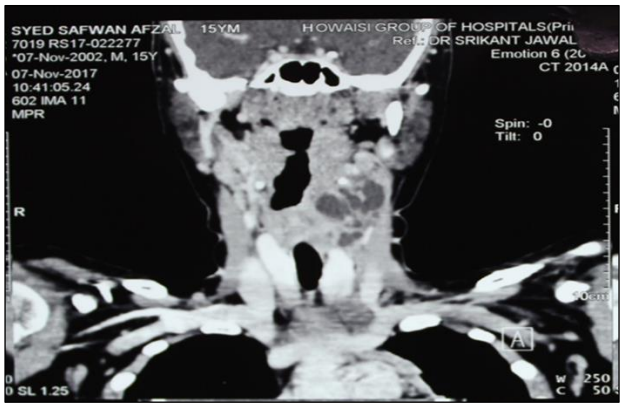

Figure 4: CECT Coronal section - Deviation of pharynx to the right.

CECT Scan showed hypotense cystic lesions with poorly enhancing walls extending from the level of carotid bifurcation to pyriform fossa and sternocleidomastoid to lateral pharyngeal wall. There were no calcifications (Figure 3 and 4).

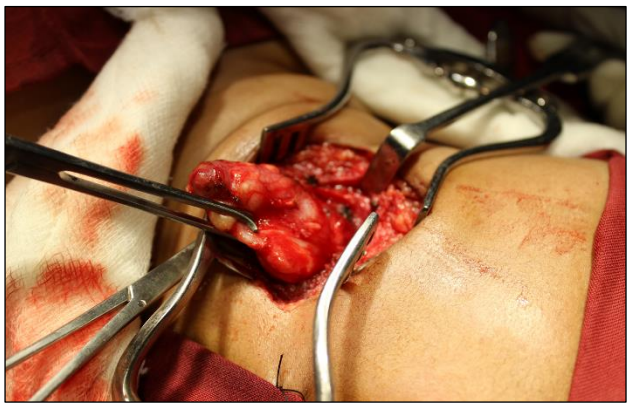

Figure 5: Arrow showing superior laryngeal nerve.

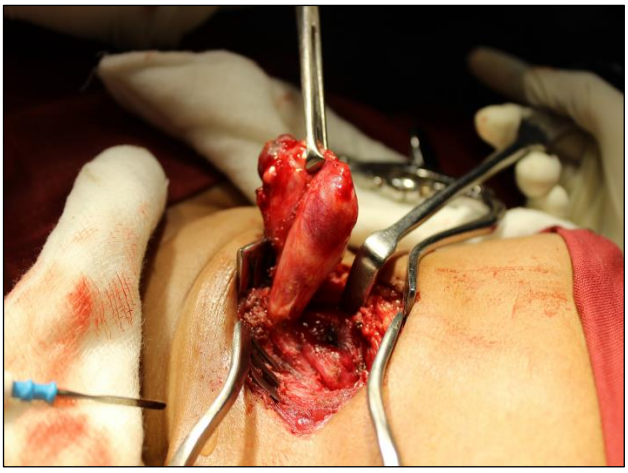

Figure 6: Intraoperative picture showing extension upto medial wall of pharynx.

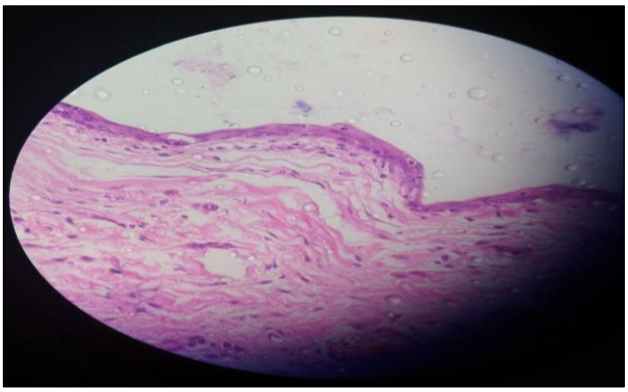

Figure 7: HPE - squamous epithelial lining of cyst.

Exploration of the neck revealed a firm mass 3x3x4cm deep to the strap muscles of the neck. It was extending from just below the anterior border of the left SCM medically upto the lateral border of the pharynx. The upper pole of the left thyroid was elevated anteriorly. Left external laryngeal nerve was pushed medially. The exact communication to pyriform fossa could not be located (Figure 5 and 6). Post-operative period was uneventful.

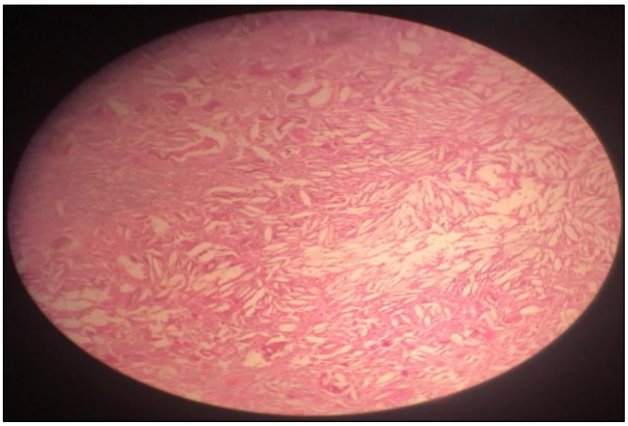

Figure 8: HPE - cholesterol crystals.

Histopathology showed a cyst filled with mucous and cholesterol crystals and lined with squamous epithelium (fig G, H). Branchial Cyst was confirmed due to relation to Sternocleidomastoid, Superior Laryngeal Nerve and Pyriform Fossa and HPE findings of squamous epithelium and cholesterol crystals on histopathology.

DISCUSSION

Specific adult structures are derived from each branchial arch and its related cleft and pouch (Table1). The first branchial cleft is the only pair to contribute directly to adult structures; it persists as the epithelium of the external acoustic meatus. The other branchial clefts are obliterated together with the cervical sinus of His as the neck develops.

From each mesodermal branchial arch, specific osseous, cartilaginous, and vascular structures arise. Each contributes a specific cranial nerve. The vestigial remnant theory states that if any portion of a branchial cleft, pouch or cervical sinus of His fails to obliterate during embryogenesis, it can result in a sinus, fistula or cyst.[6,7] Cysts secondary to 3rd and 4th clefts are extremely rare. Most often they are missed as cold abscesses and are treated inappropriately. 2nd branchial cleft anomalies most commonly present as cysts followed by sinuses and fistulae. Most are present in the submandibular space but they can occur anywhere along the course of the 2nd branchial arch tract which extends from the skin overlying the supraclavicular fossa, between the internal and external carotid arteries, to enter the pharynx at the level of the tonsillar fossa.[8]

Third branchial cleft cysts are extremely rare.[9] Most cases of third branchial cleft cysts are diagnosed in childhood and show a marked preference for the left side.[10] Branchial cleft cysts are characteristically related to the structures belonging to that branchial arch, usually anterior to structures belonging to the cranial arch and posterior to structures arising from the caudal arch. Thus, the third branchial cleft cyst also presents as a cyst related to the anterior body of SCM, starting from the level of the hyoid bone can reach upto the pyriform fossa. Because of its relation to the superior laryngeal nerve, it is pushed medially and upwards and unlike 2nd branchial cyst, the 3rd branchial cyst is anterior to internal carotid artery. Both the branchial cysts present with somewhat similar symptoms and signs like a cyst related to the sternomastoid muscle. The clinical differential diagnosis may be difficult.

In the index case too, the child was having recurrent upper respiratory infections and fever. This was concomitantly associated with the neck swelling which was mistaken for cold abscess and was investigated extensively. The child in the index case too had all the tests related to TB negative: Mantoux - no erythema, no induration, TB PCR- Negative, Gene Xpert- no MTB detected, Plain Radiograph Chest- NAD, Serum ADA-

21.3 IU/L. An attempt to FNAC was also done which was non-contributory. CECT scan showed the relationship of the cyst to the internal carotid artery, elevation and medial displacement of upper lobe of left throid, and cyst almost reaching upto thyrohyoid membrane (pyriform fossa).

Table 1: Branchial arch derivatives.

Arch/nerve	Skeletal	Ligaments	Muscles	Pouch
First	Malleus Incus	Anterior ligament of malleus Sphenomandibular ligament	Muscles of mastication Tensor tympani Tensor palati Mylohyoid Anterior belly of digastric	Auditory tube Tympanic cavity
Second	Stapes Styloid process Hyoid bone- lesser horn, upper half of body	Stylohyoid ligament	Muscles of facial expression Stapedius Stylohyoid Posterior belly of digastric	Lining (crypts) of palatine tonsils.
Third	Hyoid bone- greater horn, lower half of body	-	Stylopharyngeus	Inferior parathyroid gland Thymus
Fourth	Cartilages of larynx	-	All muscles of larynx All muscles of pharynx (except stylopharyngeus) All muscles of soft palate(except tensor palati)	Superior parathyroid gland C-cells of thyroid
Sixth	-	-	Sternocleidomastoid Trapezius	-

Confirmation of third arch branchial cyst is usually with operative findings. The index case had classical anatomic relationship with structures arising from 3rd branchial arch. Thus, confirming the origin of the cyst from the third arch.

Branchial cysts are confirmed by squamous lining on histology and cholesterol crystals in the contents. (FigG) and (FigH), clearly show squamous lining of the cyst and magnified view of cholesterol crystals. Post-operative period was uneventful.

CONCLUSION

Branchial cyst arising from third branchial cleft is being reported.

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REFERENCES

1. Salder TW. Langhan's medical embryology, 12th Edition. Lippincott Wiliams and Wilkins; 2012:260-73.
2. Frisdal A, Trainor PA. Development and evolution of the pharyngeal apparatus. Wiley Interdiscip Rev Dev Biol. 2014;3(6):403-18.
3. Kenealy JF, Torsiglieri AJ, Tom LW. Branchial cleft anomalies: a five-year retrospective review. Trans Pa Acad Ophthalmol Otolaryngol. 1990;42:1022-5.
4. Reiter D. Third branchial cleft sinus. an unusual cause of neck abscesses. Int J Pediatr Otorhinolaryngol. 1982;4:181-6.
5. Chandler JR, Mitchell. Branchial cleft cysts, sinuses and fistulas. Otolaryngol Clin North Am. 1981;14:175-86.
6. Koch BL. Cystic malformations of the neck in children. Pediatr Radiol. 2005;35:463-77.
7. Waldhausen J. Branchial cleft and arch anomalies in children. Semin Pediatr Surg. 2006;15:64-9.
8. Maran AGD, Buchanan DR. Branchial cysts: Sinuses and Fistulae. Clin Otolaryngol. 1978;3:77-92.
9. Srinjeeta G, Yuvraj P, Karan V, Adip S, Haritosh V. Third branchial cleft cyst presentation in adulthood: a case report. Otolaryngol Online J. 2014;4(4):191.
10. Joshi MJ, Provenzano MJ, Smith RJH, Sato Y, Smoker WRK. The rare third branchial cleft cyst. Am J Neuroradiol. 2009;3 (9):1804-6.

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