# Clinical Pearls of Branchial Cleft Cyst Management in an Adult

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**ABSTRACT**

***Introduction***

*Second branchial cleft anomalies most commonly present as cysts followed by sinuses and fistulae. They have been classified into four different sub-types by Bailey. Type II is most common type where the branchial cleft cyst (BCC) lies anterior to the sternocleidomastoid muscle, posterior to the submandibular gland, adjacent and lateral to the carotid sheath. In this article, a case of type II second branchial cleft anomaly is presented.*

***Case Report***

*This article aims to portray how to evaluate a patient with second branchial cleft cyst focussing, focusing on how its diagnosed and its appropriate management. A young woman who had chief complaint of swelling of left side of the neck visited our outpatient department. She underwent complete excision of the lesion. There was no recurrence at 1year follow-up visit.*

***Discussion***

*Most branchial anomalies arise from the second branchial apparatus. Most second BCCs are located in the submandibular space. Patients with BCCs are usually older children or young adults. MR imaging provide the surgeon adequate preoperative information. Treatment for these lesions is complete surgical excision.*



***Keywords***

*Branchial Cleft Cyst; Second Branchial Anomaly*


The branchial arches represent the embryological precursors of the face, neck and pharynx.[1] Anomalies of the branchial arches are one of the most common congenital lesions of the head and neck.[1] Second branchial cleft cysts are benign developmental cysts thought to arise from congenital remnants of the second branchial arch.[2] They arise in young patients between the age of 20-40 years of age.[2]

They are painless compressible asymptomatic swelling situated at the anterior border of the sternocleidomastoid muscle between the mandibular angle and clavicle.[2] They gradually progress in size, and may become painful or tender with time if they are subsequently infected.[3] The preferred management strategy is surgical excision.[3]

## Case Report

18-year-old woman presented with a swelling in the left side of the neck, which had appeared 8 months earlier and slowly progressively increased in size since then; with pain over it for 3 months. A solitary mass located along the anterior margin of the upper third of the sternocleidomastoid muscle on left side of neck below the left side of the angle of the mandible which was measuring 6 x 5 x 3 cm and extending 4 cm below the base of the mandible and obliquely 2 cm from the angle of the mandible. On palpation it was non-tender, soft in consistency and fluctuant.

Oropharyngeal examination was within normal limits. There were no lymph nodes palpable on neck examination. Patient was subjected to routine blood investigations and


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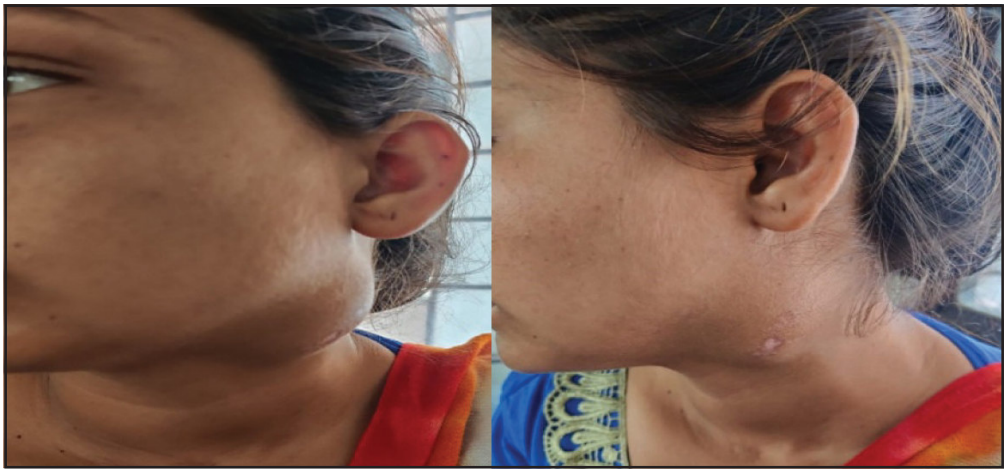

Fig. 1. Clinical image showing a mass of the upper-left neck

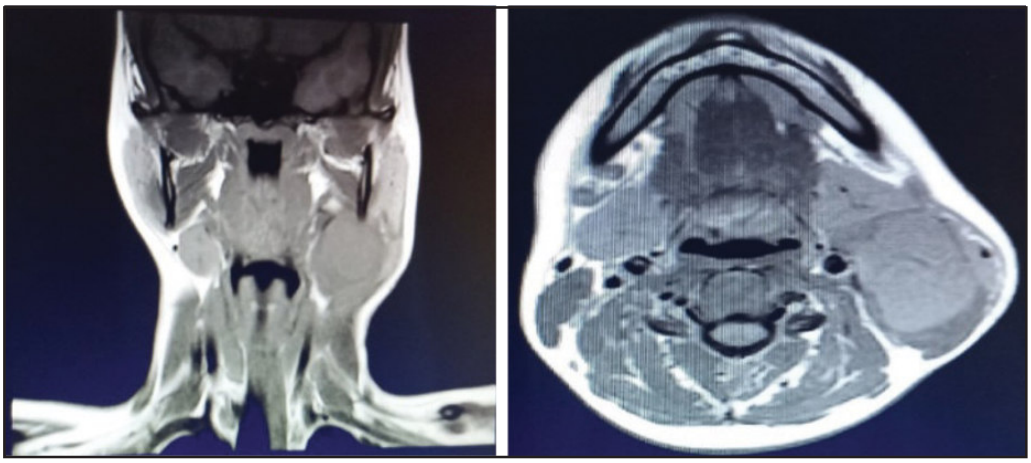

Fig. 2a. T1-weighted MRI

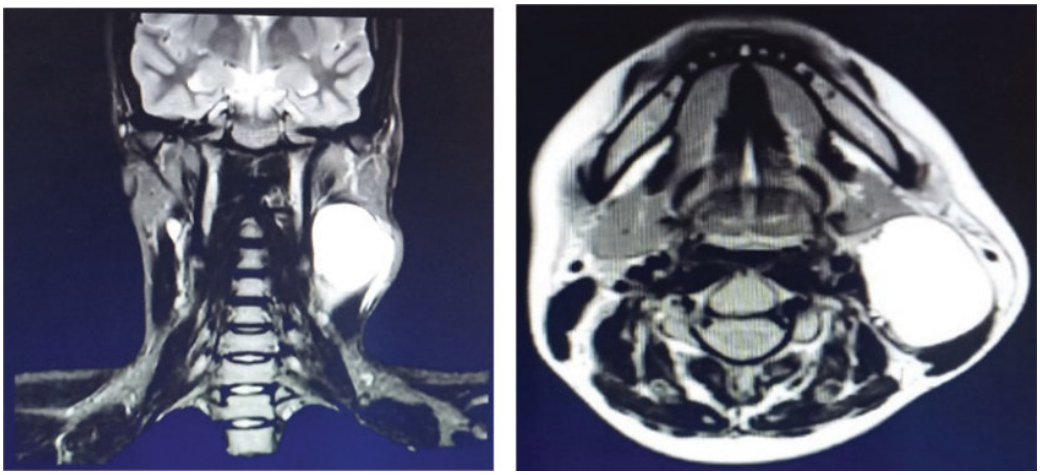

Fig. 2b. STIR and axial T2 weighted MRI

radiological imaging. Routine laboratory tests were within normal range. Fine-needle aspiration cytology showed pultaceous material with mixed inflammatory cells against a background of inflammatory necrosis. In ultrasonography of neck, the lesion presented as well-defined thick walled collection with internal echoes, 4 x 2.6 x 4.3 cm (~25 mL), which is deep to subcutaneous plane on left side of neck, abutting submandibular gland anteromedially and deep lobe of parotid supero-laterally.

Magnetic resonance imaging of neck with contrast revealed a well-deûned thin walled cystic lesion measuring 40×30×40 mm in left carotid space, anterior to the left sternocleidomastoid muscle which is displaced postero-laterally, abutting left common carotid artery and internal jugular vein medially. Post contrast, lesion shows peripheral wall and surrounding soft tissue mild enhancement. Suggestive of second branchial cleft cyst (Type II Bailey classification). Coronal and axial T1-weighted MRI shows a well-defined hypointense mass that was confined to the left aspect of the neck (Fig 2a), the mass was hyper-intense on coronal STIR and axial T2 weighted MRI sequences (Fig 2b).

The patient underwent second branchial cleft cyst surgical resection approached by a transverse cervical incision under general anaesthesia in supine position with her head turned contralaterally (Fig 3). Skin incision was performed in the upper third lateral neck along the upper neck skin crease, 2.0–2.5 cm below the lower border of the mandible. Incision distal border was at the level of anterior border of the sternocleidomastoid muscle. The skin, subcutaneous tissue, platysma muscle incision was performed layer by layer. Subplatysmal layer was elevated. Anterior border of sternocleidomastoid muscle is exposed. SCM muscle was retracted away from the field. The cyst was carefully separated from the surrounding structures. Cyst was removed (Fig 4) and sent for HPE. After complete excision, the wound was closed in layers.

Histopathological inspection of the surgical specimen with H and E stain at 10x magnification revealed a cystic wall lined with stratified squamous epithelium (Fig 6a). Subepithelium shows fibrocollagenous tissue with lymphoid aggregates, congested and dilated blood vessels (Fig 6b) with mixed inflammatory cell infiltrates; consistent with the diagnosis of a branchial cleft cyst.

The postoperative course was uneventful (Fig 5). Follow-up has shown no evidence of recurrence.

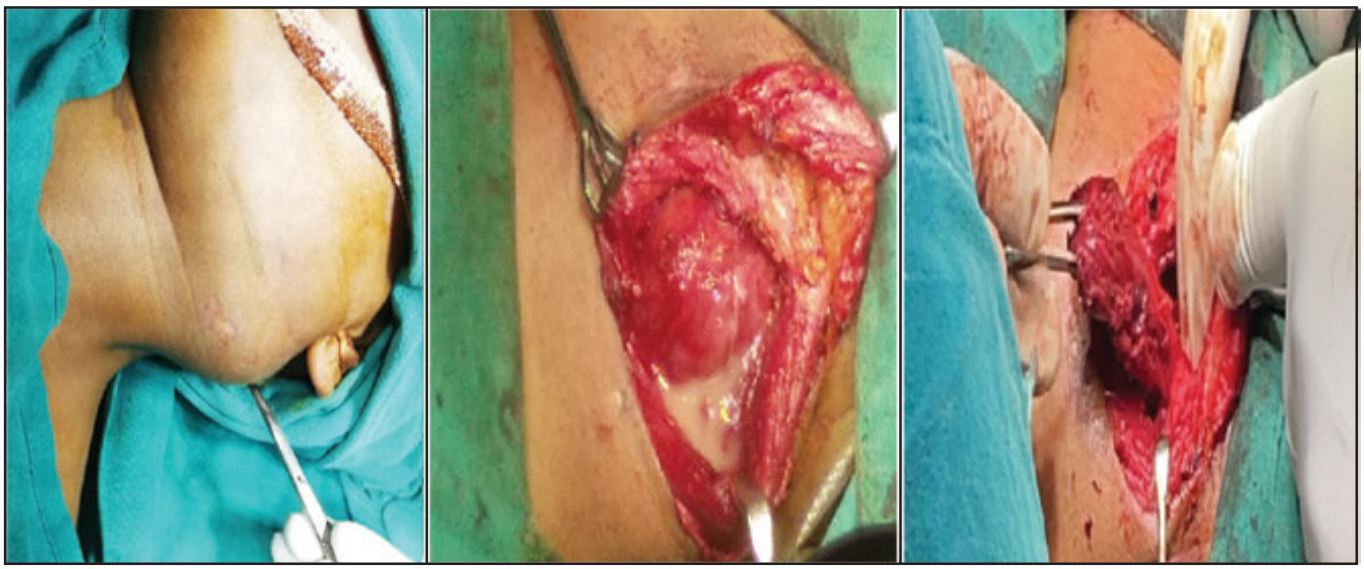

**Fig. 3. Peri-operative view**

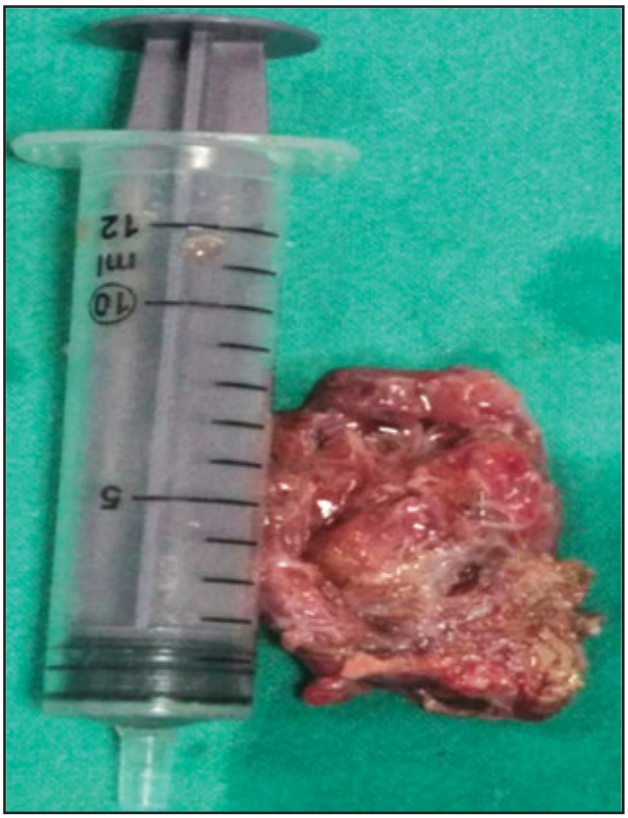


Fig. 4. Excised mass

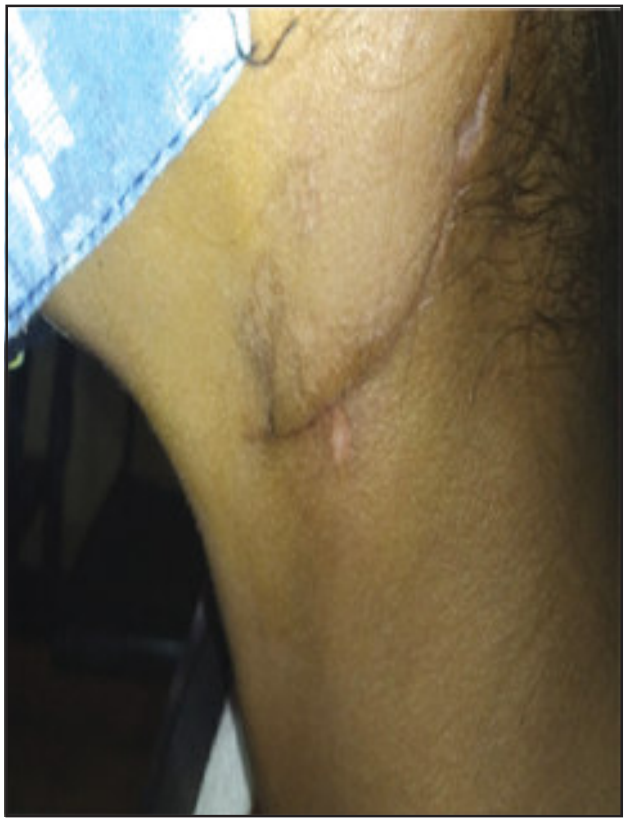

Fig. 5. Post-operative

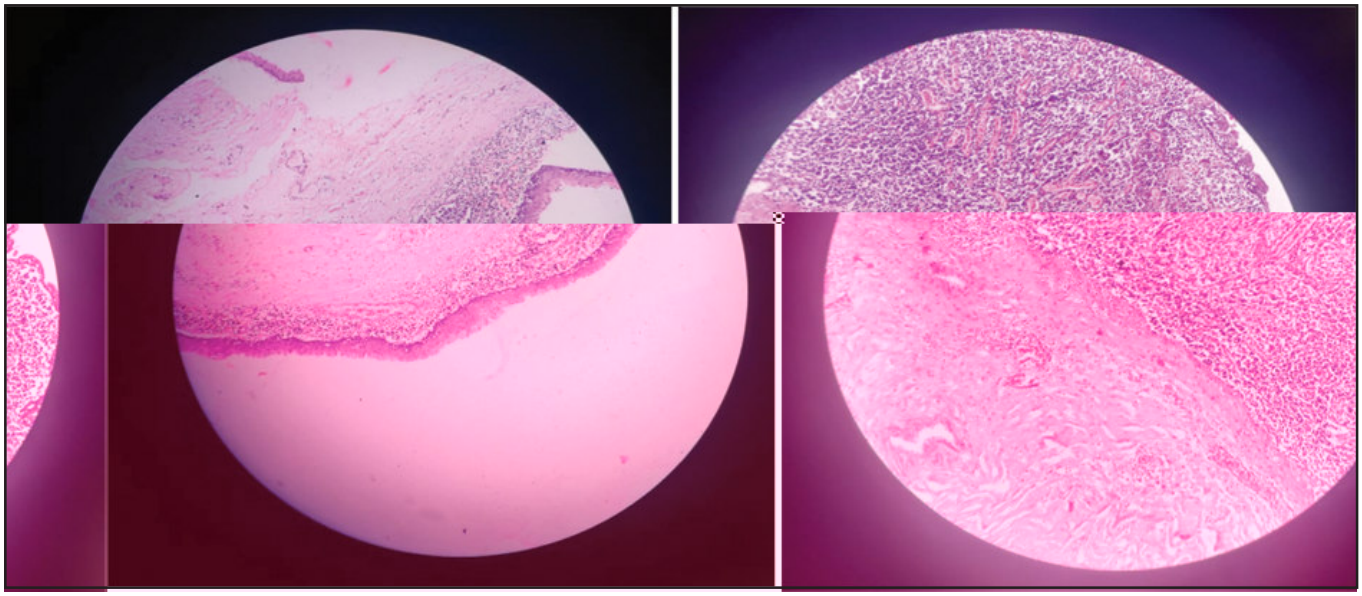

Fig. 6 (a &b) H and E stain at 10x magnification of postoperative specimen

## Discussion

During embryonic development, the second arch grows caudally, enveloping the third, fourth, and sixth arches and fusing with skin caudal to these arches, forming a deep groove (cervical sinus).[4] The edges of this grove then meet and fuse.[4] The ectoderm within the fused tube then disappears.[4] Persistence of the ectoderm gives rise to a branchial cyst.[4] There are many theories of origin of branchial cyst. These include persistence of vestiges of the pre-cervical sinus, thymo-pharyngeal ductal origin and cystic lymph node origin.[5]

Bailey classified it into four subtypes, as follows:

Type 1: situated anterior to the sternocleidomastoid, just deep to the platysma,

Type 2: the most common variant of the four subtypes, found deep to the sternocleidomastoid, lateral to the carotid space,

Type 3: these extend medially between the bifurcation of internal and external carotid arteries up to the lateral pharyngeal wall,

Type 4: positioned in the pharyngeal mucosal space, medial to the carotid sheath.[3]

Clinically SBCC (second branchial cleft cysts) is located in the upper section of lateral neck surface anterior to sternocleidomastoid muscle.[6] In typical cases, posterior section of SBCC is located under the mentioned muscle; upper pole is under the posterior belly of digastric muscle and stylohyoid muscle; medially the cyst adjoins internal jugular vein at the level of carotid bifurcation.[6]

Ninety-five percent of abnormalities of the branchial cleft apparatus arise from the second cleft.[7] At least 75% of all second branchial cleft abnormalities are cysts, which typically present when an individual is between 10 and 40-years-old.[7] They grow slowly over periods of weeks to years.[8] They present as soft, mobile, asymptomatic masses covered with normal skin.[8]

Branchial cysts typically contain straw coloured fluid consisting of cholesterol crystals and squamous epithelial cells on fine needle aspiration cytology.[9] Histopathologically, these cyst walls contain lymphoid tissue with evidence of germinal centres.[9] Sonographically, it appears as an anechoic mass or predominantly hypoechoic, cystic mass with faint internal debris and posterior enhancement.[10]

On CT imaging, they are well circumscribed, low-density cystic masses with a thin wall.[1] If they become infected, this may become thick-walled with evidence of mural enhancement, localised inflammatory change and peri-lesional fat stranding.[1] Magnetic resonance imaging provides better depiction of the deep extent of the cyst and a more previse preoperative assessment.[8] The content of the cysts varies from hypo- to isointense (relative to the muscles) in T1-weighted sequences; it is hyperintense in T2-weighted sequences.[8]

The treatment for second branchial cleft cysts is surgical excision.[6] The cysts can be located either superûcial or deep to the cervical fascia.[2] Careful dissection around the cyst bed and exploration for an associated fistula is required.[2]

## Conclusion

Second-cleft lesions comprise 90–95% of all branchial cleft anomalies. Branchial cysts are frequently incorrectly diagnosed and forgotten in the differential diagnosis.[7] The treatment of branchial anomalies begins with a careful and complete history and physical examination.[7] MRI provides better depiction of the deep extent of the cyst and a more precise preoperative assessment. Definitive management consists of complete surgical excision.

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