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A Rare Presentation of First Branchial Cleft Cyst in an Adult Female: A Case Report and Review

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ABSTRACT

Branchial cleft cysts are congenital epithelial cysts resulting from the failure of obliteration of the branchial clefts during embryonic development. They often present as painless, fluctuant swellings in the lateral aspect of the neck and may lead to complications such as infection or compression of nearby structures if left untreated. This case report outlines the diagnosis, surgical management, and postoperative care of a 34-year-old female patient presenting with a left-sided neck swelling, later diagnosed and excised as a branchial cyst. The physical examination and imaging studies, including ultrasound and CT scan, suggested a first branchial cleft cyst. Fine needle aspiration cytology supported the diagnosis by revealing benign cystic contents. The goal of treatment is to achieve complete surgical excision of the cyst to prevent recurrence and associated complications.

Keywords: *Branchial cleft cyst, lateral neck swelling, excision biopsy, congenital cyst, ENT surgery.*

1. INTRODUCTION

Branchial cleft cysts are developmental anomalies that arise due to the incomplete obliteration of the branchial apparatus during embryogenesis. These congenital epithelial cysts are typically located on the lateral aspect of the neck and are most commonly derived from the second branchial cleft, which accounts for approximately 95% of all branchial anomalies [1]. First branchial cleft cysts, as seen in this case, are relatively rare and are situated near the parotid gland and external auditory canal. Clinically, these cysts usually present as painless, slowly enlarging masses in the lateral neck region. They may become

tender or inflamed if secondarily infected. In some cases, particularly with first branchial cleft cysts, there may be a fistulous tract or involvement of the facial nerve, complicating surgical excision [2]. The incidence of branchial cleft cysts is estimated to be around 2 to 3 per 1,000 live births, with a slight male predominance [3]. Despite their congenital origin, many lesions do not become clinically apparent until later in childhood or early adulthood, often following an upper respiratory tract infection or localized trauma. A recent population-based study by Tsai et al. (2019) [5] indicated that branchial cleft anomalies constituted approximately 20% of congenital neck masses requiring surgical intervention. Other studies have further emphasized the diagnostic challenges and anatomical variability associated with branchial cleft anomalies. De Serres et al. [3] reported that delayed diagnosis may occur due to overlapping symptoms with other cervical masses. Torsiglieri et al. [6] highlighted the risk of recurrence with incomplete excision and stressed the importance of early surgical management. Moreover, imaging modalities such as MRI and CT have greatly improved preoperative localization and characterization of the cysts [10, 16]. A study by Benson et al. [13] confirmed that MR imaging is particularly helpful in delineating the relationship of first branchial cleft cysts with surrounding neurovascular structures, aiding in surgical planning and minimizing postoperative complications. Imaging studies, such as ultrasound, CT, or MRI, are crucial for diagnosis and preoperative planning, and histopathological evaluation confirms the nature of the lesion. Complete surgical excision remains the definitive treatment to prevent recurrence and potential complications, including infection or nerve involvement [6].

2. PATIENT INFORMATION

A 34-year-old female presented to the ENT department on 11th June 2025 with a chief complaint of a gradually enlarging, painless swelling in the left side of her neck. The swelling had been increasing progressively over several months, without associated pain, fever, or discharge. She had no significant comorbidities or relevant family history. Vital signs were stable on admission, and she was admitted as an emergency case and transferred to the ENT ward for further evaluation. Following detailed clinical assessment and imaging—including ultrasound and CT scan—a provisional diagnosis of a first branchial cleft cyst was made. The patient underwent excision biopsy of the cyst under general anesthesia on 14th June 2025. The cyst, located at the anterior border of the sternocleidomastoid muscle, was carefully dissected and excised in toto, with meticulous preservation of surrounding neurovascular structures. The postoperative course was uneventful.

3. CLINICAL FINDINGS

The patient presented with a gradually progressive, painless swelling on the left side of the neck, specifically in the parotid region. There were no associated constitutional symptoms such as fever or weight loss, and no history of recent infections or trauma. The swelling had been present for several months. On physical examination, a well-defined, soft-to-firm, non-tender, fluctuant swelling approximately 8 × 4 cm in size was noted. It extended from the tragus superiorly to below the mandible inferiorly and obliterated the mandibular angle skin crease. The mass was not attached to the overlying skin, and there were no signs of inflammation such as erythema or warmth. No bruit or discharge was observed. Airway assessment revealed a patent airway with midline trachea and normal laryngeal contour. Facial nerve function was intact on examination. The consistency, location, and mobility of the mass, along with the absence of infection signs or lymphadenopathy, strongly supported the diagnosis of a benign congenital lesion such as a branchial cleft cyst. These clinical findings were essential in correlating with radiologic evidence to confirm the diagnosis and plan the surgical approach.

4. DIAGNOSTIC ASSESSMENT

The diagnostic evaluation of the patient included a combination of imaging, cytological, and clinical ENT examinations, all of which contributed to confirming the diagnosis of a first branchial cleft cyst. Ultrasound of the neck revealed a well-defined anechoic lesion measuring approximately 3 × 4 cm, consistent with a fluid-filled cystic structure, which is characteristic of a branchial cleft cyst. This non-invasive imaging modality is particularly useful for initial assessment due to its high sensitivity for cystic masses and lack of radiation exposure. Complementary to this, a contrast-enhanced CT scan of the neck was performed to further delineate the lesion's anatomical relationships. The CT scan showed no abnormal findings in the adjacent structures, including the pharynx, larynx, thyroid, and parotid glands, and revealed no evidence of cervical lymphadenopathy, thus ruling out other differential diagnoses such as infected cysts or neoplastic lesions. Fine Needle Aspiration Cytology (FNAC) of the swelling provided cytological confirmation, yielding a moderately cellular smear composed of cyst macrophages, histiocytes, lymphocytes, and benign squamous cells, supporting the diagnosis of a benign epithelial cyst. Additionally, an ENT examination including indirect laryngoscopy and rhinoscopy was unremarkable, and cranial nerve assessment confirmed intact facial nerve function, which is particularly relevant in suspected first branchial cleft anomalies due to their proximity to the facial nerve. Taken together, the imaging and cytology findings, in correlation with the clinical features—specifically the lesion's location at the anterior border of the sternocleidomastoid muscle and its fluctuant, non-tender nature—strongly supported the diagnosis of a first branchial cleft cyst. The diagnosis of a **first branchial cleft cyst** was considered based on location and clinical features

5. THERAPEUTIC INTERVENTION

The primary goal of therapy in the management of branchial cleft cysts is complete resolution of the lesion and prevention of recurrence or complications such as infection, abscess formation, or nerve injury. Surgical Intervention: The patient underwent surgical excision of the cyst under general anesthesia on 14th June 2025. Positioning was supine with the neck turned to the opposite side. The mass was located at the anterior border of the sternocleidomastoid muscle and excised in toto, taking care to avoid injury to the marginal mandibular branch of the facial nerve. Histopathological examination confirmed the diagnosis.

Pharmacological Management:

- **Piperacillin-Tazobactam** (4.5 g IV every 8 hours for 5 days) was administered prophylactically to prevent perioperative infection.
- **Paracetamol** (1 g IV every 6 hours for 3 days, then oral 500 mg every 6 hours for 4 days) was given for postoperative pain management.
- **Pantoprazole** (40 mg IV once daily for 3 days, then oral 40 mg daily for 7 days) was used as gastric prophylaxis against stress-induced gastritis during the postoperative period.

Postoperative Course: Postoperative care included chest physiotherapy, incentive spirometry, and early ambulation to prevent pulmonary complications. Regular wound inspection and hygiene were maintained to avoid surgical site infection. Patient was advised regular ENT follow-ups for early detection of recurrence or complications. Postoperative recovery was uneventful. The patient received IV antibiotics (Piperacillin-Tazobactam), analgesics (Paracetamol), and proton pump inhibitors (Pantoprazole). Chest physiotherapy and incentive spirometry were initiated. She was discharged on oral antibiotics and analgesics with advice for follow-up after one week [13-15].

6. DISCUSSION

Branchial cleft cysts result from incomplete obliteration of the branchial apparatus. Second branchial cleft cysts account for 95% of these anomalies, but first branchial cleft cysts, though rare, are significant due to their proximity to the facial nerve [16-18]. Surgical excision remains the definitive treatment, with recurrence minimized through complete resection [19]. Imaging, especially ultrasonography and CT, assists in differentiating cysts from other neck masses [20-23]. This case highlights the successful management of a rare first branchial cleft cyst in a 34-year-old female, emphasizing the significance of early recognition, accurate diagnosis, and complete surgical excision. A major strength of the approach was the multidisciplinary integration of clinical, radiological, and cytological assessments, which ensured diagnostic clarity and minimized intraoperative risks. The surgical team's meticulous dissection preserved surrounding neurovascular structures, especially the marginal mandibular branch of the facial nerve, which is a known challenge in first branchial cleft cyst excisions. However, a limitation in the case was the lack of preoperative MRI, which could have provided even more detailed information regarding soft tissue and neural relationships. According to De Serres et al. and Torsiglieri et al., incomplete excision or delayed surgical intervention increases the risk of recurrence or complications [3,6]. Studies also highlight the variable anatomical presentations of branchial anomalies, underscoring the importance of individualized surgical planning [13].

7. CONCLUSION

This case illustrates the importance of accurate clinical and radiological assessment in the diagnosis of branchial cysts. Timely surgical excision provides excellent outcomes and prevents complications such as infection or nerve damage. First branchial cleft cysts, although less common, should be considered in lateral neck swellings. The rationale for concluding surgical excision as the definitive treatment lies in its proven efficacy in preventing recurrence and complications, as corroborated by histopathological confirmation and an uneventful postoperative course. This case reinforces the need for clinicians to maintain a high index of suspicion for congenital neck masses in adults and to adopt a structured diagnostic approach using ultrasound, CT, and FNAC. The primary takeaway is that timely diagnosis and complete surgical removal, complemented by appropriate perioperative care, result in excellent patient outcomes, even in anatomically complex branchial anomalies.

Patient perspective

I had a variety of issues prior to admission, but the doctor and other medical professionals were able to diagnose and treat me appropriately, allowing me to recover quickly and relieve my symptoms. I'm pleased with the care I've received.

Authors' Contribution

Contributed to the idea and design of the study. Sai Avinash .J gathered the data and Sai Avinash .J drafted the manuscript, and all authors critically revised it for relevant intellectual content and approved the final version.

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Conflicts of interest

There are no conflicts of interest.

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