EAS Journal of Radiology and Imaging Technology
Abbreviated Key Title: EAS J Radiol Imaging Technol
ISSN: 2663-1008 (Print) & ISSN: 2663-7340 (Online)
Published By East African Scholars Publisher, Kenya

OPEN ACCESS

Volume-7 | Issue-3 | May-Jun-2025 | DOI: https://doi.org/10.36349/easjrit.2025.v07i03.004

Case Report

Atypical Imaging Appearance of a Branchial Cleft Cyst: A Histopathologically Confirmed Case

Dr. Manish Dagar[1*], Dr. Sachin K Shetty[1], Dr. Rohan Agrawal[1], Dr. Saptarshi Roy[1]

[1]Junior Resident, Department of Radiology, Sree Balaji Medical College and Hospital, Chennai

Article History
Received: 17.05.2025
Accepted: 21.06.2025
Published: 24.06.2025

Journal homepage:
https://www.easpublisher.com

Quick Response Code

Abstract: Branchial cleft cysts are congenital anomalies arising due to incomplete involution of the branchial apparatus, most commonly involving the second cleft. They typically present as painless, cystic masses in the lateral neck with characteristic imaging features. However, atypical presentations in unusual anatomical locations can pose diagnostic challenges. We report the case of a 14-year-old female who presented with a painful swelling in the left upper neck. Ultrasonography and MRI revealed a heteroechoic, septated cystic lesion in the upper cervical region, deep to the parotid gland, with features overlapping multiple cystic neck pathologies. Differential diagnoses included lymphatic cyst, necrotic lymph node, cystic schwannoma, and salivary gland neoplasm. The lesion was aspirated and surgically excised. Histopathological examination confirmed the diagnosis of a second branchial cleft cyst, showing squamous epithelial lining with lymphoid aggregates and reactive lymphadenitis. This case highlights the diagnostic difficulty of branchial cleft cysts with atypical radiologic presentation, and underscores the critical role of radiology-pathology correlation in reaching a definitive diagnosis.

Keywords: Branchial cleft cyst, Congenital anomaly, Atypical presentation, Radiology-pathology correlation, Cystic neck mass.

Copyright © 2025 The Author(s): This is an open-access article distributed under the terms of the Creative Commons Attribution **4.0 International License (CC BY-NC 4.0)** which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.

INTRODUCTION

Branchial cleft cysts, also known as branchial cleft anomalies, are congenital lesions resulting from incomplete obliteration of the branchial apparatus, specifically from the first through fourth pharyngeal clefts and pouches during embryologic development [1]. Among these, second branchial cleft cysts are the most common, accounting for over 90% of all cases [2]. These lesions typically present as painless, fluctuant swellings in the lateral neck, most often along the anterior border of the sternocleidomastoid muscle [3].

On ultrasound, branchial cleft cysts are usually seen as well-defined, anechoic or hypoechoic lesions with posterior acoustic enhancement and no internal vascularity [4]. On MRI, they commonly appear as well-circumscribed lesions that are T1 hypointense to isointense and T2 hyperintense, with thin rim enhancement following contrast administration. Infected or proteinaceous cysts may demonstrate internal septations or debris [5].

However, atypical imaging features and unusual anatomical locations — such as in the deep upper cervical region or parapharyngeal space — can obscure the diagnosis and broaden the differential to include cystic lymphadenopathy, lymphatic malformations, or neoplasms [6, 7]. In such cases, histopathologic evaluation remains the definitive diagnostic modality.

We present a case of a histologically confirmed second branchial cleft cyst in a 14-year-old female, located in the upper deep cervical space, which demonstrated atypical imaging features on both ultrasound and MRI. This case highlights the diagnostic challenge posed by atypical branchial cleft cysts and underscores the importance of radiology-pathology correlation.

CASE PRESENTATION

A 14-year-old female presented with a complaint of swelling over the left side of the neck for approximately two months, which became painful over the preceding one week. There was no history of fever, trauma, difficulty swallowing, or recent infection. On clinical examination, a soft, mildly tender swelling was

***Corresponding Author:** Dr. Manish Dagar
Junior Resident, Department of Radiology, Sree Balaji Medical College and Hospital, Chennai

palpated in the left upper neck, with no overlying erythema, discharge, or facial nerve involvement.

Ultrasound Findings

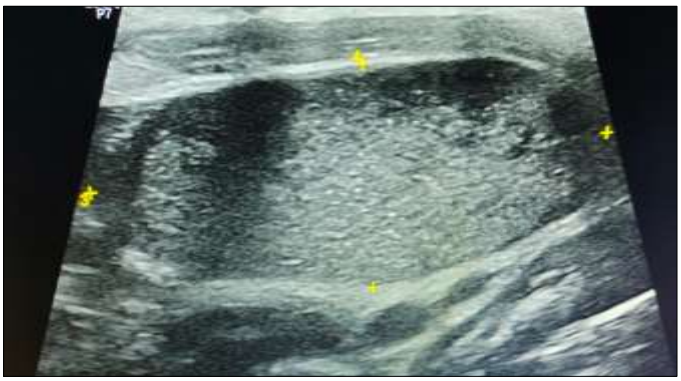
Ultrasonography revealed a heteroechoic lesion measuring approximately 4.7 × 2.2 cm, located inferior to the left parotid gland and displacing the left submandibular gland anteriorly. The lesion contained internal echoes and thin septations but showed no internal vascularity on Doppler imaging.

MRI Findings

MRI showed a well-circumscribed ovoid lesion, approximately 54 × 30 × 35 mm, in the left upper deep cervical region. The lesion was predominantly cystic, with T2 hyperintense content and iso-intense signal on T1-weighted images. Thin internal septations and eccentric soft tissue components were seen at the superior and inferior poles. The lesion was posteromedial and inferior to the left parotid gland, posterior to the left submandibular gland, abutting the sternocleidomastoid muscle laterally and carotid and jugular vessels medially, with mild mass effect.

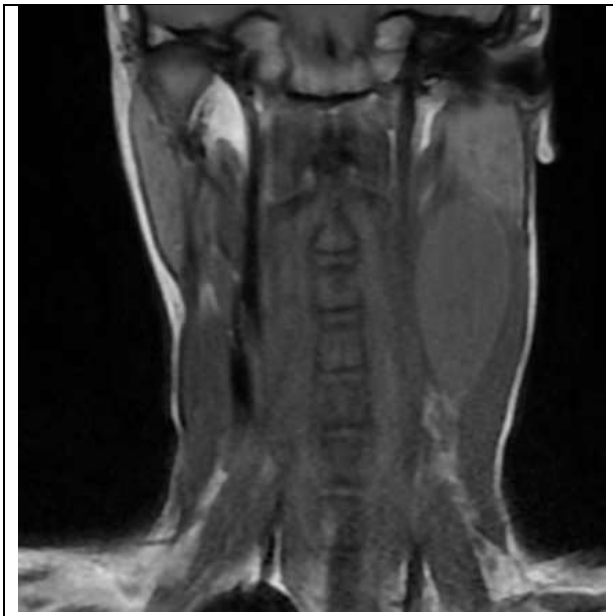
Based on imaging features and location, differentials included:

1. Cystic lymph node with necrosis
2. Lymphatic cyst
3. Branchial cleft cyst
4. Cystic minor salivary gland tumor
5. Cystic schwannoma

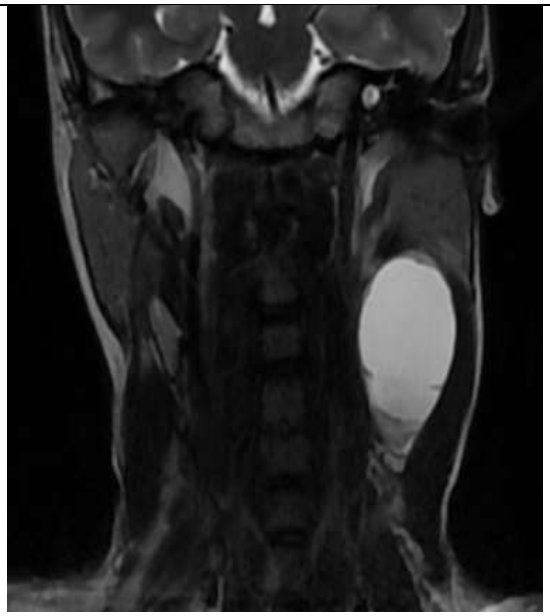


A

Figure A: A heteroechoic lesion noted inferior to the left parotid gland and seen pushing the left submandibular gland anteriorly



B



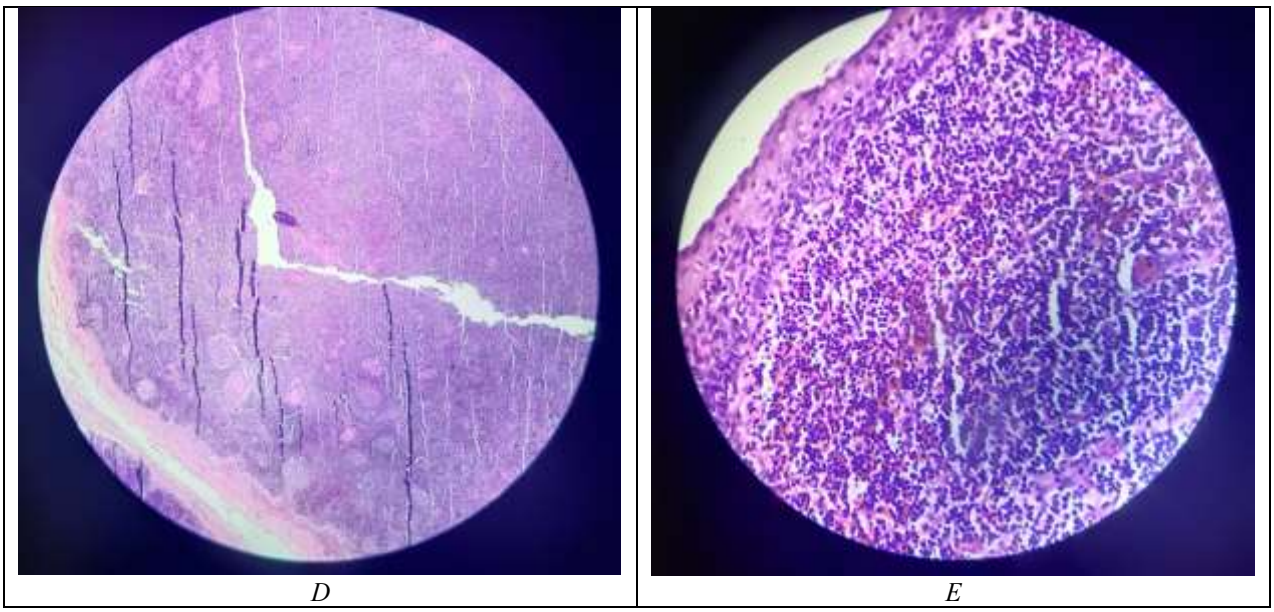
C

Figure B (on left): MRI T1 image shows a well defined Iso-intense lesion in the left upper deep cervical region
Fig. C (on right): Predominantly hyperintense on T2 with intermediate signal on superior and inferior poles

Surgical Management and Histopathology

The patient was taken for aspiration under general anesthesia, where purulent material was drained from the lesion. The cystic mass was then surgically excised, and the specimen was sent for histopathological evaluation.

Microscopic examination revealed a benign cyst lined by non-keratinizing stratified squamous epithelium, with large areas of ulceration and acute inflammation. The cyst wall showed prominent lymphoid aggregates with germinal centre formation, and two reactive lymph nodes with features of lymphadenitis were also identified within the specimen. These features were consistent with a second branchial cleft cyst, complicated by secondary infection.



D *E*

Figure D: Low power view showing cyst wall lined by stratified squamous epithelium with dense lymphoid tissue beneath (H&E stain, 10×).

Figure E: High power view showing epithelial lining and prominent subepithelial lymphoid aggregates with germinal centers (H&E stain, 40×)

DISCUSSION

Branchial cleft cysts are benign congenital lesions arising from incomplete involution of the branchial apparatus during embryonic development [1]. The second branchial cleft cyst is the most common variant, accounting for over 90% of cases, and typically presents as a painless, fluctuant mass in the lateral neck, especially along the anterior border of the sternocleidomastoid muscle in children or young adults [2, 3]. While many present with classical imaging findings and superficial locations, atypical anatomical presentations — such as in the deep upper cervical region — can lead to diagnostic uncertainty, particularly when radiological appearances deviate from the expected pattern [6, 7].

In this case, the lesion was situated in the left upper deep cervical region, posteromedial to the parotid gland and posterior to the submandibular gland, with mass effect on the carotid-jugular vascular bundle. These features, along with internal septations and T2 hyperintensity on MRI, led to a wide differential diagnosis including necrotic lymph node, lymphatic cyst, cystic schwannoma, and salivary gland neoplasm. Unlike the typical anechoic or homogeneously hypoechoic appearance of branchial cleft cysts, this lesion appeared heteroechoic with septations on ultrasound and showed atypical MRI features, such as eccentric soft tissue components.

These atypical imaging features may result from secondary infection or internal hemorrhage, altering the fluid content and internal architecture of the cyst [5-7]. This was supported intraoperatively by the aspiration of purulent material and histopathologic evidence of acute inflammation, ulcerated stratified squamous epithelial lining, and lymphoid aggregates with germinal centers — diagnostic hallmarks of a second branchial cleft cyst [2-5].

Given its unusual location and appearance, the lesion was initially mistaken for other cystic entities. This case underscores the importance of maintaining a broad differential for cystic neck masses and the critical role of histopathologic confirmation, particularly when imaging findings are inconclusive. Notably, in older patients, similar presentations can mimic cystic metastases, especially from HPV-associated oropharyngeal cancers, necessitating further caution [8].

CONCLUSION

Second branchial cleft cysts may present in atypical deep cervical locations with non-classical imaging features, complicating radiologic diagnosis. This case illustrates the potential for such lesions to mimic other cystic neck masses, including neoplasms. In these scenarios, radiology-pathology correlation is essential to establish an accurate diagnosis and guide appropriate treatment. A high index of suspicion should

be maintained in young patients presenting with cystic neck swellings in non-typical locations, even when imaging features deviate from the norm.

REFERENCES

1. Benson MT, Dalen K, Mancuso AA, Kerr HH, Cacciarelli AA, Mafee MF. Congenital anomalies of the branchial apparatus: embryology and pathologic anatomy. Radiographics. 1992;12(5):943–960.
2. Koeller KK, Alamo L, Adair CF, Smirniotopoulos JG. Congenital cystic masses of the neck: radiologic-pathologic correlation. Radiographics. 1999;19(1):121–146.
3. Waldhausen JHT. Branchial cleft and arch anomalies in children. Semin Pediatr Surg. 2006;15(2):64–69.
4. Som PM, Curtin HD. Head and Neck Imaging. 5th ed. St. Louis: Mosby Elsevier; 2011.
5. Ali SZ, Hoon V, Stanley MW, Zaleski S, Barkan GA. Fine-needle aspiration of branchial cleft cysts: cytologic features and pitfalls in diagnosis. Diagn Cytopathol. 2000;23(2):84–88.
6. Ahuja AT, King AD, Metreweli C. Second branchial cleft cysts: sonographic appearance in adults. AJNR Am J Neuroradiol. 2000;21(2):324–328.
7. Madana J, Yolmo D, Kalaiarasi R, Gopalakrishnan S, Saxena SK. Branchial cleft cysts: A pictorial review. Indian J Otolaryngol Head Neck Surg. 2012;64(1):62–64.
8. Goldenberg D, Sciubba J, Koch WM. Cystic metastasis from head and neck squamous cell carcinoma: a distinct disease variant? Head Neck. 2006;28(7):633–638.

Cite This Article: Manish Dagar, Sachin K Shetty, Rohan Agrawal, Saptarshi Roy (2025). Atypical Imaging Appearance of a Branchial Cleft Cyst: A Histopathologically Confirmed Case. *EAS J Radiol Imaging Technol, 7*(3), 58-61.