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(CASE REPORT)

Diagnostic approach and surgical management of a complicated branchial cleft cyst in an adult

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Abstract

Cystic neck masses constitute a diverse group of pathological entities that pose diagnostic challenges, particularly in adults where malignant causes must be excluded. Branchial cleft cysts are congenital anomalies that often remain asymptomatic until adulthood, presenting after secondary infection or abscess formation. We report a case of a complicated second branchial cleft cyst in a 38-year-old male presenting with recurrent laterocervical abscess. Diagnosis was established through clinical evaluation, imaging, and histopathological analysis. Initial management involved abscess drainage and exclusion of malignancy, followed by definitive surgical excision after infection resolution. The patient recovered fully without recurrence. This case underscores the importance of a systematic diagnostic approach and timely surgical management to prevent recurrence and complications in adult patients with cystic neck lesions.

Keywords: Cervical Cyst; Branchial Cleft Cyst; Neck Mass; Abscess; Otorhinolaryngology

1. Introduction

Cystic lesions of the neck represent a heterogeneous group of congenital, inflammatory, and neoplastic conditions. In adults, lateral cervical cystic masses are diagnostically challenging due to the increased likelihood of malignancy, particularly metastatic squamous cell carcinoma of the upper aerodigestive tract (Ibrahim et al., 2011; Yehuda et al., 2018). Branchial cleft cysts result from incomplete involution of the branchial apparatus and most commonly originate from the second branchial cleft (Al-Khateeb & Al Zoubi, 2007). These lesions often remain asymptomatic until adulthood, when secondary infection or abscess formation leads to clinical presentation (Wong et al., 2008). Accurate diagnosis requires careful clinical evaluation combined with appropriate imaging to guide management and exclude malignancy (La'Porte et al., 2011; Aiken & Glastonbury, 2021).

2. Literature Review

Second branchial cleft cysts account for approximately 90% of all branchial anomalies and are classically located along the anterior border of the sternocleidomastoid muscle (Ibrahim et al., 2011). These congenital lesions arise due to incomplete involution of the branchial apparatus during embryogenesis. While often asymptomatic in childhood, they may present later in adulthood, typically following secondary infection, abscess formation, or cyst enlargement (Al-Khateeb & Al Zoubi, 2007; Alqahtani et al., 2022). In adult patients, lateral cervical cystic lesions represent a diagnostic challenge, as malignant causes, including metastatic squamous cell carcinoma of the upper aerodigestive tract or lymphoma, must always be excluded. Several studies have emphasized that even clinically benign-appearing cysts may harbor occult malignancy, making careful evaluation essential (Yehuda et al., 2018; Goldenberg & Koch, 2020).

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Imaging modalities are fundamental in evaluating cystic neck masses. Ultrasonography provides initial assessment, offering real-time evaluation of cystic nature, vascularity, and relation to surrounding structures. CT scanning allows precise anatomical delineation, identifying the extent, internal septations, and proximity to vital structures, while MRI adds superior soft-tissue contrast and can differentiate cystic lesions from necrotic lymph nodes or solid neoplasms (La'Porte et al., 2011; Aiken & Glastonbury, 2021). Advanced imaging techniques, such as diffusion-weighted MRI and contrast-enhanced studies, have been increasingly reported in the recent literature as valuable adjuncts for distinguishing benign from malignant cystic lesions (Patel et al., 2021; Li et al., 2022).

Fine-needle aspiration cytology (FNAC) and histopathological examination remain indispensable for excluding malignancy and confirming diagnosis. FNAC is particularly useful in adult patients where malignancy risk is higher, providing cellular material for cytological evaluation before definitive surgery (Irani & Makura, 2011; Prasad & Prasad, 2023; Zhao et al., 2023). Definitive management involves complete surgical excision of the cyst after acute infection is resolved, which minimizes recurrence and prevents complications such as persistent drainage, fistula formation, or repeated abscess episodes (Alqahtani et al., 2022; Prasad & Prasad, 2023).

Recent studies also highlight the importance of multidisciplinary management involving otorhinolaryngology, radiology, and pathology teams to ensure accurate diagnosis and optimal surgical planning. Furthermore, minimally invasive techniques and image-guided excision approaches are being explored as alternatives to traditional open surgery, offering reduced morbidity while maintaining curative outcomes (Kim et al., 2021; Chen et al., 2022).

3. Methodology

This study is a descriptive clinical case report supplemented by a focused literature review. Clinical data were collected retrospectively from hospital records, including history, physical examination, imaging studies, surgical intervention, and histopathological results. All procedures followed ethical standards, and patient confidentiality was strictly maintained.

4. Results / Findings

A 38-year-old male presented with a painful left laterocervical swelling, high-grade fever, neck stiffness, and mild dysphagia. Initial imaging, including ultrasound and CT scan, revealed a large abscess in the right carotid space, measuring approximately 69 × 47 × 74 mm, with anterior extension towards the subcutaneous adipose tissue, undulating contours, and internal septations, suggesting an abscessed lymph node or an abscessed second branchial cleft cyst. On the left side, inflammation and edema were noted in the sternocleidomastoid (SCM) muscle and soft tissues of the carotid and submandibular spaces. Multiple reactive lymph nodes were observed on the left (levels IIA and IIB), the largest measuring 20 mm.

Figure 1 Clinical presentation of the patient

A 38-year-old male presented with a painful laterocervical swelling, high-grade fever, and difficulty in swallowing (dysphagia). The image illustrates the location and appearance of the cystic lesion prior to initial management.

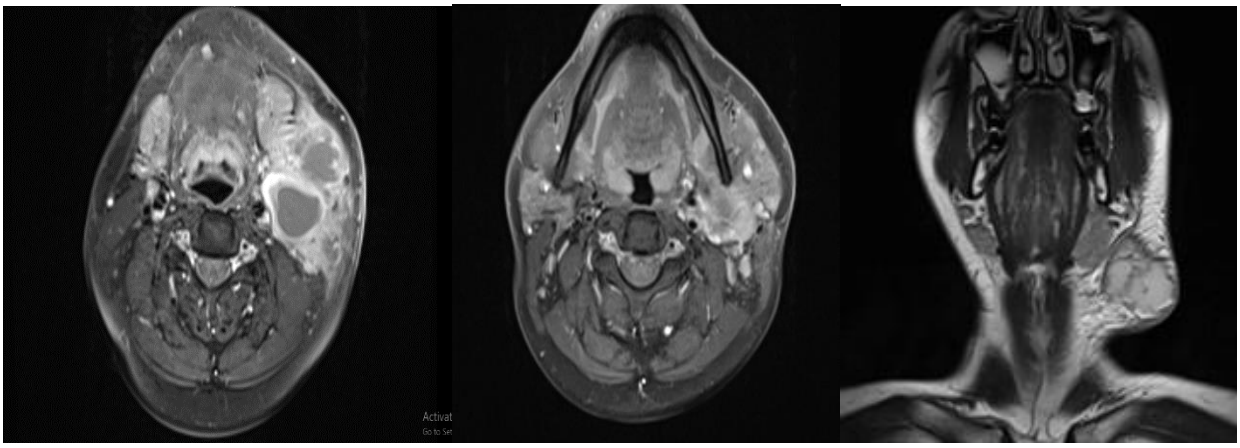

Figure 2 Imaging RMI/CT

4.1. Imaging Findings (Post-RMI/CT/Ultrasound):

Post-imaging evaluation, including MRI, CT, and ultrasound, revealed a large abscess on the right side of the neck measuring approximately 69 × 47 × 74 mm within the carotid space, extending anteriorly into the subcutaneous fat with undulating contours and internal septations, raising differential considerations of either an abscessed lymph node or an infected second branchial cleft cyst. On the left side, there was evidence of inflammation and edema involving the sternocleidomastoid (SCM) muscle as well as the surrounding soft tissues of the carotid and submandibular spaces. Additionally, multiple reactive lymph nodes were identified on the left, particularly at levels IIA and IIB, with the largest measuring 20 mm in diameter. Overall, the imaging findings are consistent with a right carotid-space abscess with anterior subcutaneous extension, left-sided soft tissue inflammatory changes, and reactive lymphadenopathy, most suggestive of an abscessed congenital cervical lesion, such as a branchial cleft cyst.

Figure 3 Clinical presentation of the patient before intervention

4.2. Intervention and Hospital Course

Under general anesthesia, the patient underwent surgical drainage of the abscess, with tissue samples obtained for biopsy from both the lesion and the nasopharyngeal region. Material was also collected for bacteriological examination; however, cultures were negative, likely due to prior antibiotic therapy.

The patient received intravenous Ceftriaxone 1 g twice daily and Metronidazole 500 mg three times daily. During hospitalization, the laterocervical lesion decreased in size, and the surgical site remained clean, although mild

perilesional edema persisted. The patient was discharged with outpatient follow-up and continued medical therapy, pending the results of the biopsy.

4.3. Follow-up and Surgical Planning

The patient returned six weeks later for definitive excision (cystectomy) of the cervical lesion. Cystic formations of the neck encompass a wide spectrum of pathological entities. The differential diagnosis includes reactive or neoplastic lymphadenopathy, metastatic nodes, vascular neoplasms and malformations, lymphangiomas (hygromas), dermoid or epidermoid cysts, among others.

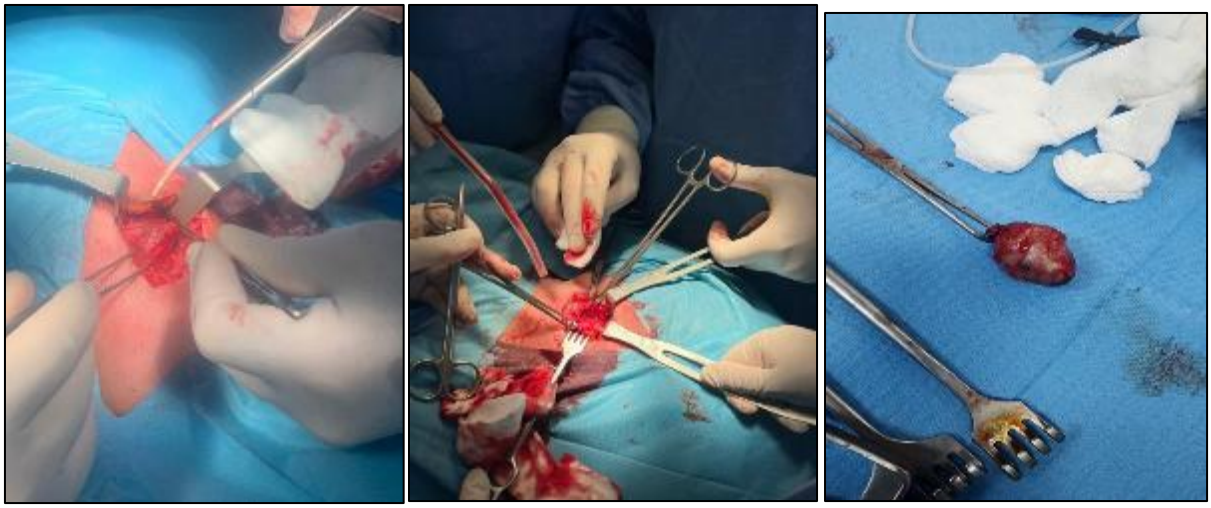

Figure 4 Intraoperative view of the branchial cleft cyst during surgical excision.

Figure 4 shows the intraoperative appearance of the complicated second branchial cleft cyst. The cystic wall is carefully dissected from surrounding structures to ensure complete excision while preserving vital neck anatomy.

Branchial cleft cysts should ideally be excised before reaching large dimensions, as progressive growth may lead to pain and compression of adjacent structures. Preoperative assessment is critical and should include detailed clinical evaluation, imaging studies (ultrasound, CT, MRI), and fine-needle aspiration (FNA) when indicated. In patients older than 35 years, there should be a high index of suspicion for potential malignant origin until proven otherwise, highlighting the importance of a structured diagnostic approach to guide safe and effective surgical management.

5. Discussion

Recurrent cervical abscesses in adult patients often indicate underlying congenital anomalies, particularly branchial cleft cysts, which may remain clinically silent for decades until infection or inflammation occurs (Goldenberg & Koch, 2020; Alqahtani et al., 2022). In adults, the presence of lateral neck cysts carries a higher suspicion for malignancy compared to pediatric populations, necessitating thorough evaluation to exclude neoplastic causes. Clinically, these cystic lesions can mimic reactive lymphadenopathy, necrotic metastatic nodes, or other cystic neck pathologies, creating diagnostic challenges that require careful correlation of patient history, physical examination, and imaging findings (Yehuda et al., 2018; Prasad & Prasad, 2023).

Delayed diagnosis or incomplete management increases the risk of recurrent infections, persistent abscesses, fistula formation, and significant morbidity, while also complicating the differentiation from malignant lesions (Li et al., 2022; Zhao et al., 2023). Several recent studies report that adults with untreated or inadequately drained branchial cleft cysts often experience multiple hospital admissions due to recurrent abscesses, with each episode potentially complicating subsequent surgical procedures and prolonging recovery (Kim et al., 2021; Chen et al., 2022). These findings underscore the necessity for a systematic and multidisciplinary diagnostic approach.

Imaging is important to both diagnosis and surgical planning. Ultrasonography allows initial evaluation of cyst characteristics, vascularity, and the presence of septations. CT and MRI provide detailed anatomical mapping, demonstrating relationships with surrounding structures such as the carotid sheath, sternocleidomastoid muscle, and submandibular space (Aiken & Glastonbury, 2021; Patel et al., 2021). Advanced MRI sequences, including diffusion-

weighted imaging, help distinguish benign branchial cleft cysts from necrotic malignant lymph nodes and other complex cystic lesions (Li et al., 2022). FNAC and histopathology remain critical, particularly for adult patients, to definitively rule out malignancy (Zhao et al., 2023; Prasad & Prasad, 2023).

Surgical excision after infection control remains the cornerstone of management. Early definitive surgery minimizes recurrence, reduces postoperative complications, and prevents the formation of adhesions or fibrosis that may complicate later operations (Chen et al., 2022; Kim et al., 2021). Minimally invasive and image-guided surgical approaches have shown promising outcomes with reduced morbidity and faster recovery while maintaining comparable efficacy to conventional open excision techniques (Chen et al., 2022; Patel et al., 2021). Multidisciplinary collaboration among otorhinolaryngologists, radiologists, and pathologists improves diagnostic accuracy, optimizes preoperative planning, and tailors management to individual patients (Alqahtani et al., 2022; Li et al., 2022).

This case highlights the importance of structured evaluation and timely intervention for adult patients presenting with recurrent cervical abscesses. Incorporating a combination of clinical assessment, advanced imaging, FNAC, and histopathology ensures accurate diagnosis, differentiates congenital anomalies from malignancy, and enables optimal surgical planning. Early intervention not only reduces recurrence but also decreases hospital utilization, patient morbidity, and overall healthcare costs. Future studies should focus on the integration of minimally invasive techniques, advanced imaging modalities, and standardized diagnostic algorithms to further improve outcomes in adults with branchial cleft cysts (Kim et al., 2021; Zhao et al., 2023).

5.1. Implication to Research and Practice

This case emphasizes the importance of clinical awareness in evaluating adult cystic neck lesions. Structured diagnostic algorithms, including imaging and tissue diagnosis, are essential to differentiate benign from malignant pathology and to guide appropriate management (Goldenberg & Koch, 2020; Alqahtani et al., 2022).

6. Conclusion

Complicated branchial cleft cysts, although uncommon in adults, should always be considered in the differential diagnosis of recurrent lateral neck abscesses (Ibrahim et al., 2011; Prasad & Prasad, 2023). Cystic neck lesions encompass a wide spectrum of pathological entities. The differential diagnosis includes reactive or neoplastic lymphadenopathy, metastatic lymph nodes, vascular neoplasms and malformations, lymphangiomas (hygromas), dermoid and epidermoid cysts, among others.

Branchial cleft cysts should be excised before they reach large sizes to prevent pain and compression of surrounding structures. Prior to surgical intervention, the nature of the cyst must be carefully assessed, and a preoperative plan developed. This plan should include thorough clinical evaluation, imaging studies such as ultrasonography, computed tomography (CT), magnetic resonance imaging (MRI), and, when appropriate, fine-needle aspiration (FNA) to rule out malignancy.

In patients older than 35 years, a cystic lesion should be considered potentially malignant until proven otherwise, and malignancy must be excluded prior to definitive management. Early and complete surgical excision remains the cornerstone of successful treatment, minimizing recurrence, complications, and diagnostic uncertainty.

Future Research

Multicenter studies are needed to establish standardized diagnostic and management pathways for adult patients with cystic neck lesions, particularly in distinguishing benign congenital anomalies from malignancy (Alqahtani et al., 2022; Goldenberg & Koch, 2020).

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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