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Parathyroid Cyst Presenting as a Cervical Mass: A Case Report and Updated Review of the Literature

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Abstract: Background: Parathyroid cysts (PCs) are rare lesions that often resemble other cervical cystic conditions, making preoperative diagnosis challenging, especially in resource-limited settings. **Methods:** We report a case of a parathyroid cyst diagnosed and treated at Chongqing University Fuling Hospital in 2020. Clinical presentation, imaging, cytological features, pathological findings, differential diagnosis and management strategies were analyzed in conjunction with an updated review of the literature. **Conclusion:** PCs represent a rare subset of parathyroid lesions and are most often non-functioning. Their imaging and cytological characteristics frequently resemble those of thyroid cysts, which may lead to misdiagnosis. Measurement of parathyroid hormone levels in aspirated cyst fluid is essential when a PC is suspected. Surgical excision remains the definitive treatment. This case underscores the diagnostic challenges and highlights the importance of heightened clinical awareness, particularly in primary and rural healthcare settings.

Keywords: Parathyroid Cyst; Cervical Cystic Lesion; Diagnosis; Benign Lesion

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1.Introduction

Parathyroid cysts (PCs) represent an uncommon subset of parathyroid lesions characterized by the accumulation of serous or proteinaceous fluid within the cyst cavity, first described in 1880 and with the earliest documented surgical excision reported in 1905[1]. A comprehensive meta-analysis of all documented parathyroid cyst cases published between 1905 and 2016 identified 359 patients, revealing a female predominance and indicating cervical swelling as the most frequently reported presenting symptom[2]. These lesions are conventionally categorized into functioning and non-functioning types, the vast majority are non-functioning and are identified incidentally during routine cervical or thyroid imaging or surgical exploration, with no biochemical evidence of primary hyperparathyroidism[3]. Conversely, functioning PCs are typically observed in older male individuals and present with overt clinical and laboratory manifestations of primary hyperparathyroidism. Their cystic fluid contains markedly elevated concentrations of parathyroid hormone (PTH), and cyst rupture may precipitate an acute parathyroid crisis[4].

Accurate preoperative identification of PCs remains challenging. On fine-needle aspiration cytology (FNAC), non-function-

ing PCs often mimic cystic thyroid nodules because cytological specimens typically lack recognizable parathyroid elements. This diagnostic ambiguity is less evident in functioning PCs, in which hypercalcemia and elevated serum PTH levels prompt targeted endocrine evaluation and help establish a definitive diagnosis[5]. Although the overall prognosis of PCs is excellent and long-term outcomes are generally favorable, accurate diagnosis and meticulous procedural handling are essential.

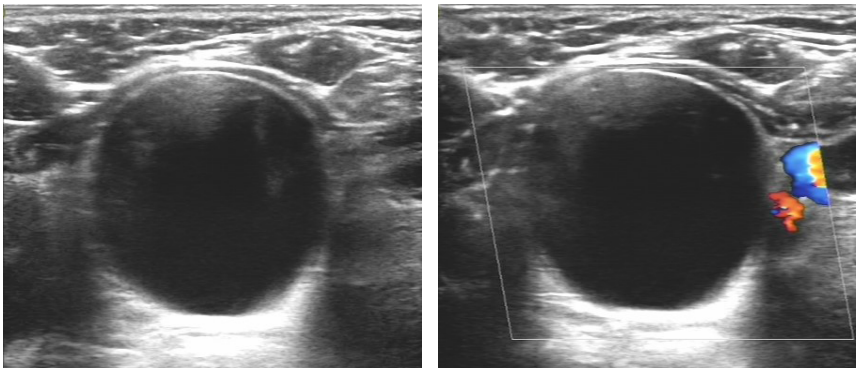
Radiologists and surgeons must exercise particular caution during evaluation and intervention, as accurate recognition and appropriate management are often needed to achieve optimal therapeutic outcomes. Herein, we describe a case of a non-functioning parathyroid cyst diagnosed in a rural hospital in China and provide a review of the current literature. This report aims to enhance awareness among community-level clinicians and radiologists and to highlight the diagnostic challenges and clinical implications associated with this uncommon entity.

2.Case Presentation

A 46-year-old female patient was admitted to the Department of Breast and Thyroid Surgery of our hospital on March 25, 2020, due to a one-week history of an anterior neck mass. One week prior, she palpated a walnut-sized mass in the anterior cervical region, which did not move with swallowing. The mass was non-tender and showed no ulceration. She denied fever, night sweats, weight loss, palpitations, personality changes, or appetite alterations, and reported no hoarseness or choking when drinking. She also denied bone pain, kidney stones, or any history of neck irradiation.

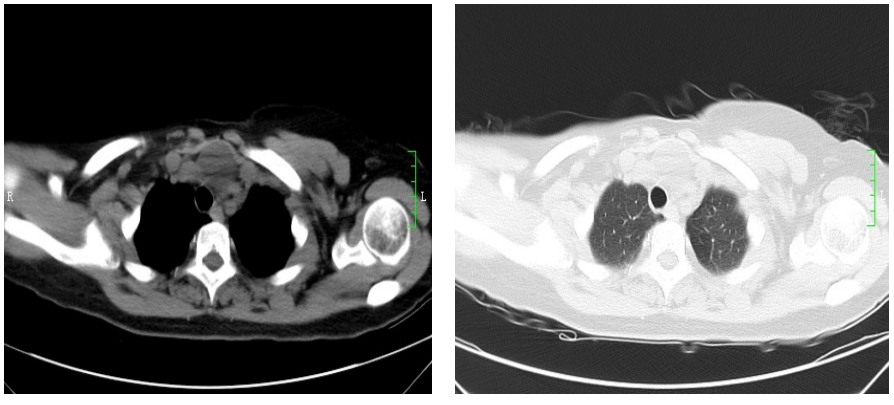
On admission, physical examination revealed mild swelling in the anterior neck and a relatively large palpable mass with medium firmness, clear borders, and good mobility. Outpatient ultrasonography showed an anechoic mass measuring 33.3 mm × 30.5 mm located in the midline anterior neck above the sternal notch, between the bilateral common carotid arteries. The lesion had a regular shape, well-defined margins, good sound transmission, and slightly irregular inner walls. Color Doppler Flow Imaging (CDFI) detected no obvious blood flow signals within the cyst or along the cyst wall (Figure 1).

Figure 1. A well-defined cystic mass located above the sternal notch in the anterior cervical region. CDFI shows no obvious blood flow signals within the cyst or along the cyst wall.



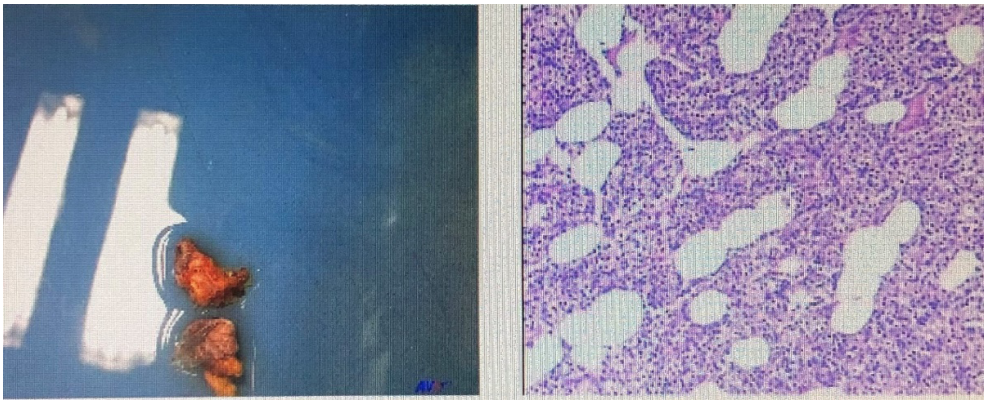
Contrast-enhanced cervical CT revealed a cystic, water-density lesion measuring approximately 34.4 mm × 31.7 mm located in the lower portion of the left thyroid lobe, with no enhancement on contrast imaging (Figure 2).

Figure 2. A cystic, water-density lesion located in the lower portion of the left thyroid lobe, with no enhancement observed on contrast-enhanced imaging.



The patient was admitted to our hospital for further evaluation and treatment. Preoperative routine examinations after admission revealed no significant abnormalities. On March 27, the patient underwent cervical exploration and excision of the neck mass under general anesthesia. Intraoperative findings showed that the mass had medium firmness and was predominantly cystic, measuring approximately 3.0 cm × 2.0 cm. The capsule was intact, the boundaries were well-defined, and there was no invasion of surrounding tissues. Postoperative pathological examination indicated a benign cystic lesion in the neck, with partial parathyroid tissue identified in the cyst wall (Figure3).

Figure 3. A benign cystic lesion in the neck, with focal parathyroid tissue identified within the cyst wall. Bar=100um.



3.Discussion

Parathyroid cysts constitute a rare form of parathyroid pathology, accounting for approximately 0.8%–3.41% of parathyroid lesions and an estimated 0.075% prevalence in the general population. Although most commonly encountered in individuals in the fourth to fifth decades of life, occurrences in adolescents have also been documented. The present case provides additional insight into the clinical spectrum of PCs, particularly within the setting of a resource-limited rural hospital in China and contributes to the understanding of their presentation and management.

Our patient, a middle-aged woman, aligns with the demographic characteristics described in prior studies. The cyst in this case was relatively small and non-functioning, consistent with benign clinical behavior. Existing literature reports a mean cyst diameter of 4.81 ± 2.88 cm, with documented sizes ranging from 0.5 to 15 cm[2, 6]. Cysts smaller than 2.5 cm are frequently identified incidentally during imaging examinations or cervical surgical procedures. In this instance, the lesion was self-detected by the patient, suggesting that even modestly sized cysts may become clinically apparent depending on their anatomical location[7].

The pathogenesis of PCs remains incompletely elucidated. Several hypotheses have been proposed, including derivation from embryologic remnants of the third or fourth branchial pouches, coalescence of pre-existing microscopic parathyroid microcysts, retention of glandular secretions, persistence of vestigial Kursteiner canals from fetal development, and cystic degeneration within pre-existing parathyroid adenomas[8]. Increasing reports have described parathyroid adenomas undergoing cystic degeneration and presenting as PCs[7]. Therefore, researchers propose that cystic degeneration of parathyroid adenomas should be added to the etiological mechanisms as an additional potential contributing factor[9].

Although parathyroid cysts (PCs) are infrequently encountered in routine clinical practice, they should be included in the differential diagnosis of cystic lesions of the neck and superior mediastinum[10]. When radiologic findings raise suspicion for a parathyroid origin and malignancy has been reasonably excluded, fine-needle aspiration with measurement of PTH levels in the aspirated fluid is particularly informative, as it assists both in excluding other potential etiologies and in establishing a provisional diagnosis of a PC[11]. Surgical excision is widely regarded as the definitive treatment for cystic parathyroid lesions, a consensus supported by accumulating evidence in the literature[12]. In clinical practice, evaluation of serum calcium and phosphorus concentrations, combined with diagnostic aspiration to confirm parathyroid origin and assess for possible malignancy, is recommended prior to proceeding with operative management[13].

This report is subject to the inherent limitations of a single case description. The observations may not be generalizable to the broader PC population, and the absence of long-term follow-up constrains conclusions regarding recurrence risk and

long-term outcomes. Nevertheless, the case underscores the importance of recognizing this uncommon entity, particularly in primary care and community hospital settings where diagnostic resources may be limited.

4.Conclusion

Due to the limited availability of basic research and large-scale retrospective analyses, the pathogenesis of PCs remains poorly defined and continues to warrant further investigation. Nonetheless, the growing number of published reports has progressively enhanced clinical awareness of this entity. By presenting a confirmed case from our institution and reviewing the current literature, we aim to further improve diagnostic accuracy and therapeutic decision-making practicing in rural healthcare settings in China.

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Conflict of Interests

The authors declare that there is no conflict of interest regarding the publication of this paper.

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