




# Parathyroid cyst: A rare entity

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## Abstract

Parathyroid cysts are an uncommon entity. They are classified as functioning and nonfunctioning cysts. Cyst aspiration with detection of parathyroid hormone is a useful tool to confirm the diagnosis. Here, we report four cases of parathyroid cysts. One patient had a functioning cyst. Ultrasonography of the neck revealed a cystic lesion behind the left lobe of the thyroid gland in two cases and a right cystic thyroid nodule in two cases. The cysts exerted a mass effect on the adjacent structures in two cases without clinical compressive symptoms. Fine-needle aspiration with detection of parathyroid hormone in the cyst fluid was performed in one case (nonfunctioning cyst): intracystic parathyroid hormone level was high. Recurrence was noted 1 month after the cyst aspiration. All patients underwent surgical treatment. Our series is characterized by two cases of nonfunctioning intrathyroidal parathyroid cysts which are very uncommon. They are mistaken for thyroid cysts. After surgery, no recurrence was noted. We aim to describe the epidemiological, clinical, and paraclinical features of this condition as well as its therapeutic modalities.

## Keywords

Parathyroid glands, parathyroid cyst, fine-needle aspiration, parathyroid hormone, surgery

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## Introduction

Parathyroid cysts (PCs) are uncommon conditions. They represent less than 0.5% of parathyroid lesions.<sup>1</sup> They are classified as functioning and nonfunctioning cysts.<sup>1,2</sup> PCs are mostly nonfunctioning ones with nonspecific physical and radiological features.<sup>1–3</sup> What characterizes PCs is the presence of parathyroid hormone (PTH) in the cystic fluid.<sup>1</sup>

The purpose of this article is to describe the epidemiological, clinical, and paraclinical features of this condition as well as its therapeutic modalities.

## Case report

### Case 1

A 45-year-old woman presented to our outpatient clinic with a 3-month history of an anterior neck mass. The patient had compressive symptom: dysphagia. Physical exam showed a 3-cm soft, non-tender, and well-limited anterior neck mass moving on swallowing. Ultrasonography of the neck revealed a 38-mm right cystic thyroid nodule. Fine-needle aspiration (FNA) result was “nondiagnostic.” The patient

underwent a right lobo-isthmectomy: a cystic nodule located in the isthmus of the thyroid gland. Grossly, the cut surface revealed a 3.5-cm cyst with watery clear fluid. Histological exam confirmed the diagnosis of an intrathyroidal PC. After a follow-up of 3 years, no recurrence was noted.

### Case 2

A 22-year-old woman presented with an anterior neck mass lasting for 3 years. Dysphagia (compressive symptom) was noted 2 months before the consultation. Physical exam revealed a 4-cm soft anterior neck mass moving on swallowing. Ultrasound showed a 40-mm right cystic thyroid nodule. FNA result was “nondiagnostic.” The patient underwent a

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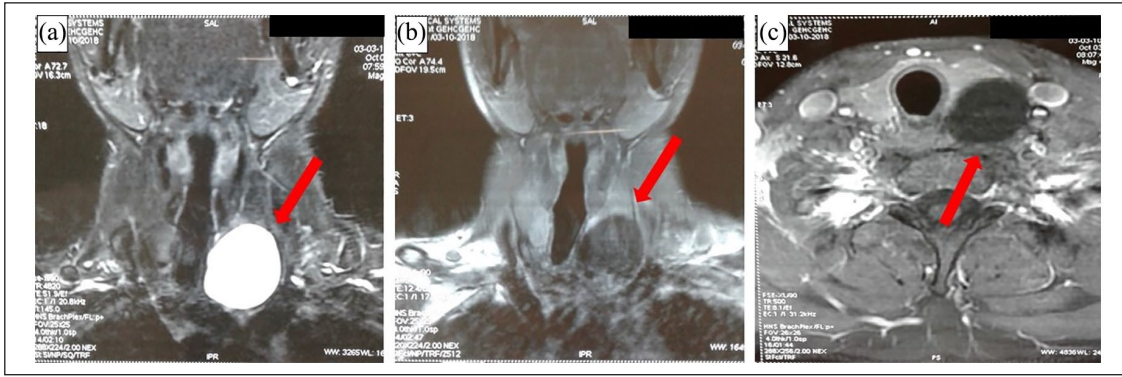
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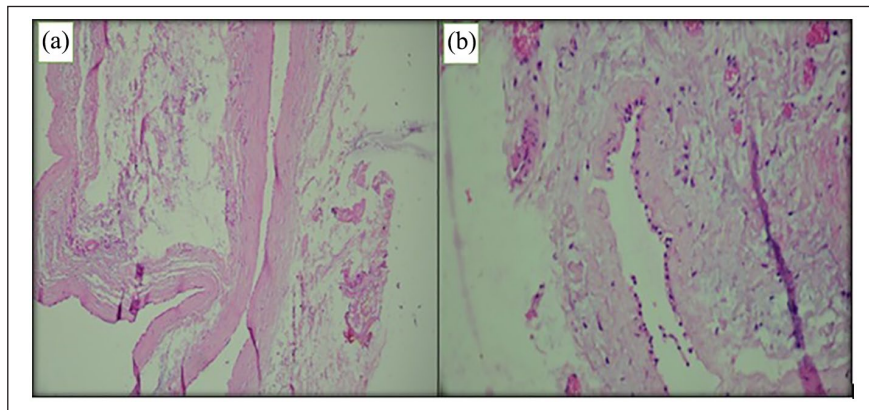
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**Figure 1.** Cervical MRI (magnetic resonance imaging) shows a cystic lesion (Red arrow) ( $45 \times 41 \times 35 \text{ mm}^3$ ) behind the left lobe of the thyroid gland that exerted a mass effect on the trachea and the esophagus. (a) Coronal T2-weighted image: shows a hyperintense lesion. (b) Coronal T1-weighted image: shows a hypointense lesion. (c) Axial T1-weighted image after gadolinium injection: shows a hypointense non-enhancing lesion.



**Figure 2.** (a) A fibrous cyst wall lined by a flattened epithelium (HE  $\times 50$ ). (b) Parathyroid cells: clear epithelial cells (HE  $\times 400$ ).

right lobo-isthmectomy: a cystic nodule located in the right lobe of the thyroid gland. Grossly, the cyst fluid was colorless. Histological exam confirmed the diagnosis of an intrathyroidal PC. No recurrence was noted after 4 years of follow-up.

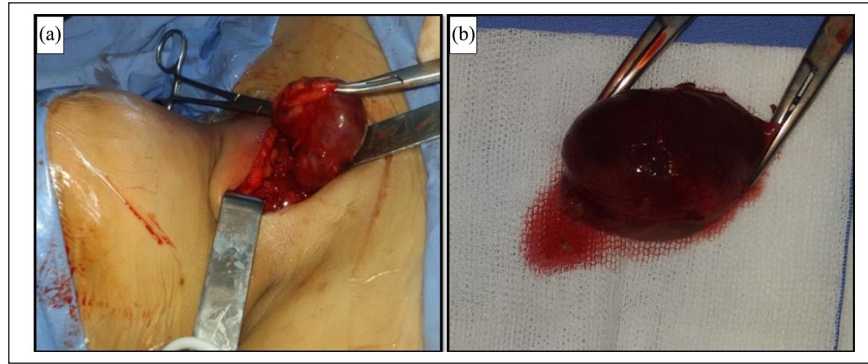
### Case 3

A 39-year-old man was referred to our department for a cervical cystic mass discovered incidentally on ultrasonography. No compressive symptoms were noted. Physical exam showed a 3-cm soft and non-tender anterior neck mass moving on swallowing. Ultrasound of the neck revealed a 50-mm cystic lesion behind the left lobe of the thyroid gland. Serum calcium and serum PTH levels were normal. Magnetic resonance imaging (MRI) showed a cystic lesion behind the left lobe of the thyroid gland that exerted a mass effect on the trachea and the esophagus (Figure 1). A FNA with detection of PTH in the cyst fluid was performed. The fluid was clear-watery. The cytologic examination showed paucicellular specimen without cytologic signs of malignancy. The patient's intracystic PTH level was

high (355 ng/l). Recurrence was noted 1 month after the FNA. Therefore, the patient underwent a surgical excision of the cystic mass. The cyst was adjacent to the lower pole of the left lobe of the thyroid: it arose from the inferior parathyroid gland. The cyst was accidentally ruptured. Histological exam confirmed the diagnosis of PC (Figure 2). After a follow-up of 2 years, no recurrence was noted.

### Case 4

A 46-year-old woman presented with a 6-month history of polyarthralgia and bone pain. The patient had no compressive symptoms. Physical exam of the neck was normal. The laboratory workup revealed serum calcium level was 3.27 mmol/l, serum phosphate level was 0.47 mmol/l, and serum PTH level was 1508 ng/l. Ultrasonography of the neck revealed a cystic mass behind the left lobe of the thyroid gland. A  $^{99\text{m}}\text{Tc}$  sestamibi scan has been performed: it showed a heterogeneous focal retention. The SPECT/CT (Single Photon Emission Computed Tomography/Computed tomography) acquisition revealed a 5-cm hypodense nodule that exerted a



**Figure 3.** (a) Intra-operative view of a PC which was adjacent to the lower pole of the left lobe of the thyroid. (b) Gross appearance of a PC (surgical piece).

mass effect on the left lobe of the thyroid and the trachea. A functional PC was suspected. The patient underwent a surgical excision of the cystic mass (Figure 3). The cyst was adjacent to the lower pole of the left lobe of the thyroid: it arose from the inferior parathyroid gland. The intra-operative examination suggested a PC. The level of serum PTH and serum calcium were normalized after the surgery. Histological exam confirmed the diagnosis of PC. No recurrence was noted after 2 years of follow-up.

## Discussion

PCs are a rare entity that represents less than 1% of all cystic cervical masses.<sup>3</sup> They mostly affect women in the fourth to sixth decades.<sup>1-4</sup> The majority of our patients were women. PCs occur rarely in children: 1% of PCs.<sup>1</sup>

Regarding their secreting character, PCs are subdivided into two main categories: functioning and nonfunctioning cysts.<sup>1,2</sup> Functioning cysts make up 10%–20% of PCs.<sup>1,2,5</sup> One case of functioning PC was noted in our study. In 0.3%–3% of cases, hyperparathyroidism is caused by functioning PCs.<sup>1,6</sup> The latter have a similar distribution between male and female, while nonfunctioning ones are two times more frequent in females.<sup>1</sup> Functioning PCs predominate in older patients.<sup>1</sup> Serum levels of PTH and calcium are normal in case of nonfunctioning PCs.<sup>7</sup>

PCs can arise in the neck and the mediastinum. The incidence of mediastinal PCs is up to 33.5%.<sup>1</sup> The majority of PCs arise from the inferior parathyroid gland.<sup>1</sup> Cervical PCs are mostly left-sided.<sup>1,7,8</sup> In our study, the two extrathyroidal PCs arose from the left inferior parathyroid gland. Intrathyroidal and intrathyroidal PCs are very uncommon.<sup>1,3</sup> To date, eight intrathyroidal PC cases have been reported in the literature.<sup>2</sup> In our series, two PCs were intrathyroidal. Intrathyroidal PCs are often incidentally discovered in the histological exam after surgery.<sup>3,9</sup>

Several mechanisms of the development of PCs were presumed: congenital disorder (vestigial remnant of the third or fourth branchial pouch or the persistence of the Kürsteiner

canals), microcyst coalescence, simple retention of parathyroid secretions, and infarction or degeneration of a parathyroid adenoma.<sup>2-5,8</sup>

PCs have a heterogeneous clinical presentation depending on their size, location, and secreting character.<sup>1,9</sup> The majority of cases are asymptomatic, presenting with an incidentally found neck mass, which is often mistaken for other cervical masses, particularly a thyroid cyst.<sup>1-3</sup> Parathyroid microcysts (<1 cm) are more frequent and often incidentally found.<sup>9,10</sup> Large cysts may cause compressive symptoms (dyspnea, dysphagia, hoarseness, vein thrombosis, cough).<sup>1,3,8-10</sup> Mediastinal cysts can cause recurrent laryngeal nerve palsy.<sup>1</sup> Functioning PCs present with hyperparathyroidism symptoms.<sup>1,8</sup> In the majority of these cases, the cause of this parathyroid dysfunction is an adenoma, which coexisted with the PC or degenerated into a PC.<sup>1,5</sup> Cyst rupture or hemorrhage into the PC (spontaneously or caused by FNA) can cause acute hypercalcemic crisis or a cervical hematoma.<sup>1,5,8</sup> Cases of multiple PCs have been reported.<sup>1,8</sup> PCs may coexist with other conditions such as pheochromocytoma and MEN-1 syndrome (Multiple Endocrine Neoplasia type 1).<sup>1,11</sup> The differential diagnosis of cervical PCs includes thyroid goiter, thyroid cyst, benign and malignant thyroid nodule, parathyroid adenoma and carcinoma, and branchial cleft cyst.<sup>1,2</sup> Mediastinal PCs should be differentiated from vascular lesions, teratomas, lipomas, adenopathy, neuromas, thymomas, bronchogenic cysts, lymphangiomas, cysts and tumors of esophagus, cystic hygromas, and mediastinal malignancies and metastases.<sup>1</sup>

Ultrasonography of the neck is the first imaging technique to be performed: it reveals the cystic nature of the mass and is usually followed by FNA.<sup>1,8</sup> The location behind or under the thyroid gland is in favor of the parathyroid origin of the cyst.<sup>2</sup> Ultrasonography is a sensitive but less specific method due to many variations in PC visualization in terms of PC shape, size, and location.<sup>7</sup> CT scan and MRI show nonspecific cystic lesion.<sup>1</sup> They can help establish the relationship to adjacent tissues particularly in the presence of compressive symptoms or substernal extension, and they are also indicated in mediastinal localizations of PCs.<sup>2,4,9</sup> The



sensitivity of  $^{99m}\text{Tc}$  sestamibi scans for functioning PCs is lower (29%) than that for non-cystic parathyroid adenomas (68%–95%).<sup>5</sup> Compressed parathyroid tissue at the cyst's periphery and/or a lack of significant tracer uptake and retention, or dilution of the parathyroid tissue content can explain the false-negative results of scintigraphy.<sup>8</sup>

The fluid aspirated by FNA is colorless, clear-watery.<sup>1,7</sup> The watery clear fluid is suggestive of the diagnosis of PCs.<sup>6,10,11</sup> The cytomorphological sample is mostly pauci- or acellular.<sup>7</sup> The cytological exam reveals small clusters of epithelial cells and fibroblasts.<sup>1</sup> PCs contain high concentrations of PTH.<sup>1,8</sup> Intracystic level of PTH in functioning PCs is higher than nonfunctioning ones.<sup>8</sup> FNA with detection of PTH in the cyst fluid (regardless of the level) is an important tool to confirm the diagnosis.<sup>2,3,5–7,10,11</sup> In our series, the diagnosis was made by FNA with detection of PTH in one case: the fluid was clear with paucicellular specimen.

Histologically, PCs have a thin wall with a cuboidal or columnar single-layered epithelium.<sup>1,4,7,8</sup> This pathology is mostly seen in nonfunctioning cysts, whereas functioning ones are mainly described as pseudocysts by lacking this epithelium.<sup>1</sup> Functioning PCs can be formed by adenomatous tissue without any evidence of adenoma or hyperplasia.<sup>1</sup> Two cases of PC carcinoma have been reported.<sup>11</sup> Immunohistochemically, PCs are positive for parathormone peptide, glycogen, and focally for chromogranin.<sup>1</sup>

FNA is the first-line treatment of nonfunctioning PCs.<sup>1,2,6</sup> Although FNA is less invasive, the recurrence rate remains high.<sup>5,8</sup> The larger the cyst is, the more likely it is to relapse after cyst aspiration.<sup>2</sup> In our study, FNA was performed as a first treatment in one case: nonfunctioning PC that relapse 1 month after FNA. In case of recurrence, surgical excision is recommended.<sup>1,2,9</sup> Sclerotherapy with tetracycline or ethanol injection is an alternative treatment in case of recurrence after FNA.<sup>1,2</sup> After sclerotherapy, there is a high risk of leakage of the sclerosing agent that can cause fibrosis within the surrounding tissues.<sup>2,5,8</sup> This can lead to recurrent laryngeal nerve injury.<sup>2,5,8</sup> Besides, this may increase the risk of complications of the surgery in case of failure of sclerotherapy.<sup>2,5,8</sup> Nonfunctioning PCs with compressive symptoms or esthetic concerns require surgical treatment.<sup>1,6,10</sup> Functioning PCs are treated with surgical resection.<sup>1,2,5,8</sup> Mediastinal PCs, uncertain diagnosis of PCs, and possibility for malignancy are other indications for surgical treatment.<sup>1,8,9</sup> The rupture of the cyst and its incomplete excision are reasons of recurrence after surgery.<sup>1,10</sup> Patients with large cysts are at higher risk of symptomatic hypocalcemia after surgery.<sup>11</sup>

Recurrence has been observed in 27.83% of cases.<sup>1</sup> Papavramidis et al.<sup>1</sup> found that there is no statistically significant difference between surgical excision and FNA as far as recurrence rate. No recurrence has been noted in our cases. No malignant transformation has been reported.<sup>1</sup>

## Conclusion

Despite its rarity, PC should be considered in the differential diagnosis of neck masses especially those adjacent to the

lower pole of the thyroid gland. Intrathyroidal PCs are very uncommon. Nonfunctioning PCs are more frequent than functioning ones. Cyst aspiration with detection of PTH is a useful tool to confirm the diagnosis. There are three therapeutic options: cyst aspiration, sclerotherapy, and surgery. Surgical excision is still an effective treatment.

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## Informed consent

Written informed consent was obtained from all the patients for their anonymized information to be published in this article.

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