C A S E R E P O R T S

UDC: 616.44-003.94-07-089
DOI: https://doi.org/10.2298/VSP211125068O

Surgical treatment of parathyroid cysts: case series and review of literature

Hirurško lečenje paratiroidnih cisti: serija bolesnika i pregled literature

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Abstract

Introduction. Parathyroid cysts (PCs) are divided into two categories: functional and nonfunctional. If large enough, both types of PCs can present as a mediastinal or cervical mass in 1–5% of patients. **Case report.** A retrospective analysis of the data on patients operated on for primary hyperparathyroidism or cervical/mediastinal mass from 2016 to 2021 was conducted. An analysis of the demographic data of the patients, data on preoperative fine needle aspiration biopsy, level of parathyroid hormone in serum pre- and postoperatively, level of serum calcium, as well as on clinical presentation of the disease, was carried out. In this five-year period, a total of 555 patients were operated on, in whom the parathyroid gland was described as a definitive pathohistological finding. Of the total number, PCs were found in seven cases. In five out of the seven cases, PC was nonfunctional. Four female and three male patients were operated on due to PC. The mean age of operated patients was 49.8 years. In one patient, the nonfunctional cyst was represented as a cervical and upper mediastinal mass with a maximal diameter of 10 cm. **Conclusion.** Although PCs represent about 0.5% of all changes in the parathyroid glands, they can be suspected preoperatively, especially if a water-like liquid is obtained by a fine needle aspiration biopsy. In order to remove the PC completely without making a lesion on the capsule, with the aim of avoiding parathyreomatosis, but to preserve the recurrent laryngeal nerves, the operation should be performed by an experienced endocrine surgeon.

Key words:
diagnosis, differential; parathyroid glands; surgical procedures, operative.

Apstrakt

Uvod. Paratiroidne ciste (PC) mogu se podeliti u dve kategorije: funkcionalne i nefunkcionalne. Oba tipa PC, ukoliko su dovoljno velika, mogu se prezentovati kao medijastinalna ili cervikalna masa kod 1–5% bolesnika. **Prikaz bolesnika.** Urađena je retrospektivna analiza podataka bolesnika operisanih u periodu od 2016. do 2021. godine zbog primarnog hiperparatiroidizma ili postojanja cervikalne/medijastinalne mase. Sprovedena je analiza demografskih podataka bolesnika, podataka o preoperativnoj aspiracionoj biopsiji, nivou paratiroidnog hormona u serumu pre i postoperativno, nivou serumskog kalcijuma, kao i o kliničkoj prezentaciji bolesti. U petogodišnjem periodu operisano je ukupno 555 bolesnika, kod kojih je patohistološkim nalazom potvrđeno postojanje patološki izmenjene paratiroidne žlezde. Od ukupnog broja, kod njih sedam opisana je PC. Kod pet od ovih sedam bolesnika, PC je bila nefunkcionalna. Četiri osobe ženskog pola i tri osobe muškog pola operisane su zbog PC. Prosečna starost operisanih bolesnika iznosila je 49,8 godina. Kod jednog bolesnika nefunkcionalna PC se manifestovala kao cervikalna masa u gornjem medijastinumu, maksimalnog promera od 10 cm. **Zaključak.** Iako PC predstavljaju oko 0,5% svih promena na paratiroidnim žlezdama, na njih se može posumnjati preoperativno, naročito ako se aspiracionom biopsijom tankom iglom dobije tečnost slična vodi. Da bi se PC odstranila u celosti i bez lezije kapsule, sa ciljem da se izbegne paratireomatoza, kao i da se sačuvaju rekurentni laringealni nervi, operaciju bi trebalo da uradi iskusan endokrini hirurg.

Ključne reči:
dijagnoza, diferencijalna; paratireoidne žlezde; hirurgija, operativne procedure.

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Introduction

Cysts of the parathyroid gland or parathyroid cysts (PCs) are relatively rare and represent 0.5% of all parathyroid pathology [1]. Depending on hormonal secretion, PCs can be divided into two categories: functional and nonfunctional. Functional PCs present with symptoms of primary hyperparathyroidism. Both functional and nonfunctional PCs can be presented as anterior n or mediastinal mass with symptoms of compression of surrounding organs (dysphagia, trouble with breathing). Until now, around 360 PCs have been published in the literature as case reports or case series. In this paper, we described seven patients with PCs [2].

Case report

We conducted a single-center study with a retrospective analysis of medical records of operated patients from January 2016 to June 2021. We identified all patients in whom pathohistological (PH) findings detected PCs after surgical treatment. PH PCs were defined with a thin wall composed of cuboid cells. The study was conducted following the Good Clinical Practices with their origins in The Declaration of Helsinki. We collected informed consent from all patients included in the study. We reviewed the demographic data of the patients, data on preoperative fine needle aspiration biopsy (FNAB), level of parathyroid hormone (PTH) in serum pre- and postoperatively, level of serum calcium, and clinical presentation of disease (difficulty swallowing, neck or mediastinal mass).

Over the five years, we reviewed a total of 555 patients operated on due to primary hyperparathyroidism, neck or mediastinal mass with PH confirmation of PC after the operation. We excluded patients who were operated on due to secondary or tertiary hyperparathyroidism. Of 555 operated patients, in seven cases, the PH onset was PC. Table 1 shows relevant clinical characteristics (age, gender, presentation of disease – mediastinal or neck mass, functional/nonfunctional cysts), PTH, calcium, and phosphate levels of these patients. All patients had neck discomfort and were presented with either cervical or mediastinal mass, which was one of the indications for the operation.

Four female and three male patients were operated on. The mean age of operated patients was 47.8 years at the time of the operation, ranging from 38 to 64 years. Two of the patients had functional PCs with clinical manifestations (bone pain, nephrocalcinosis) of primary hyperparathyroidism with confirmed high levels of calcium and PTH level. In the remaining patients, serum PTH and calcium levels were in the range.

In five of our patients, a preoperative FNAB was performed, and water-like fluid was aspirated. In the aspirated material, the high PTH level was detected, and in all four cases, it was significantly high, ranging from 311 to 2,500 ng/L. Cytology was also performed; the pathological finding was typical for cysts: liquid with no cells found.

Case number two was the youngest patient, a male in whom a nonfunctional PC was presented as a large cervical-partially mediastinal mass. Computed tomography (CT) was performed, and a cyst with a maximal diameter of 10 cm was seen (Figure 1). That was the largest PC in our study (Figure 2). PH finding was similar in all cases: thin wall cyst with one layer of cuboid cells. Immunohistochemistry was positive for PTH, while thyroid transcription factor 1 (TTF1) was negative. PH finding of the thin cyst wall (of the patient under ordinal number 2) is shown in Figure 3.

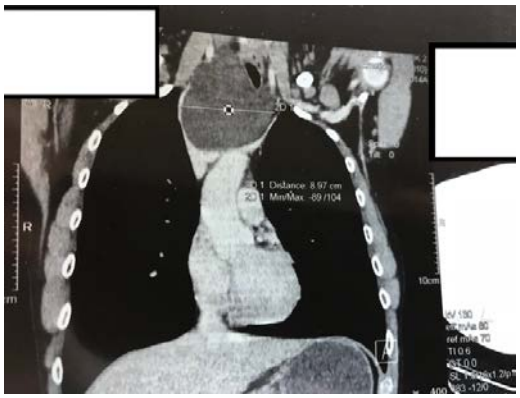

Fig. 1 – Computer tomography of the neck shows a large mass in the neck and partially in the upper mediastinum in the second patient.

Table 1

Clinical characteristics of patients with parathyroid cyst

Patient number	Gender	Age (years)	Type of cyst	Biggest diameter of the cyst (cm)	Serum PTH (ng/L) Pre/Post-operative	PTH in aspiration (ng/L)	Serum Ca/PO_4 (mmol/mL)	Location of gland
1	F	52	functional	3.5	78 /18	-	2.62/1.2	dex. inf.
2	M	38	nonfunctional	10	37.8	340	2.42/1.1	dex. inf.
3	M	64	functional	2.9	131/7	-	2.46/0.86	sin. inf.
4	M	64	nonfunctional	4.2	37/-	311	2.23/0.95	dex. inf.
5	F	47	nonfunctional	3.3	42/31	2,500	2.24/1.04	sin. inf.
6	F	36	nonfunctional	2.9	36/-	921	2.31/-	sin. inf.
7	F	48	nonfunctional	3.35	44/-	890	2.28/-	sin. inf.

F – female; M – male; PTH – parathyroid hormone; Ca – calcium; PO_4 – phosphate; dex. inf. – dexter inferior; sin. inf – sinister inferior.
Reference ranges for serum PTH, Ca and PO_4 are 15-65 ng/L, 2.15–2.65 mmol/mL and 0.8–1.55 mmol/mL, respectively.

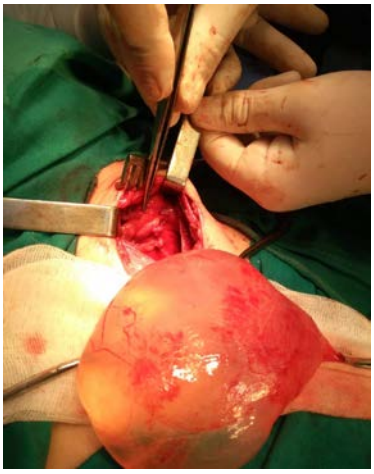

Fig. 2 – Intraoperative finding of big parathyroid cyst in the second case.

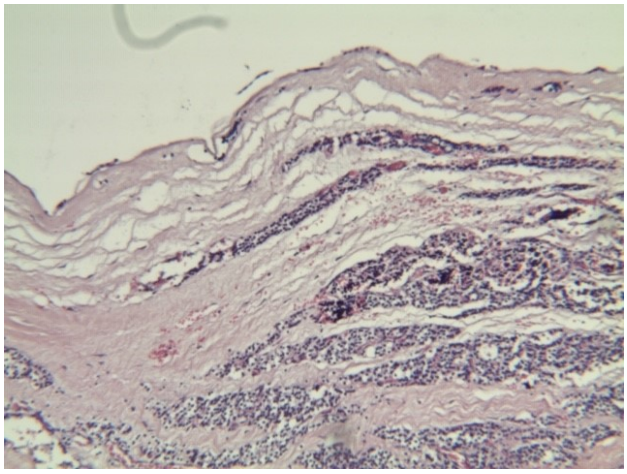

Fig. 3 – Histopathological finding of the thin cyst wall (hematoxylin and eosin, × 100) of the second patient.

Discussion

The first description of the parathyroid gland was made by Sir Richard Owen, who described the parathyroid gland in an Indian rhino [3]. A few decades later, in the nineteenth century, Sandström et al. [4] first described the parathyroid gland in humans. Since then, around 360 PCs have been described in literature [2]. Since parathyroid glands arise from the third and fourth branchial pouches, they can be located anywhere from the floor of the primitive foregut to its final location. Large PCs frequently descend into the mediastinum due to a combination of gravitation and the effect of negative intrathoracic pressure [5].

PCs can be divided into two categories: functional and nonfunctional. Diagnoses for both types of PCs are made preoperatively based on serum PTH and calcium levels [1]. In functional PC, serum PTH and calcium levels are elevated, while phosphate level is lower or between range levels. Scintigraphy is indicated when a suspicious PC is noticed. In functional PC, scintigraphy is positive, while in nonfunctional PC, it is negative [6]. Besides PTH values, localization and relation to other vital organs should be set. For that purpose, an ultrasound of the neck is usually enough; sometimes, CT or magnetic resonance imaging is needed due to large and especially mediastinal cysts [7]. When a hypoechoic nodule is seen on ultrasound, FNAB should be done and sent for the detection of the PTH level. Liquid from PCs is usually water-like, unlike the liquid from thyroid cysts, which is usually yellowish or dark brown. The color and PTH value of punctuated content is greatly valued when the PC is intrathyroidal [8].

In 2018, Papavramidis et al. [2] conducted a meta-analysis from 1905 until 2016 and found 359 reported cases of PCs described in 218 articles. The mean age of the population was 49.24 years, and the mean age of our patients was 47.8 years. The ratio between men and women was 1:1.85. Female predominance is seen in the reported meta-analysis. In our study, female to male ratio was 1:1.3. The most frequent symptom described in Papavramdisis [2] meta-analysis was neck mass, followed by compressive symptoms and parathyroid dysfunction. In two of our patients, PC was functional, followed by high levels of serum calcium. In the remaining five cases, PCs were detected as cervical masses. Preoperative FNAB was performed in five of our patients, in which water-like fluid was removed, and high levels of PTH were detected; cytology findings showed noncellular content.

The mean diameter of PCs was 4.81 ± 2.88 cm, ranging from 0.5 to 15 cm. Males usually had bigger PCs than females. Our second patient had a PC that was 10 cm in diameter. As far as the location is concerned, bigger PCs were located in the middle compartment of the mediastinum.

DeQuervain et al. [9] first operated on a patient with mediastinal PC in 1925. Mediastinal PCs are usually asymptomatic; they usually show up incidentally on a chest X-ray. As they grow larger, dyspnea and dysphagia may occur. Hoarseness due to paralysis of the recurrent laryngeal nerve has been less frequently reported [10].

Treatment of PCs can be either surgery (which is most common) or sclerosing therapy. Sclerosing therapy can be used as an alternative if there are contraindications for surgery. It is performed with ethanol or tetracycline less frequently. This way of treatment may be associated with many complications, such as neck pain, neurotoxicity, and recurrent nerve palsy [11]. All functional PCs are best treated by surgical excision. Nonfunctional PCs sufficiently large to be symptomatic or obstructing should also be surgically removed [12].

Conclusion

Although PCs represent about 0.5% of all parathyroid pathology, they can be diagnosed preoperatively, especial-ly if a water-like liquid is found with FNAB. Experienced endocrine surgeons should perform the operation by preserving the cyst wall to avoid parathyreomatosis and recurrent laryngeal nerve preservation.

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Received on November 25, 2021
Revised on June 19, 2022
Accepted on June 22, 2022
Online First June 2022