CASE REPORT

Parathyroid cyst first two adolescents' case report and literature review

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Abstract:
The parathyroid cyst is a relatively rare parathyroid pathology. The rarity of parathyroid problems presents as a neck mass; affects the susceptibility of the clinicians to think about parathyroid cyst in a neck mass patient. Once the parathyroid cyst is diagnosed, the cyst must be clarified as a functioning or non-functioning cyst. We aim to present these cases to shed some light on the rare differential diagnosis of anterior neck masses. In this case report, two adolescent patients presented with parathyroid cysts. We treated them by parathyroid cyst excision due to recurrence of the cyst after complete aspiration.
Objectives: To shed light on the rare presentation of anterior neck mass in adolescents to avoid missing parathyroid cyst as a differential diagnosis in this age group.
Study design: Two case reports
Setting: Department of Surgery, King Salman Military Hospital, Northwestern province Saudi Arabia.
Duration: July 15, 2020, to January 14, 2021
Material and Methods: Two case reports and a review of the literature.
Results: Adolescent parathyroid cysts are non-functional, and the congenital anomaly is the likely etiology.
Conclusion: Clinicians have to consider parathyroid cysts in patients with anterior neck mass.

Keywords: parathyroid gland, hyperparathyroidism, parathyroid cyst, hypercalcemia, parathyroid cystic degeneration.

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Introduction:
The parathyroid cyst (PC) is a rare parathyroid pathology. The treatment depends on the cyst's size, anatomical position, and functional status. The main stay of treatment for the functioning parathyroid cyst is surgical excision, while non-functioning parathyroid cyst treatment is aspiration, alcohol injection, or sclerotherapy. The recurrent non-functioning cyst should be excised. We are reporting rare cases of non-functioning parathyroid cysts in adolescent patients, and both were treated by surgical excision.

Case report#1:
An 11-year-old boy presented with one month history of an asymptomatic neck mass. The patient denied any pressure symptoms or change in voice and had no other endocrine symptoms. On physical examination, 2.5x1.0cm, a painless anterior neck mass left to the midline. Ultrasound revealed a rounded, well-defined cystic structure in separable from the left thyroid lobe (fig 1a). The patient thyroid function test is normal. As the usual approach for thyroid cysts, the patient underwent ultrasound-guided fine-needle aspiration (FNA). Ultrasound-guided aspiration revealed 5ml of colorless fluid, and the cyst was completely aspirated. The cytological examination revealed macrophages (consistent with cyst fluid), a rare cluster of small cells with clear cytoplasm, and central round nuclei (fig 1b).

There was no colloid. Such FNA findings made

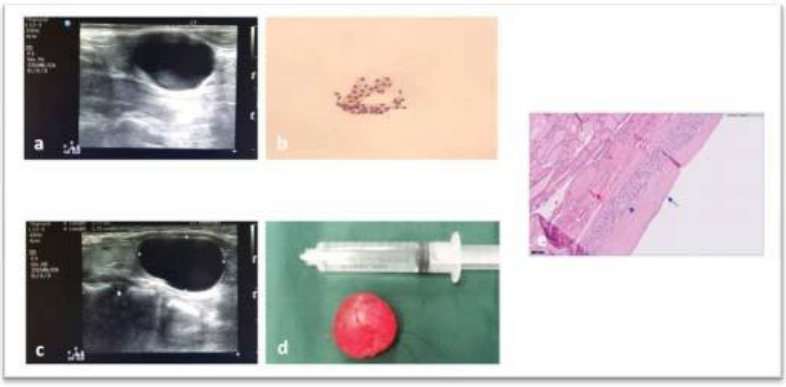

Figure-1: (a) first ultrasound showing 2.4 x 1.9 cm cyst. (b) fine needle aspiration cytology showing clear fluid and few cells (c). follow up ultrasound showing recurrent cyst. (d) cyst after excision. (e) cyst wall under the microscope, lining cells of the cyst are atrophic due to fluid pressure, they have clear cytoplasm (Blue arrow), compressed parathyroid tissue is present (arrowhead) adjacent to thyroid tissue (red arrow).

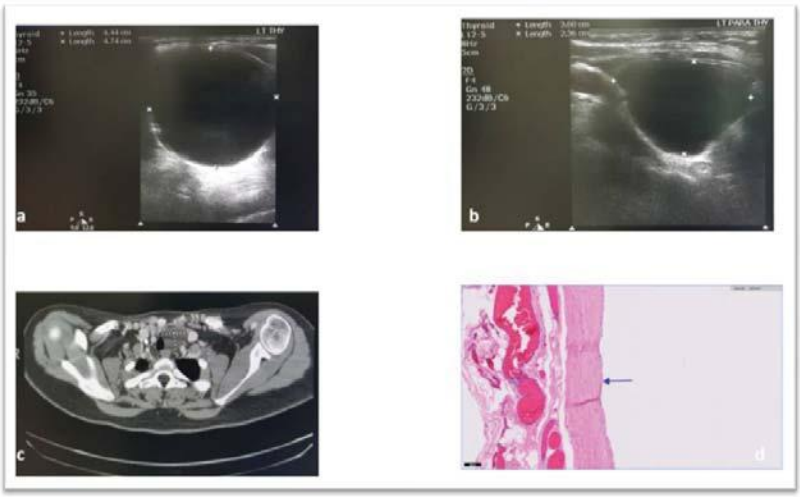

Figure-2: (a) first ultrasound showing 4.4 x 4.7 cm cyst. (b) follow up ultrasound showing recurrent cyst. (c) CT neck scan showing cyst in the anterior mediastinum (d) Parathyroid cyst under the microscope Fibrocollagenous tissue lined by cuboidal epithelium with pale- to clear cytoplasm.

parathyroid cyst one of the differential diagnoses. The aspirated fluid was sent to measure the parathyroid hormone level to confirm the diagnosis. The fluid parathyroid hormone level was 51.5pg/mL, which was diagnostic for the parathyroid cyst. The patient was then re-evaluated clinically and bio-chemically for the parathyroid function status. The serum parathyroid hormone and calcium were normal. After 5-months, the mass recurred, and the ultrasound showed a 3.5x2.1cm recurrent cyst. The patient was prepared for parathyroid cyst excision, which was done uneventfully. The intra-operative finding was a translucent cyst 3.5x3x2cm attached to the left inferior thyroid lobe Fig 1c. The microscopic examination showed that flattened atrophic epithelium lined the cyst wall, a compressed parathyroid, and adjacent thyroid tissue (Fig 1d).

Case report#2:

A 16-year-old girl presented to the endocrine surgery clinic with an anterior neck for a year. On physical examination, a painless, mobile central neck mass left to the midline, 4x3cm in size. The mass was not moving with swallowing. Ultrasound revealed an enlarged left thyroid lobe with a large cystic nodule measuring 4.4x4.7cm and no significant cervical lymph nodes (Fig-2a). Ultrasound-guided aspiration yielded 40ml clear fluid. There were no cells in the aspirated fluids under the microscope. So, the fluid was sent to the laboratory to measure the parathyroid hormone level, which was 689.6pg/ml. The serum parathyroid hormone function and calcium were normal. The mass recurred three months after aspiration, and the ultrasound neck revealed a 3.6x2.4cm recurrent cyst (Fig 2b). The patient underwent surgery, and the excision was done uneventfully (Fig 2c). There was a left neck cystic lesion close to the left thymic horn. Microscopically the cyst wall is composed of fibro-collagenous tissue containing a few clusters of bland parathyroid tissue. (Fig 2d).

Discussion:

The parathyroid gland was the last discovered organ in the human body. Ivar Viktor Sandström, a Swedish anatomist, discovered and histologically described the glandin 1880.[1] Goris excised the first parathyroid cyst (PC) in 1905.[2] The parathyroid cyst represent less than 5% of all neck masses.[3] Most of the cysts are non-functioning, 91% with female gender predominance, and most reported functioning cysts are in elderly male patients.[3,4,6] 1% of parathyroid cyst patients are pediatric cases;[3] up to our knowledge, no more pediatric cases were reported in the literature since Entwistle et al. reported the

6th pediatric case in 1994,[5] and no adolescent cases had been reported. So, we are reporting1st and 2nd adolescent patients with parathyroid cysts.

Based upon the presumed mechanism of cyst formation, the parathyroid cyst can be classified as developmental arising from remnants of the 3rd and 4th branchial cleft or from vestigial remnants of the parathyroid gland (Kursteinercanals) and acquired like degenerative parathyroid adenoma or intra-adenomatous gland bleeding.[4] The former is a non-functional cyst with clear fluid; the latter is a functional cyst containing brown or bloody fluid.

The patients with functional parathyroid cyst present with high serum parathyroid hormone and either symptomatic or asymptomatic hypercalcemia, while non-functional parathyroid cyst patients present with normal parathyroid hormone levels like our patients.

Most parathyroid cyst are found incidentally during the cervical or mediastinal examination or thyroidectomy, while most pre-operatively diagnosed parathyroid cyst patients present with an asymptomatic neck mass[7] similar to our cases. The parathyroid cyst symptoms, if any, depending on the cyst size, anatomical position, and functional status. The patient may present with dysphonia and dyspnea, especially mediastinal parathyroid cyst.[8] In a study of 93-patients with mediastinal parathyroid cyst, the incidence of recurrent laryngeal nerve-related symptoms was 9.5% due to edema resulting from pressure on the nerve.[9] Although the hyper parathyroidism symptoms in functioning parathyroid cyst are rare, some patients were reported with parathyroid crisis.[10] The commonest anatomical position of the parathyroid cyst is the neck, and the left lower parathyroid is the commonly involved gland[3]—both of our cases in the left. The size of the cyst is variable as well, and the largest reported cyst was 15cm in diameter.[11,12]

Parathyroid cyst diagnosis depends on the fine needle aspiration (FNA) and should be suspected in the absence of colloids in brown-colored fluid or clear fluid aspiration of a suspected thyroid cyst.[8] In both of our cases, aspirated fluids were clear. The presence of the high parathyroid hormone (PTH) in the aspirated fluid has been diagnostic for parathyroid cyst since commented by Chimènes in 1963.[13] The fine needle aspiration is contra indicated in cases of suspected parathyroid carcinoma, which is usually cystic degeneration[14] to avoid seeding of malignant cells in the surrounding tissues; fortunately, it is a rare entity.

Ultrasound (US) neck is the best tool to differentiate between cystic and solid lesions. Unfortunately, it might not help to differentiate between the thyroid and parathyroid origin of the cyst.[15] Computed Tomography (CT) of the neck, upper thorax, and Magnetic Resonance Image (MRI) are common modalities to localize the cyst. Technetium 99m (99mTc)-sesta methoxy-isobutylisonitrile (sestamibi) is useful for localization of the functional parathyroid cyst.[16] We did not use nuclear scanning because both of our cases are non-functioning parathyroid cyst. We used a computed tomography scan in the second case because of the cyst's location and size.

Conclusion:
The treatment of the functional parathyroid cyst is surgical resection. For asymptomatic, we use the serum calcium level to guide the treatment plan like parathyroid adenoma. The curative treatment of non-functional cysts is ultrasound complete cyst aspiration.[17] If the non-functional cyst recurs after aspiration or causes obstructive symptoms, surgical resection is the treatment of choice.[18] There are several options for non-functional cysts like sclerotherapy or alcohol injection published in the case of reports. All treatment options for functional and non-functional cysts depend on case series and case reports.

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Role and contribution of authors:
Ahmed Al-Ameer, collected the data, references and wrote the article.

Yousef S.Alalawi, critically review the article, and advised useful changes.

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