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Original Article

Partial sternotomy application in mediastinal parathyroid adenomas

Mediastinal paratiroid adenomlarında parsiyel sternotomi uygulaması

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ABSTRACT

Aim: Solitary parathyroid adenomas are the most common cause of primary hyperparathyroidism. Generally neck exploration is adequate for parathyroid adenoma surgery, however some of them aren't accessible using a cervical approach and sternotomy or thoracotomy can be required. In this study we present surgical application of eight cases with mediastinal parathyroid adenoma.

Material and Methods: Between Jan 2006 - Mar 2018, eight patients who underwent partial sternotomy for mediastinal parathyroid adenoma in our clinic were included in the study. Patients' datas were retrospectively reviewed. Blood tests, radiographic and scintigraphic methods were performed and the results were reviewed. Localization of mediastinal parathyroid adenoma, performed treatment methods and prognosis were evaluated.

Results: Seven of the cases were female (87.5%) and the mean age was found to be 49.7 years (range: 30-64 years). Bone pain what's the most common symptom. All of the patients experienced hypercalcemia and hyperparathyroidia. PTH and Ca values returned to normal in postoperative period. No recurrent or consistent hyperparathyroidism was seen during follow-up period. No postsurgical morbidity or mortality developed.

Conclusion: We claimed that partial sternotomy is a safe and adequate method for removing ectopic mediastinal parathyroid adenomas.

Key Words: Mediastinal parathyroid adenoma, Surgery , Partial Sternotomy

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ÖZ

Amaç: Primer hiperparatiroidinin en sık nedeni soliter paratiroid adenomlarıdır. Genellikle boyun cerrahisi paratiroid adenomun çıkarılması için yeterlidir, ancak bazılarının servikal bir yaklaşımla ulaşılması mümkün değildir ve sternotomi veya torakotomi gerekebilir. Bu çalışmada mediastinal paratiroid adenomlu sekiz olgunun cerrahi uygulamasını sunduk.

Gereç ve Yöntemler: Ocak 2006- Mart 2018 tarihleri arasında kliniğimizde mediastinal paratiroid adenomu nedeniyle parsiyel sternotomi uygulanan sekiz hasta çalışmaya alındı. Hastaların verileri retrospektif olarak incelendi. Çalışılan kan testleri, radyografik ve sintigrafik yöntemler ve sonuçlar gözden geçirildi. Mediastinal paratiroid adenomunun lokalizasyonu, uygulanan tedavi yöntemleri ve prognozları değerlendirildi.

Bulgular: Olguların 7'si kadın (% 87.5) ve yaş ortalaması 49.7 (30-64) idi. Kemik ağrısı en sık görülen semptomdu. Tüm hastalarda hiperkalsemi ve hiperparatiroidi vardı. Postoperatif dönemde Parathormon (PTH) ve Ca değerleri normale döndü. Takip süresince tekrarlayan veya kalıcı hiperparatiroidizm görülmedi. Cerrahi sonrası morbidite veya mortalite gelişmedi.

Sonuç: Parsiyel sternotomi ektopik mediastinal paratiroid adenomlarını gidermek için güvenli ve yeterli bir yöntem olduğunu düşünmekteyiz.

Anahtar Kelimeler: Mediastinal Paratiroid Adenom, Cerrahi, Parsiyel Sternotomi

Introductıon

The third most common endocrine disorder worldwide is primary hyperparathyroidism (1). Solitary parathyroid adenomas are the most common cause of primary hyperparathyroidism. Surgery is good and only option for curative theraphy. Neck exploration is the mainstay of parathyroid adenoma surgery. However adenomas can be seen in an ectopic focus (2). The prevalence of ectopic adenomas reported as 15–20 % of patients and 1–2 % are located in the lower mediastinum. This location poses a technical challenge to the surgeon, as deep mediastinal parathyroids are often not accessible using a cervical approach and a sternotomy or thoracotomy is required (3-5).

In this study we present surgical application of eight cases with mediastinal parathyroid adenoma.

Material and methods

Patients

Permission was obtained from the university ethics committee for this study (2018-04/30). Between Jan 2006 and Mar 2018, eight patients who underwent surgery for mediastinal parathyroid adenoma in our clinic were included in the study. Patients' data were retrospectively reviewed. Demographic findings such as age, sex, patients' history and the symptoms and findings determined during physical examination were evaluated. Hematologic and biochemical blood tests, chest X-ray, neck ultrasound, computed thorax tomography (Thorax CT), and Thallium-technetium subtraction parathyroid scan (Figure 1) were performed and the results were reviewed. Localization of mediastinal parathyroid adenoma, performed treatment and prognosis were evaluated.

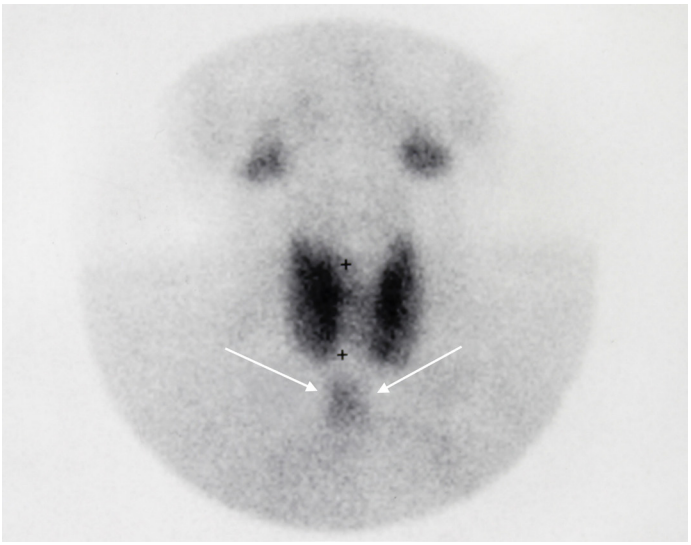

Figure 1: Scintigraphic image of parathyroid adenoma

Surgical approach:

Cases were given Techneticum 99m-MIBI 30 minutes before surgery. Afterwards, classical transcervical (coller) incision was made under general anesthesia while the neck was hyperxtended. In patients whose adenoma was unreachable through this incision, T incision was made accompanied with partial sternotomy. After the upper 1/3 part of the sternum was cut with a saw, it was opened with a pediatric sternal retractor (Figure 2). The mediastinum was intraoperatively scanned with gamma-probe. The identified nodule was excised with surrounding fatty tissue. In one patient whose adenoma was unreachable through partial sternotomy, total median sternotomy was necessary. The adenoma of this patient was localized at the posterior mediastinum.

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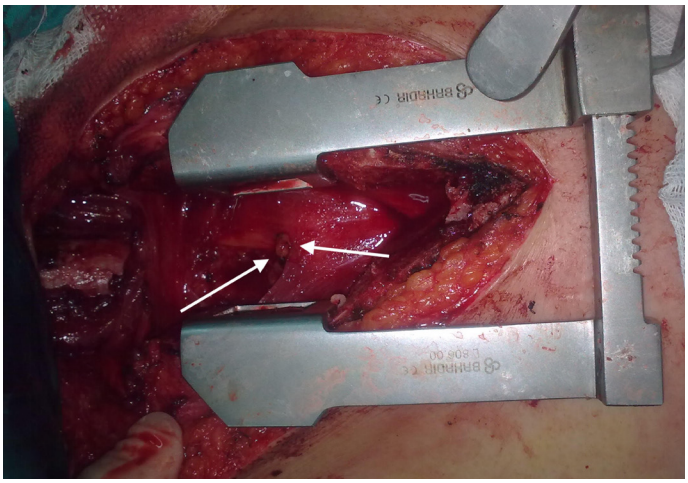

Figure 2: Intraoperative view of partial sternotomy

Statistical analysis

Data of our study were installed to Statistical Package for the Social Sciences (SPSS) version 22.0 program. Arithmetic mean, standard deviation, frequency and percentages were used in the evaluation of the data.

Results

Seven of the cases were female (87.5%) and the mean age was found to be 49.7 years (range 30-64 years). Demographic data are shown on Table 1. In most of our patients (87.5%), bone pain was the most distinct symptom. Other symptoms included tiredness, myalgia and weakness of extremities. In the blood biochemistry of all patients, levels of calcium (Ca) (range: 10.4-12.6) and parathormone (PTH) (range: 186-296) were found to be increased (Table 1). In order to rule out postoperative residual parathyroid adenoma, mediastinum was rescanned with a γ-probe, and no activity was detected. In all cases, postoperative PTH and Ca values return to normal. Based on histological examination results, all patients were diagnosed with parathyroid adenoma. None of the patients had any malignancy. No recurrent or consistent hyperparathyroidism was seen during follow-up period. No postsurgical morbidity or mortality developed. The mean duration of hospitalization was 5.1 days (range: 4-7).

Table 1. Demographic data of patients

Patients no	Age	Gender	Serum calcium level (mg/dl)	iPTH (pg/dl)	Location	Surgical approach	Pathology	Duration of stay at the hospital (day)	Post operative hyperthyroidism
1	52	Female	12,3	201,3	Anterior mediastinum	Partial sternotomy	Adenoma	6	cured
2	46	Female	10,8	252,6	Anterior mediastinum	Partial sternotomy	Adenoma	4	cured
3	50	Female	10,4	211,8	Anterior mediastinum	Partial sternotomy	Adenoma	4	cured
4	56	Female	10,8	217,9	Anterior mediastinum	Partial sternotomy	Adenoma	4	cured
5	64	Female	11,5	215	Posterior mediastinum	Total Sternotomy	Adenoma	7	cured
6	53	Male	12,6	296	Anterior mediastinum	Partial sternotomy	Adenoma	5	cured
7	30	Female	10,7	186	Anterior mediastinum	Partial sternotomy	Adenoma	5	cured
8	47	Female	12,3	238,7	Anterior mediastinum	Partial sternotomy	Adenoma	6	cured

Discussion

Most of the parathyroid adenomas can be removed with neck exploration. However the neck incision may be insufficient, as in the mediastinal settlement (6). It was reported as four in ten patients were undergoing two or more re-explorations because of inadequate evaluation of preoperative localization (7). The inferior parathyroid glands are located commonly at the inferior part of the thyroid gland. But in the %2 of the part of population they can be located in the thymus and settle in the mediastinum and in only 0.2 of patients are encountered below the thymus in the anterior mediastinum (7,8). So in 18% of cases mediastinal surgery is required (7). Because of this, preoperative anatomic evaluation should be made carefully.

Ultrasonography, CT, and MRI have a relatively low sensitivity for determination of parathyroid adenomas. CT scan may not be identified parathyroid adenomas smaller than 1.5 cm. Scintigraphical evaluations have good sensivity and it supports of the other techniques (2,9). Thallium-technetium subtraction parathyroid scintigraphy was performed after ultrasonographic evolution in our cases.

The intraoperative γ-probe technique is facilitated the work of the surgeon. Activity can be easily determined and mass can be localized with this technique. So surgical trauma is reduced and re-explorations can be prevent with detection of surrounding tissue (2,10). We used this technique in our applications.

The cervical incision may not be enough in excision of ectopic parathyroid glands. Median sternotomy or thoracotomy is frequently necessary in these situations (7,9). This techniques have %12-21 incidence of complications (9,11). Big area can be detected with open techniques. But the wound healing and the cosmetical results are not good. Partial sternotomy can be a good alternative for median sternotomy. Cosmetical results are better in partial sternotomy (12). We applied partial sternotomy with neck dissection. Any complication was not observed in postoperative period. The mean postoperative hospitalization time was 5,1 days. Good cosmetical results and quickly wound healing were obtained in controls.

Video-assisted thoracoscopic surgery (VATS) and robotic surgery are the another options for ectopic parathyroid gland surgery. In the literature, this methods were reported as less complicated than median sternotomy (9,13,14). Sameh and coworkers found that similar complications rate between open techniques and VATS but the mean length of stay was significantly shorter in the minimally invasive group (15). Ismail and co-workers resected ectopic mediastinal parathyroid glands in five patients with the da Vinci robotic system. They suggested non-robotic thoracoscopic procedures have certain disadvantages such as limited mobility of straight instruments, a two dimensional view, an unstable camera platform and poor ergonomic position of the surgeon (14). We preferred partially sternotomy because partially sternotomy and VATS have the same complications ratio, VATS requires more equipments and experience, and we haven't got robotic system in our hospital.

Conclusion

We suggested that partial sternotomy can be applied for mediastinal parathyroid adenomas safely if surgical team haven't got adequate experience and equipment for VATS and robotic system.

Declaration of conflict of interest

The authors received no financial support for the research and/or authorship of this article. There is no conflict of interest.

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