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RESEARCH ARTICLE

# Clinical Outcomes of Parathyroidectomy in Resistant Renal Hyperparathyroidism

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## Abstract

**Objective:** Secondary hyperparathyroidism is associated with impaired calcium, phosphorus and vitamin D balance in patients with chronic renal insufficiency, and patients are often treated medically. However, some patients have medical treatment resistance. The definition of resistant renal hyperparathyroidism despite intake of calcimimetic, parathormon binding and vitamin D analogs persistent parathormone elevation and related symptoms. The only treatment for resistant renal hyperparathyroidism is surgery. This study was designed to investigate the indications for operation of patients with parathyroidectomy due to resistant renal hyperparathyroidism.

**Materials and methods:** Nineteen patients over 18 years of age who underwent hemodialysis due to end stage renal failure and who underwent parathyroidectomy due to secondary and tertiary hyperparathyroidism were included in the study. Patients pre- and post-operative and most recent calcium, phosphorus, parathormon values, operative patterns, pathology reports were recorded. Clinical results of parathyroidectomy were discussed.

**Results:** The study was designed with 19 patients. Eleven of the patients were female (57.9%), 8 were male (42.1%) and the mean age was 44 ± 19 (18-91) years. Preoperative parathormon: 1811 ± 901 (436-3513) pg/ml, 3 patients (15.8%) tertiary hyperparathyroidism; Sixteen patients (84.2%) were diagnosed with secondary hyperparathyroidism. Subtotal parathyroidectomy in 11 patients (57.9%), and recurrent disease in 3 patients (15.8%). Minimally invasive surgery was performed in 5 patients (26.3%). Three patients had persistent hypoparathyroidism (15.8%). The most frequent operation indication was a very high parathormon value (18/19: 94.7%). Surgical success rate was 68.4%. In patients, the most common symptom was bone and muscle pain (84.2%).

**Discussion:** In our series, the most common surgical causes for medical treatment-resistant renal hyperparathyroidism were parathormon elevated and bone-muscle pain.

## Keywords

parathyroidectomy, refractory renal hyperparathyroidism, permanent hypoparathyroidism

## Introduction

In patients with chronic renal failure, secondary hyperparathyroidism occurs due to impaired calcium, phosphorus and vitamin D imbalance. Therefore, bone mineral metabolism is evaluated by studying calcium, phosphorus, parathormon and alkaline phosphatase values in patients starting from stage 3 chronic renal disease [1].

Hypocalcemia, hyperphosphatemia, vitamin D deficiency and increased FGF-23 levels lead to the development of secondary hyperparathyroidism. Initial treatments for renal hyperparathyroidism include low phosphorus diet, phosphorus binders and vitamin D analogs [2]. In recent years, effective hemodialysis and calcimimetics have led to a significant decrease in the number of patients going to surgery [3,4].

The definition of resistant renal hyperparathyroidism is the ongoing parathormon elevation and related symptoms despite calcimimetic phosphorus binding, and vitamin D analogs treatment [5].

The frequency of parathyroidectomy in resistant renal hyperparathyroidism is 1% per year patients of di-

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alysis. However, surgery is the only treatment method such patients [6].

There is a consensus on parathyroidectomy in the presence of resistant renal hyperparathyroidism and symptoms, but there is no consensus for parathyroidectomy indications in patients with very high parathormone levels alone [7].

This study was designed to investigate the indications for operation of patients with resistant renal hyperparathyroidism.

## Materials and Methods

Patients with secondary hyperparathyroidism and tertiary hyperparathyroidism who underwent parathyroidectomy among patients undergoing hemodialysis for end-stage renal insufficiency between November 1, 2011 and June 1, 2018 were retrospectively selected.

Pre-operative symptoms of the patients were examined and recorded.

Patients pre- and post-operative and most recent calcium, phosphorus, parathormon values, operative patterns, pathology reports were recorded.

Less than 18-years-old patients and those without dialysis were excluded from the study.

SPSS 22.0 program was used for statistical analysis. $P < 0.05$ was determined for significance. Parametric tests were used for the data showing normal distribution, and nonparametric tests were used for those who did not.

An informed consent form was obtained from all patients.

The institutional board review approval the use of the data provided that patient names remain confidential.

## Results

Nineteen patients who met the study criteria were included. Female/Male: 11 (57.9%)/8 (42.1%). The mean age was 44 ± 19 (18-91). Preoperative parathormon: 1811 ± 901 (436-3513) pg/ml, post-op parathormon 231 (4-903) pg/ml, preoperative calcium: 9.57 ± 1.59 (6.2-12.8) mg/dl, post-op calcium 7:34 ± 23.1 (5.5-10.1) mg/dL. 3 patients (15.8%) had tertiary hyperparathyroidism; 16 patients (84.2%) had secondary hyperparathyroidism.

Subtotal parathyroidectomy was performed in 11 patients (57.9%) and second operation was performed in 3 patients (15.8%), minimally invasive surgery was performed in 5 patients (26.3%).

Although all patients received active vitamin D, phosphorus binding and calcimimetic, parathormone levels were not under control.

The most frequent operation indication was a very high parathormone value (18/19: 94.7%).

Surgical success rate was 68.4%.

**Table 1:** Patient characteristics.

| | |
|---|---|
| **Patient number** | 19 |
| | 11 Female (57.9%) |
| | 8 Male (42.1%) |
| **Mean age** | 44 ± 19 (18-91) |
| **Pre-op parathormon (pg/ml)** | 1811 ± 901 (436-3513) |
| **Pre-op calcium (mg/dl)** | 9.57 ± 1.59 (6.2-12.8) |
| **Hyperparathyroidism** | Secondary 16 (84.2%) |
| | Tertiary 3 (15.6%) |
| **Operation** | Subtotal parathyroidectomy 11 (57.8%) |
| | Re-operation 3 (15.8%) |
| | Minimal invasive surgery 5 (26.3%) |
| **Calcium phosphorus product (CaxP)** | 47.55 ± 17.34 (23-81) |
| **Surgical success rate** | 68.40% |
| **The most common symptom** | Bone and muscle pain (84.2%) |
| **Permanent hypoparathyroidism** | 3/19 (15.8%) |
| **Duration of post-op follow-up (month)** | 40.78 ± 22.21 (1-78) |

Calcium phosphorus product was 47.55 ± 17.34 (23-81).

The most common symptom in patients was bone and muscle pain (84.2%)

The mean post-op follow-up time of our patients was 40.78 ± 22.21 (1-78) months (Table 1).

The late complications were hypoparathyroidism and disease recurrence.

## Discussion

In our study the most common surgical indications for resistant renal hyperparathyroidism were medical treatment resistance, parathormone elevated and bone-muscle pain.

Continuous parathormone stimulation in renal hyperparathyroidism causes polyclonal hyperplasia in the parathyroid glands over time, which may translate into monoclonal hyperplasia and parathyroid adenoma (tertiary hyperparathyroidism). After this conversion, parathyroid cells develop resistance to calcium sensing receptor and vitamin D receptor. Even if calcium and active vitamin D levels are normal, there is no suppression and autonomy occur. If the parathormon is more than 800 pg/ml for a period of at least 6 months, or if it is more than 9 times higher than normal, there is resistance. Parathormon resistance, hypercalcemia, hyperphosphatemia, osteoporosis, pathological fracture, itching, severe bone pain and myopathy parathyroidectomy are recommended [8-10]. The most frequent surgical indications in our study were medical treatment resistant parathormone elevation (rate 94.7%).

Resistant renal hyperparathyroidism parathyroidec-

tomy reduces mortality and reduces muscle and bone pain [11]. The most common symptom in our patient group was bone and muscle pain and the rate was 84.2%. Our results are consistent with literature data. There was a marked improvement in the symptoms with the operation.

In patients with chronic renal insufficiency, parathyroid hormone levels must remain within reasonable ranges for the protection of bone health. Excessive high-turnover bone disease; while scarring leads to adynamic bone disease [12,13]. Resistant renal hyperparathyroidism, usually with high-turnover bone disease [14].

In patients with treatment-resistant secondary hyperparathyroidism, parathyroidectomy has reduced all and cardiovascular causes mortality [15].

The number of patients with hyperparathyroidism due to renal resistant hyperparathyroidism is approximately 10% [16]. In hemodialysis patients in our center this rate was 13%.

The surgical success rate in our study was 68.4%. The rate of hypoparathyroidism in our study was 15.8%. Three patients had a second operation due to persisting or recurrent disease.

Five patients underwent minimally invasive surgery. The success rate of this method was 20%. This seems to be related to inadequate surgery. In the study of Alesian, et al., the success rate was reported as 92% [17]. This method may be an alternative method in a small number of patients who will not undergo general anesthesia.

Patient count was low, and retrospective of our study was limitations of our study.

In conclusion, the most common surgical causes of renal hyperparathyroidism in medical treatment-resistant patients in our series were parathormon elevated and bone-muscle pain.

## Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

## Animal and Human Rights Statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.


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No.


## Conflict of Interest

The authors declare that there is no conflict of interest.

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