Correlation of Biochemical Variables with Adenoma Size in Patients with Primary Hyperparathyroidism

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Introduction:

Primary hyperparathyroidism is an endocrine disease characterized by inappropriate excess secretion of parathyroid hormone. In 80% of patients with primary hyperparathyroidism, the cause is solitary parathyroid adenoma. Rarely, it can be seen due to parathyroid hyperplasia and carcinoma. The most common way of presentation is asymptomatic hypercalcemia. In symptomatic patients; weakness, concentration disorder, depression, hypertension, arrhythmia, nephrolithiasis, nausea, vomiting, bone pain, bone fractures, Brown tumors can be seen. Primary hyperparathyroidism biochemically; characterized by high parathyroid hormone, high calcium levels and low phosphorus levels. Bone turnover is increased. Serum alkaline phosphatase level is high. It may be accompanied by high chlorine and low bicarbonate (hyperchloremic acidosis). Primary hyperparathyroidism is the most common cause of hypercalcemia in outpatient clinics . Treatment is necessary for symptomatic primary hyperparathyroidism. Surgery is the only definitive treatment method. Preoperative estimation of parathyroid adenoma size may facilitate decision-making on the extent of surgical exploration and may help minimize postoperative complications by allowing minimal exploration. Neck USG and technetium-99m sestamibi scintigraphy can be used to visualize preoperative parathyroid adenoma. However, intraoperative localization of parathyroid adenoma may be difficult, especially in cases where preoperative imaging is negative. In the literature, there are studies showing the relationship between perioperative levels of variables (calcium, parathormone, phosphate) related to primary hyperparathyroidism and the severity of parathyroid adenoma.(6) The aim of our study is to reveal the relationship between perioperative biochemical profile and adenoma size in patients operated for primary hyperparathyroidism.

Method:

In our study, demographic information, symptoms, pathology and biochemistry results of 100 patients diagnosed with primary hyperparathyroidism and operated for parathyroid adenoma in the General Surgery Department of Bezmialem Vakıf University Hospital between May 2019 and July 2022 were retrospectively reviewed. Patients diagnosed with primary hyperparathyroidism and operated for parathyroid adenoma were included in the study; Patients with secondary hyperparathyroidism, parathyroid hyperplasia or carcinoma were excluded. Calcium and parathormone values on the preoperative and postoperative 1st day, PTH value measured at the intraoperative 10th minute, preoperative ALP value, decrease in calcium value [(preopca-postop1st day ca)/preopca*100], decrease in parathormone value [(preoppth -intraoppth)/preoppth*100] and the maximum diameter of the adenoma were recorded from the pathology reports. Bivariate correlations were calculated by the Spearman's correlation test at the 95% significance level. Correlations were considered strong at $r \geq 0.6$, moderate at $0.2 \leq r < 0.6$, and weak at $r < 0.2$.

Results:

100 patients were included in the study. The median age of the patients was 55 years. Youngest patient was 14 years old and the oldest patient was 82 years old. 81% of the patients were females. 34% of patients had musculoskeletal pain. 31% of the patients did not have any complaints and were presented with asymptomatic hypercalcemia. 21% of patients had suffered from nephrolithiasis. 2% of the patients had fractures. Only 1% of the patients had Brown tumor. The median value of the maximum adenoma diameter was 2 cm (range 0.7-4). Maximum adenoma diameter were found to be moderately positively correlated with preoperative parathormone (r = 0.37) levels. Maximum adenoma diameter were found to be moderately positively correlated with preoperative calcium (r = 0.3). Also maximum adenoma diameter were found to be moderately positively correlated with preoperative alkaline phosphatase levels (r = 0.31). There was also moderate positive correlation with pre- and postoperative calcium levels (r = 0.41). Preoperative parathormone levels found to be moderately positively correlated with preoperative alkaline phosphate levels (r = 0.35).

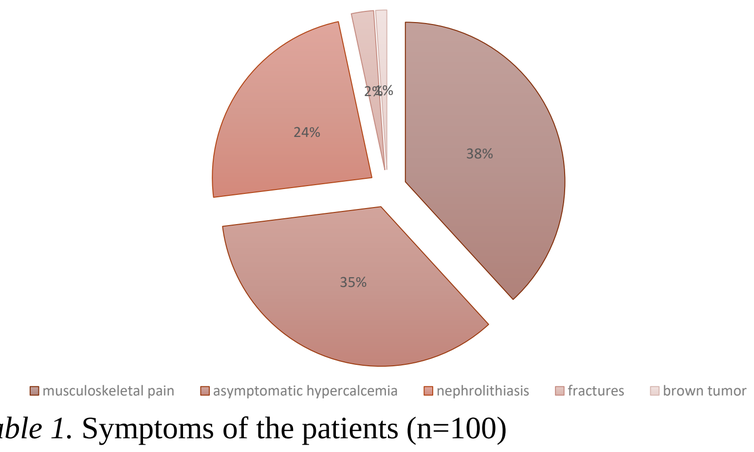

Table 1. Symptoms of the patients (n=100)

	n	Median	Mean	SD	Min-max
Age	100	58	55	13	14-82
Preoperative PTH(pg/ml)	100	231	332	360	70-2564
Postoperative PTH (pg/ml)	96	24	31	33	1-220
Decrease in PTH (%)	96	83	80	12	39-99
Preoperative calcium (mg/dl)	100	11,5	11,6	0,7	9,7-13,8
Postoperative calcium (mg/dl)	100	9,3	9,3	0,8	7,3-11,7
Decrease in calcium (%)	100	19	19	6	4-44
Preoperative ALP (IU/l)	95	102	118	63	30-400
Maximum Adenom diameter (cm)	100	2	2	0,7	0,7-4

Table 2. Patient characteristics, endocrine profile and adenoma characteristics

	n	Correlation coefficient	p
Preoperative PTH	100	0,37	0,001
Preoperative calcium	100	0,3	0,002
Preoperative ALP	95	0,31	0,002

Table 3. Multiple linear regression model n=100 with maximum adenoma volüme as dependent variable

Conclusions:

We concluded that preoperative estimation of adenoma size according to biochemical variables is difficult as maximum adenoma diameter is moderately correlated with calcium, alkaline phosphatase and parathormone values.

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