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# The changing pattern of diagnosing primary hyperparathyroidism in young patients

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**KEYWORDS:**
Primary hyperparathyroidism;
Pediatric hyperparathyroidism;
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**Abstract**

**BACKGROUND:** Primary hyperparathyroidism (PHPT) is increasing in adults but rarely reported in young patients where routine blood work is obtained more judiciously. We aim to determine how PHPT is currently being diagnosed in young patients and examine surgical outcomes.

**METHOD:** We retrospectively analyzed PHPT patients 24 years of age or less who underwent parathyroidectomy from 2001 to 2014. Patients were divided into 2 time periods: 2001 to 2007 (A) and 2008 to 2014 (B). Incidentally, diagnosed patients lacked objective symptoms of PHPT and had no family history.

**RESULTS:** Forty young patients met inclusion criteria: 16 in group A and 24 in group B. Those in group A compared with group B had similar mean age, preoperative calcium, and parathyroid hormone ($P > .05$). Incidental diagnosis was more common in the contemporary group (42% vs 25%, $P = .001$).

**CONCLUSIONS:** Current diagnosis of PHPT in young patients is increasingly incidental. This trend may be attributed to the more liberal use of labs in younger patients.

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Primary hyperparathyroidism (PHPT) is a rare finding in young patients. We examined patients <24 years with PHPT and how they came to be diagnosed. We found that more contemporary patients had increasingly incidental diagnosis of PHPT.

The incidence of primary hyperparathyroidism (PHPT) is increasing in the adult population, due in part to the implementation of routine calcium screening.[1] Therefore, the clinical profile of adults with PHTP is also increasingly nonspecific and asymptomatic. PHPT, however, is rarely reported in children and young adults, where routine blood work is often obtained more judiciously. The incidence of PHTP in young patients is far less common than in adults, with 2 to 5 cases per 100,000 in young patients vs 1 in 1,000 in adults,[2–4] which argues against routine screening. Younger patients tend to present with increased disease severity,[5,6] and delay in evaluating young people for parathyroid disorders can lead to significant end-organ damage at presentation, such as nephrocalcinosis and pathologic fracturing.

As more is being understood about hyperparathyroidism in younger patients, there is increased awareness of

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sporadic PHPT in this population with its associated nonspecific symptoms. A recent literature review focusing on hyperparathyroidism in pediatric and adolescents report the incidence of PHPT may be underestimated, and to consider a lower threshold for ordering screening calcium levels to allow earlier diagnosis of parathyroid dysfunction.[7] As these patients are all younger than 50 years, they meet current consensus guidelines for parathyroid surgery.[8,9] In addition, the literature further supports that parathyroid surgery in young patients with PHPT is safe and effective.[6,7,10–12] The aims of this study were to determine how PHPT is currently being diagnosed in young patients, and to assess characteristics and outcomes of parathyroid surgery in this population. We hypothesized that there has been a change over time in how young patients are being diagnosed with PHPT at our institution.

## Methods

A retrospective analysis was performed on a surgical parathyroid database to include all patients who underwent parathyroidectomy for PHPT between January 1, 2001 and December 31, 2014. We defined surgical cure as normocalcemia at 6-months after surgery, and all the patients had a minimum of 6-months of follow-up. We chose age 24 years or less as a designated cut-off for young age based on the lowest 2 percentile groups in our database. Young patients were divided into 2 equal time periods for analysis: those who underwent surgery from 2001 to 2007 (A) and those who had surgery from 2008 to 2014 (B). Patients were divided into these groups to identify and compare any changes in our cohort over time. To determine which patients were incidentally diagnosed, we looked for those patients with a negative family history who lacked objective symptoms of PHPT such as kidney stones, bone pain, and hypercalcemic crisis. We examined parathyroid surgery outcomes in all patients, and then specifically looked at outcomes for patients with a positive family history. Recurrence was defined as hypercalcemia after 6 months after parathyroidectomy. Categorical variables were analyzed using chi-square test or Fisher's exact-test, and independent *t* tests were used to compare continuous variables. All statistical calculations were performed using SPSS (IBM SPSS Statistics for Windows, version 22.0. Armonk, NY: IBM Corp.)

## Results

### Patient selection and demographics

There were a total of 40 patients aged 24 years or less (range age 10 to 24) who underwent parathyroidectomy for PHPT between 2001 and 2014. This comprised 1.5% (40/2,601) of our total parathyroidectomy volume during this time period. The population demonstrates a slight female predominance (1.7:1). The PHPT patients were then divided into those undergoing surgery in 2 equal time periods, 16 individuals were in group A (2001 to 2007) and 24 in group B (2008 to 2014; Fig. 1). Patient characteristics remained comparable between the 2 time periods. There was no difference between patients in group A and B in terms of family history ($P = .73$), preoperative calcium (11.8 mg/dL vs 11.5 mg/dL, $P = .50$) and parathyroid hormone (118 pg/mL vs 187 pg/mL, $P = .18$; Table 1).

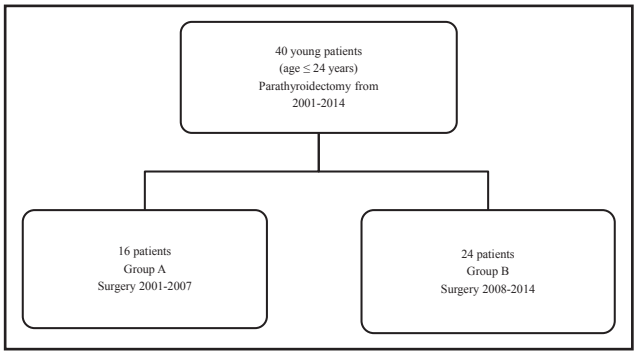


**Figure 1** Patient selection and groupings.

### Diagnosis of primary hyperparathyroidism

We examined medical records to determine how these young individuals were diagnosed with PHPT. Owing to the nonspecific nature of the symptoms associated with hyperparathyroidism, we considered PHPT as symptomatic only when specific symptoms of kidney stones, bone pain, or hypercalcemic crisis were present. Other nonspecific symptoms, such as abdominal pain, or the absence of symptoms at the time of presentation was considered incidental. In addition, we excluded patients with a positive family history when examining patients for incidental diagnosis, as this subset of patients have a higher suspicion of PHPT. Incidentally, diagnosed patients were therefore diagnosed during workup of nonspecific symptoms, most commonly abdominal pain, or based on labs drawn for suspicion of another disease process. (Table 2). We found that an

**Table 1** Patient demographics

| Variable | Group A, 2001–2007 (n = 16 patients) | Group B, 2008–2014 (n = 24 patients) | *P* value |
|---|---|---|---|
| Age, y (median [range]) | 19 [10–23] | 19 [10–24] | .79 |
| Sex | | | 1.00 |
| Male | 6 (37.5%) | 9 (37.5%) | |
| Female | 10 (62.5%) | 15 (62.5%) | |
| Positive family history* | 4 (25%) | 8 (33.3%) | .73 |
| Preoperative calcium (mg/dL; mean ± SEM) | 11.8 ± .3 | 11.5 ± .2 | .50 |
| Preoperative PTH (pg/mL; mean ± SEM) | 118 ± 21 | 187 ± 46 | .18 |

PTH = parathyroid hormone; SEM = standard error of the mean.
*Family history includes multiple endocrine neoplasia type I and familial hyperparathyroidism.