

Surgical Management of Primary Hyperparathyroidism: A Study of 9 Cases

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Abstract

Introduction: Primary hyperparathyroidism (pHPT) is defined by an excessive secretion of parathyroid hormone (PTH) that remains elevated relative to serum calcium levels. Its incidence is steadily increasing, with a marked predominance in women. The definitive diagnosis is biological, while imaging is essential to localize the parathyroid lesion and guide surgical treatment. **Objective:** To analyze the epidemiological, clinical, therapeutic, and prognostic features of patients who underwent surgery for primary hyperparathyroidism. **Materials and Methods:** Retrospective analysis involving 9 patients who underwent surgery for primary hyperthyroidism between January 2014 and December 2017. Results: The most represented age group in our series was [60 - 80 years], the average age was 66.3 years, with an extreme at 48 and 77 years. A female predominance was observed (78%), osseous manifestations of hypercalcemia were the dominant presentation, Serum calcium levels were elevated in 100% of patients, and iPTH levels were elevated in all cases. A topographic diagnosis was made based on imaging findings, cervical ultrasound was performed on 6 patients, while cervico-thoracic CT was conducted in 56% of the cases. All patients received preoperative treatment to reduce serum calcium levels involved rehydration and diuretics. The surgical approach consisted of a classic transverse cervicotomy. Post-operative recovery was uneventful. Pathological examination revealed a parathyroid adenoma in 100% of the patients. **Conclusion:** Primary hyperparathyroidism (pPTH) is the most common endocrine disorder in adults after thyroid diseases. It is incidentally discovered in more than 50% of the cases. Surgical intervention remains the definitive treatment of symptomatic forms, despite emerging medical alternatives. Transverse cervicotomy has proven effective and remains a reliable and accessible treatment option in our context, until minimally invasive surgery become more widely available.

Keywords

Surgery, Parathyroid, Hypercalcemia, Adenoma

1. Introduction

Primary hyperparathyroidism (pHPT) is defined by an inappropriate increase in the secretion of parathyroid hormone (PTH) relative to calcium levels, resulting from both an increased number and activity of parathyroid cells.

Its incidence is approximately 28 cases per 100,000 individuals [1]. pHPT is generally discovered when asymptomatic, often presenting with only mild hypercalcemia, making it a frequent incidental finding.

Surgery remains essential, particularly in younger patients and in symptomatic or progressive forms of the disease [2] [3].

In this retrospective study of 9 cases of surgically managed primary hyperparathyroidism, we aimed to examine the epidemiological and clinical profiles of the condition within our local context and to discuss the therapeutic strategies, with a particular focus on surgical management.

2. Materials and Methods

We retrospectively studied patients diagnosed with primary hyperparathyroidism, and managed surgically between January 1st 2014 and December 31st 2017 in our head and neck department. All patients with complete records were included and unusable records were excluded. The data source included patients' medical records and operative reports.

3. Results

3.1. Epidemiological Study

3.1.1. Age

The age of the patients at the time of diagnosis ranged from 48 to 77 years, with a mean age of 66.3 years, only one patient (11%) was from the age group of 40 to 60 years, while the remaining eight (89%) were from 60 to 80 years.

3.1.2. Sex

There was a female predominance in our cohort: 7 women (78%) and 2 men (22%), with sex ratio (M/F) of 0.3.

3.2. Medical History

All female patients were post-menopausal. Three of our patients were previously diagnosed with primary hyperthyroidism, five patients (55%) had a history of hypertension. One patient presented with a history of hyperthyroidism. Two patients had undergone abdominal surgery one for nephrolithiasis and the other for cholelithiasis. A history of miscarriage was reported in three female patients

(33%), one patient (11%) reported alcohol consumption, no history of smoking was reported among the patients.

3.3. Presentation and Symptoms (Figure 1)

Seven patients (78%) presented with generalized inflammatory bone pain, often associated with diffuse myalgia. One patient (11%) reports arthralgia. Five patients (56%) describe muscle cramps in the lower limbs. Four patients (44%) experienced palpitations. Constipation was reported by three patients (33%) during the months preceding their consultation. One patient (11%) presented with epigastric pain. In one case, hypercalcemia was incidentally discovered during routine laboratory tests performed as part of anemia workup.

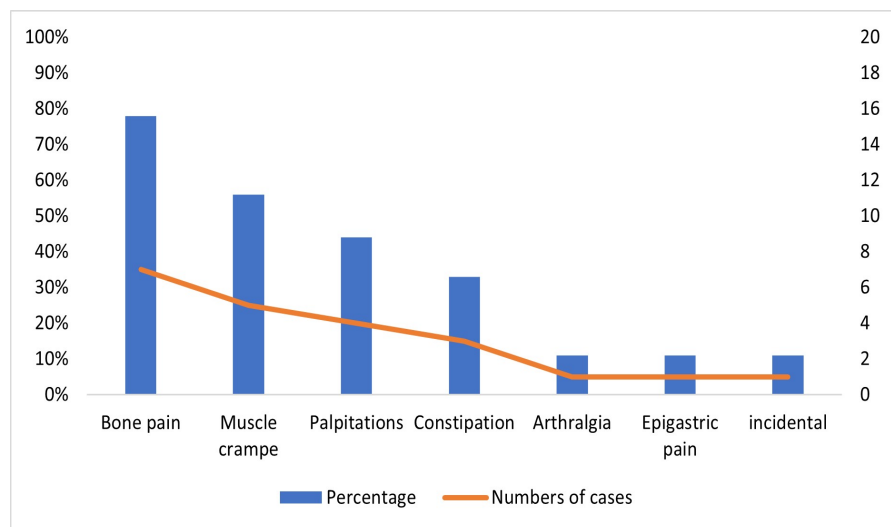


Figure 1. Distribution of patients according to clinical manifestations.

3.4. Physical Examination

Six patients (67%) presented with deterioration of general condition, the symptoms included fatigue, unquantified weight loss, unspecified anorexia. One patient (11%) exhibited mental disturbances. A gait abnormality was observed in one patient (11%).

3.5. Paraclinical Investigation

3.5.1. Laboratory Findings

Serum parathyroid hormone (PTH) concentration was measured in seven patients. In four cases, the value was twice the upper limit of the normal range. In the remaining three cases, PTH levels were mildly elevated: 69.96 and 94 pg/mL respectively. Serum calcium concentration ranged from 106 to 165 mg/mL, with a mean value of 135.5 mg/mL. Hyperphosphatemia was detected in one patient (11%). Elevated 24-hour urinary calcium (>6.25 mmol/24 h). Excretion was observed in two cases. Serum alkaline phosphatase was elevated in two patients (>125 UI/l). All patients had a normal renal function.

3.5.2. Cervical Ultrasonography (USG)

Six patients underwent cervical USG, revealing a single parathyroid nodule in all cases (100%), and associated thyroid nodules in two cases (33%).

3.5.3. Cervical CT Scan

Five patients underwent a cervical CT scan, which also revealed a single parathyroid nodule in each case. Associated thyroid nodules were observed in 2 cases.

3.6. Surgical Treatment

All patients received appropriate preoperative preparation, including rehydration, diuretic therapy, and monitoring of both cardiac and renal functions. Each patient in our series underwent parathyroidectomy through a standard transverse cervicotomy (**Figure 2**) with excision of a single parathyroid nodule.



Figure 2. Surgical approach to the parathyroid gland, under the thyroid lobe.

Although the location varied, the lesions were predominantly located in the inferior parathyroid glands (89%) (**Figure 3**), illustrates the distribution of patients based on the surgical procedure performed.

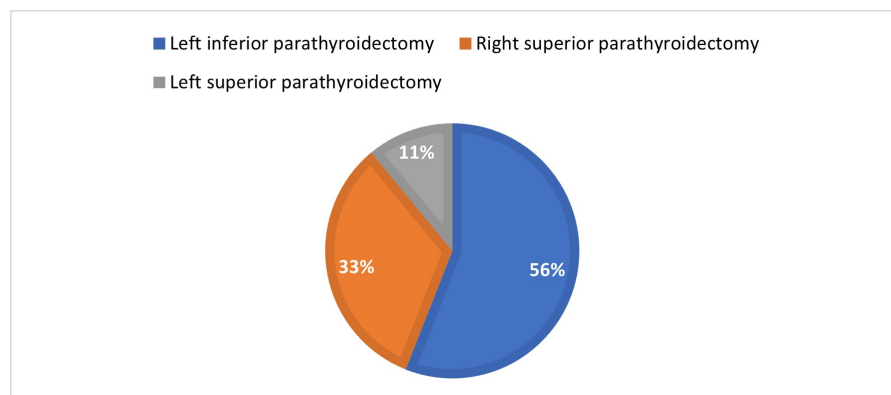


Figure 3. Distribution of patients according to the surgical procedure performed.

A lobo-isthmectomy and a total thyroidectomy were performed in two cases (22%).

3.7. Outcome

The post-operative course was uneventful for all patients (**Figure 4** and **Figure 5**), with normalization of serum calcium levels. Vomiting was observed in one case, which resolved after the administration of antiemetics.



Figure 4. Patient in the immediate post-operative period.



Figure 5. Patient in the distant post-operative period.

Two months postoperatively the patients returned with normal serum calcium and phosphorus levels

During the 5 years follow-up, no recurrence was observed. clinical examination was normal, total calcium (2.2 to 2.6 mmol/l) and PTH levels (15 to 65 pg/ml) were normal.

3.8. Pathological Examination

In our series, histopathology revealed a single parathyroid adenoma in all cases (100%) (**Figure 6**).



Figure 6. Surgical specimen of a parathyroid adenoma.

4. Discussion

4.1. Epidemiology

4.1.1. Age

Claire BLANCHARD-LOUIS in Nantes reported a mean age of 68 years [4]. HARIGA *et al.* in Tunisia observed a mean age of 56.5 years [5]. Both studies noted that the age at the diagnosis was over 50 years, which was also the case in our series.

4.1.2. Sex

Our cohort showed a female predominance with 78% female and 22% male patients. **Table 1** presents the predominant sex reported by various authors.

Table 1. Predominant sex reported in international series.

Series	Country	Predominant Sex
Claire-BLANCHARD (2012) [4] (n = 116)	France (Nantes)	Female (78%)
S. Miller (2008) [6] (n = 1066)	United states	Female (74%)
Our series (n = 9)	Senegal (Dakar)	Female (78%)

n: Number of cases.

4.2. Diagnosis

4.2.1. Clinical Features

Primary hyperparathyroidism can be discovered through various clinical presentations:

- It can be completely asymptomatic and discovered incidentally during routine blood work.
- It may present with symptoms of hypercalcemia and/or be associated with renal, osseous, digestive, cardiovascular and neuropsychiatric manifestations.

In our series, all patients initially sought consultation in general medicine. The most common symptoms of hypercalcemia including fatigue, weight loss and osseous manifestations were observed in 78% of cases.

One patient was asymptomatic, with hypercalcemia discovered incidentally.

Our findings differ from those of M. KHEDER [7] who found that the majority of the cases were discovered through hypercalcemia in laboratory tests, most of which were asymptomatic.

4.2.2. Clinical Manifestations

In the present study, osseous manifestations were the most common (78%), including bone pain, arthralgia, and abnormal gait. General symptoms were the second most frequent (67%), such as fatigue and weight loss. One case of depressive disorder (11%) was noted. **Table 2** summarizes the clinical signs reported in various international studies.

Table 2. Frequency of clinical signs in international series.

Signes	Series	Claire Blanchard 2012 [4] (n = 116)	Hariga 2007 [5] (n = 25)	Our Series 2018 (n = 9)
General	Fatigue	76%		
	Weight loss	53%	28%	67%
	Osseous	44%	40%	78%
	Renal	---	44%	---
	Cardiovascular	45%	28%	44%
	Digestive	---	36%	44%
	Neuropsychiatric	50%	---	11%

n: Number of cases.

4.3. Laboratory Findings

In our series, serum calcium levels were above the normal range in 100%, as were iPTH levels. Two patients had elevated 24-hour urinary calcium excretion.

In 2007 HARIGA *et al.* [5] reported that 92% of their patients had elevated serum calcium levels with a mean range of 115mg/L. 24-hour urinary calcium excretion was above the normal range in 72% of the patients and normal in 28%. iPTH were elevated in 100% with a mean value of 405 pg/mL

4.4. Imaging

4.4.1. Cervical USG (Ultrasonography)

In the 2007 series of M Tassart *et al.* [8] in Paris, the sensitivity of the USG was

85%.

Our results are higher with a sensitivity of 100% of USG. However, the size of our sample requires some cautions.

4.4.2. CT Scan

In our series, a CT scan was conducted in five patients and confirmed the diagnosis in all cases, resulting in sensitivity of 100%. As reported by the authors the sensitivity and specificity of the CT scan are 70% and 90% respectively, slightly more accurate compared to ultrasound [9].

4.5. Treatment

4.5.1. Medical Treatment

There are two main approaches:

- The first aims to manage hyperparathyroidism-related osteoporosis by using bone resorption inhibitors, estrogens, selective estrogen receptors modulators (SERM) and bisphosphonates.
- The second focus on reducing the PTH secretion through the use of calcimimetics or neutralizing the hormone via anti-PTH immunization [10].

In our series, all patients who presented with hypercalcemia (100%) received hypocalcemic treatment consisting of furosemide and rehydration. Moreover, no patient received bone-targeted or etiological treatment.

4.5.2. Surgical Treatment

A parathyroidectomy with excision of a single nodule was performed in 100% of the cases. The nodule exhibited variable locations, with a predominance in the inferior parathyroid region.

HARIGA [5] also realized excision of a single nodule in 88% of the cases.

4.6. Histopathology

In our series, parathyroid adenoma accounted for 100% of the cases.

Table 3 compares our results of histological findings with those of international series.

Table 3. Frequency of histological types according to the literature.

International series	Year (Country)	Adenoma	Hyperplasia	Carcinoma
Inabnet (n = 100) [11]	2002 (United States)	96%	1%	3%
Dhioub (n = 34) [12]	2006 (Tunisia)	76%	23%	0%
Barbier [13]	1992	97.2%	1%	1.8%
Ryan [14]	1997	98%	2%	0%
Our series (n = 9)	2018 (Senegal)	100%	0%	0%

In all international series, as well as in ours, parathyroid adenoma is by far the most commonly found pathological lesion in pHPT.

4.7. Postoperative Outcome

The post-operative course was uneventful in the majority of the cases 98% [15].

However, a strict monitoring protocol should be implemented:

-Clinical monitoring: assessing for hypocalcemia signs such as muscle cramps, tingling in the extremities, paresthesia, and numbness.

-Biological monitoring: immediate postoperative monitoring of serum calcium levels on Day 0, Day 1 and Day 8 [16].

Acute hypocalcemia and recurrent laryngeal nerve paralysis [12] [13] are the main immediate postoperative complications. Serum calcium levels typically drop the most between the first and the third postoperative days.

In Barbier *et al.* [13] multicenter study, the rate of permanent recurrent laryngeal nerve paralysis in 1.5% in 4883 patients who underwent traditional cervicotomy.

In our study, no cases of hypocalcemia, recurrent laryngeal nerve paralysis, or hematoma were reported. similarly, no late complications such as postoperative hypoparathyroidism, renal insufficiency or acute pancreatitis were observed.

Proye, in a series of 1888 patients, a 97.6% success rate was attained after primary standard cervicotomy [17]. This rate is close to those typically reported in other series, which range around 95% [18].

In our study, we achieved a 100% success rate with classic cervicotomy, with full recovery.

The risk of failure can be minimized by exploring the ipsilateral gland and searching for an ipsilateral supernumerary gland. The causes are multiples. **Table 4** presents the main causes of primary hyperparathyroidism recurrence.

Table 4. Main causes of recurrence according to Proye [17].

Ectopic gland	35%
Incomplete exploration	32%
Supernumerary gland	23%
Assessment error	22%
Incomplete gland resection	16%
Second localization	13%
Development of secondary HPT	3%
Diagnostic error	3%

In our series, there was no recurrence observed during the 5 years follow up period.

The findings from our study align with data from international cohorts, which demonstrate a very low recurrence rate following surgical treatment [5] [17]. According to our results, transverse cervicotomy has demonstrated its effectiveness and remains an efficient and accessible therapeutic approach our countries, until minimally invasive surgery [19] [20] become more widely available.

5. Conclusions

Primary hyperparathyroidism (pHPT) is the second most common endocrine disorder in adults following thyroid diseases, affecting women more often, it is incidentally discovered in 50% of the cases.

The curative treatment for symptomatic cases remains surgical, despite emerging medical alternatives.

Transverse cervicotomy remains an efficient and accessible therapeutic approach for less advanced countries.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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