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# Primary Hyperparathyroidia at the Abass Ndao Hospital Center: About 29 Cases

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## Abstract

**Introduction:** In Senegal, there is very little data on primary hyperparathyroidism despite an overall upward epidemiological trend. The objective was to describe its epidemiological, clinical, therapeutic and evolutionary aspects. **Materials and Methods:** This was a cross-sectional, descriptive study, conducted over 5 years (from January 01, 2018 to December 31, 2022) at the National Abass Ndao Hospital Center and including all confirmed cases of primary hyperparathyroidism. **Results:** Twenty-nine patients were included with a female predominance (86.20%) and an average age of 48.10 ± 18.93 years. The discovery of hyperparathyroidism was fortuitous in 79.31% of cases. The main clinical manifestations were osteoarticular (62%) and urinary (34.5%). On average, serum calcium measured was 109.2 ± 7.92 mg/l, corrected serum calcium 111.3 ± 6.25 mg/l, urinary calcium 421.9 ± 96.45 mg/24h and parathormone at 145 ± 159.71 pg/ml. Among the patients, 25 had hypercalcemia (86.2%) and all had 24-hour hypercalciuria. The diagnosis was retained in view of the elevated parathyroid hormone (PTH) values in all patients. Cervical ultrasound objectified a parathyroid adenoma in 27.58% of cases and 12 patients or 46.2% had presented a scintigraphy in favor of a parathyroid adenoma. We found 01 cases of multiple endocrine neoplasia type 2. Bone densitometry performed in 10 patients found osteoporosis in 60% of cases (6 patients) and osteopenia in 40% of cases (4 patients). Surgical treatment was performed in 12 patients (41.4%). The histology of the surgical specimens was in favor of a parathyroid adenoma in all cases. Among the operated patients, the evolution was marked by a cure rate of 100%. **Conclusion:** The symptomatology of primary hyperparathyroidism remains mainly osteoarticular and urinary. Surgery has proven its effectiveness in our series. We insist on the

systematic dosage of calcemia especially in women over 50 years and the promotion of morphological explorations.

## Keywords

Primary Hyperparathyroidism, Hypercalcemia, Parathormone, Osteoporosis, Dakar

## 1. Introduction

Primary hyperparathyroidism (PHP) is defined by excessive production of parathyroid hormone (PTH) of primary parathyroid origin, which is not adapted to blood calcium levels [1]. It is the third most common endocrinopathy after diabetes and dysthyroidism. In Europe, almost 1.07% of hospitalized patients had PHP, *i.e.* 8.3 cases per 100,000 [2] [3] [4]. In Senegal, Niasse *et al.* [5] reported 22 cases in the rheumatology department of Aristide le Dantec Hospital, with a prevalence of 0.02%. PHP is mainly seen from the fifth decade onwards [6] [7]. The predominance of HPP in women and the average age at onset in the fifties are well documented in the literature [8] [9] [10] [11] [12]. Since the automated measurement of blood calcium, PHP is most often diagnosed incidentally at an asymptomatic stage [13] [14] [15]. The diagnosis is made biologically when there is an increase in serum calcium and parathyroid hormone. In our context, a few studies of PHP are in the rheumatology specialty. The variety of circumstances of discovery, beyond rheumatological manifestations, led us to carry out this study with the aim of studying the epidemiological, clinical and therapeutic profile of PHP in our context.

## 2. Patients and Methods

This was a descriptive, cross-sectional study conducted from 01 January 2018 to 31 December 2022 at the Abass Ndao National Hospital. The database used to establish the work was based on a study of the records of patients included during the period. Our study included all patients whose diagnosis of primary hyperparathyroidism had been established on the basis of biological parameters. The information contained in this dossier has been collected using a reporting form we designed ourselves. These were hypercalcaemia and/or normocalcaemia, the elevation of parathyroid hormone levels inappropriate to calcaemia and elevation of 24-hour calciuria. We excluded patients with secondary hyperparathyroidism (chronic renal failure, hypovitaminosis D) or tertiary hyperparathyroidism and those whose records could not be found or were incomplete. For the purposes of our study, the normal values were (88 - 104 mg/l) for measured serum calcium, (100 - 250 mg/24h) for 24-hour calciuria, and (6 - 50 pg/ml) for plasma parathyroid hormone. Bone densitometry was performed to detect osteoporosis (defined by a T-score ≤ −2.5 DS) and osteopenia (T-score between −1 and −2.5 DS). Data were collected using a pre-established questionnaire. All pa-

tient files meeting our inclusion criteria were used. An interview and a complete clinical examination were carried out, followed by short- and long-term clinical-biological monitoring. We proceeded to an overall analysis of the different epidemiological and diagnostic aspects and the therapeutic and evolutionary modalities of our population. The items chosen when drawing up the questionnaire were inspired by the specific and non-specific clinical manifestations of primary hyperparathyroidism, the biological profile and the various therapeutic aspects. The post-operative evaluation was based on clinical examination (looking for signs of hypo- or hypercalcaemia, recurrential paralysis, cervical haematoma, wall abscess), blood calcium and PTH levels, and biology. Other biological investigations and morphological data were also performed according to the context. The data entry mask and statistical analysis of the data were carried out using Microsoft Excel software 2016 and R version 4.1.1. In the descriptive analysis, qualitative variables were described by frequency tables. Quantitative variables were described by their position (mean) and dispersion (standard deviation, extremes) parameters. For bivariate analysis, the Chi2 or Fisher test was used for proportion comparisons. An association was observed if p-value < 0.05.

## 3. Result

### 3.1. Epidemiological Data

During the study period, 29 patients met the inclusion criteria. The mean age of our patients was 48.1 ± 18.9 years (range 20 to 82 years). The mean age was 45.2 ± 18.5 years in women and 66 ± 10.7 years in men. In our series, there were 25 women (86.2%) and 4 men (13.8%), giving a sex ratio (M/F) of 0.16. Menopause was found in 12 patients (48%), arterial hypertension in 7 patients (24.14%), type 2 diabetes in 6 patients (20.69%) and pathological fracture in 3 patients (10.34%). The other pathologies were multiple endocrine neoplasia in one patient (3.45%) and 2 thyroidectomies for thyroid nodules (6.89%). Table 1 summarises the epidemiological data from our study.

**Table 1.** Summary of epidemiological data from our study.

| Epidemiological data | Cases | Percentage |
|---|---|---|
| Our series | 29 | 100% |
| Women | 25 | 86.20% |
| Menopause | 12 | 48% |
| High blood pressure | 7 | 24.14% |
| Diabetes mellitus | 6 | 20.69% |
| Renal lithiasis | 4 | 13.79% |
| Recurrent gastric ulcers | 2 | 6.89% |
| Viral hepatitis B | 1 | 3.45% |
| Pheochromocytoma | 1 | 3.45% |
| Medullary thyroid cancer | 1 | 3.45% |
| MEN type 2 | 1 | 3.45% |

### 3.2. Clinical Data

In our study, 23 patients (79.3%) presented with primary hyperparathyroidism discovered incidentally. Bone pain was the main presenting sign in 62.1% of cases, followed by general signs including weight loss in 32.14% of cases. Urinary signs included renal colic and polyuro-polydipsic syndrome in 13.8% of cases and haematuria in 6.9%. The majority of patients (67.8%) were of normal weight. Cervical examination revealed nodular cervical swelling in 4 patients (13.79% of cases). Table 2 shows the circumstances in which PPH was discovered in our study.

### 3.3. Biological Data

On average, measured calcaemia was 109.2 ± 7.92 mg/l (normal 88 - 104 mg/l) and corrected calcaemia was 111.3 ± 6.25 mg/l. In our series, 25 patients had hypercalcaemia, *i.e.* 86.20% of cases, and only 4 patients had normalcaemia (85 - 105 mg/l), *i.e.* 13.8% of cases. Hypophosphaemia (normal 25 - 45 mg/l) was found in 24/28 patients, *i.e.* 85.7% of cases, with a mean phosphaemia of 21.1 ± 6.03 mg/l. All patients had 24-hour hypercalciuria (urine levels above 250 mg/24h) with a mean of 421.92 ± 96.45 mg/24h (normal range 100 - 250 mg/24h). The diagnosis of HPP was based on elevated PTH values in all patients, with a mean of 145.01 ± 159.71 pg/ml (normal range 6 - 50 pg/ml). Vitamin D status was assessed in all patients. Deficiency (vitamin D < 20 ng/ml) was noted in only one patient (3.45%). Table 3 shows the average biological parameters of our patients.

### 3.4. Morphological Data

Cervical ultrasound was performed in all patients, and was consistent with an

Table 2. Circumstances of discovery of the disease in our study.

| Circumtances of discovery | | Patients | % |
|---|---|---|---|
| **Osteoarticular signs** | Bone pain | **18** | 62.07% |
| | Fractures | **3** | 10.34% |
| **Urinary signs** | Renal colic | **4** | 13.79% |
| | Haematuria | **2** | 6.89% |
| | Polyuria-polydipsia | **4** | 13.79% |
| **General signs** | Weight loss | **9** | 32.14% |
| | Obesity | **3** | 10.71% |
| **Neuromuscular signs** | Muscle weakness | **6** | 20.69% |
| | Paresthesia | **1** | 3.45% |
| **Digestive signs** | Chronic constipation | **1** | 3.45% |
| | Peptic ulcer | **2** | 6.89% |
| **Cardiovascular signs** | High blood pressure | **7** | 24.14% |
| **ENT signs** | Thyroid nodule | **4** | 13.79% |

**Table 3.** Average biological parameters of patients in our series.

| Biological parameters | Results | Reference values |
|---|---|---|
| Average blood calcium | 109.19 mg/l | [88 - 104 mg/l] |
| Average corrected calcium | 111.26 mg/l | [85 - 105 mg/l] |
| Average calciuria | 421.92 mg/24h | [100 - 250 mg/24h] |
| Phosphoremia moyenne | 21.06 mg/l | [25 - 45 mg/l] |
| Average PTH | 145.01 pg/ml | [6 - 50 pg/ml] |
| Average Vitamin D | 35.5 ng/ml | [30 - 45 ng/ml] |

adenoma in 8 patients (27.58% of cases). MIBI Tc99 scans were performed in 26 patients (89.6% of cases). Twelve patients (46.1%) had an abnormal scan in favour of a parathyroid adenoma. According to the location of the adenomas, 11 patients had a parathyroid adenoma located in the thyroid cavity (91.7% of cases), 1 patient had an ectopic location in the mediastinum (8.3% of cases). Three patients had undergone a cervical CT scan (10.34% of cases). No suspicious lesions were identified. Cervical magnetic resonance imaging (MRI) was carried out in only 1 patient, and returned normal.

### 3.5. Complications

Radiological assessment carried out in 9 patients (31.03%), revealed diffuse bone demineralisation in 8 cases (88.9%). Bone densitometry was performed in 10 patients (34.5%). Sixteen patients (57.14%) had mild renal insufficiency (GFR between 60 and 90 ml/ml/min/1.73 m) and 1 patient (3.57%) had moderate renal insufficiency (GFR between 30 and 60 ml/ml/min/1.73 m). Renal ultrasound was performed in 6 patients (20.69%) and found stage 2 right pyelohydronephrosis and stones associated with pyelocalic dilatation (16.67%) in two different patients.

### 3.6. Therapeutic Data

Apart from dietary hygiene measures (oral and/or intravenous hyperhydration) prescribed in all cases, 28 out of 29 patients (96.55%) had received medical treatment. This consisted of bisphosphonates with zoledronic acid in 26 patients (92.9%) and calcitonin in 5 patients (17.9%). Twelve patients (41.38%) had undergone surgical treatment with conventional cervicotomy.

### 3.7. Histological Data

Anatomopathological examination of the surgical specimens showed parathyroid adenoma in all cases. No parathyroid hyperplasia or carcinoma was found in any of the patients.

### 3.8. Evolution

The post-operative course was marked by muscle cramps, distal paresthesias and

hypocalcaemia in 02 patients (16.7%). The majority of patients (83.3%) had a simple and favourable post-operative course. There were no cases of recurrent paralysis, cervical haematoma or wall abscess. In the long term, the average duration of post-operative monitoring ranged from 6 months to 5 years. There was no recurrence in any of the patients operated on, giving a 100% success rate. Therapeutic failures were noted in 13 of the 14 patients who received only medical treatment, giving a recurrence rate of 92.9%.

## 4. Discussion

### 4.1. Epidemiological Data

The presentation and management of PHP have changed radically in recent years. The chance discovery of this disease has become a frequent occurrence. Our study was conducted over a period of 5 years and included 29 cases of PHP. Two other Senegalese studies had evaluated this condition externally. These were the series of 22 cases reported by Niasse *et al.* [5] in a rheumatology department over a period of 17 years and the series of 10 cases reported by Dia *et al.* [10] over a period of 14 years. These results support the assertion that PPH was much more frequent than previously described, thanks to the systematic measurement of calcium levels. The predominance of women and the mean age at onset in our patients are in line with data in the Maghreb, Black African and Western literature [8] [9] [10] [11] [12]. In our series, the mean age at diagnosis was 48.1 ± 18.9 years, in line with the mean age of 47.3 years in the series by Dia *et al.* [10] and 51.35 years in the series by Niasse *et al.* [5]. A stable gender distribution over the five decades was described, with an average female predominance of about 87.5% [12]. PHP was more common in postmenopausal women, who accounted for 44% of the women in our series.

### 4.2. Clinical and Biological Data

Primary hyperparathyroidism is unique in its clinical polymorphism. In Western literature, the diagnosis is currently made in 80% of cases at an asymptomatic stage [12]. This is due to the widespread use of calcaemia measurement. In terms of symptoms, bone, general and urinary signs predominated in our series and those in the literature [1]-[12]. In the series by Niasse *et al.* [5] in a rheumatology unit, osteoporosis and renal lithiasis were the most frequently described presentations. The prevalence of osteoporosis and osteopenia leading to the diagnosis of HPP has quadrupled in thirty years, rising from 10% in 1985 to 44% in 2005 [16]. This is probably due to better access to bone densitometry. As illustrated in the literature [1]-[12], the majority of our cases of primary hyperparathyroidism were isolated and sporadic in appearance. However, we found one case in the setting of multiple endocrine neoplasia. The patient had a history of bilateral pheochromocytoma. Hormonal investigations revealed corrected hypercalcaemia at 124 mg/l, an increase in PTH to 256 pg/ml, and persistent elevation of calcitonin to 391 µmol/l. This suggests type 2 multiple endocrine neoplasia,

for which genetic testing for the RET proto-oncogene is currently underway. The series by Dia *et al.* [10] and Niasse *et al.* [5] respectively reported 2 cases of NEM type 2A with a RET proto-oncogene mutation. In the study by Maruani *et al.* [17], calcaemia was normal in 10% to 20% of patients, confirming the normocalcaemic form of primary hyperparathyroidism. It was the measurement of ionized serum calcium that revealed serum calcium values above normal in 50% of cases. In our series, 86.2% of cases were hypercalcaemic and only 13.8% normocalcaemic. Assessment of calciuria remains essential in the diagnosis. It was elevated in all our patients in our series. Elsewhere, Ljunghall S *et al.* [18] reported hypercalciuria in 40% - 50% of patients. In general, the serum concentration of PTH 1 - 84 is elevated in 90% of patients. Thus, in the majority of cases, the diagnosis was easy to establish by demonstrating simultaneous elevation of serum calcium and serum PTH. In 10% of patients, PTH was not clearly elevated but was inappropriate for hypercalcaemia [19]. Our series is in line with the literature [5] [10] [19]. In addition, Velayoudom-Cephise *et al.* [19] found an associated vitamin D deficiency of 51% in a French series.

### 4.3. Morphological Data

Ultrasound has a sensitivity of 65% - 85% and a specificity of 90% - 95% [20]. Sestamibi-TC99m scintigraphy is highly specific for abnormal parathyroid tissue. In our series, 46.1% of scans were consistent with parathyroid adenoma. Our study also demonstrates the sensitivity and specificity of sesta MIBI scintigraphy superior to ultrasound in terms of exploration of the parathyroid gland. In the series by Niasse *et al.* [5], of the 22 cases of primary hyperparathyroidism, 86% had a parathyroid adenoma and 14% had a parathyroid hyperplasia. Our results are in line with the literature, according to which parathyroid adenoma remains the most frequent etiology of primary hyperparathyroidism [8]. 18 F fluorocholine PET is less irradiating than MIBI scintigraphy and has a detection rate of 96% per patient diagnosed and 90% per lesion diagnosed [21], which would suggest that it should be used as a first-line treatment [22].

### 4.4. Therapeutic and Biological Data

Surgical treatment remains the curative treatment, whatever the clinical form [13] [23], in order to preserve patients' bone capital and quality of life. For this reason, age under 50 years is an independent indication for surgery [13]. In our series, 41.4% of patients had undergone surgery. In comparison, in the series by Niasse *et al.* [12], 54% of patients had undergone surgical treatment. The intervention of an experienced surgeon improves therapeutic success. The classic surgical approach is bilateral transverse cervicotomy. This technique was used in all our patients (100% of those operated on). Histologically, adenomatous lesions predominate [23] [24] [25]. Niasse *et al.* [5] reported parathyroid adenomas in 86% of cases and hyperplasia in 19%. These same histological lesions were found in 88.88% and 11.11% respectively by Dia *et al.* [10].

However, the main limitation of our study is due to its retrospective nature.

## 5. Conclusion

The advent of automated calcaemia measurement has shown that PPH is much more common than previously described in the literature. Thanks to the systematic measurement of blood calcium levels, it is now more often than not diagnosed incidentally at an asymptomatic stage in the presence of hypercalcaemia. The diagnosis and management of hyperparathyroidism will be facilitated by making the measurement of blood calcium in women over the age of 50 more widely available, and by training providers in surgical techniques and explorations for the benefit of patients.

## Conflicts of Interest

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

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