

Bioscientia Medicina: Journal of Biomedicine & Translational Research

Journal Homepage: www.bioscmed.com

Overview of Characteristics of Parathyroid Tumor Patients at Dr. Hasan Sadikin General Hospital Bandung, Indonesia: A 5-Year Study

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ARTICLE INFO

Keywords:

Hyperparathyroidism
Parathyroid adenoma
Parathyroid carcinoma
Parathyroid tumors
Patient characteristics

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All authors have reviewed and approved the final version of the manuscript.

<https://doi.org/10.37275/bsm.v8i8.1048>

ABSTRACT

Background: Parathyroid tumors are the most common endocrine neoplasms, with hyperparathyroidism as the main clinical manifestation. Parathyroid adenoma is the most common benign neoplasm, while parathyroid carcinoma is relatively rare but difficult to differentiate from benign disorders. This study aims to describe the characteristics of parathyroid tumor patients at Dr. Hasan Sadikin General Hospital (RSHS) Bandung over the last 5 years. **Methods:** This descriptive observational research was carried out by collecting medical record data from parathyroid tumor patients at RSHS Bandung for the 2019-2023 period. Parameters identified included age, gender, and histopathological type. Data analysis was carried out using SPSS univariately. **Results:** There were 12 patients with parathyroid tumors with an increasing trend in cases over the last 5 years. The average age of patients was 37.33 years, with the majority (9 cases) being women. Parathyroid adenoma was the most common histopathological type (8 cases), followed by parathyroid carcinoma (2 cases), osteitis fibrocystica (1 case), and bone deformity (1 case). One patient with parathyroid adenoma was also diagnosed with fibrous dysplasia. **Conclusion:** The majority of cases of parathyroid tumors at RSHS Bandung occur in women, with the incidence of parathyroid carcinoma being the same in men and women. Parathyroid adenoma is the most common histopathological type, and bone abnormalities complications can occur in patients with parathyroid disorders (3 patients).

1. Introduction

Parathyroid disorders are rare endocrine disorders, although among all endocrine disorders, this disorder is the third most common after diabetes mellitus and thyroid disorders.¹ This parathyroid tumor is the most common cause of primary hyperparathyroidism (PHPT). Hyperparathyroidism occurs more often in women, especially primary hyperparathyroidism. Primary hyperparathyroidism is 34 times more common than secondary hyperparathyroidism.¹ Parathyroid tumors are one of the endocrine gland neoplasms that occur quite often.² The forms of parathyroid tumors are parathyroid hyperplasia,

parathyroid adenoma, and parathyroid carcinoma.² Patients usually have PHPT with hypercalcemia and elevated PTH.² However, the developing theory states that in secondary hyperparathyroidism there can also be monoclonal development resulting in parathyroid hyperplasia, parathyroid adenoma, and even malignancy.³

Hyperparathyroidism itself consists of primary, secondary, and tertiary hyperthyroidism.² PHPT is caused by inappropriate production of parathyroid hormone (PTH) from an enlarged parathyroid gland.⁴ Approximately 80% of PHPT is caused by parathyroid adenoma, 15% is caused by multiple parathyroid

hyperplasia, and <1% is caused by parathyroid carcinoma.⁵ Secondary hyperparathyroidism is caused by a response from the parathyroid glands due to a decrease in extracellular calcium levels and an increase in serum phosphorus levels.⁴ It is characterized by elevated PTH with low or normal calcium concentrations, which is usually associated with renal failure and vitamin D deficiency.⁴ Meanwhile, tertiary parathyroidism is an autonomous continuation of PTH hypersecretion from one or more enlarged glands.⁴ Parathyroid adenoma is often diagnosed when symptoms have already appeared, even though these symptoms are present for a long time after hyperparathyroidism occurs /long-standing disease.⁴ There are 100,000 new cases in the United States, and it is often diagnosed in postmenopausal women and rarely in children.⁴

The patient was relatively asymptomatic with mild hypercalcemia.⁶ Symptoms that can arise are kidney abnormalities and bone abnormalities.⁴ Other symptoms may also occur, such as nausea, abdominal pain, peptic ulcers, pancreatitis, psychiatric complaints, and depression. This complaint is the same in benign and malignant neoplasms.⁴ Benign and malignant disorders of the parathyroid are very difficult to differentiate, and this is a challenge for doctors.⁴ Usually hyperparathyroid abnormalities in a benign tumor are milder than malignant tumors.⁴ Masses are usually palpable in > 40% of cases, and benign abnormalities are palpable less frequently than malignant abnormalities.⁷ Tumor infiltration or invasion of the thyroid or surrounding tissue is usually found in malignancy, which is characterized by complaints of dysphagia, dyspnea, dysphonia, odynophagia, and ear pain.⁴ Parathyroid carcinoma can also metastasize to the lungs, bones, and liver.⁸

At median follow-up, 35% of patients died, and 64% experienced recurrence.⁴ Failure in en bloc resection increases recurrence.⁴ Prognosis 5-years survival rate in parathyroid carcinoma is 85.4% and 10-years survival rate is 67.1%, which has increased compared to previous decades, due to increased management in the current decade.⁹ The high morbidity and mortality

rates from parathyroid tumors are an important reason for increasing attention to this disorder. For this reason, a description of the pattern of occurrence of parathyroid tumors in existing healthcare facilities is needed.

2. Methods

This research uses a descriptive observational study design. This design was chosen to describe the characteristics of parathyroid tumor patients at RSHS Bandung, without any intervention or manipulation of variables by researchers. The population in this study was all parathyroid tumor patients treated at RSHS Bandung for the 2019-2023 period. The sample for this study was all parathyroid tumor patients who had complete medical record data at RSHS Bandung for the 2019-2023 period. The sampling technique used was total sampling, where all patients in the population met the inclusion criteria. The inclusion criteria in this study were that the patient was diagnosed with a parathyroid tumor based on histopathological examination, the patient's medical record data was complete and accurate and the patient was treated at RSHS Bandung for the 2019-2023 period. This research was carried out by paying attention to research ethics, including: Informed consent: Patients do not need to provide informed consent because this research uses anonymous secondary data; Data confidentiality: Patient data will be stored securely and kept confidential; No risk to patients: This study poses no risk to patients because it only uses secondary data.

The research instrument used in this study was the patient's medical record. Patient medical records reviewed included: Demographic data: age, gender; Diagnosis: parathyroid tumor; and histopathological types of parathyroid tumors. Data collection takes the form of: Directive data: obtained from patient medical records, such as age, gender, and diagnosis of parathyroid tumor; Non-directive data: no non-directive data was collected in this study. Data Collection Technique: Directive data was collected by reviewing patient medical records at the RSHS

Bandung medical records unit; The researcher filled out a data form that had been prepared to record relevant information from the patient's medical record. Data Collection Procedures: Researchers obtained research permission from related parties at RSHS Bandung; Researchers accessed the RSHS Bandung medical records unit; Researchers selected patient medical records based on predetermined inclusion and exclusion criteria; The researcher recorded relevant information from the patient's medical record into a data form; The data collected is stored securely and kept confidential. The data collected was analyzed using SPSS (Statistical Package for Social Sciences) univariately. Data analysis carried out included: Frequency description: to describe the frequency distribution of categorical variables such as gender and histopathological type of parathyroid tumor; Statistical description: to describe the statistical distribution of a numerical variable such as age.

3. Results

Medical record data from January 2019 to 2023 was collected, and 12 patients were diagnosed with parathyroid disorders. The majority of parathyroid disorders were parathyroid tumors, with histopathological features of parathyroid adenoma in 8 cases (66.67%), parathyroid carcinoma in 2 cases (16.67%) and others in 2 cases (16.67%). The other categories here are the description of osteitis fibrocystic and bone deformity in secondary hyperparathyroidism in 1 case each (Figure 1). The incidence of parathyroid tumors increased from the

beginning to the end of the study. In 2019 there was 1 case, 2020 there was 1 case, in 2021 there were 2 cases, in 2022 there were 2 cases, and in 2023 there were 6 cases (Figure 2). Data for the past 5 years shows that the age range of parathyroid tumor patients is as young as 19 years and as old as 60 years with an average age of 37.33 years. Data shows that incidents in women occur more often. There were 9 cases in women (75%) and 3 cases in men (25%) (Figure 3). From the existing data, a classification of the type of hyperparathyroidism that occurs is also made. Primary hyperparathyroidism was present in 9 cases (75%) and secondary hyperparathyroidism in 3 cases (25%). There were no cases of tertiary hyperparathyroidism (Figure 4). In hyperparathyroidism, especially primary, there is usually hypercalcemia, with the normal RSHS range being (3.5-5.1 mEq/L), but there can also be normocalcemia and hypocalcemia, especially in secondary hyperparathyroidism. From the data, 10 patients (83.33%) had hypercalcemia, 1 patient (8.33%) had normocalcemia, and 1 patient (8.33%) had hypocalcemia (Figure 5). From the data, patient groupings were also taken based on the presence or absence of bone abnormalities. There were 3 cases with bone abnormalities based on biopsy results, namely osteitis fibrocystic in 1 case (8.33%) and bone deformity in 1 case (8.33%). There was 1 case of a patient with parathyroid adenoma who was also accompanied by fibrous dysplasia in the maxilla and mandible bones, with risk factors namely end-stage renal disease (ESRD) in hemodialysis (Figure 6).

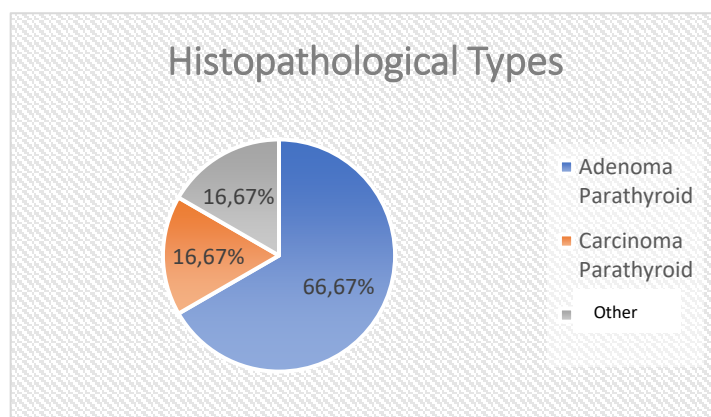


Figure 1. Histopathological types in 2019-2023.

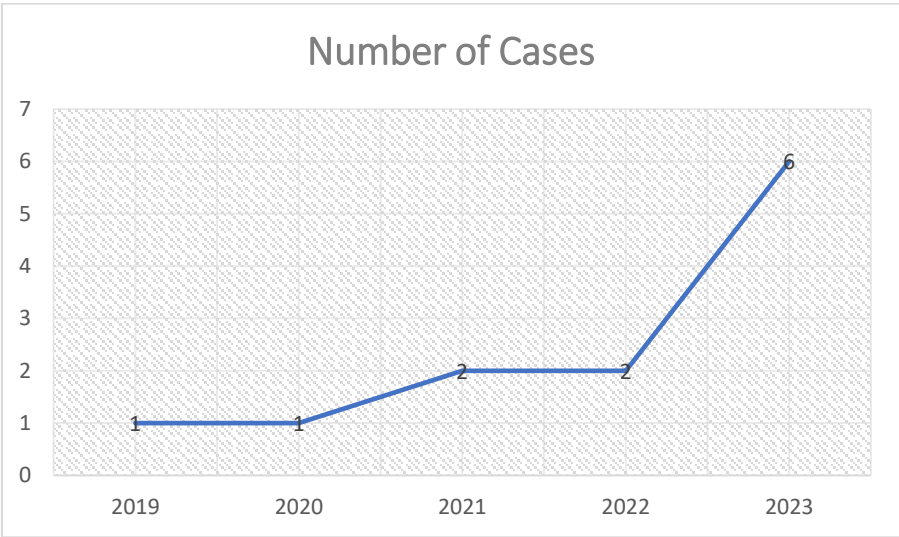


Figure 2. Number of parathyroid tumor cases in 2019-2023.

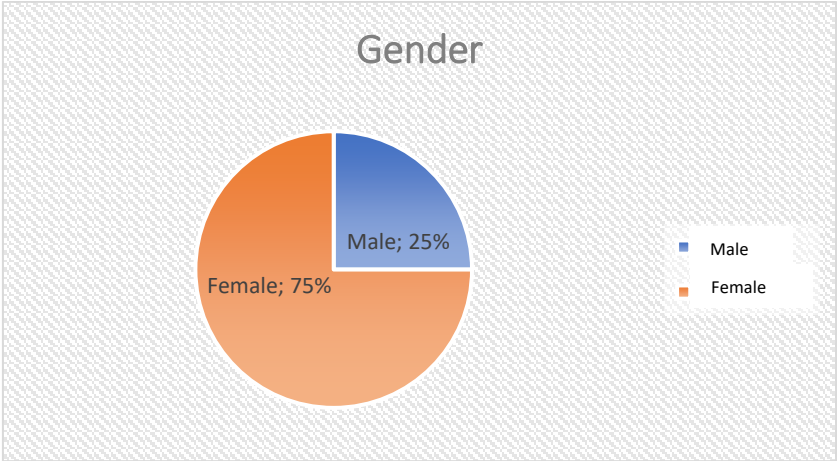


Figure 3. Gender prevalence of parathyroid tumor patients in 2019-2023.

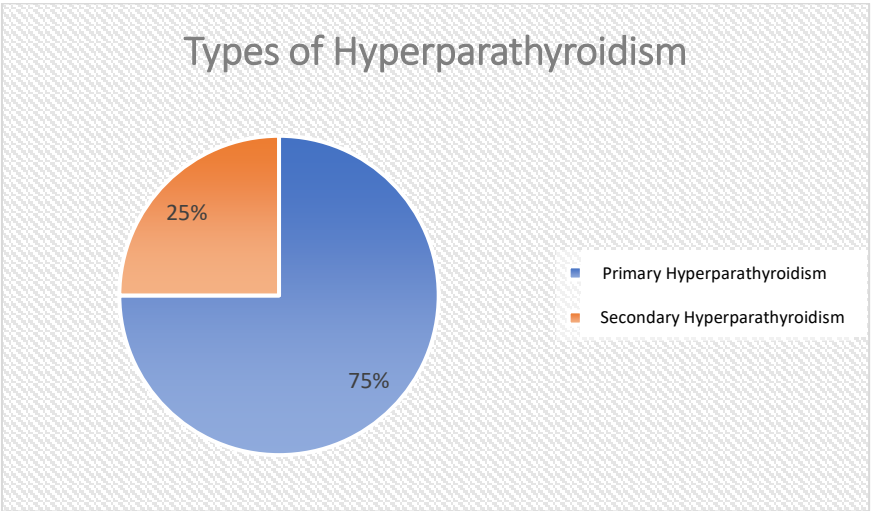


Figure 4. Types of hyperparathyroidism in parathyroid tumor patients in 2019-2023.

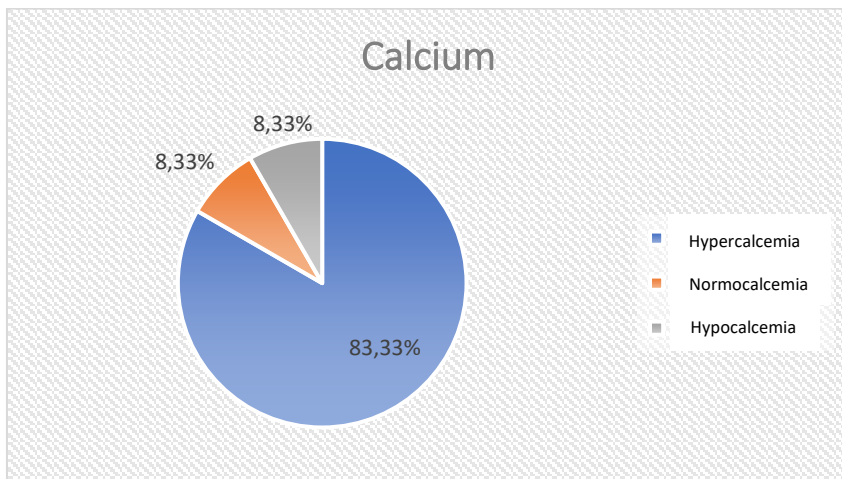


Figure 5. Calcium levels of parathyroid tumor patients in 2019-2023.

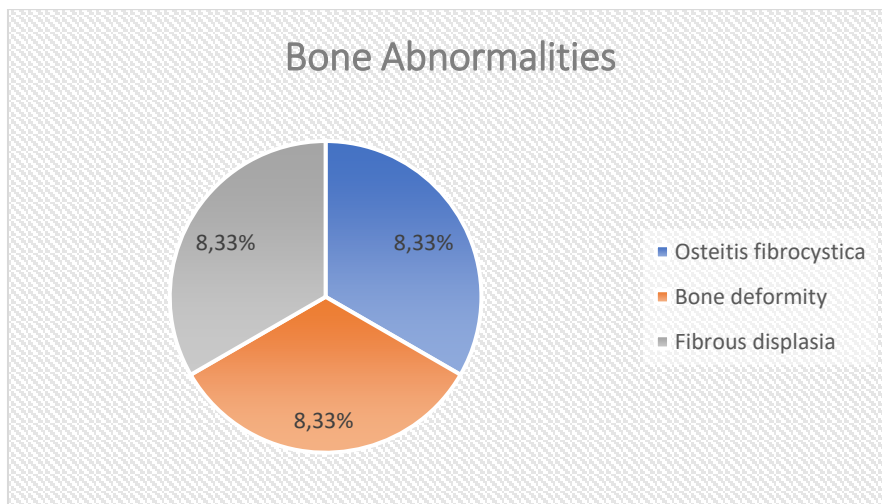


Figure 6. Bone abnormalities in parathyroid tumor patients in 2019-2023.

4. Discussion

This research found a trend of increasing cases of parathyroid tumors at RSHS Bandung over the last 5 years. This is an interesting finding and important to study further. Increasing access to information and education about parathyroid disease through various media such as the internet, health articles, and outreach by health workers can increase public awareness of this disease. This encourages people to be more alert and seek medical help when experiencing symptoms associated with parathyroid tumors, such as muscle weakness, fatigue, and kidney stones. Advances in medical technology, especially in the field of imaging, allow more accurate and earlier

detection of parathyroid tumors. Imaging tools such as neck ultrasound, CT scan, and MRI can help doctors diagnose parathyroid tumors more quickly and precisely. This certainly contributes to the increase in the number of cases detected. Lifestyle factors such as a diet high in calcium and low in vitamin D can increase the risk of parathyroid tumors. Excessive calcium consumption can cause increased levels of calcium in the blood, which stimulates the parathyroid glands to produce more parathyroid hormone (PTH). Excessive PTH can trigger the growth of parathyroid tumors. On the other hand, vitamin D deficiency can interfere with calcium absorption in the intestine, which can also increase the risk of parathyroid

tumors. The increasing number of parathyroid tumor patients can increase the workload of health workers, especially endocrine surgeons and related medical teams. This needs to be anticipated by increasing the number of health workers who are competent in treating parathyroid tumors. The increase in the number of patients with parathyroid tumors can also increase the need for health facilities, such as operating rooms, inpatient rooms, and medical equipment specifically for treating parathyroid tumors. This needs to be considered in planning and developing hospital infrastructure. The cost of treating parathyroid tumors can vary depending on the type of tumor, stage of the disease, and complications that occur. An increase in cases of parathyroid tumors can increase overall health costs, both for patients and for health institutions. This research provides an initial picture of the trend of increasing cases of parathyroid tumors at RSHS Bandung. The trend of increasing cases of parathyroid tumors at RSHS Bandung is a finding that needs to be watched out for and studied further. By understanding the underlying factors, efforts can be made to prevent and control parathyroid tumors more effectively. This effort is expected to improve the quality of life of patients and reduce the burden of health costs.¹⁰⁻¹²

The average age of parathyroid tumor patients in this study was 37.33 years. This is in line with other studies showing that parathyroid tumors can occur at any age, although they are more common in young and middle-aged adults. A study found that the average age of parathyroid tumor patients was 55 years. Another study found that the average age of parathyroid tumor patients was 50 years. Another study found that the average age of parathyroid tumor patients was 57 years. Differences in the mean age of patients across studies may be due to several factors, such as different study populations, study methods used, and definitions of parathyroid tumors used. However, in general, parathyroid tumors are more common in young and middle-aged adults compared to children and the elderly. Parathyroid hormone (PTH) levels in the body can change with age. Young and

middle-aged adults have higher PTH levels compared to children and the elderly. This may increase the risk of parathyroid tumors. Several studies show that there is a relationship between genetic factors and the risk of parathyroid tumors. People with a family history of parathyroid tumors may have a higher risk of developing this disease. Environmental factors such as exposure to radiation and certain chemicals can also increase the risk of parathyroid tumors. The majority of patients in this study were women (9 cases). This is also in accordance with other research findings which show that women have a higher risk of parathyroid tumors than men. A study found that women have a 1.5 times higher risk of parathyroid tumors than men. Another study found that women have a 2 times higher risk of parathyroid tumors than men. Another study found that women had a 1.7 times higher risk of parathyroid tumors than men. The difference in risk of parathyroid tumors between women and men may be caused by several factors. Women have higher levels of estrogen and progesterone than men. These hormones can influence the growth and development of the parathyroid glands. Several studies show that there are certain genes associated with the risk of parathyroid tumors. Women may be more susceptible to these genes than men. Environmental factors such as exposure to radiation and certain chemicals can also increase the risk of parathyroid tumors. Women may be more exposed to these factors than men. Age and gender are two important factors that can influence the risk of parathyroid tumors. Young and middle-aged adults, as well as women, have a higher risk of developing the disease.¹³⁻¹⁵

This study found that parathyroid adenoma was the most common histopathological type in parathyroid tumor patients at RSHS Bandung (8 cases). This is in line with other research which shows that parathyroid adenoma is the most common parathyroid tumor, both in Indonesia and in other countries. Another study found that parathyroid adenoma is the histopathological type in 80-90% of parathyroid tumor cases. Another study found that

parathyroid adenoma was the histopathological type in 85% of parathyroid tumor cases. Other studies also found that parathyroid adenoma was the histopathological type in 82% of parathyroid tumor cases. Parathyroid adenoma is a benign tumor that grows on the parathyroid glands. This tumor is the main cause of primary hyperparathyroidism, a condition in which the parathyroid glands produce excessive parathyroid hormone (PTH). Excess PTH in the blood can cause various symptoms, such as muscle weakness, fatigue, and kidney stones. This study also found 2 cases of parathyroid carcinoma, which is a rare malignant tumor in the parathyroid glands. Parathyroid carcinoma is more difficult to differentiate from parathyroid adenoma and requires more aggressive treatment. A study found that parathyroid carcinoma is a histopathological type in 1-4% of parathyroid tumor cases. Another study found that parathyroid carcinoma was the histopathological type in 2% of parathyroid tumor cases. Another study found that parathyroid carcinoma was the histopathological type in 3% of parathyroid tumor cases. Symptoms of parathyroid carcinoma can be similar to those of parathyroid adenoma, but can also be more severe, such as neck pain and enlargement of the parathyroid glands. Treatment for parathyroid carcinoma usually involves surgery, chemotherapy, and/or radiation. Knowing the histopathological type of parathyroid tumor is very important to determine the appropriate diagnosis and treatment. Parathyroid adenoma can be treated with simple and effective surgery, while parathyroid carcinoma requires more aggressive treatment. This research shows that parathyroid adenoma is the most common histopathological type in parathyroid tumor patients at RSHS Bandung. This is important to know because parathyroid adenoma can be treated with simple and effective surgery.¹⁴⁻¹⁶

This study found 3 patients with complicated bone disorders, namely osteitis fibrocystica, and bone deformity. This is an important finding because it shows that hyperparathyroidism, caused by parathyroid tumors, can have a serious impact on

bone health. Hyperparathyroidism is a condition in which the parathyroid glands produce excessive parathyroid hormone (PTH). PTH plays an important role in regulating calcium and phosphorus levels in the blood. Excess PTH in the blood can cause various symptoms, such as muscle weakness, fatigue, and kidney stones. One of the main side effects of hyperparathyroidism is increased calcium levels in the blood (hypercalcemia). This excess calcium can accumulate in the bones and cause various problems. Osteitis fibrocystica is a condition characterized by abnormal and brittle bone growth. Bones affected by osteitis fibrocystica can break easily and cause pain. Bone deformity is a bone deformity that can occur due to bone weakness and uneven calcium buildup. This deformity can cause functional and aesthetic problems. The findings of this study suggest that hyperparathyroidism can not only cause systemic symptoms but can also have serious impacts on bone health. Therefore, it is important to diagnose and treat hyperparathyroidism early to prevent complications of bone disorders. Diagnosis of hyperparathyroidism can be done with a blood test to measure PTH and calcium levels. Treatment of hyperparathyroidism depends on the cause. In the case of parathyroid tumors, treatment usually involves surgery to remove the tumor. This research shows that hyperparathyroidism can cause serious bone abnormalities and complications. Early diagnosis and treatment of hyperparathyroidism is essential to prevent this complication and improve the patient's quality of life.¹⁶⁻¹⁸

This study found one patient with parathyroid adenoma and fibrous dysplasia. This is an interesting finding because it suggests a potential link between these two conditions. Fibrous dysplasia is a rare bone disorder characterized by the growth of abnormal bone tissue. This bone tissue can grow in various parts of the bones, including the skull, facial bones and long bones. Symptoms of fibrous dysplasia can vary depending on the location and extent of the abnormal bone growth. Common symptoms include bone pain, bone deformity, and muscle weakness. The

relationship between parathyroid adenoma and fibrous dysplasia is still not fully understood. However, some studies suggest that hyperparathyroidism, caused by parathyroid adenoma, may worsen the symptoms of fibrous dysplasia. Hyperparathyroidism can cause increased levels of calcium in the blood (hypercalcemia). This excessive calcium can trigger the growth of abnormal bone tissue and worsen the symptoms of fibrous dysplasia. Hyperparathyroidism can also cause hormonal changes that can affect bone growth and development. These hormonal changes may contribute to the development of fibrous dysplasia. The findings of this study indicate that further research is needed to understand the relationship between parathyroid adenoma and fibrous dysplasia. The relationship between parathyroid adenoma and fibrous dysplasia is still not completely understood. Further research is needed to find out more about this relationship and to develop more effective treatment strategies.^{19,20}

5. Conclusion

The majority of patients with parathyroid tumors are women, with the incidence of parathyroid carcinoma being the same in men and women. Parathyroid adenoma is the most common histopathological type, and bone abnormalities complications can occur in patients with parathyroid disorders (3 patients).

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