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Research Article

A Case Series of Parathyroid Adenoma: Our Institute Experience

Chinmayee P Joshi[1], Vaishali A Patel[2]* and Amrutha V Das[2]

[1]*Assistant Professor, Department of ENT, B.J. Medical College, Civil Hospital, Ahmedabad, Gujarat, India*

[2]*Second Year Resident, Department of ENT, B.J. Medical College, Civil Hospital, Ahmedabad, Gujarat, India*

***Corresponding Author:** Vaishali A Patel, Second Year Resident, Department of ENT, B.J. Medical College, Civil Hospital, Ahmedabad, Gujarat, India.

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Abstract

Introduction: Parathyroid adenoma is the common cause of Primary hyperparathyroidism. It is a benign solitary tumor of parathyroid gland. It is a very rare tumor and has very nonspecific clinical symptoms.

Objective: 1) To arrive at correct diagnosis of parathyroid adenoma in patient with clinically non-specific symptoms by biochemical and radiological investigation and final confirmation by histopathological examination. 2) This study assesses the impact of excision of parathyroid adenoma and patient outcomes with a great quality of life.

Methods: We conducted a retrospective interventional case analysis by selecting 10 patients with biochemically and radiologically proven to be parathyroid adenoma who came to Civil Hospital, Ahmedabad referred from orthopaedic and medicine department from period of July 2018 to October 2019 who underwent surgical excision and had post-operative histological and biochemical confirmation.

Results: 1) There were 10 operated cases of parathyroid adenoma at our institute in last one year. 2) Out of which 10 were symptomatic and one case detected incidentally. Symptoms were varied and included skeletal, renal, neuromuscular and neuropsychiatric manifestation. 3) Histopathologically, out of 10 operated cases, 9 cases proven to be benign parathyroid adenoma while one case suggests possibility of malignancy.

Conclusion: 1) Majority of cases were female presented with neuromuscular, neuropsychiatric symptoms, some of cases had renal symptoms. There was even one incidental case of asymptomatic parathyroid adenoma. 2) In all these cases, 10 cases had high clinical suspicion which was aided by biochemical finding and was followed by tc99 sestamibi scan which help in confirming diagnosis of parathyroid adenoma which was subsequently proved by histopathological examination. 3) There was definitive indication of surgery in all these cases and symptomatic improvement was noted after the surgery was performed.

Keywords: Parathyroid Gland; Parathyroid Adenoma; Hypercalcemia; Primary Hyperparathyroidism; Renal Stone

Introduction

The parathyroid glands are small, oval-shape structures found in close to the thyroid. Eighty-five percent of patients have 4 glands, with 2 lying superior and 2 inferior. The superior glands (developed from the fourth branchial pouch) are usually located on the posterior-lateral surface of the middle to superior thyroid lobe. The inferior glands are more variable in location due to their embryological descent with the thymus (both developing from the third branchial pouch) and can be found at any point along its path of descent. Most commonly, they are located in the inferior third of the thyroid gland.

A normal parathyroid gland is the size of an apple seed and weighs approximately 0.5g. Microadenomas are defined as tumors that weigh less than less than 0.1g, while a giant adenoma is over 2g. The average weight of an adenoma is 1g [1,2].

Primary hyperparathyroidism is 3rd most common neuroendocrine disorder. Parathyroid adenoma is the most common pathology for Primary hyperparathyroidism in 80 - 85% cases. Parathyroid adenoma is a benign solitary tumor of parathyroid gland. Double adenomas found in 4% - 5% patients [3-5]. Its Incidence to be 2.5/1000 population. It can occur at any age mostly at 50 - 70

years old. It has female preponderance with Female: male ratio is 3:2. Most commonly located in lower one third of thyroid gland.

Etiology

A parathyroid adenoma is part of a spectrum of parathyroid disease that also includes parathyroid hyperplasia and parathyroid carcinoma.

The etiology of a parathyroid adenoma remains unknown for most patients. The most common genetic mutation associated with sporadic adenomas is the cyclin D1/PRAD1 gene [6]. Alteration in the normal function of this gene affects PTH secretion. Approximately 20% to 40% of sporadic adenomas have overexpression of cyclin D1. Regarding environmental factors, some data suggest that a history radiation therapy predisposes a patient to parathyroid disease later in life. Long-term calcium deficiency may also result in parathyroid disease due to chronic stimulation of PTH [7].

Clinical features

- May present with muscle weakness.
- The first signs of a parathyroid adenoma and the resulting primary hyperparathyroidism can include bone fractures and urinary calculi such as kidney stones [8].
- Patients can experience common symptoms that can range from joint, muscle, and abdominal pain to slight discomfort.
- Additionally, patients might be experiencing feelings of depression due to the hormonal imbalance [8].
- Constipation and exhaustion can also be experienced parathyroid adenoma is not diagnosed until found on standard blood-tests that reveal high calcium content in the blood, It can appear in 24 hr urine calcium as well but it is not essential for diagnosis [9,10]. There is also a potential that the kidneys could be damaged with the excess of calcium in the blood [8].

Aims and Objectives

- To arrive at correct diagnosis of parathyroid adenoma in patient with clinically non-specific symptoms by biochemical and radiological investigation and final confirmation by histopathological examination.
- This study assesses the impact of excision of parathyroid adenoma and patient outcomes with a great quality of life.

Materials and Methods

We conducted a retrospective interventional case analysis by selecting 10 patients with clinically nonspecific symptoms which was then biochemically and radiologically proven to be parathyroid adenoma who came to Civil Hospital, Ahmedabad, Gujarat referred from Orthopaedic, Urosurgery and Medicine department from the period of July 2018 to October 2019 who underwent surgical excision and also had post-operative histological and biochemical confirmation.

Inclusion and exclusion criteria

Inclusion Criteria	Exclusion Criteria
• Clinically presented with Hypercaelcemia related symptoms like abdominal pain, body pain, limb weakness.	• Patients who are not willing for surgery.
• Blood investigation which has Serum calcium concentration = 11 meq/L or more and PTH >= 44 pg/ml	• Patient who are not fit for surgery.
• Radiologically proven with Tc99 sestamibi scan	• Pregnant or breast feeding women.
• Histologically proven	

In my study, to diagnose a Parathyroid adenoma in patients who are suspicious clinically, We did all Routine blood investigation (Complete Blood Count, PT/INR, Renal Function Test, Liver Function Test, HIV test, HBsAg test, Anti HCV antibody test) with specific blood investigations like Serum calcium, Serum parathyroid level, Thyroid profile which was aided by Imaging study like:

i) Ultrasonography neck

ii) Tc99 sistamibi scan (gold standard of parathyroid localisation)

iii) Ultrasonography kidney-ureter bladder (to rule out renal stone).

All above to diagnose Parathyroid adenoma.

Blood investigation: In patients with clinically suspicious to be parathyroid adenoma we did blood investigation as showed in figure 1 along with Routine blood investigation.

Figure 1: Shows biochemical finding suspicious for parathyroid adenoma.

Imaging study

Ultrasonography of neck: Further to confirm diagnosis of Parathyroid adenoma we did Ultrasonography of Neck which has Sensitivity of USG is only 73% - 86% [11-13] (Figure 2).

Figure 2: Shows Homogenous hypoechoic extra thyroid oval mass with fat plane separating it from normal thyroid tissue and it is typically vascular.

Technetium-99m-sestamibi subtraction scintigraphy: It has sensitivity of 98% for diagnosis of Parathyroid adenoma (Figure 3).

Figure 3: Shows Suggestive of Parathyroid adenoma involving lower pole of left lobe of thyroid gland.

Ultrasonography of kidney-ureter-bladder: To rule out Renal stone in association of Parathyroid adenoma in patient with complaint of abdominal pain.

3DCT Scan of Right shoulder: Done in patient with long standing complaint of Shoulder pain with restriction of movement of upper limb which was not relieved on medication which showed multiple pathological fracture of ribs and lytic lesion of head of humerus with generalized osteoporotic scan.

Management

For all the Symptomatic Parathyroid adenoma in patients of primary hyperparathyroidism, Parathyroidectomy is mainstay of treatment.

For patients who are asymptomatic The National Institutes of Health (NIH) have developed consensus guidelines, most recently updated in 2009 giving specific indications for when surgery is recommended [14] (Box 1).

- Age < 50
- Serum calcium > 0.25 mmol/L above upper limit of normal
- Renal
  - A. Creatinine clearance < 60 c/min,
  - B. 24-h urine for calcium > 400 mg/d (> 10 mmol/d)
  - C. Presence of nephrolithiasis or nephrocalcinosis by X-ray, ultrasound, or CT.
- Bone mineral density (by DXA):
  - A. BMD by DXA: T-score < −2.5 at lumbar spine, total hip, femoral neck, or distal 1/3 radius
  - B. Vertebral fracture by X-ray, CT, MRI
- Medical follow-up undesired or impractical (Adapted from Bilezikian 2014).

Box 1: National Institutes of Health consensus guidelines for surgery in asymptomatic PHPT.

The consensus guidelines also recommend a structured conservative follow-up protocol for patients who do not fulfil the guidelines for surgery mentioned above and advice regarding hydration status and symptom recognition. Monitoring protocol for patients with asymptomatic PHPT are as follows (Adapted from Bilezikian 2014):

- eGFR: estimated glomerular filtration rate annually.
- Serum calcium annually.
- serum creatinine, annually.
- If renal stones suspected, 24-h biochemical stone profile, renal imaging by X-ray, ultrasound, or CT Every 1 - 2 years (3 sites).
- X-ray or VFA of spine if clinically indicated (e.g. height loss, back pain).

Surgical procedure

As surgical procedure is concern painting and draping done in all aseptic condition. Surgery was performed under general anesthesia. Surgical steps for operative procedure is as follows.

Figure

Gross appearance

Figure 4: Shows gross appearance of Excised en masse sample is which is Solitary and well circumscribed nodular mass with delicate capsule and haemorrhagic changes.

Further sample was confirmed by post-operative sample histopathological examination shown in figure 5.

Post-operative care

- Post op physiotherapy was given in all patient with limb weakness.
- One case of renal stone was operated.

Figure 5: Shows histopathological sample stained with H and E stain which shows Encapsulated, cellular, homogeneous lesion composed of chief cells with oxyphil cells in delicate capillary network with no capsular and vascular invasion seen.

- After parathyroidectomy, calcium levels drops in next 2 - 4 days, if symptomic drop in calcium level appears then it can be treated with calcium gluconate.
- Patient with shoulder pain due to multiple pathological fracture was referred to orthopaedic department for management of fracture.

Result

In my study of 10 patients 7 patients were male while 3 patients were female which was also found in most of other studies.

Figure 6: Shows as there is sex distribution which shows female preponderance.

Out of which 10 were symptomatic and one case detected incidentally. Symptoms were varied and included skeletal, renal, neuromuscular and neuropsychiatric manifestation (Figure 7).

Most of the study shows as most common location of parathyroid adenoma to be arise from inferior parathyroid gland also seen with my study with parathyroid adenoma involved inferior parathyroid gland in 9 patients and in one patient it was arised from superior parathyroid gland.

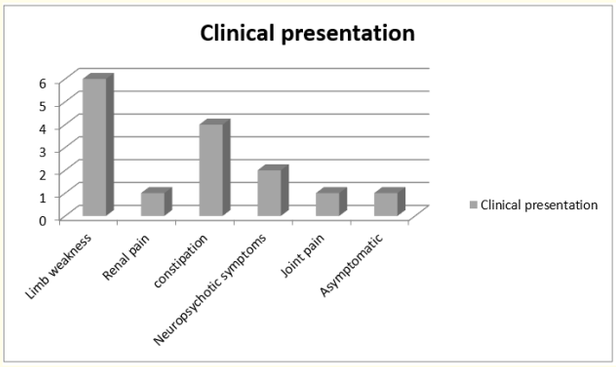

Figure 7: Shows out of 10 patients in my study 6 patients were presented with complaint of muscle weakness. second most common symptom in my study was constipation which accounted 4 patients in my study followed by 2 patients neuropsychiatric symptoms like depression, anxiety. One of my patients also presented with shoulder pain due to multiple pathological fractures due to hypercalcemia. One patient was presented with recurrent renal calculi and one patient was asymptomatic which was found incidentally.

Among all 10 patients, 9 cases were found to be parathyroid adenoma on histopathological examination but one case was found to have Parathyroid malignancy. Figure 8 patient with parathyroid adenoma then referred to Cancer hospital for further management.

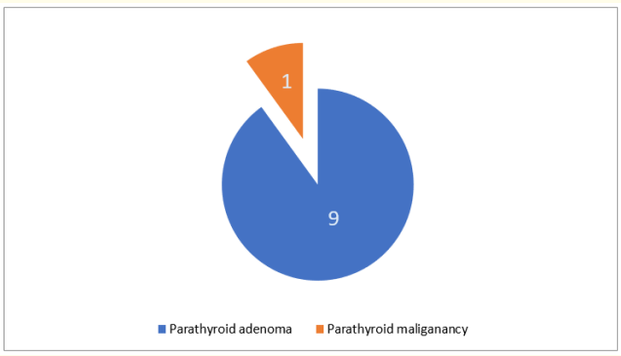

Figure 8: Shows histopathological distribution in my study.

Discussion

- Most studies have reported female preponderance as observed in my study.
- The age range of my study is < 45 years. In one study from India has age range of 40 - 74yr.
- One of our patient presented with diabetes mellitus and hyperparathyroidism. After parathyroidectomy, patient showed improvement in glycaemic control which was also found in some study [15].
- In our study, parathyroidectomy was efficient and safe operation with excellent normalization of serum calcium and serum parathyroid hormone and high rate of patient satisfaction.
- In our study, there is no post op complication but in one Indian study, change of voice due to recurrent laryngeal nerve injury was reported.
- All of our patients showed significant improvement clinically after surgical excision of parathyroid adenoma that is in form of improvement in limb weakness, improvement in mood etc.

Conclusion

1. Majority of cases were female presented with neuromuscular, neuropsychiatric symptoms, some of cases had renal symptoms. There was even one incidental case of asymptomatic parathyroid adenoma.
2. In all these cases, 10 cases had high clinical suspicion which was aided by biochemical finding and was followed by tc99 sestamibi scan which help in confirming diagnosis of parathyroid adenoma which was subsequently proved by histopathological examination.
3. There was definitive indication of surgery in all these cases and symptomatic improvement was noted after the surgery was performed.

Limitation of the Study

- Fairly small number of Parathyroid adenoma as compared to other Indian studies.
- Short duration of follow up due to short period of study.

Bibliography

1. Gupta M., *et al.* "Hyperparathyroidism Mimicking Metastatic Bone Disease: A Case Report and Review of Literature". *Journal of Adolescent and Young Adult Oncology* 7.3 (2018): 400-403.
2. Allen E and Fingeret A. "Anatomy, Head and Neck, Thyroid". StatPearls StatPearls Publishing; Treasure Island (FL) (2019).
3. Pallan S., *et al.* "Diagnosis and management of primary hyperparathyroidism". *British Medical Journal* (2012): e1013.
4. Fraser WD. "Hyperparathyroidism". *Lancet* 9684 (2009): 145-158.
5. Edafe O., *et al.* "Current predictive models do not accurately differentiate between single and multi gland disease in primary hyperparathyroidism: a retrospective cohort study of two endocrine surgery units". *Annals of the Royal College of Surgeons of England* 100.2 (2018): 140-145.

6. Zukerberg LR., *et al*. "Cyclin D1/PRAD1 expression in parathyroid adenomas: an immunohistochemical study". *The Journal of Clinical Endocrinology and Metabolism* 81 (1996): 1736-1739.

7. Sahli ZT., *et al*. "A garden of parathyroid adenomas". *BMJ Case Reports* (2017).

8. "Parathyroid adenoma: Diagnosis and treatment". Clevel and Clinic (2012).

9. Raruenrom Y., *et al*. "Diagnostic accuracy of planar, SPECT, and SPECT/CT parathyroid scintigraphy protocols in patients with hyperparathyroidism". *Nuclear Medicine Review Central and Eastern Europe* 21.1 (2018): 20-25.

10. Prabhu M and Damle NA. "Fluorocholine PET Imaging of Parathyroid Disease". *Indian Journal of Endocrinology and Metabolism* 22.4 (2018): 535-541.

11. Berri RN and Lloyd LR. "Detection of parathyroid adenoma in patients with primary hyperparathyroidism: the use of office-based ultrasound in preoperative localization". *The American Journal of Surgery* 191 (2006): 311-314.

12. Grosso I., *et al*. "Preoperative localization of parathyroid adenoma with sonography and 99mTc-sestamibi scintigraphy in primary hyperparathyroidism". *Journal of Clinical Ultrasound* 35 (2007): 186-189.

13. Bhansali A., *et al*. "Ultrasonography in detection of single and multiple abnormal parathyroid glands in primary hyperparathyroidism: comparison with radionuclide scintigraphy and surgery". *The Journal of Clinical Endocrinology* 65 (2006): 340-345.

14. Bilezikian JP., *et al*. "Guidelines for the management of asymptomatic primary hyperparathyroidism: summary statement from the Fourth International Workshop. Consensus Statement". *The Journal of Clinical Endocrinology and Metabolism* 99.10 (2014): 3561-3569.

15. Gerl H., *et al*. "Improvement of diabetes mellitus after excision of a parathyroid adenoma". *Wiener klinische Wochenschrift* 110 (1998): 841-844.