

Role of Intra-Operative PTH (IOPTH) Estimation in Surgical Management of Patient with Parathyroid Adenoma - A Case Report

Shailesh Pitale¹, Himanshu Patil²

ABSTRACT

Primary hyperparathyroidism the most important cause for hypercalcemia is due to an inappropriate excess secretion of parathyroid hormone. Intraoperative Parathyroid hormone (IOPTH) measurement has recently been introduced as a useful adjunct in confirming successful excision of abnormal parathyroid gland by presenting this case report we tend to evaluate the clinical usefulness of IOPTH measurement during Minimal Invasive Parathyroidectomy (MIP) in our hospital. A fall more than 50% of the pre-op value is suggestive of adequate removal of the tumor. This insists the importance of doing intra-operative PTH assay while removing the parathyroid adenoma.

Keywords : Primary hyperparathyroidism, Parathyroid adenoma, Hypercalcemia, S.PTH, S.Calcium, Intraoperative PTH monitoring.

Introduction :

Primary hyperparathyroidism is a hypercalcemic

state due to excessive secretion of parathyroid hormone (PTH)¹. The disease is characterized by a loss of the normal feedback control of PTH by extracellular calcium, but the exact underlying cause remains to be clarified². In most patients, a benign, solitary adenoma is responsible for the hypersecretion. Primary hyperparathyroidism due to parathyroid hyperplasia is less common and may occur associated with syndrome of multiple

¹Consultant Endocrinologist & Director,

²Consultant Endocrinologist

Dew Medicare & Trinity Hospital, Nagpur

Address for Correspondence -

Dr. Himanshu Patil

E-mail : himansupatil_hp@yahoo.com

Received on 22nd July 2017

Accepted on 5th October 2017

endocrine neoplasia. Primary hyperparathyroidism is asymptomatic in most patients but it may present with signs and symptoms suggestive of recurrent pancreatitis, acid peptic disease, weakness, easy fatigability, subperiosteal bone resorption, nephrolithiasis, ectopic calcification, depression etc.^{1,3}. Surgical resection of abnormal parathyroid glands either in the form of neck exploration or focused approach is the only curative treatment for primary hyperparathyroidism⁴. The focused approach however requires non-visual confirmation that abnormal glands have been removed. In such surgeries where focused approach is considered, non-visual confirmation for localizing the abnormal parathyroid gland can be aided by assessment of intraoperative PTH monitoring. Intraoperative PTH assessment minimizes neck dissection, prevents injury to normal functioning glands and assures complete excision of hypersecreting gland.

Case Report :

A 46-year-old man attended OPD, at a Hospital in Akola with complaints of recurrent chronic constipation, bodyache, bony pains and Nephrolithiasis for the past few days. On enquiry he was hospitalized at a peripheral rural hospital and had undergone a left parathyroidectomy and left thyroidectomy and his pre-hospitalisation laboratory investigations showed elevated Ionic Calcium 6.8 (RR : 1.0-1.3 mmol/L) and

Figure 1 : Parathyroid Scan suggestive of left Inferior Parathyroid Adenoma

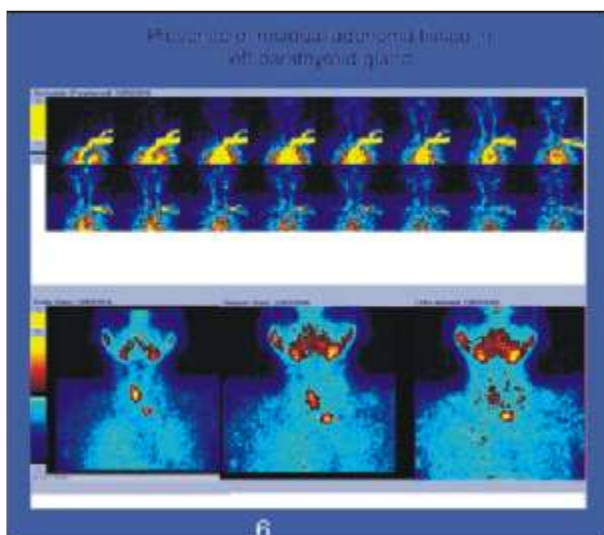
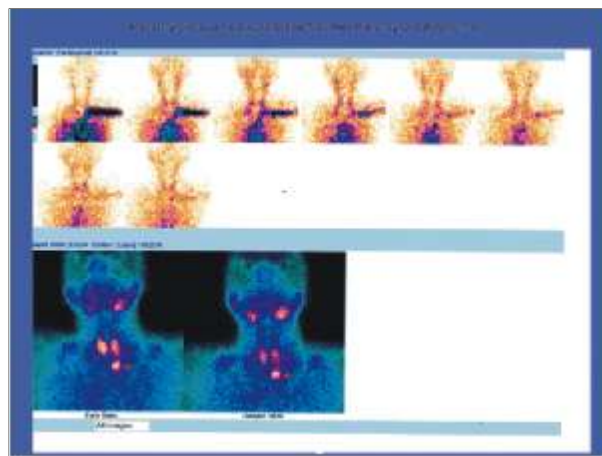


Figure 2 : Post Operative Parathyroid scan of same patient showing presistance of parathyroid adenoma suggesting inadequate excision after first surgery



Parathormone levels 445 pg/ml (RR-10-65 pg/ml). Ultrasound neck was negative for parathyroid adenoma, however sestamibi scan suggested left inferior parathyroid adenoma.

A diagnosis of Primary Hyperparathyroidism was made based on the clinical history, laboratory investigations that were suggestive of primary hyperparathyroidism. Patient underwent neck exploration, left inferior parathyroidectomy along with thyroidectomy was performed. On third postoperative day patient developed signs and symptoms suggestive of hypercalcemia and thus was referred to us for further expert management.

Following lab investigations were ordered and repeat sestamibi scan was arranged. The results of these were as follows : Ionic calcium : 1.5 (elevated), Vitamin D : 56 (normal), PTH : 562 (elevated), Phosphates : 2.1 (low). Ultrasound Pelvis revealed bilateral Nephrocalcinosis. Ultrasound Neck was suggestive of small lesion of thyroid echo texture at location of left inferior parathyroid gland measuring 0.8 X 0.4 X 1.1. Repeat Sestamibi scan was suggestive of left inferior parathyroid adenoma consistent with previous scan.

A repeat parathyroidectomy was performed on this patient 10 days later and this time as a measure to confirm the removal of the tumor, intra-operative PTH estimation was ordered. As the half-life of PTH is approximately 3 - 5 minutes, sample for intra-operative PTH assay was collected 15 minutes after

the removal of the mass. Intra-operative serum calcium and PTH values were 76.7 pg/mL. A fall of more than 50% of the pre-op value is suggestive of adequate removal of the tumour⁵ and the surgeons went ahead with the wound closure by layers.

The next morning, the patient's ionic calcium decreased to 1.1 mg/dL (RR: 1.0 - 1.3) and PTH level decreased to 6.4 pg/mL. He had no complications from his operation and pathology showed sections consistent with a parathyroid adenoma. One month after the operation, the patient's symptoms had improved, with increased energy and no abdominal problems. His ionic calcium was 1.2 mmol/L (RR 1.0 - 1.3). The patient did not have postoperative hypocalcemia, and there were no clinical features to suggest hungry bone syndrome.

Discussion :

Surgical resection of abnormal parathyroid glands is the only curative treatment for primary hyperparathyroidism⁴. Abnormal parathyroid glands can be removed via bilateral neck exploration or focused parathyroidectomy. The bilateral neck exploration approach relies on visual inspection of all parathyroid glands to ensure that all abnormal ones are removed^{6,7}. The focused approach, however, does not require exposure of all glands but requires non-visual confirmation that all abnormal glands have been removed. Intraoperative parathyroid hormone (PTH) monitoring leverages the short half-life of the PTH hormone (three to five minutes) to provide the necessary assurance that a focused parathyroidectomy has been adequately performed before concluding the surgery⁸. Focused parathyroidectomy guided by intraoperative PTH monitoring minimizes neck dissection, prevents injury to normal functioning glands and with few exceptions assures complete excision of hypersecreting glands.^{9,10} When the final intraoperative PTH value is < 40 pg/mL there is no recurrence of the tumor.⁴ In addition, intraoperative PTH measurements accurately predict postoperative S. Calcium levels hence can identify patients at risk of developing hypocalcemia much

earlier than monitoring of Serum Calcium levels. Thus, intraoperative PTH monitoring allows patients to undergo focused parathyroidectomy with less time, less dissection, lower cost, a smaller incision and equal success rate compared to bilateral neck exploration.

Conclusion :

The measurement of intraoperative PTH level becomes a reliable surrogate for in vivo parathyroid function more so when facility for intraoperative frozen section is unavailable.

Acknowledgments :

The authors extend their gratitude to Dr. M. Kapre, Director Neeti Clinics Pvt Ltd for their surgical expertise and excellent operative skills.

References :

1. Birkenhager JC, Bouillon R; Asymptomatic primary hyperparathyroidism. *Postgraduate Medical Journal*, 1996;72:323-326.
2. Brown M; The pathophysiology of primary hyperparathyroidism. *Journal of Bone and Mineral Research*, 2002; 17 (Suppl 2): N24-N29.
3. Silverberg SJ, Bilezikian JP; Evaluation and management of primary hyperparathyroidism. *Journal of Clinical Endocrinology and Metabolism*, 1996; 81:2036-2083.
4. Fraker DL, Harsono H, Lewis R; Minimally invasive parathyroidectomy : benefits and requirements of localization, diagnosis, and intraoperative PTH monitoring. long-term results. *World J Surg*, 2009; 33:2256.
5. Wharry LI, Yip L, Armstrong MJ, Virji MA, Stang MT, Carty SE, McCoy KL; The final intraoperative parathyroid hormone level: how low should it go?. *World journal of surgery*. 2014;38(3):558-63.
6. Norman J, Lopez J, Politz D; Abandoning unilateral parathyroidectomy : why we reversed our position after 15,000 parathyroid operations. *J Am Coll Surg*, 2012; 214:260.
7. Chen H, Wang TS, Yen TW, Doffek K, Krzywdka E, Schaefer S, Sippel RS, Wilson SD; Operative failures after parathyroidectomy for hyperparathyroidism: the influence of surgical volume. *Annals of surgery*. 2010; 252(4):691-5.
8. Irvin GL 3rd, Dembrow VD, Prudhomme DL; Operative monitoring of parathyroid gland hyperfunction. *Am J Surg*, 1991; 162:299.
9. Schneider DF, Mazeh H, Sippel RS, Chen H; Is minimally invasive parathyroidectomy associated with greater recurrence compared to bilateral exploration? Analysis of more than 1,000 cases. *Surgery*, 2012; 152:1008.
10. Rajaei MH, Bentz AM, Schneider DF, Sippel RS, Chen H, Oltmann SC; Justified follow-up: a final intraoperative parathyroid hormone (ioPTH) over 40 pg/mL is associated with an increased risk of persistence and recurrence in primary hyperparathyroidism. *Annals of surgical oncology*. 2015;22(2):454-9.