

The Role of Intra-Operative Parathyroid Hormone Estimation in the Surgical Management of Patient with Parathyroid Adenoma- A Case Report

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Abstract: Primary hyperparathyroidism the most important cause for hypercalcemia, is due to an inappropriate excess secretion of parathyroid hormone .A 13 year old boy attended OPD, at Rajiv Gandhi government general hospital , Chennai, with the complaints of recurrent abdominal pain and vomiting. Provisionally he was diagnosed to have acute pancreatitis as evident by ultrasound abdomen and serum Amylase. Further laboratory investigations showed elevated serum Calcium (16.4mg/dl) and Parathormone levels (239.2pg/ml). MRI Neck showed left inferior parathyroid adenoma. A final diagnosis of Parathyroid adenoma resulting in Primary hyperparathyroidism was made. The patient was taken up for surgery - Inferior parathyroidectomy along with cervical thymectomy was done. On the third post operative day the patient developed symptoms of acute pancreatitis. Serum Amylase, S. Lipase, S.PTH and calcium remained elevated. Tc-99m Sestamibiscan done showed a lesion behind left sternoclavicular joint. The patient was taken for up for neck re-exploration surgery 10 days later and suspicious tissue as evident in the scan was removed. This time intra-operative PTH estimation was ordered. Sample for intra-operative PTH assay was collected 15 minutes after the removal of the mass. The intra-operative Parathyroid value was 14.2 pg/ml. A fall >50 % of the pre-op value is suggestive of adequate removal of the tumor. Post-operatively the PTH and calcium values were 13.6pg/ml and 10mg/dl respectively. Post-operative period was uneventful. This insists the importance of doing intra-operative PTH assay while removing the parathyroid adenoma especially when facility for intra-operative frozen section is unavailable.

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 clarified [2]. 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 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 hyperparathyroidism [4]. The focused approach, however requires nonvisual confirmation that all abnormal glands have been removed.

CASE REPORT:

A 13 year old boy attended OPD, at Rajiv Gandhi Government General Hospital, Chennai, with complaints of recurrent abdominal pain and vomiting for the past 1 and 1/2 years for which he was hospitalized for an average period of 5 days each time. A provisional diagnosis of recurrent pancreatitis was made based on the clinical history, serum Amylase and ultrasound -abdomen. Further laboratory investigations were suggestive of primary hyperparathyroidism.

USG Abdomen was suggestive of acute pancreatitis. MRI Neck showed left inferior parathyroid adenoma.

Patient underwent bilateral neck exploration, left inferior parathyroidectomy along with cervical thymectomy was done. On third postoperative day patient developed signs and symptoms suggestive of acute pancreatitis with following biochemical values :- S. Amylase-1272 IU/L, S. Lipase-1034U/L, S. Calcium- 13.7 mg/dL and S.PTH - 163.1 pg/mL.

Table -1: Pre-operative Investigations

Analyte	Values	Normal range
S. Amylase	145 IU/L	25-130 IU/L
S. Alkaline Phosphatase	281 IU/L	38 -369 IU/L
S. Calcium	16.4 mg/dL	9-11 mg/dL
S.PTH	239.4 pg/mL	15- 68.3 pg/mL
Free T4	1.2 ng/dL	0.93-1.7 ng/dL
S.TSH	3.20 μ IU/mL	0.3-4.2 μ IU/mL
S. Calcitonin	2.88 pg/mL	0 – 18.2 pg/mL
S. Cortisol	0.6 μ g/dL	3.7 – 19.4 μ g/dL
S. Gastrin	49.5 pg/mL	13 -115 pg/mL

As there was persistent elevation of S. Calcium and S.PTH levels Tc-99mSestamibi scan was done which showed parathyroid mass behind the left sternoclavicular joint.

10 days later a reexploration surgery was undertaken and this time as a measure to confirm the removal of the tumour, 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 10 mg/dL and 14.2 pg/mL respectively. A fall of more than 50% of the pre-op value is suggestive of adequate removal of the tumour [5] and the surgeons went ahead with the closure. Post-op S.PTH and S. Calcium values were 13.6pg/ml and 10mg/dl respectively. Post -op period of the patient was uneventful.

DISCUSSION:

Surgical resection of abnormal parathyroid glands is the only curative treatment for primary hyperparathyroidism [4]. 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 nonvisual 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 surgery [8]. 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.

CONCLUSION:

Hence 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.

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