

CASE REPORT

EMERGENCY PARATHYROIDECTOMY UNDER COMBINED SUPERFICIAL AND DEEP CERVICAL PLEXUS BLOCK IN A PATIENT WITH HYPERPARATHYROID CRISIS: A CASE REPORT

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ABSTRACT: Hyperparathyroid crisis is a serious and potentially life threatening complication of markedly increased serum calcium concentrations most commonly due to severe primary hyperparathyroidism. Identification and resection of the adenoma leads to cure of the disease. Parathyroidectomy for localized adenomas can be done under local anaesthesia and sedation or a cervical plexus block with sedation besides general anaesthesia. We report a case of successful management of a patient who presented with hyperparathyroid crisis and underwent emergency parathyroidectomy under combined deep and superficial cervical plexus block.

KEYWORDS: Hypercalcemic Crisis, Parathyroidectomy, Primary Hyperparathyroidism Parathyroid Adenoma, Regional Anaesthesia, Cervical plexus block.

INTRODUCTION: Primary hyperparathyroidism (pHPT) is usually caused by a single parathyroid adenoma (90%), rarely by multiple adenomas or hyperplasia (10%) and in 1-2% cases by carcinoma.¹ Parathyroid crisis is a rare manifestation of Primary hyperparathyroidism. Parathyroidectomy is the only curative therapy.² Criteria for surgery³ include significant hypercalcemia (> 1 mg/dl above upper limit of normal), marked hypercalciuria (> 400 mg/day), low bone density, unexplained renal insufficiency and episode of acute primary hyperparathyroidism. The majority of parathyroid explorations are performed under general anaesthesia (GA) utilizing either a standard endotracheal tube or a laryngeal mask airway. Conversely, monitored anaesthesia care (MAC) with local and regional anaesthesia has been shown to be safe, and allow for cure rates equivalent to GA.

We report successful management of a patient diagnosed with primary hyperparathyroidism with bilateral nephrocalcinosis due to solitary parathyroid adenoma, who underwent emergency parathyroidectomy under combined deep and superficial cervical plexus block.

CASE REPORT: A 39 yrs old male patient who was a known case of solitary parathyroid adenoma causing primary hyperparathyroidism with bilateral medullary nephrocalcinosis since 2 yrs presented to emergency department with symptoms of drowsiness, disorientation, vague abdominal pain, nausea, vomiting, generalised weakness. The patient was tachypneic and pulse rate was 120/min, blood pressure of 150/90 mmHg and an oxygen saturation of 100% on room air. Biochemical investigations showed serum calcium (Ca^{++}) levels of 15.6 mg/dl, serum phosphate 2.4 mg/dl, Parathyroid hormone (PTH) level 887.2 pg/ml. Alkaline phosphatase level was 1172 IU/L. Ultrasound scan of the neck revealed a 2cm well-defined mass inferoposterior to

CASE REPORT

left thyroid lobe. Patient was diagnosed with hyperparathyroid crisis and started on medical management with intravenous (IV) fluids and furosemide at dose of 40 mg 4th hourly. His hydration status and serum electrolytes were monitored during this forced saline diuresis.

He was posted for emergency parathyroidectomy after initial resuscitation. His further investigations revealed Hb 12g/dl, platelet count 2.61 lakhs/mm³, serum creatinine 1.52mg/dl, blood urea 21mg/dl, Na⁺ 135meq/l, K⁺ 2.8meq/l, Ca⁺⁺ 14.8mg/dl. ECG showed ST segment elevation in V1-V3 leads, ST depression in V4-V6. 2D Echocardiography showed grade I left ventricular diastolic dysfunction with trivial Mitral and Tricuspid regurgitation and ejection fraction 65%.

We opted for regional anaesthesia accompanied with iv sedation. In the OT patient was monitored for ECG, NIBP, oxygen saturation (Spo2) and temperature. Patient was premedicated with inj. midazolam 1mg iv, inj. glycopyrrolate 0.2mg iv, inj. fentanyl 75mcg iv. Under strict asepsis, left sided combined superficial and deep cervical plexus block was performed. Patient was positioned supine with head turned to right side. A superficial cervical block was administered with 5ml of 0.5% bupivacaine plain in a fan shaped manner at the midpoint of posterior border of the sternocleidomastoid muscle. For the deep cervical plexus block, a single- injection technique was followed. Mastoid process and Chassaignac's tubercle(transverse process of C6 vertebra) were identified and a line was drawn joining these two points. Another line was drawn parallel and about 1 cm posterior to this line. A 5 cm 22 gauge needle was inserted on the second line 6 cm caudal to the mastoid process. At 2cm depth transverse process of C4 vertebra was approached and 10ml of 0.5% bupivacaine plain was injected after negative aspiration for blood and CSF.

Supplemental oxygen was delivered at 4 l/min through face mask. After confirming the adequacy of blockade, surgery was started. Intravenous sedation was maintained with inj fentanyl 50mcg and 1mg midazolam to alleviate patient anxiety. Surgery lasted for 2 hours and patient withstood the procedure without any complications. Patient was shifted to ICU for observation and continuous monitoring. He was closely observed for the signs and symptoms of hypocalcemia. Serum Ca⁺⁺ and PTH levels were monitored carefully. On second postoperative day, the patient was started on oral calcium. His postoperative course was uneventful. Postoperative analgesia was provided with inj fentanyl 50 mcg iv.

DISCUSSION: Many patients with primary hyperparathyroidism are asymptomatic. Hypercalcemia is responsible for the broad spectrum of signs and symptoms that affect multiple organ systems. Hyperparathyroid Crisis⁴ (incidence- 1-2%) usually occurs in a symptomatic hyper parathyroid patient who might be subjected to stress or any intercurrent illness. These patients present with 3-4 times higher PTH levels than those with asymptomatic disease. Serum calcium level rises acutely above 14 mg%. Clinical manifestations are polyuria, polydypsia, palpitation, hypertension, marked dehydration, anorexia, nausea, vomiting, weakness, lethargy, altered mental status or even coma. In untreated cases the condition can deteriorate rapidly and can progress to coma and collapse so it should be treated as a medical emergency.⁵ numerous studies have reported that early diagnosis, emergent preoperative medical management, and expeditious parathyroidectomy provide the best course of treatment for hypercalcemic crisis.⁷

CASE REPORT

Medical management involves rapid hydration with IV fluids (150-300 ml/h) to restore normal fluid volume. Forced saline diuresis using loop diuretics (furosemide 40mg/4hr) inhibits tubular reabsorption of calcium. Bisphosphonates and Calcitonin cause suppression of disease activity. When serum calcium level remains higher than 14mg/dl in spite of intensive medical therapy, dialysis should be considered. Peritoneal dialysis can remove 100-500mEq of calcium in 24 hours whereas hemodialysis approximately 70mEq/ hour.

Emergency parathyroidectomy in patients presenting with hyperparathyroid crisis secondary to adenomatous disease is effective, with a reported success rate of 92%⁶ and an excellent long-term outcome.⁷ The majority of parathyroid gland explorations are performed under general anaesthesia. The literature on LA versus GA in parathyroidectomy is incomplete and non-definitive. The cervical block/local anaesthesia techniques have been shown to be safe, and allow for cure rates equivalent to GA.^{8,9} Furthermore, with patients remaining conscious during exploration, the operating surgeon may assess functional status of phonation. Teksoz S¹⁰ and co-authors contemplated that for patients with well-localized single gland disease, minimally invasive parathyroidectomies (MIP) with local anaesthesia and intravenous sedation have high cure rates and less morbidity at experienced centers without general anaesthesia and hospital stay. Bergenfelz et al¹¹ demonstrated that MIP under LA reduced operative time and postoperative hypocalcemia when compared to bilateral neck exploration under GA. Similarly Michael J. Black and co-workers¹² showed that parathyroidectomies done under regional anaesthesia were associated with significantly lower post-operative pain, nausea, and vomiting. Sang Yoon¹³ reported successful management of parathyroidectomy under superficial cervical plexus block (SCPB) in a patient with severe kyphoscoliosis.

Our patient was posted for emergency parathyroidectomy after initial resuscitation. Though there is no single calcium level which can be considered to be safe before taking up these patients for surgery, Ziegler¹⁴ noted that there is a risk of life-threatening cardiac arrhythmias when severe hypercalcemia is not treated preoperatively. Hypercalcemia with coexisting skeletal muscle weakness prompted us to use regional technique.

Cutaneous innervation of both deep and superficial cervical plexus blocks includes the skin of the anterolateral neck and the ante- and retroauricular areas. In addition, the deep cervical block anaesthetizes three of the four strap muscles of the neck, geniohyoid, the prevertebral muscles, sternocleidomastoid, the scalenes.¹⁵ Though studies¹⁶ have proven that superficial cervical plexus block with local infiltration is as effective as a combined superficial and deep cervical plexus block many clinicians perform a SCPB to complement the DCPB¹⁷ to achieve complete anaesthesia and avoids possible failure of the regional technique. So in our case we performed a combined superficial and deep cervical plexus block to ensure complete anaesthesia.

Adequate preoperative assessment and proper anaesthesia technique followed by postoperative monitoring for hypocalcemia helped us in successful management of the patient. Serum calcium level usually normalizes by 3rd – 4th day and thus was monitored at regular postoperative intervals.¹⁸ Oral calcium therapy was instituted on 2nd postoperative day.

CONCLUSION: Anaesthetic management of the patient for emergency surgery with parathyroid adenoma is not without challenges. Preoperative optimization of the hydration status and keeping

CASE REPORT

ionized calcium within normal limits during perioperative period can reduce potential complications. Combined superficial and deep cervical plexus block is an acceptable technique and provides effective analgesia with limitation of side-effects, but such techniques can be extremely hazardous in light of inadequate anaesthesia. It does require considerable practice and skill in recognition of anatomical structures and placement of the needle.

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CASE REPORT

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Fig. 1: Enlarged parathyroid gland

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