

CASE REPORT

Anesthetic concerns in hyperparathyroidism: a report of three cases

Virendra Kumar¹, Neha Dayal², Jyoti Garg³

¹CMO-NFSG, Anesthesia, Safdarjung Hospital, Ring Road, Ansari Nagar West, Safdarjung, New Delhi, Delhi 110029, (India)

²Specialist Anesthesia, Lifeline Hospital, 6th Interchange, Exit 25, Jebel Ali Village, Dubai, (UAE)

³Clinical Associate in Anesthesia, Singapore General Hospital, Outram Road, Singapore 169608

Correspondence: Dr. Virendra Kumar, A-2492, Type-5, Netaji Nagar, New Delhi-110023 (India); E-mail: yuksar@rediffmail.com; Phone: 09891758765

ABSTRACT

Hyperparathyroidism is a rare disorder with male to female ratio of 1:2000. Parathyroidectomy is the definitive treatment, but its multisystem involvement poses many anesthetic challenges. We describe the successful perioperative management of 3 cases of hyperparathyroidism with different clinical presentations.

Key words: Hyperparathyroidism; Anesthesia, General; Parathyroidectomy; Postoperative Hypocalcemia

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INTRODUCTION

Calcium is predominantly an intracellular ion and mediates its physiological effects on bone metabolism, myocardial, neurological and vascular smooth muscles by extracellular ionized form. Its serum levels are regulated by parathormone, vitamin D and calcitonin.¹ Hyperparathyroidism is associated with hypercalcemia and parathyroidectomy is the definitive cure. Multisystem involvement poses anesthetic challenges. Three cases with different clinical presentations and standard anesthetic management are discussed.

CASE REPORT 1

A 36 year old female, weighing 50 kg, presented with bilateral hip and leg pain and altered gait for two years. Preoperative biochemical parameters suggested hyperparathyroidism (listed in Table 1) and left parathyroidectomy was planned

CASE REPORT 2

A 20 year old male, weighing 28 kg, presented with complaints of reduction of his height, chest and back deformity with bilateral knee and ankle pain since two and half years. He also had had weakness, significant weight loss, polyuria, polydipsia and sand dust passage in urine. Examination revealed thoracic scoliosis to left, lumbar scoliosis to right, winging of scapulae and distal phalangeal shortening and flattening. Preoperative investigations suggested hyperparathyroidism as listed in Table 1. Left

inferior parathyroidectomy was planned.

CASE REPORT 3

A 14 year old female, weighing 32 kg, had increasing shoulder pain for one month and outward bending of legs at knees (genu valgum). Preoperative biochemical parameters suggested the diagnosis of hyperparathyroidism (listed in Table 1). Left hemithyroidectomy with left inferior parathyroidectomy was planned.

Standard anesthetic protocol was followed. Patients were premedicated with alprazolam. Infusion of crystalloids started to prevent renal hypoperfusion. Monitoring included non-invasive blood pressure (NIBP), heart rate (HR) with continuous electrocardiogram (ECG), O₂ saturation (SpO₂), neuromuscular monitoring, end tidal CO₂ (EtCO₂) and urine output. Intravenous analgesia was provided with inj. fentanyl 2 µg/kg and trachea intubated by flexometallic tracheal tube No. 7.0 using propofol 2 mg/kg and vecuronium 0.08 mg/kg. Anesthesia was maintained with isoflurane in O₂ and 65% N₂O, and vecuronium in 0.02 mg/kg increments. Intraoperatively serum electrolytes, ionized calcium and arterial blood gases (ABG) were monitored. Neuromuscular block was reversed with neostigmine 0.05 mg/kg and glycopyrrolate 0.01 mg/kg and the patient was smoothly extubated. Postoperatively patient was shifted to ICU for monitoring vital signs, serum electrolytes, ionized and total serum calcium and parathormone (PTH) levels. Patients

Table 1: Preoperative biochemical parameters

Preoperative investigations	Case 1	Case 2	Case 3
Serum calcium (mg/dl)	10.89	12.5	10.8
Serum parathormone (pg/ml)	1073	1041	1423
urine calcium (mg/24 hr)	77	276	113
Alkaline phosphatase (U/L)	1250	2720	2786
Serum electrolytes, KFT, TFT, serum albumin, ECG	within normal limits	within normal limits	within normal limits
X-ray abdomen	staghorn calculus in renal pelvis	-	-
X-ray shoulder	-	-	unicameral bone cyst
Ultrasound neck	left parathyroid hyperplasia	parathyroid adenoma	parathyroid adenoma
Metaiodobenzylguanidine (MIBG) scan	left parathyroid hyperplasia	parathyroid adenoma	parathyroid adenoma from left thyroid lobe
Bone scan	-	multiple bone osteoporosis, expansile lytic lesions	-

KFT=Kidney function test; TFT=Thyroid function test; ECG=Electrocardiogram

manifested hypocalcemia 4-24 hrs postoperatively. Case 1 had total serum calcium 10.19 mg/dl (normal 9 - 10.5 mg/dl) and ionized calcium 0.7 mg/dl (normal 1.1-1.5 mg/dl) on first postoperative day, which normalized on second postoperative day. Other investigations were normal. Patient was advised oral calcium, vitamin D, antibiotics and analgesics. Case 2 showed total serum calcium of 9.5 mg/dl becoming 9.0 mg/dl on second and 8.5 mg/dl on third postoperative day, which normalized subsequently. Ionized calcium remained 0.6 - 0.8 mg/dl normalizing only after third postoperative day. 20 ml of 10% calcium gluconate in 500 ml of 5% dextrose was administered over 8 hrs on postoperative day 1 and 2, while 10 ml calcium gluconate was infused over 8 hrs on third day and patient discharged on oral calcium, magnesium and vitamin D. Third case had total serum calcium 6.3 mg/dl and ionized calcium 0.78 mg/dl and developed tetany not responding to intravenous calcium gluconate. Serum magnesium was found to be low, so it was administered. Tetany subsided, but serum calcium remained low for 6 days. Injectable calcium was continued till serum calcium normalized, followed by oral calcium. Serum calcium, parathormone and 24 hr urinary calcium became normal after first week.

DISCUSSION

Hyperparathyroidism occurs secondary to parathyroid hyperplasia, adenoma or carcinoma. Abnormal parathormone secretion causes increase in serum calcium secondary to bone resorption, decreased renal clearance and increased intestinal absorption leading to impaired bone, gastrointestinal and renal function. Majority of patients are asymptomatic. Manifestations include bone pain, pathological fractures, renal calculi, paresthesia, myopathy, delirium, seizures and coma. Cardiac

manifestations include hypertension, prolonged PR and short QT interval.^{1,2} Persistent hypercalcemia, normal or elevated parathormone levels, hypersecreting parathyroid gland in Meta-iodobenzylguanidine scan (MIBG scan) and USG (ultrasonography) neck confirms the diagnosis.^{3,4} Parathyroidectomy follows medical management and is the only curative treatment for primary hyperparathyroidism, with 95% cure rate and minimal morbidity in the hands of an experienced endocrine surgeon.⁵ Coexisting systemic abnormalities complicate anesthetic management. Malnutrition and hypoalbuminemia (may alter calcium levels) require preoperative correction. Neurological assessment and associated MEA (Multiple Endocrine Adenopathy) and MEN II syndrome must be ruled out. Aspiration prophylaxis is mandatory, considering them full stomach due to altered mental status. Increased vulnerability to fractures require careful positioning and laryngoscopy.¹ Perioperative maintenance of hydration and electrolyte correction is imperative. Skeletal muscle weakness decreases, whereas hypercalcemia increases the muscle relaxant dose,^{6,7} thereby necessitating intraoperative neuromuscular monitoring.^{1,8} Hypercalcemia associated arrhythmias mandate continuous ECG monitoring. As acidosis decreases calcium binding to albumin, normocarbica is maintained to avoid life threatening hypercalcemia. Head up position with induced hypotension provides blood free field and facilitates surgery. Parathyroidectomy is associated with complications like bleeding, hypoparathyroidism and recurrent laryngeal nerve injury making vocal cord movement assessment imperative during extubation.⁹ These complications can be minimized using minimal invasive procedures (endoscopic or scan directed parathyroid removal).^{10,11}

Though there are no specific guidelines for anesthesia for

anesthetic concerns in hyperparathyroidism

parathyroidectomy, superficial or combined superficial and deep cervical plexus block and local anesthesia have also been used successfully other than general anesthesia.¹² We followed a standard general anesthetic plan in all our cases. Hypocalcemia commonly manifests 4-24 hrs postoperatively and normalizes by third to fourth day.^{1,4,6} Based on the severity, oral or intravenous calcium is initiated postoperatively. In our cases, one patient with mild hypocalcemia received oral calcium and vitamin D, whereas others with moderate to severe hypocalcemia initially received intravenous and subsequently oral calcium, once levels approached normal values. Case 3 was unresponsive to calcium but readily responded to magnesium. Vitamin D and calcium constitutes the primary treatment for hypoparathyroidism regardless of cause, exception being inactivity due to hypomagnesemia, which is treated with

magnesium supplements. Furthermore, NSAIDs are avoided as analgesics in presence of renal dysfunction.⁴

CONCLUSION

Adequate preoperative assessment, optimization and avoidance of factors potentiating hypocalcemia and hypercalcemia are the mainstay of anesthetic management in hyperthyroid disease. Close perioperative monitoring for signs of hypocalcemia and hypercalcemia, restoring and maintaining normal calcium levels are the focus for successful outcome in these patients.

Authors' contribution:

VK: Concept, conduction of study, literature search, statistical analysis & manuscript editing

JG & ND: Manuscript editing, statistical analysis & literature search

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