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Patient with Suspected Malignancy and Skeletal Metastasis Turns Out To Be a Case of Secondary Hyperparathyroidism: Anaesthetic Perspective

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Abstract : *It is not uncommon in medical practice to diagnose a disorder which after investigations turns out to be a totally different disease necessitating a complete change in our approach to treatment. Cancer is one such disorder which is being encountered with alarming incidence and due to its dreaded nature accorded a high index of suspicion by the treating physicians. We present one such case where the patient with a pathological fracture was initially suspected as a case of malignancy; but on further investigations turned out to be a case of secondary Hyperparathyroidism. In the following article we discuss the anaesthetic management of a Patient with Secondary Hyperparathyroidism.*

Keywords: *Calcium, Hyperparathyroidism, Malignancy, Pathological Fracture, Vitamin D*

I. Introduction

Parathyroid disorders present unique challenge to the surgeon, physician and to the attending Anaesthesiologist. Surgery of parathyroid gland is associated with multiple challenges during peri-operative period. The most striking electrolyte disturbance during parathyroid surgery is the imbalance of calcium levels in the body and the main emphasis during the entire peri-operative period revolves around the maintenance of normal serum calcium levels. The present case reviews the various anaesthetic considerations and implications during parathyroid surgery.

II. Case

A 25 year male was referred to Govt Cancer Hospital, Aurangabad for management of pathological fracture of neck femur (left) with suspicion of malignancy. Earlier, patient had a history of slipping from his bike after which he had pain and difficulty to walk for which he consulted a private orthopaedician. Patient was advised MRI scan of left hip which revealed pathological fracture of neck femur (left) and possibility of bone marrow infiltrative disease s/o leukemia/lymphoma. Hence, Patient was referred to Govt Cancer Hospital, Aurangabad for further management. On admission, patient was examined and found to have anxious behavior, shivering, and haematuria in addition to fracture. Patient was given IV antibiotics and analgesics. His investigations were as follows:

TABLE NO 1	
Hb	12.7g%
PCV	40.3,
TLC	7550,
DLC	$N_{51}L_{35}M_5E_4$
Blood Urea	22mg/dl,
Sr Billirubin	0.8mg/dl,
Sr Creatinine	0.7mg/dl,
SGOT/SGPT	26/23,
Sr $ALPO_4$	183,
Sr Calcium	10mg/dl,
Sr Phosphate	3.2 mg/dl

Subsequently, a biopsy was taken from fracture site under spinal anaesthesia. Histopathology report showed no e/o Lymphoma/Leukemia infiltrates. Then the patient was further investigated for-

TABLE NO 2	
Serum protein electrophoresis	M band Negative
Bence- Jones proteins	Negative
Bone marrow biopsy	Negative
Serum β_2 microglobulin	Negative
Serum PTH level	327 pg/ml
Vitamin D_3 level	4.81 ng/ml
USG Abdomen and Pelvis	within normal limits
ECG	within normal limits(normal QT interval)

During the course of investigations it was found that the patient had a high serum Parathormone (PTH) level 327pg/ml (Normal: 15.0-68.30 pg/ml) and very low Vitamin D_3 level 4.81 ng/ml,(Normal 20-100ng/ml). Hence, it was suspected a case of Secondary Hyperparathyroidism. Patient was subsequently advised a USG neck which showed a $2.2 \times 1.7 \times 0.7\ cm$ well defined hypoechoic lesion with moderate vascularity in the inferior and middle lobe of left thyroid gland s/o Parathyroid adenoma. The Patient was referred to Department of Surgery, where it was decided to proceed with excision of Parathyroid adenoma.

Pre-Operative Optimization:
1. Normal saline @ 4 ml/kg/hr.
2. Inj Zolendronate 5 mg IV
3. Inj Frusemide 20 mg IV 8 hrly
4. Inj Arachitol (Vitamin D) 60000 IU/week
5. Tab Ranitidine- 150 mg HS
6. Tab Alprazolam- 0.5 mg HS

Anaesthetic Management:

General Anaesthesia with tracheal intubation and muscle relaxants was chosen as preferred mode of Anaesthesia. After obtaining the informed written consent patient was taken on OT table, explained about the procedure and monitors were attached. Intravenous access was secured at left upper limb with 18 G IV cannula. A drip of Normal Saline was started through an extension line. Premedication was given with Inj Ondansetron-4 mg IV, Inj Midazolam- 1 mg IV and Inj Fentanyl- 50 µg IV. Pre-oxygenation was done with 100% oxygen (O_2) for 3 min. Patient was induced with Propofol 150 mg IV till loss of consciousness. After confirmation of ventilation, Inj Atracurium 0.5 mg/kg was given to provide Muscle relaxation for Laryngoscopy. Airway was secured with cuffed PVC Endotracheal Tube No. 8.5 with the help of gentle laryngoscopy. Eyes were moistened by normal saline and were covered. A 15˚ head-up position with gentle neck extension was given to ease the surgical conditions. Adequate padding was done to prevent inadvertent trauma during the surgical procedure.

Monitoring:
- NIBP
- Pulse oximetry,
- ECG (5 leads),
- Temperature,
- $EtCO_2$

Blood was kept arranged before the commencement of procedure. Ambient room temperature was maintained throughout the procedure to make surgical conditions comfortable. Titrated doses of non depolarizing muscle relaxant were used. Extubation was carried out in a fully awake state and after establishing a regular breathing pattern with adequate tidal volume and muscle strength.
Postoperatively, the patient was kept in post anaesthesia care unit and was closely observed for signs and symptoms of Hypocalcaemia

Post-Operative Complications:
1. **Hypocalcemic tetany:** Patient developed post-operative tingling, numbness on face along with sweating all over body and anxious behavior. Chvostek's and Trousseau's sign were Positive. Hypocalcaemia was diagnosed by monitoring serum calcium levels which were found to be 7mg/dl (Normal 9-11 mg/dl) and was treated with 10cc of Inj Calcium Gluconate 10% IV slowly and subsequently with a continous infusion of Calcium Gluconate 10% in D5.
2. **Post-operative pain:** Multimodal Analgesia was employed to relive post operative pain. He received Injectable Paracetamol and Tramadol for postoperative pain control.

Postoperative course was uneventful for the pathological fracture; the patient was continued on skin traction and later on (after 2 months) underwent Hip Joint replacement.

III. Discussion

Calcium is essential for many biological processes like cardiac automaticity, excitation-contraction coupling, blood coagulation, neuronal conduction, synaptic transmission, hormone secretion and mitotic division. [1] Extracellular calcium occurs in three forms: as non-ionized protein bound (approximately 50%), as calcium-anion complexes (5%) and as ionized divalent cations (approximately 45%). It is the free (ionized) extracellular calcium concentration that mediates all the physiological effects, maintenance of which is affected by three main calciotropic hormones: parathyroid hormone (PTH), vitamin D and calcitonin. [2]

Many patients with primary hyperparathyroidism are asymptomatic. In symptomatic patients common findings include renal calculi, bone pains, pathological fractures, skeletal muscle weakness or non-specific symptoms such as depression, lethargy, vague aches and pains. Cardiac manifestations include prolonged PR interval, short QT interval and systemic hypertension. [2] The diagnosis of primary hyper-parathyroidism is demonstrated by persistent hypercalcaemia in the presence of normal or elevated parathyroid hormone concentration. [3],[4] In our case, the patient presented with pathological fracture and bone pains. The patient was investigated for pathological fracture which subsequently demonstrated hypercalcaemia and raised PTH levels which initially led us to diagnose it as primary hyper-parathyroidism, but as patient had very low Vit D3 (4.81 ng/ml) levels it was later established to be a case of secondary hyperparathyroidism.

R Bhanu Murthy et al[5], A Hussain et al [6] and Rajesh Rachha [7] reported cases of Pathological Fracture which were found to be due to Primary Hyperparathyroidism because of Parathyroid adenoma. In our case also we got a similar presentation but the etiology of Hyperparathyroidism was Vitamin D deficiency. Puneet Chopra and Sukanya Mitra[8] have described management of a similar case of Primary Hyperparathyroidism wherein they used Thiopentone and Vecuronium for anaesthesia while in our study we used Propofol and Atracurium because of their short duration of action and lesser effects on metabolism respectively. Stefan Okert et al [9] have described management of cases of secondary Hyperparathyroidism without autotransplantation. In our study we also did a similar management. Intravenous fluids are the initial therapy for severe hypercalcaemia. Diuretic therapy should not be initiated until euvolemia is achieved. Loop diuretics increase the urinary calcium excretion by 200-250 mEq/day. Other modalities include bisphosphonates, calcitonin and dialysis, which are reserved for the patients with renal failure. [3], [10] in our case, normocalcaemia was achieved with hydration and furosemide therapy. Anaesthesia for hyperparathyroidism is not without problems. One needs to be vigilant about various factors that might alter serum calcium levels. Continuous ECG monitoring in these patients is imperative for cardiac rhythm disturbances. [11] Co-existing skeletal muscle weakness may decrease the requirement of muscle relaxant in this group of patients. [12] Acidosis increases ionized calcium, which can cause life threatening hypercalcaemia; hence it is important to maintain normocarbia. Positioning on the operating table needs special care as these patients are at high risk of accidental Fractures. Postoperative hypoparathyroidism needs to be monitored carefully. Serum calcium level usually normalizes by 3 rd – 4th days and thus needs to be checked at regular postoperative intervals. [1],[2],[3] Our patient received IV Calcium Gluconate 10% infusion for the first 72 hours. Subsequently oral calcium therapy was instituted.

IV. Conclusion

To Conclude, the diagnosis of Hyperparathyroidism may be confused with many other conditions such as cancer and its must be kept in differential diagnosis in patients presenting with pathological fractures. Adequate pre-operative assessment and preparation, close monitoring of the signs and symptoms of hypo- and hypercalcaemia, restoration and keeping calcium within normal limits during perioperative period is the cornerstone of successful anaesthetic management of patients with abnormal calcium metabolism.

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