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CHALLENGES IN MANAGEMENT OF TRACHEOMALACIA FOLLOWING TOTAL THYROIDECTOMY AND PARATHYROID ADENECTOMY IN A COMPLEX ELDER FEMALE WITH PREVIOUS HISTORY OF SUBTOTAL THYROIDECTOMY AND PARATHYROIDECTOMY. – A CASE REPORT

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ABSTRACT

Postoperative complications in patient with tracheomalacia and hyperparathyroidism include sudden airway collapse due to weakened tracheal cartilage and severe hypocalcemia manifesting as neuromuscular irritability or cardiac arrhythmias. Thyroid and parathyroid surgery if associated with chronic airway compression, poses a considerable challenge in perioperative airway management. Critical care management plays a pivotal role by ensuring continuous airway monitoring, timely airway stabilization and rigorous metabolic surveillance; including frequent correction of calcium levels to support recovery and to prevent life-threatening outcomes. We present challenges in management of post-operative airway obstruction in elder female with longstanding large thyroid mass and parathyroid adenoma. This case highlights the multidisciplinary team approach, continuous airway monitoring and awareness of the risk of delayed airway collapse in-spite of uneventful intraoperative course.

INTRODUCTION:

Long standing thyroid mass can lead to chronic airway compression, resulting in tracheomalacia. Parathyroid adenomas may co-exist with large thyroid enlargements, adding to the complexity of surgical management.[1] Postoperative complications in patients with tracheomalacia and hyperparathyroidism include sudden airway collapse due to weakened tracheal cartilage projects life threatening complication [2,4,6,7] and severe hypocalcemia manifesting as neuromuscular irritability or cardiac arrhythmias[1,7]. These complications demand prompt recognition and vigilant management. Critical care management plays a pivotal role by ensuring continuous airway monitoring, timely airway stabilization (often requiring tracheostomy), and rigorous metabolic surveillance; including frequent assessment and correction of calcium levels.[8]

We describe interventions and critical care management of a notable case of elder female with multiple risk factors, who developed airway compromise following thyroidectomy and parathyroidectomy.

Case Details:

A 61year-old female presented with anterior neck swelling of five years duration, gradually increasing in size, without associated pain or signs of local inflammation. Over preceding 3–4 months, she had developed exertional dyspnea, generalized fatigue, and arthralgia. Past surgical history: subtotal thyroidectomy10 years back for multinodular goiter and parathyroidectomy 22 years prior for primary hyperparathyroidism. Drug History: Tab. Cinacalcet 30 mg three times daily for regulation of hyperparathyroid function.

Preoperative examination: patient was hemodynamically stable and showed no signs of respiratory compromise at rest. Airway assessment revealed; Mallampati classification of Grade II, adequate mouth opening and normal neck extension. Cross-sectional imaging with contrast-enhanced computed tomography (CT) of neck and thorax demonstrated well-demarcated, iso-dense mass in anterior neck consistent with recurrent multinodular goiter. Radiologically, lesion was noted to extend into superior mediastinum with suspicious features suggestive of possible left parathyroid adenoma.

Biochemical investigations: mildly reduced total serum calcium levels (8.2 mg/dL) with low-normal ionic calcium (1.67 mmol/L), in the setting of markedly elevated intact parathyroid hormone (iPTH) level at 551 pg/ml. These findings raised the suspicion for recurrent parathyroid pathology[1]. The constellation of imaging and laboratory findings was consistent with a recurrent multinodular goiter with possible mediastinal extension and suspected left-sided parathyroid adenoma, warranting definitive surgical management. Endocrinology consultation opted and started calcium and vitamin D supplementation with Tab Shelcal HD (500 mg elemental calcium and 400 IU vitamin D_3), two tablets four times daily, in preparation for surgical intervention.

Anesthesia management: Patient was scheduled for total thyroidectomy with parathyroidectomy in view of recurrent multinodular goiter with suspected parathyroid pathology. Considering the imaging findings suggestive of tracheal narrowing and anticipated airway challenges, video laryngoscopy-guided endotracheal intubation was performed using 7.5 mm flexometallic endotracheal tube, with premedication: inj ondansetron 4mg iv, inj fentanyl 50ug iv. & inj propofol 80mg and inj suxamethonium 75 mg was used for induction. Surgical resection was completed without major complications. Intraoperative blood loss was 700 ml. Intraoperative surgical & anesthesia course was uneventful After confirming recovery from anesthesia, neuromuscular monitoring and positive cuff leak test, extubation was performed [9], by using reversal inj neostigmine 0.5mg/kg and inj glycopyrrolate. Shortly after extubation, patient developed acute respiratory distress characterized by sudden desaturation and severe breathlessness. On examination, breath sounds were absent on auscultation, raising suspicion for acute bronchospasm, although tracheomalacia was ruled out as previous cuff leak test was positive. [9] Prompt re-intubation was done for airway protection and respiratory stabilization and was transferred to intensive care unit (ICU) for elective mechanical ventilation and close airway monitoring[10].

ICU management: The patient was managed with controlled ventilation. On review of medical history: history of breathlessness, breathlessness symptoms aggravating in supine position and palpitations, severe allergy to cold, acute seasonal asthmatic episodes and arthralgia was obtained. Controlled weaning was planned as per multidisciplinary discussion with pulmonary physician, surgeons and ENT team

suspecting tracheomalacia. Chest physician opinion was focused to rule out bronchospasm and started systemic steroids, bronchodilators, and antihistaminic. Serum calcium closely monitored; every 6 hours in first 2 days and 12 hourly thereafter and calcium gluconate infusions initiated for hypocalcemia, titrated based on both biochemical levels and clinical signs according to the recommendations of the endocrinology [1,7].

Interventions: Indirect laryngoscopy for vocal cord evaluation and bronchoscopy were performed on day 2 under general anesthesia to rule out suspicion of bronchial obstruction with mucous plug [8,10]. Fibre-optic bronchoscopy revealed significant tracheal wall hypomobility and dynamic airway collapse, confirming the diagnosis of tracheomalacia. Rigid bronchoscopy provided further visualization, demonstrating pronounced tracheal lumen narrowing and loss of normal cartilaginous support, with mucosal edema and evidence of airway compromise during spontaneous breathing. These endoscopic findings guided the decision for airway protection and highlighted the severity of underlying tracheal instability, reinforcing the need for multidisciplinary airway management in the perioperative period [8,10]. These features were consistent with Subsequent computed tomography (CT) of the chest identified evidence of laryngotracheal edema.

Progressive weaning from ventilatory support was attempted over the next three days, patient gradually given T-piece trial with alternate CPAP support with minimal oxygen requirement [8,9].

On fourth postoperative day, patient was comfortable on T-piece with normal ABG and normal serum calcium; patient was ambulated in ICU. With multi-disciplinary team ENT and Surgeons standby for emergency tracheostomy suspecting airway collapse; planned extubation was done. After 20 minutes, patient developed breathlessness followed by desaturation, which was relieved by positive bag and mask ventilation, so prompting an emergency tracheostomy performed by the surgical and ENT teams.

In further ICU stay, serial serum calcium monitoring was done with replacement given as per endocrinologist advice. Once the patient started to oral intake, a transition to high-dose oral calcium supplements (1,000–2,000mg elemental calcium per day in divided doses) along with vitamin D as per recommendation of endocrine team to maintain normocalcemic [1,7]. Following tracheostomy, the patient was gradually weaned from the ventilator and maintained on a T-piece with minimal oxygen requirements. By the sixth postoperative day, patient was transferred to ward on thermo-vent on Room air with advice for tracheostomy care and calcium monitoring.[1]

DISCUSSION:

Multidisciplinary approach includes anesthesiology, surgery, critical care, ENT surgeon, pulmonology endocrinology team and vigilant nursing [3,11,12,].

Considerations during Critical care management in recurrent goiter and parathyroid surgery:

a. Perioperative Airway Complications: Anticipated Difficult Airway in patients with large, longstanding multinodular goiters and prior thyroid surgeries, due to tracheal compression and potential tracheomalacia. [1,3,5] Advanced planning with video laryngoscopy and flexometallic tube is crucial for safe airway management. Multiple extubation trials & post-extubation respiratory distress risk is more. [2,10] This event underscores the vulnerability of patients with chronic tracheal compression and possible tracheomalacia to airway collapse soon after the relief of external tracheal pressure. Prompt reintubation within seconds was essential for airway protection, to prevent hypoxic injuries.

b. Mechanical Ventilation: i. Ventilatory management with pressure-regulated volume control (PRVC) ventilation offers balance between targeted tidal volumes and airway pressure limitation, accommodating reduced tracheal compliance from edema, tracheomalacia, or prolonged compression. ii. Serial weaning attempts, repeated extubation failures necessitated re-evaluation with bronchoscopy and imaging, confirming the contribution of tracheomalacia and laryngotracheal edema to extubation failure. iii. Early tracheostomy in case of persistent post-extubation airway compromise should be strongly considered. This facilitates airway patency, enables ongoing ventilatory support, and reduces the risk of laryngeal injury and ventilator-associated pneumonia. [8,10]

c. *Multidisciplinary pulmonary and critical care interventions:* i. Expert involvement of chest physicians for acute management of bronchospasm and airway edema[14]. ii. Use of systemic steroids and bronchodilators to decrease airway inflammation and bronchial hyperreactivity[11]. iii. Antihistaminic considered when allergic or inflammatory triggers are suspected. Iv. Therapeutic bronchoscopy for identification and removal of mucus plug if present and assessment of tracheal dynamics. V. Imaging and Endoscopic Surveillance: Repeated CT chest and airway endoscopy is critical to diagnose tracheomalacia, laryngotracheal edema, and aspiration events, guiding further interventions[8].

d. *Metabolic Monitoring*: Calcium and Parathyroid Hormone Monitoring allow rapid intervention in hypocalcemic events which are common post-thyroidectomy/parathyroidectomy, especially in previously compromised parathyroid function. Administration of intravenous calcium gluconate is titrated to biochemical targets and clinical symptoms, under continuous infusion or frequent boluses as required. Transition to enteral calcium and vitamin D supplementation is done as soon as feasible[1,7]. *Prevention of Secondary Complications:* perioperative risk of aspiration pneumonia in large goiters; early diagnosis with CT and initiation of antibiotic is useful.

CONCLUSION:

This case highlights expert critical airway management in re-operative thyroid and parathyroid surgery.

Quick reintubation without delay, therapeutic bronchoscopy, and early tracheostomy ensures optimal outcomes and minimizes morbidity from airway instability. Regular airway suctioning and chest physiotherapy prevent respiratory complications. Approaches to ventilator weaning and electrolyte monitoring enhance outcomes in this complex elder patient.

Figure 1: Large Thyroid mass (10×2cm) & Small Parathyroid Adenoma (2×1cm)

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