

Submucous dissection of the nasopharynx complicating nasotracheal intubation

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SUMMARY

We present the case of a 60-year old woman, who had an unusual complication of nasotracheal intubation, which was carried out to relieve post-thyroidectomy respiratory distress at the University of Ilorin Teaching Hospital (UIITH). She presented with a huge malignant goitre complicated by severe respiratory distress due to pressure symptoms and left vocal cord palsy. An emergency near-total thyroidectomy was done under endotracheal general anaesthesia. Respiratory distress persisted after thyroidectomy and tracheal extubation. A nasotracheal tube was subsequently passed. On the fourth postoperative day, she developed another episode of severe respiratory distress due to endotracheal tube blockage. Her trachea was extubated but attempts to re-introduce the tube through the nasal route were unsuccessful but instead resulted in submucous dissection of the nasopharynx. An emergency tracheostomy was subsequently performed.

Key words: Thyroidectomy, respiratory distress, nasotracheal intubation, complications.

Respiratory obstruction is a lethal complication of thyroidectomy for giant goitre. This needs urgent intervention for the relief of the obstruction and maintenance of a patent airway. One of such methods is nasotracheal intubation. The technique was first described by Magill in 1928. He reported that a large bore tube would pass through the nose and would easily enter the trachea, and, referred to this as “blind intubation”.¹ Nasotracheal intubation may be employed for operations in the vicinity of the airway (dental, otorhinolaryngological) or may be preferred for long-term intubation. Complications arising from the use of this technique have been documented. An unusual complication of the technique is submucous dissection of the nasopharynx, which is reported in this case.

Case report

A 60-year old woman was admitted into the surgical ward of the UIITH with a 15-year history of anterior neck swelling which increased more rapidly in size four weeks before presentation. She had an associated four-week history of pressure symptoms. There were no toxic symptoms. Her past medical history was not significant. Physical examination revealed an elderly woman

who was not pale, but mildly dyspnoeic. She had a huge, firm, multinodular anterior neck swelling, measuring 28cm x 14cm with distended veins. No bruit was heard over the mass and there was no regional lymphadenopathy. The pulse rate was 72 beats per minute while the blood pressure was 120/70mm Hg. The heart sounds were normal. Indirect laryngoscopy revealed left vocal cord palsy. A diagnosis of giant malignant goitre with pressure symptoms and left recurrent laryngeal nerve palsy was made. She was scheduled for elective thyroidectomy.

The following investigations were done:

- Packed cell volume: 38%
- White blood cell count: $6.1 \times 10^9/L$.
Differential count: neut=50%, lymph=40%, eosin=10%.
- Serum electrolytes and urea:
Na⁺ 106 mmol/L, K⁺ 4.3 mmol/L, Ca²⁺ 2.17mmol/L, urea 4.1mmol/L creatinine 79mmol/L.
- Neck ultrasound showed a huge multinodular goitre with cystic degeneration.
- Neck x-ray showed a huge soft tissue opacity containing amorphous calcification. There was narrowing and deviation of the trachea to the left with suggestion of retrosternal extension.
- Chest X-ray revealed multiple rounded opacities in the lung fields bilaterally suggestive of cannon ball secondaries.
- Arterial blood gas and flow volume loop was not available.

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While she was being prepared for surgery, she developed severe respiratory distress and was rushed to the theatre for emergency near-total thyroidectomy on account of severe respiratory distress with cyanosis.

In the induction room, the arterial oxygen saturation (SaO₂) with the patient breathing room air was below 70%. She had both inspiratory and expiratory stridor while auscultation of the chest showed markedly reduced air entry bilaterally. She was classified as ASA physical status 4E. One hundred percent oxygen was administered which raised the SaO₂ to 100 percent. An intravenous access was secured via a peripheral arm vein with a size 18g cannula. Her baseline vital signs were as follows: BP 160/90 mm Hg, pulse 120 beats per minute.

Anaesthesia was induced with 2% halothane in oxygen. Orotracheal intubation was carried out uneventfully with a size 6.0mm ID polyvinyl chloride (PVC) cuffed endotracheal tube under deep halothane anaesthesia. Anaesthesia was maintained with 50% nitrous oxide in oxygen and 0.5% halothane. Controlled ventilation was instituted manually. Muscle relaxation was ensured with pancuronium while pentazocine was administered for intraoperative analgesia. The intraoperative conduct of anaesthesia was uneventful. At the end of surgery, the trachea was extubated in the operating room under direct laryngoscopy following adequate reversal of residual neuromuscular blockade with atropine and neostigmine. Post-extubation direct laryngoscopic examination revealed poorly mobile vocal cords bilaterally. In the immediate post-extubation period, while still in the recovery room, the patient went into severe respiratory distress and became cyanosed. Under deep halothane anaesthesia in oxygen, direct laryngoscopy was done and nasotracheal intubation was accomplished with a size 6.0mm ID cuffed PVC endotracheal tube after four attempts. A diagnosis of post-thyroidectomy upper airway obstruction secondary to right recurrent laryngeal nerve palsy superimposing on a pre-existing left recurrent laryngeal nerve palsy was made.

The patient was admitted into the Intensive Care Unit (ICU) for airway management and observation. She remained stable in the ICU until the fourth post-operative day when she had another episode of severe respiratory distress due to blockage of the endotracheal tube. It therefore became necessary to effect a change of the tube. A Cook's tube exchanger was not available.

The trachea was extubated in the operating room. Under deep inhalational anaesthesia with halothane in 100% oxygen, nasotracheal intubation was found to be difficult. Each time the tube was passed, its movement was observed under the soft tissues of the neck, lateral to the trachea. Laryngoscopy, however, revealed that the tube was seen bulging under the submucous membrane of the oropharynx and the laryngeal inlet was free. There was active bleeding into the pharynx, which was suctioned continuously while a Trendelenburg position aided gravitation of the blood for effective suctioning. The trachea was finally secured via the oral route and a tracheostomy was done under general anaesthesia. She was re-admitted into the ICU.

The patient later developed tracheo-oesophageal fistula post-tracheostomy resulting in difficulty with oral feeding. An orogastric tube was passed for feeding. She subsequently had hypoproteinaemic generalized oedema and ascites, nutritional anaemia, septicaemia and expired on the 17th day-post tracheostomy.

Discussion

Surgeons and anaesthetists are quite familiar with post-thyroidectomy respiratory distress, the threat it poses to the patient's life and

the horrifying challenges in managing these patients. Post-thyroidectomy respiratory distress can be due to several causes. These include reactionary haemorrhage with tension haematoma, chondromalacia, oedema of the larynx, mucus or blood in the airway and recurrent laryngeal nerve injury affecting laryngeal patency.² Reactionary haemorrhage is a problem of early postoperative period. Haemorrhage in the neck is a significant problem since small amounts of blood in the deep space near the trachea may obstruct the airway. Diagnosis is confirmed by swelling of the neck and bulging of the wound which were not seen in this reported case. The treatment is by opening the incision, evacuating clot and securing the bleeding vessels. Endotracheal intubation may become necessary.

Oedema of the larynx usually occurs on the second or third day after thyroidectomy and was not a likely cause of respiratory distress in this patient. Diagnosis is by direct laryngoscopy and the patient may require endotracheal intubation to relieve airway obstruction. Chondromalacia occurs as a result of erosion of the tracheal cartilages by a large goitre, but is rare unless the actual tracheal cartilage is removed in malignant cases.

The cause of respiratory distress in the immediate post-extubation period in this patient was due to injury to the recurrent laryngeal nerve. She already had a pre-existing left recurrent laryngeal nerve palsy and post-extubation direct laryngoscopy revealed poorly mobile vocal cords. Injury occurs more commonly when thyroidectomy is being performed for malignant disease.³ Injury may be unilateral or bilateral, partial or complete. In bilateral partial paralysis, the vocal folds are apposed leading to airway obstruction. This was the most likely mechanism of injury the patient had. A bilateral complete paralysis which leads to a valve-like obstruction is an uncommon condition and occurs in lesions of the brain stem.⁴ It is usually associated with other cranial nerve lesions.

Post-thyroidectomy respiratory distress is a surgical emergency that requires urgent management for its relief. Its management depends on the cause of the respiratory distress and for the reported case, the ideal technique was to secure the trachea with an endotracheal tube. A surgical airway can also be used where prolonged maintenance of the patency of the airway is anticipated. In 1959, Thomas⁵ reported a series of 100 cases of large goitres where over 60% of these cases had "massive" goitres. Thomas mentioned the surgical problems that accompany massive goitres and made a strong suggestion for perioperative tracheostomy to prevent post-thyroidectomy respiratory distress. We may not agree with this suggestion because of the problems associated with tracheostomy, except where prolonged respiratory support is anticipated. This further supports the findings of Olurin et al who reported that the skill of thyroidectomy improved so much over the years that the incidence of post-thyroidectomy tracheostomy fell from 25% to less than 3% over all.⁶ In a recent report, Obekpa et al⁷ reported a series of 33 patients with large or giant goitres who had prophylactic tracheal splintage by retaining the endotracheal tube in-situ for 24h. postoperatively in the ICU. There was no incidence of post-operative respiratory distress, or mortality in this series. They suggested that judicious post-thyroidectomy management of giant goitre patients in the ICU with endotracheal tube in-situ for 24h, improves their survival chances. Post-thyroidectomy, patients can also be routinely admitted into the ICU or a High Dependency Unit for a period of 24h for observation of the airway. This allows immediate management of respiratory distress if it occurs and decreases morbidity and mortality.

Nasotracheal intubation was the choice of technique for the maintenance of the patency of the airway in this reported case. The primary indications for nasal intubation are avoidance of the

surgical field, difficulty with oral intubation and when prolonged intubation is anticipated. Prolonged intubation was anticipated in this patient, hence nasotracheal intubation was indicated. The advantages of the technique in prolonged intubation include provision of a more stable tube fixation with less chance of kinking and is more comfortable in the awake patient. It also allows for easier oral toilet. The disadvantages of nasotracheal intubation are :- the need to use a smaller tube, making pulmonary toilet more difficult; pressure on the nasal alae; and the possibility of precipitating bleeding or of blocking sinus or middle ear drainage, leading to infection.

The perioperative complications of endotracheal intubation have been reviewed by many authors.^{8,9,10} Children, female patients, patients with poor dentition, and those undergoing difficult tracheal intubation are more likely to sustain injury during intubation.¹¹ In a review article, Blanc and Tremblay⁹ listed more than 30 possible acute problems associated with complications of endotracheal intubation and extubation. These included broken teeth, lacerations and perforations of the pharynx, submucosal haemorrhage, tears of the vocal cords, subluxation of the arytenoid cartilage, hoarseness and sore throat. Others were, paralysis of the vocal cords, reflex responses to laryngoscopy and tracheal intubation, and, inadvertent intubation of the oesophagus or bronchi.

In addition to the general complications of endotracheal intubation, several other complications are specific to nasal intubation. Epistaxis may occur even when vasoconstriction, a lubricated tube and careful manipulation are employed. Other complications peculiar to the technique are bacteraemia¹², nasal necrosis¹³, paranasal sinusitis¹⁴ and infective endocarditis in susceptible patients.¹⁵ The nasal or nasopharyngeal mucosa may be damaged and false passages created during nasotracheal intubation. The reported case had an unusual complication of nasotracheal intubation i.e. submucous dissection of the nasopharynx. This complication was first reported in 1953 by Daly¹⁶, almost a quarter of a century after Magill described the technique in 1928. A brief description of the anatomy of the nasal cavity explains the aetiology of the condition and how to prevent its occurrence.

The nasal cavities extend from the nares (nostrils) anteriorly to the choanae posteriorly. The superior, middle and inferior conchae (turbinates) on the lateral wall cover the entrance to the sinuses and nasolacrimal duct. Care must be taken not to disrupt the conchae when passing a tube through the nose. Posteriorly, the nasal cavities open into the nasopharynx through the choanae. In passing a tube through the nose, some resistance is usually encountered as the posterior choana is reached. Application of excessive pressure at this point of resistance may tear the nasopharyngeal mucosa and dissect submucosally.¹⁷ Further inadvertent advancement of the tube in the submucosal plane leads to creation of false passages as was seen in this patient. This was, most likely, the mechanism that resulted in this complication of nasotracheal intubation in the patient. In such a situation, a difficult intubation scenario ensues as the trachea cannot be secured. Also, haemorrhage as it occurred in this patient has deleterious consequences particularly if it results in aspiration. This informed the immediate use of the oral route to secure the trachea before tracheostomy. Application of excessive pressure during nasotracheal intubation may be prevented by the following measures:-

- a. using the larger of the two nares for the technique,
- b. selecting a tube size that is just adequate for the nare to be used,
- c. using topical anaesthesia with a vasoconstrictor. Topical anaesthesia ensures a calm patient during awake intubation, while

vasoconstriction shrinks the mucosa thereby increasing the volume of the space for easier passage of the tube.

- d. using a warmed, well-lubricated tube which allows for easier passage of the tube.
- e. the tube must be gently manipulated into the nasopharynx on its way to the trachea.

Conclusion

Some types of post-thyroidectomy respiratory distress are relieved by securing the airway with an endotracheal tube. Nasotracheal intubation has its indications with added advantages. As a minimally invasive technique, it is not without its complications. Submucous dissection of the nasopharynx with creation of false passages (and subsequent haemorrhage) is a complication of the technique that should be recognized and it is avoidable.

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