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CASE REPORT

Iatrogenic Tracheal Injury During Hemithyroidectomy: A Case Report

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ABSTRAK

Kecederaan trakea iatrogenik (ITI) boleh berlaku semasa pembedahan, intubasi atau endoskopi trakeobronkial. ITI yang dikaitkan dengan hemitiroidektomi ialah komplikasi yang jarang berlaku tetapi boleh mendatangkan kesan yang serius. Gejala ITI boleh muncul secara serta-merta atau lewat. Rawatan ITI meliputi cara konservatif atau pembedahan, namun tiada garis panduan piawai mengenai kaedah pengurusannya. Dalam artikel ini, kami melaporkan satu kes melibatkan kecederaan trakea yang berlaku semasa pembedahan hemitiroidektomi, melibatkan membran krikotiroid dan cincin trakea posterolateral kanan pertama hingga kedua semasa hemitiroidektomi kanan, di mana jahitan primer telah dilakukan. Walau bagaimanapun, pada hari keenam selepas pembedahan, pesakit mengalami pembengkakan leher dan kesukaran bernafas akibat jangkitan pada tapak pembedahan yang disertai dengan kelumpuhan sementara pita suara, sehingga memerlukan prosedur trakeostomi. Pesakit kemudiannya berjaya dirawat dengan pendekatan konservatif. Kesimpulannya, pendekatan terapeutik terhadap ITI perlu disesuaikan berdasarkan kepada masa pesakit hadir, keadaan klinikal pesakit, serta saiz dan lokasi kecederaan.
Kata kunci: *Hemitiroidektomi; iatrogenic; kecederaan trakea*

ABSTRACT

Iatrogenic tracheal injury (ITI) can occur in operations, intubation or tracheobronchial endoscopy. ITI associated with hemithyroidectomy is a very rare but devastating complication which can manifest immediately or in a delayed manner. The therapeutic approach can be conservative or surgical, but there is no universal consensus on the management. In this article, we described a rare case of intra-operative tracheal injury involving the cricothyroid membrane and right posterolateral first to second tracheal rings during right hemithyroidectomy, in which primary suturing was attempted. However, on the sixth day postoperatively, the patient developed neck swelling and respiratory distress owing to infection at surgical site complicated with temporary vocal cord palsy, which necessitated a tracheostomy. Patient was subsequently managed successfully with conservative management. We concluded that the therapeutic

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approach of ITI should be based on the time of presentation, clinical condition of the patient, size and location of the lesion.
Keywords: Hemithryoridectomy; iatrogenic, tracheal injury

INTRODUCTION

Iatrogenic tracheal injury (ITI) is a very rare complication of thyroid surgery, particularly hemithyroidectomy as it is a relatively safe procedure performed by endocrine surgeons, in which the complication rate is even lower than that of total thyroidectomy (Windon et al. 2018). It can manifest as subcutaneous emphysema, neck swelling or respiratory distress immediately or in a delayed manner. Both conservative and surgical management have been described in the literature, depending on time of presentation, clinical condition of the patient and size of the lesion (Ovejero-Gomez et al. 2014). ITI have been treated in different ways based on scarce personal experience and references. There is no clear consensus on criteria for therapeutic approach (Tartaglia et al. 2018). We reported a rare case of ITI during hemithyroidectomy which failed primary repair due to infection but was treated successfully with tracheostomy and subsequent conservative management.

CASE REPORT

A 57-years-old lady underwent right hemithyroidectomy to remove a large toxic multinodular goitre with retrosternal extension (6 cm x 6 cm x 10 cm), which was reported as benign nodular hyperplasia. She is known to have hypertension and chronic kidney disease stage IV, besides a surgical history of thyroidectomy complicated with left vocal cord palsy for an unknown thyroid disease. Prior to operation, no Lugol's iodine was given. The patient was intubated with electromyography endotracheal tube (ETT) size 7.0 mm. Right hemithyroidectomy was performed under intraoperative neuromonitoring for 3 hours. During the dissection of the thyroid gland, the recurrent laryngeal nerves (RLN) were identified under direct visualisation. The dissection planes were meticulously maintained near the thyroid capsule and the peritracheal planes to minimise the risk of RLN injury. Nevertheless, following the removal of the right thyroid gland, surgeon detected a tracheal defect as the endotracheal tube (ETT) became exposed through the tracheal defect indicating a breach in the tracheal wall. Thus, the otorhinolaryngology (ORL) team was called to the operation theatre.

A full thickness tracheal cartilage laceration was identified on the right lateral wall at 10 o'clock extending vertically from the cricothyroid membrane to the level of the second tracheal ring. The defect was repaired primarily with absorbable Vicryl suture 3/0 and reinforced with superimposed strap muscle flap. Prior to closing the neck wound, integrity of the sutured tracheal wall was confirmed by intraoperative valsalva manoeuvre. The patient was kept deeply sedated in the intensive care unit (ICU) and extubated after 2 days.

Postoperatively on the sixth day, the patient developed stridor and acute respiratory distress. Neck was noted to have vague diffuse swelling anteriorly. It was not erythematous and non-tender with no discharge nor subcutaneous emphysema. Ultrasound neck revealed a small haematoma (1 cm x 2 cm x 4 cm) at the right thyroid bed. A bedside flexible laryngoscopy showed a right vocal cord paresis in paramedian position with pre-existing left vocal cord paralysis in median position. In view of worsening respiratory distress, the patient was intubated and pushed for a neck exploration and tracheostomy under an emergency setting. The tracheal defect was found to be unhealthy, sloughy and infected with pus. Tracheostomy was attempted however failed to achieve sufficient tidal volume for ventilation due to large air leak from the unhealthy tracheal defect. Patient was kept intubated with ETT

distal to the tracheal effect and sent back to the ICU. The neck wound was dressed with diluted povidone ribbon gauze twice a day and broad spectrum intravenous antibiotics was started. The case was referred to the visiting laryngologist.

A multidisciplinary discussion between ORL, anaesthetist and surgical department decided for another neck exploration 1 week later. Neck exploration revealed minimal slough at the tracheal defect and the primary repair sutures remained intact (Figure 1). The mucosa and soft tissue overlying trachea were edematous, but no further pus discharge was observed. Tracheoscopy confirmed that intraluminal tracheal mucosa was normal from subglottis until carina. A low tracheostomy was performed with horizontal incision between the uninjured 3rd to 4th tracheal rings to facilitate the resolution of infection and healing of the tracheal defect (Figure 2). Intravenous antibiotic was continued, and the neck wound dressing was changed to a simple normal saline dressing for another week to promote wound healing and granulation. Subsequently, the patient was discharged home with the tracheostomy after being weaned off oxygen and establishing oral feeding.

During the first month follow-up, the neck wound was noted to be well healed, however granulation tissue was present at the superior tracheostoma. An examination under anaesthesia and excision of the suprastomal granulation tissue was performed under general anaesthesia to create a patent airway. Recovery was uneventful. Repeated flexible laryngoscopy confirmed that the right vocal cord has regained its mobility. The patient was able to vocalise and tolerated oral feeding, hence the decision was made for decannulation at two months after tracheostomy. The patient had an uncomplicated recovery and showed no evidence of tracheal stenosis at the six-month follow-up. However, she was subsequently lost to follow-up.

DISCUSSION

ITI during thyroidectomy mostly occurs in the posterolateral trachea following attempted suture ligation of vessels near the ligament of Berry or with the use of diathermy adjacent to the trachea (Windon et al. 2018). ITI is also more common

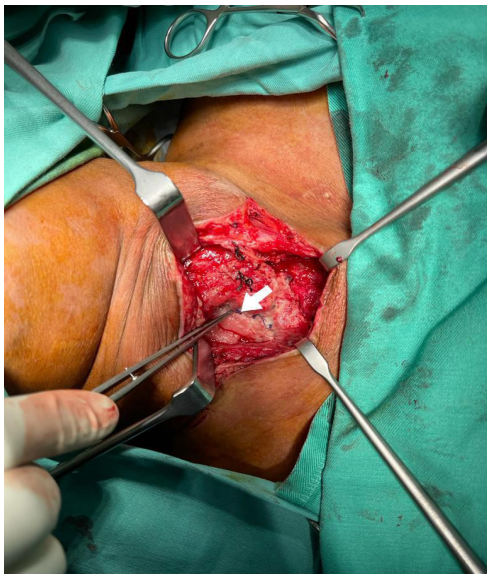

FIGURE 1: Neck re-exploration revealing intact suture at the site of primary repair

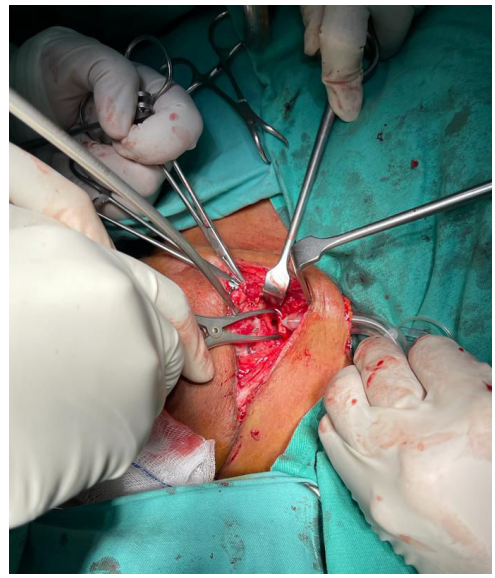

FIGURE 2: Tracheostomy performed at 3rd to 4th tracheal rings

in poorly encapsulated disease. A long standing multinodular goitre such as in this case, is composed of repeated hyperplasia, involution and dense fibrosis, thus making defining the plane for dissection from surrounding tissue difficult. In addition to that, previous thyroid surgery has altered the anatomy and adhesions may have developed to further increase the risk of iatrogenic tracheal injury. A bulky tumour also increased the risk of ITI due to excessive use of electrocautery for haemostasis (Mazeh et al. 2012). Furthermore, the operation was done without giving Lugol's iodine prior. In order to decrease intraoperative bleeding which indirectly reduces risk of ITI, the use of Lugol's solution before surgery is encouraged (Tartaglia et al. 2018).

Infection has led to unsuccessful primary repair in our case. The infection at the right thyroid bed possibly caused the right recurrent laryngeal nerve neuropraxia in our patient, thus resulting in acute respiratory distress in the setting of preexisting left vocal cord palsy. We hypothesised that the patient's premorbid status, i.e. hypertension and chronic kidney disease played a role in delayed wound healing and contributed to infection. Furthermore, long term compression of the trachea by a large goitre is well known to cause tracheomalacia, making it more susceptible to infection and breakdown of wound (Ma et al. 2023). Intraoperative excessive use of cautery near the trachea may also lead to ischemia and localised haematoma which favour the growth of infection (Ma et al. 2023). The formation of small haematomas at the right thyroid bed postoperatively also become a nidus for infection. The infection caused the right vocal cord paresis and eventually rendered our primary repair unsuccessful and necessitated a tracheostomy.

There is no specific staging system for ITI associated with thyroidectomy. When ITI is identified intraoperatively, a study favoured prompt primary repair as the gold standard (Al-Hijaj & Al-Mansori 2012). A few definitive repair techniques have been described. In essence, primary repair can be performed using absorbable or non-absorbable sutures, myovascular transposition flaps, suction drains, the application of Tisseel tissue-bonding agents, or combinations of these approaches (Tartaglia et al. 2018). These methods are typically employed in cases without tracheal necrosis. In cases of large extension or wide necrosis, management options include debridement with or without tracheostomy and suction drain, placement of Montgomery T- tube, circumferential tracheal excision with anastomosis and tracheal stenting under local anaesthesia for patient with poor general condition (Tartaglia et al. 2018).

Criteria for conservative versus surgical treatment differ among surgeons. Azar et al. (2021) proposed surgical repair in the presence of any respiratory compromise. Another study postulated that tracheal injury less than one third of circumference is a good candidate for conservative management (Kara et al. 2013). Ma et al. (2023) recomended conservative treatment for tracheal injury smaller than 2 cm. Principally airway control is of the utmost importance. Decisions for surgical management should be based on the clinical condition of the patient, size, depth and location of the lesion (Ovejero-Gomez et al. 2014).

We opted for immediate repair with absorbable suture and reinforced with strap muscle when ITI was identified intraoperatively. However, it was complicated with infection with right vocal cord paresis. In the context of a pre-existing left vocal cord palsy, tracheostomy was performed not only to secure the airway but also to bypass the tracheal defect, facilitating spontaneous healing. We believed that frequent regular dressing and precautionary measures such as straining avoidance and antitussive medication also enhanced the patient's recovery.

CONCLUSION

Our experience suggested that intraoperative tracheal injury should be repaired primarily and followed by close monitoring. Despite primary repair, ITI may be further complicated by hematoma, infection, recurrent nerve injury

or even tracheal necrosis. A low threshold for diagnosing complications should be maintained. We recommend that the management of ITI to be individualised based on the timing of presentation, clinical condition of the patient and the size and location of the injury.

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