

Intraoperatively diagnosed tracheal tear during a parathyroidectomy with previously undiagnosed tracheomalacia: a case report

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Abstract : Tracheal rupture is a rare complication of endotracheal intubation and surgery of thyroid gland. We present a case of tracheal rupture diagnosed and repaired intraoperatively. A 76-year-old female patient with a recurrent parathyroid adenoma and cold thyroid nodule was scheduled for a bilateral exploration of the parathyroid glands associated to thyroid lobectomy. Induction of anesthesia was uncomplicated. Orotracheal intubation was easy and atraumatic using a 6.5mm EMG endotracheal tube (ETT) with low pressure cuff. Approximately 30 minutes after beginning surgery, a tracheal tear was suspected by the anesthesiologist warned by his respiratory monitoring alarms (leakage in the ventilatory system). After confirming the diagnosis, a suture was performed and antibiotic coverage was administrated. The patient made a slight cervical subcutaneous emphysema and fully recovered after four weeks without any other complication. We review the literature and discuss the risk factors of tracheal tear during thyroidectomy surgery and endotracheal intubation.

Key words : Tracheal rupture ; thyroidectomy ; tracheomalacia ; peroperative management.

INTRODUCTION

Thyroidectomy (and parathyroidectomy) is a common and low-risk procedure performed widely for removal of malignant or benign tumor. Complication rates following thyroidectomy are low, with an overall incidence of 4.3% among experienced surgeons (1). Complications most commonly include vocal cord paresis or paralysis, hypoparathyroidism, hypocalcemia, hematoma and wound infection. Tracheal injury associated with (para-)thyroidectomy is rare. The trachea may be perforated intraoperatively. This damage is usually recognized and repaired immediately with little or no morbidity. However, unrecognized injury or delayed rupture secondary to tracheal necrosis can present up to 2 weeks postoperatively.

CASE

A 76-year-old female patient suffering from hyperparathyroidism and phosphated diabetes was addressed to our institution. Her symptoms were caused by a recurrent lower right parathyroid adenoma which had already been resected in 2013.

Due to the fortuitous discovery of a cold thyroid nodule in the left lobe (euthyroid status) during the assesment, a bilateral exploration of the parathyroid glands associated with a left thyroid lobectomy was scheduled. At pre-anesthetic evaluation, the patient did not meet any contra-indication to general anesthesia or surgery. She was categorized grade 2 according to the evaluation (risk-) score of the American Society of Anesthesiologists (ASA 2).

Indeed, her medical history included a phosphated diabetes, a controlled hypertension under beta-blocker and an asymptomatic hypertrophic cardiomyopathy with good ventricular function. On physical examination, a weight of 39 kg for a size of 140 cm (BMI = 19.9) was noted and neither difficult intubation criteria nor goiter were identified. Routine biology and electrocardiogram (ECG) were normal.

A monitoring including pulse oxymetry, non-invasive blood pressure (NIBP) and ECG was used and a peripheral veinous line was placed.

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Induction of anesthesia was conducted according to a reliable protocol used in our institution which combines remifentanyl (0.15 to 0.25 mcg / kg / min), propofol with target controlled infusion (TCI) 'site effect' mode and 1% sevoflurane. Endotracheal intubation was performed using a plastic (blunt) probe guide inserted in a 6.5 cm diameter endotracheal tube (ETT) with a low pressure cuff on which an electromyography (EMG) monitoring electrode was applied following the manufacturer's recommendations. This monitoring is based on recording EMG elicited by an electrical stimulation through a cutaneous electrode placed on the shoulder of the patient. The surgeon can locate the nerve using a sterile stylet (*Inomed Medizintechnik GmbH – Germany*).

This intubation was easily performed, atraumatic and was classified, after the direct laryngoscopy, as grade I following the Cormack Lehane classification.

We confirmed the good position of the ETT by a symmetrical auscultation. The cuff pressure was checked using a manometer (20-30cm H₂O). The patient was ventilated with volume controlled mode - 5-6ml / kg for a respiratory rate of 12 / min.

Approximately 30 minutes after the beginning of the surgery, a sudden drop of the insufflation pressure compatible with a major leak in the ventilation circuit was observed.

The surgeon then noticed, together with a gurgling noise, that the cuff of the endotracheal tube was visible in the operative site. The right posterolateral wall of the trachea had been dissected (Figure 1). In order to ensure sealing, the cuff was deflated of a few milliliters and moved a few centimeters forward.

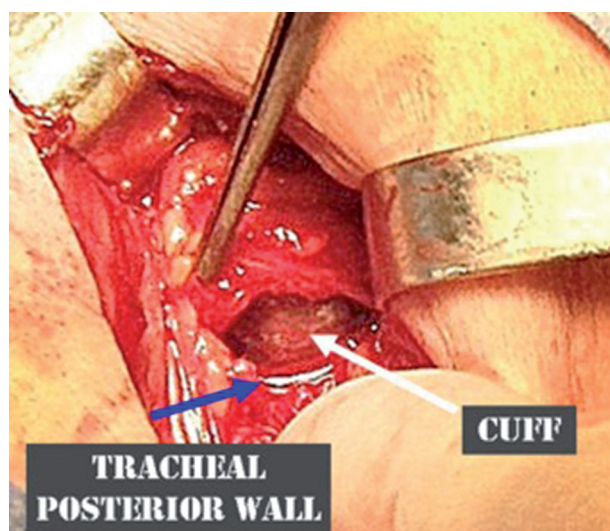


Fig. 1. — Rupture of the tracheal posterior wall

It was re-inflated below the tear, reinstating a good seal. Respiratory and hemodynamic parameters of the patient remained stable during the incident. Given the width of the breach/gap and the friability of the tracheal tissue, the help of a otorhinolaryngologist colleague was required. A three points suture with Prolene (resorbable suture) was performed and a safety Penrose drain was implemented. Antibiotic coverage with amoxicillin and clavulanic acid 1g / 100mg was administered. In these conditions, the adenomatous parathyroid tissue was eventually resected. The left lobe of thyroid gland was left in place because of the tear located in a weakened part of the posterior tracheal wall. The end of the procedure was uneventful. It was decided to awake the patient while making sure to avoid cough. After swallowing reflexes had appeared, we proceeded to extubation.

After a standardized monitoring of two hours in post-anesthetic care unit, the patient was able to return to his room for the rest of the management.

Clinical examination on postoperative day 1 (POD 1) showed a slight cervical subcutaneous emphysema.

A chest X-ray (POD1) showed a parietal emphysema of the left cervical region (Figure 2).

On POD 5, the patient was discharged from hospital. Four weeks later no postoperative complication was reported.

DISCUSSION

Tracheal rupture is a rare complication of both endotracheal intubation and surgery of the thyroid gland. Their low respective incidences are quite comparable, and so are the risk factors that can lead to it. We will discuss them for each case (endotracheal intubation versus thyroidectomy). Over the past decade, the incidence of tracheal injury following endotracheal intubation has been estimated between 0.05% and 0.37% depending on the series (2). Despite this low incidence, some risk factors have been identified, such as difficult situations (emergency, failure and multiple attempts, use of rigid probes guides or mandrels, ...), the lack of experience of the operator, inappropriate tube size or overinflation of the cuff (3). Important coughing and (re)positioning of the tube without deflating the cuff are also risk factors of tracheal damage (4-6). Risk factors related to the patient such as advanced age (> 50 years), female sex or the presence of tracheal anomaly (diagnosed or not) as tracheomalacia were also reported.

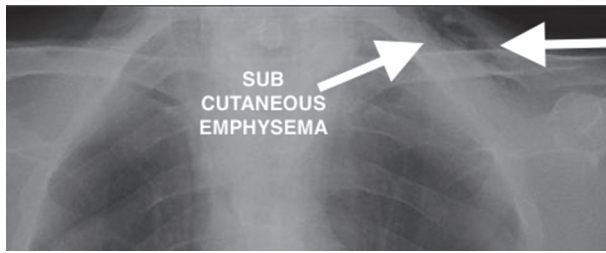


Fig. 2. — Chest X-Ray - Sub cutaneous emphysema

Iatrogenic lesions of the trachea during surgery of the cervical region are also very rare. A (brief) review of the literature identifies some risk factors for injury during thyroidectomy. These are similar to the risk factors discussed above for endotracheal intubation (age, female gender, high pressure cuff, coughing, tracheomalacia). Thyrotoxic goiter and a patient's height smaller than one meter sixty must be added. *Gosnell et al* examined 11,917 thyroidectomy performed for a period of 45 years (7). They identified an incidence of perforation of the trachea of 0.06%. In this study, all lesions were located in the posterolateral wall of the trachea and were repaired immediately during surgery. All patients recovered without long-term complications.

However, late breaking several days after the procedure has only been described in case-reports. Usually, patients presented on postoperative day 5 to 7 with

subcutaneous emphysema and respiratory distress which can go to a need for reintubation. Necrosis lesions appear to be the cause of this late rupture and a higher mortality is associated with it (8).

In this case, we found several risk factors related to the patient: female gender, the small size (140cm), advanced age (76 years). Although endotracheal intubation was delicate, we could not exclude that the posterior tracheal wall already weakened by tracheomalacia associated with the (para-) thyroid disease and that it could have been further weakened. The fact that it was a recurrence after a first surgery could have been a contributory factor of this injury, despite careful

surgical dissection. The originality of this case lies in the initial identification of this rupture through the use of respiratory monitoring alarms (leakage in the ventilatory system). The immediate anesthetic management of this breakdown by deflating the cuff and carefully pushing forward the tube must be recommended in order to find a good seal and allow a suture in good conditions.

CONCLUSION

Despite the low incidence of tracheal injury related to thyroid surgery or endotracheal intubation, such damage should always be considered. Its prognosis, if identified and repaired intraoperatively, is excellent.

All patients with subcutaneous emphysema within hours or days following a thyroidectomy (or other cervical surgery) should suggest a late rupture of the trachea.

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