

Total Thyroidectomy Followed by Bilateral Pneumothorax and Pneumomediastinum with Simultaneous Damage to the Recurrent Laryngeal Nerve: Report of a Case

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Abstract

Background: Thyroidectomy is a common and safe surgical procedure which is typically associated with low morbidity. Pneumomediastinum and pneumothorax following cervical emphysema after thyroidectomy have been rarely mentioned, and the mechanism implicated in these two conditions is uncertain.

Case report: We present a 53-year-old male who experienced extensive emphysema, bilateral pneumothorax and pneumomediastinum following total thyroidectomy under general anaesthesia with damage to the left recurrent laryngeal nerve. The diagnostic evaluation, management, and the possible aetiology of these complications are discussed.

Results: We believe that the pneumothorax was not the result of the damage to the airway or larynx. We assume that the pneumothorax was caused by operative damage to the neck or was due to anatomical reasons. It is also feasible that air entered through the thinned fascial layer owing to the surgery. Another hypothesis is the possibility that the pneumothorax was caused by mid-surgery damage, given the difficulties in surgical manoeuvring. This hypothesis is further reinforced when considering the synchronous damage to the left recurrent laryngeal nerve.

Conclusion: The complications observed in this case after total thyroidectomy with invasive manoeuvres were very rare. However, they were suspected early and the patient recovered without further problems.

Key words *Thyroidectomy; bilateral; pneumothorax; pneumomediastinum; laryngeal nerve*

Introduction

Thyroidectomy is a common and safe surgical procedure which is typically associated with low morbidity, providing the parathyroid glands and laryngeal nerves are identified and preserved and the surgeon is watchful as to the major issue of haemorrhage. The complications of thyroidectomy are well known and described, some of which can be fatal; others are quite disturbing, particularly in their permanent form.

Pneumomediastinum and pneumothorax occur in patients with increased intra-alveolar pressure (Valsalva manoeuvre, cough and emesis) which leads to the rupture of marginal pulmonary alveoli [1]. It is a complication that can arise during general anaesthesia, mid- or post-surgery. However, pneumomediastinum and pneumothorax following cervical emphysema after thyroidectomy has been rarely mentioned, and the mechanism involved is uncertain; usually, it is associated with difficult dissection toward the pleura or mediastinum [2].

This report focuses on a very rare case of a male patient who experienced pneumomediastinum and pneumothorax following total thyroidectomy with simultaneous damage to the left recurrent laryngeal nerve, without mediastinal dissection or pleural injury. Diagnostic evaluation, possible aetiology, and management are discussed along with a review of the literature.

Case presentation

A 53-year-old male, with past medical history remarkable for diabetes mellitus and heavy smoking, was admitted for elective thyroidectomy due to multinodular goiter.

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Preoperatively, rigid endoscopy showed normal movement and position of both vocal cords.

The procedure was performed under general anaesthesia, and intubation caused no complications. Total thyroidectomy with central neck dissection was carried out via transcervical incision. Only the right recurrent laryngeal nerve was identified while no tracheal leakage was observed in underwater testing during positive anaesthetic ventilation.

After extubation, the pulse-oxygen saturation was maintained at 100% and the patient fully regained consciousness. However, within 15 minutes of his being taken to the recovery room, the patient suddenly complained of chest pain and he developed dyspnoea. Pulse oxygen saturation rapidly dropped to 92% stabilized at 84%. His blood pressure reduced to 85/40 mmHg and his pulse rate increased to 118 bpm. Stethoscopy revealed a considerably faint sound of respiration on both sides of the thorax. Pneumothorax and damage to the recurrent laryngeal nerves were suspected. In consequence, emergency tracheal intubation was performed and the patient was moved to the intensive care unit (ICU). A chest radiograph revealed bilateral pneumothorax, pneumomediastinum, and massive subcutaneous emphysema (Figure 1). Tube thoracostomies were carried out and an outflow of a large amount of air was observed. After the initial outflow, further air outflow was not noted. Subsequently, a new chest X-ray showed the recovery of the collapsed lungs and extinction of bilateral pneumothorax (Figure 2).

Movement of vocal cords was endoscopically tested; the left cord was stable in the middle line while the right maintained its mobility. In order to exclude tracheal perforation, bronchoscopic examination was also performed which revealed no damage to the tracheal wall.

Over the next ten days, the pneumomediastinum and pneumothorax resolved gradually and the patient was discharged from the ICU.

Discussion

Pneumothorax mainly presents with pleuritic chest pain, tachycardia, tachypnoea, and a decline in pulse-oxygen saturation. If hypotension presents, tension pneumothorax should be suspected - an event that demands timely intervention in the form of intercostal needle decompression or formal chest tube placement. During general anaesthesia, these signs may be masked, as was the case in our patient, and only after extubation does respiratory disability become apparent.

Pneumothorax is a rare complication of general anaesthesia and is usually caused by regional blocks, placement of central venous lines, and barotrauma due to positive airway pressure from assisted ventilation which is related to alveolar rupture, or airway instrumentation [3]. The risk of this complication is higher in patients with pre-existing lung deficiency like chronic obstructive lung disease or emphysematous changes [4]. In our patient, the preoperative chest X-ray showed no pathological signs, although his history of heavy smoking may indicate underlying lung disease.

Although this complication was first mentioned early in 1947 [5], few studies concerning the cause-effect relationship between the surgical technique during thyroidectomy and the development of pneumothorax have been reported in the literature. Dissection toward the pleura or superior to mediastinum constitutes a possible mechanism when substernal goitre or extensive malignancy occurs. Several reports have indicated that pneumothorax can occur dur-

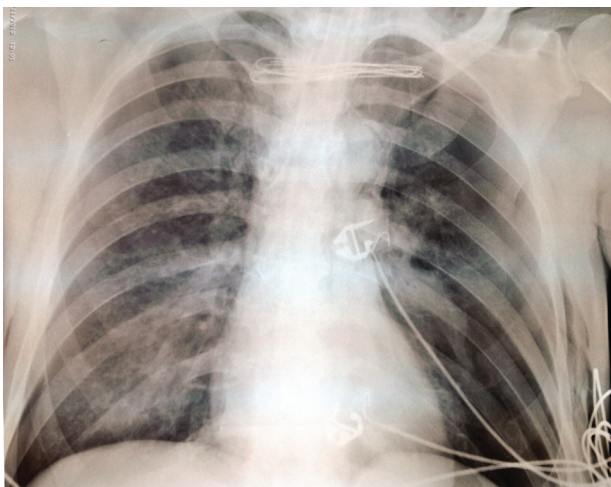


Figure 1. The chest X-ray shows bilateral pneumothorax, pneumomediastinum, and subcutaneous emphysema

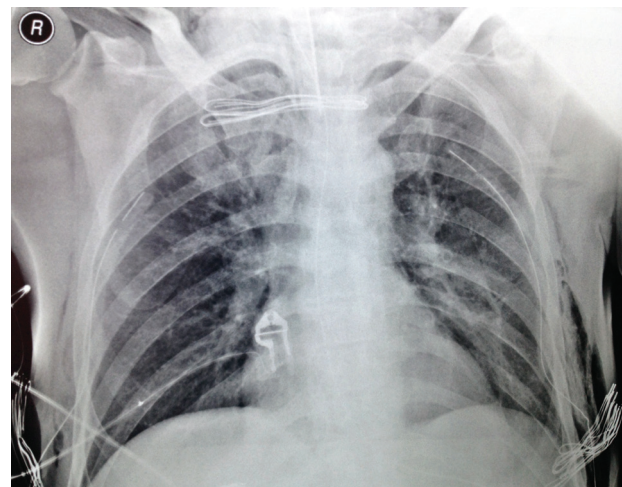


Figure 2. The chest X-ray shows the tube thoracostomies and the recovery of the collapsed lungs

ing dissection below the level of clavicles or low neck dissections, especially when a simultaneous pleural injury is described [6]. Slater and Inabnet [7] reported one case of parathyroid gland surgery and pneumothorax where the gland was near the thymus gland and there was pleural damage which caused the pneumothorax. In our case, the gland was limited to above the level of clavicles so our incisions did not expand in the mediastinum and there were no signs of pleural injury.

Injury of the trachea is related to subcutaneous emphysema and pneumomediastinum. The risk for tracheal perforation increases when removing the isthmus of the thyroid gland and during dissection close to the area where the recurrent laryngeal nerve enters the tracheal cartilage [1]. Extension of subcutaneous emphysema from the cervical region into the thorax and mediastinum and spontaneous rupture of pre-existing emphysematous bullae can also result in pneumothorax [8]. Nevertheless, pneumothorax without pleural violation is uncommon, regardless of tracheal rupture. Furthermore, in our case, no tracheal leakage was observed in underwater testing during positive anaesthetic ventilation.

Lee et al [9] presented a patient who experienced dyspnoea caused by a postoperative haematoma and narrowed airway from medially fixed unilateral vocal fold, who subsequently developed pneumothorax as a result of deep breathing and vigorous coughing. None of these were observed in the case presented herein.

In our reported case, there was no evidence of peripheral vascular oxygen saturation decline or hypoxia during the surgery; hence, we believe that the pneumothorax was not due to the damage of the airway or larynx during anaesthesia. Furthermore, the likelihood of alveolar rupture resulting from alveolar overinflation is low given that positive end-expiratory pressure was not performed. Therefore, we assume that in this particular case the pneumothorax was caused by operative damage to the neck or was due to anatomical reasons.

Most frequently, as has been reported in the literature [10], there is a rupture of the mediastinal pleura that follows damage to the fascial layer with the mediastinal emphysema. However, in the presented case, there were no clear signs of chest damage. Taking into account the negative pressure, we believe it is feasible that air entered through the thinned fascial layer due to the surgery. Another hypothesis is the possibility that the pneumothorax was caused by mid-surgery damage; given the difficulties in surgical manoeuvring - especially on the left lobe of the thyroid gland - there may have been thoracic damage of which the surgical team was not aware. This hypothesis

is further reinforced when considering the synchronous damage to the left recurrent laryngeal nerve.

In this case, the patient developed very rare complications, including subcutaneous emphysema, pneumothorax and pneumomediastinum with synchronous damage to the recurrent laryngeal nerve, after total thyroidectomy with invasive manoeuvres. However, timely diagnosis and intervention enabled the patient to make a full recovery without further problems.

Informed Consent

Written informed consent obtained from the patient for publication of her medical data.

Conflict of Interest

There is no conflict of interest.

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Αμφοτερόπλευρος Πνευμοθώρακας και Πνευμομεσοθωράκιο με Ταυτόχρονη Βλάβη στο Αριστερό Παλίνδρομο Λαρυγγικό Νεύρο μετά από Ολική Θυρεοειδεκτομή: Παρουσίαση Περιστατικού

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Περίληψη

Σκοπός - Δεδομένα: Η θυρεοειδεκτομή είναι μία κοινή και ασφαλή χειρουργική επέμβαση, η οποία συνδέεται με χαμηλή νοσηρότητα. Το πνευμομεσοθωράκιο και ο πνευμοθώρακας με το υποδόριο εμφύσημα, ως αποτέλεσμα ολικής θυρεοειδεκτομής, έχουν σπάνια αναφερθεί, ενώ ο μηχανισμός δημιουργίας τους δεν έχει διευκρινιστεί.

Παρουσίαση περιστατικού: Παρουσιάζουμε έναν άντρα 53 ετών ο οποίος εμφάνισε εκτεταμένο υποδόριο εμφύσημα, αμφοτερόπλευρο πνευμοθώρακα και πνευμομεσοθωράκιο, με ταυτόχρονη βλάβη στο αριστερό παλίνδρομο λαρυγγικό νεύρο, μετά από ολική θυρεοειδεκτομή υπό γενική αναισθησία. Επιχειρούμε επίσης να θέσουμε ως αντικείμενο σκέψεων και συζητήσεων τη διαγνωστική αξιολόγηση, τη διαχείριση και η πιθανή αιτιολογία αυτών των επιπλοκών.

Αποτελέσματα: Υποθέτουμε ότι ο πνευμοθώρακας συνέβη από βλάβη κατά την επέμβαση ή από ανατομικές αιτίες και λόγω της αρνητικής πίεσης εισήλθε αέρας μέσω του λεπτού στρώματος της περιτονίας. Πιθανή και η δημιουργία του λόγω των δύσκολων χειρουργικών ελιγμών γεγονός που ενισχύεται από τη σύγχρονη βλάβη στο αριστερό παλίνδρομο λαρυγγικό νεύρο.

Συμπέρασμα: Αναφέρονται πολύ σπάνιες επιπλοκές μετά από ολική θυρεοειδεκτομή και δύσκολους χειρουργικούς χειρισμούς. Παρόλα αυτά οι επιπλοκές διαγνώστηκαν άμεσα και αντιμετωπίστηκαν αποτελεσματικά χωρίς περεταίρω προβλήματα.

Λέξεις κλειδιά: Θυρεοειδεκτομή, πνευμοπεριτόναιο, πνευμομεσοθωράκιο, κάκωση παλίνδρομου λαρυγγικού

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