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Case Report Open Access

Multiple Rare Complications Following Total Thyroidectomy and Bilateral Neck Dissection: Case Report and Literature Review

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Abstract

Background: Thyroidectomy is a common and safe surgical procedure and is typically associated with low morbidity and mortality. Delayed tracheal rupture after thyroidectomy has only infrequently been reported. Here we are reporting a case in which a number of rare complications of total thyroidectomy and neck dissection happened over a very short period of time with a review of existing literature.

Case presentation: A 48-year-old man, diagnosed as metastatic papillary thyroid cancer. Underwent total thyroidectomy and bilateral modified neck dissection complicated by severe bronchospasm, bilateral pneumothorax, pneumomediastinum, pneumopericardium managed by underwater seal drainage of his chest cavities. On the 10th postoperative day he developed spontaneous tracheal rupture which compromised his airway. He was coded, eventually intubated resuscitated. In the operating room he had his neck explored, neck haematoma evacuated, tracheal tear debrided and a tracheostomy tube was inserted.

Conclusion: Thyroidectomy remain a commonly performed safe surgery typically associated with low mortality and morbidity. However other rare and serious complications as observed in this case can sometimes take place and can be life threatening. Bilateral pneumothorax, pneumomediastinum and pneumopericardium are examples of such serious complications. Multiple contributing factors include heavy smoking, alleged barotrauma, and extensive electrocautery dissection. In our case the late spontaneous rupture of the trachea most likely been predisposed to by the excessive explosive smokers cough.

Introduction

Thyroidectomy is a common and safe surgical procedure and is typically associated with low morbidity and mortality provided that the surgeon is aware of the anatomical variations of the important adjacent structures especially, the major blood vessels, the parathyroid glands and the recurrent laryngeal nerves. Some of the aforementioned complications though rare can be fatal, others are quite disturbing especially in their permanent form, and few can be life threatening [1]. …as in our patient's case. Although thyroid operations are associated with very low complication rates, other serious and rare complications like pneumothorax, pneumomediastinum, pneumopericardium, and tracheal injury during thyroidectomy has been described previously in case series and is usually identified and repaired at the time of the surgical procedure [2,3]. Delayed tracheal rupture after thyroidectomy has only infrequently been reported [4-8]. The diagnosis of any delayed tracheal rupture is based on a detailed history, a high index of suspicion, subcutaneous emphysema on physical examination, appropriate imaging, and possibly bronchoscopy [8]. The treatment recommendation range from conservative management to surgical repair and depends on the cause and the patient's status.

We are presenting a case of papillary thyroid cancer with bilateral cervical lymph nodes which developed multiple rare complications including tracheal rupture that led to an unfavorable patient outcome.

Case Presentation

A 48-year-old man, heavy smoker, presented with a gradually increasing painless neck swelling of 8 months duration and a vague sense of heaviness and discomfort upon swallowing. On examination he looked well. Neck examination revealed enlarged lymph nodes occupying levels 2, 3, and 4 bilaterally. The rest of his system examination was normal. The thyroid functions test was normal as well as his ECG and chest X-ray. An ultrasound of the neck showed 'a hyper-vascular thyroid gland containing many sub centimeter nodules mostly cystic. In the left lobe there was one solid nodule measuring 1.3 cm x 0.9 cm. There were bilateral large suspicious lymph nodes seen at all neck levels, the left ones were larger. There was bilateral sub-clavicular level 7 lymph nodes and some mediastinal lymph nodes (Figure 1a and 1b).

The CT scan neck confirmed the presence of bilateral large suspicious lymph nodes on both sides of the neck involving levels 2, 3, 4. FNA of the left cervical lymph node showed metastatic papillary thyroid cancer.

An informed consent was obtained. Surgery was conducted under general anesthesia with neuromonitoring. A total thyroidectomy with bilateral modified lymph node dissection including levels 2, 3, 4, 5, 6, and level 7 was performed. The recurrent laryngeal nerves and the parathyroid glands were bilaterally identified and preserved. Two suction drains were inserted. The surgery took slightly over 3 hours with approximately 300 to 400cc of blood loss.

Using a GlideScope at extubation both vocal cords were seen to be mobile, although the left cord was moving less than the right one. Ten minutes after extubation the patient developed severe bronchospasm. Steroids, nebulization and bronchodilators were immediately started and he was transferred to the ICU on 100% oxygen via a face mask connected to an Ambu bag. His oxygen saturation was 89% and FiO2 of 10 liters. The Patient was intubated and ventilated. X-ray chest

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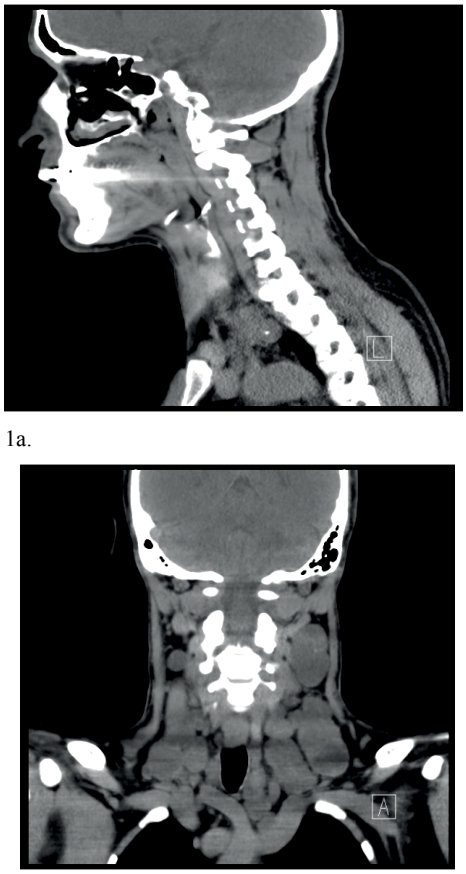


1a.

1b.

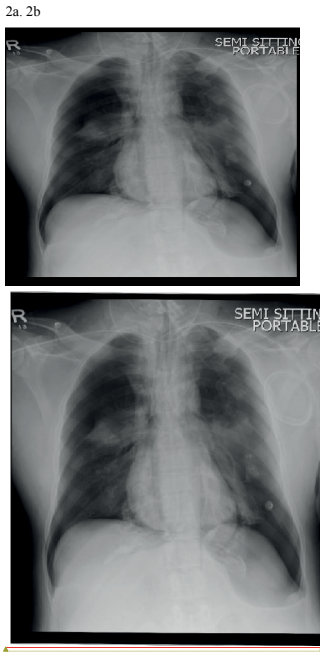
Figure 1a and 1b: The CT scan neck confirmed the presence of bilateral large suspicious lymph nodes on both sides of the neck involving levels 2, 3, 4.

showed bilateral pneumothorax, bilateral pneumomediastinum, and pneumopericardium. Bilateral pigtail drains were immediately inserted and connected to an underwater seal (Figures 2 and 3).

The lungs expanded fully and the oxygen saturation improved dramatically to 98% with 40% oxygen. On day 2 post-operative patients was extubated. He complained of hoarseness of voice and slight chocking sensation on drinking water and a stridor on moderate effort. ENT examination revealed intact right vocal cord and sluggishly moving left vocal. The ENT team ruled out any indication for tracheostomy at this stage. The patient stayed in the ICU for 6 days when both chest drains and neck drains were removed and he was transferred to the ward. In the ward, he started to show remarkable improvement and a date for discharge was decided.

The histopathology report revealed very extensive papillary thyroid cancer involving both lobes multifocal tumour size 1.5 cm. There were numerous positive lymph nodes adherent to the thyroid. Extra-thyroid extension was present. The surgical margin was negative however very close to the tumor within a one mm of the inked margin. No lymph-vascular invasion. Seventeen lymph nodes plus the matted ones all had papillary thyroid cancer. The tumour according to the AJCC 7th edition was pT 1a pN1Mx

On the 10th postoperative day the patient developed successive forceful episodes of severe cough and he started to produce large amounts of fresh blood and clots from his mouth, nose and from the



2a. 2b

Figure 2: 2a. Pre-operative normal Chest X-ray. 2b. Bilateral Pneumothorax & Pneumopericardium.

neck wound. Very shortly after that, he became unresponsive and was coded. The wound was explored bedside and a big haematoma was evacuated. Simultaneously CPR was started and continued for 20 minutes. Intubation was difficult and it took over 10 minutes to do. The endotracheal tube was seen in the depth of the neck anteriorly indicating a ruptured trachea, causing the bleeding and the difficult intubation. Following a successful resuscitation, the patient was rushed to the operating room. Neck exploration under general anesthesia revealed a fresh tracheal rupture involving the second to the fourth tracheal rings anteriorly without obvious necrosis, or tracheomalacia of the tracheal wall. The posterior muscular wall of the trachea was intact. There was no obvious source of bleeding; however, the patient received two units of packed RBCs. There was a big hematoma and edema in the soft tissues of the neck involving both sternocleidomastoid and strap muscles. Debridement of the tracheal rings was performed and a tracheostomy tube was inserted and fixed in place. The wound was then loosely packed. An upper GI endoscopy excluded any source of upper GI bleeding. The patient was transferred to the ICU intubated and ventilated (Figure 4).

On the 2nd day in the ICU the patient developed a seizure assessed by neurology and was commenced on anticonvulsive drugs. The patient remained in ICU getting progressively non responsive and a repeat CT scan showed evidence of interval deterioration in the global brain oedema a sequel of severe anoxic/hypoxic brain injury.

EEG showed profuse diffuse encephalopathy and no epileptiform discharges. Patient stayed in ICU for 8 weeks then was transferred to the ward with a tracheostomy and a stomach feeding tube on total nursing care for hypoxic brain insult.

Discussion

We believe this is the first published case in the Western part of Saudi Arabia. Our patient, a heavy smoker, developed severe bronchospasm immediately post extubation and continued to be ventilated by a face

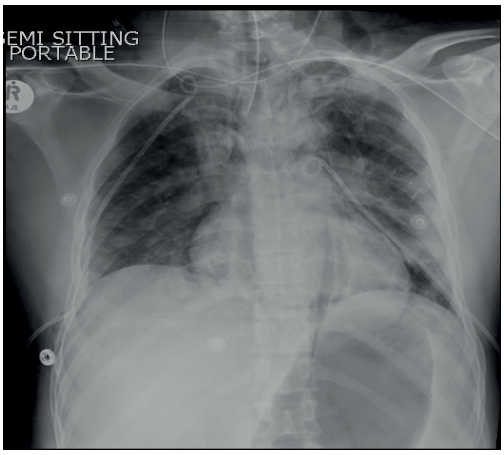


Figure 3: Bilateral Pigtail *in situ*.

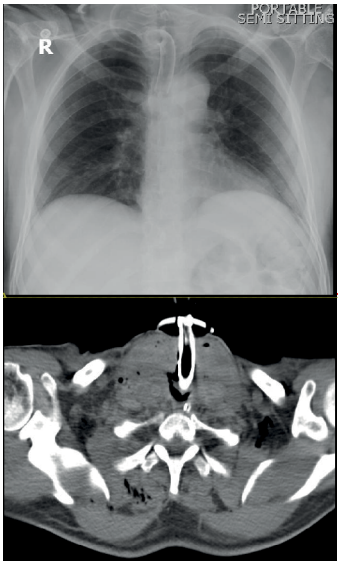


Figure 4: CT scan showing tissue oedema and tracheostomy tube *in situ*

mask and an Ambu bag for 5 to 10 minutes before he was re-intubated and ventilated. Acute bronchospasm and tension pneumothorax during general anesthesia are uncommon, however it has to be suspected and immediately managed by taking a stat chest X-ray, especially if the patient shows signs of respiratory insufficiency even in the presence of other complications which appear to account for the respiratory distress like in our patient where total thyroidectomy and bilateral neck dissection are more commonly complicated by respiratory distress, stridor or even pneumomediastinum and bilateral pneumothorax [9-12]. Such complications if overlooked or left untreated untoward hemodynamic and respiratory after effects will ensue. Delay in the treatment of tension pneumothorax can result in significant morbidity and mortality particularly in mechanically ventilated patients [10]. On the other hand unilateral spontaneous pneumothorax is a common finding in a wide spectrum of patients; bilateral spontaneous pneumothorax is estimated to account for only 1.3% of all cases of pneumothorax [11]. It is typically caused by a rupture of intra-parenchymal alveoli those results in retrograde dissection of air along the broncho-vascular sheath of bronchi and pulmonary vessels. The retrograde dissection results in pneumomediastinum, pneumopericardium and contralateral pneumothorax. Pneumomediastinum and pneumothorax occur in patients with increased intra-alveolar pressure "Valsalva maneuver, excessive cough and emesis" which leads to the rupture of marginal pulmonary alveoli due to high positive airway pressure. It is a complication that can arise during general anesthesia, mid or post-surgery, and this might explain what happened to our patient from the time of estuation when he developed severe bronchospasm until he was re-intubated. Before this he was only ventilated with a face mask and an Ambu bag, an extra factor that might have compounded the bad effects of barotrauma as a cause of this air dissection in the pleura and mediastinum and the pericardium. The mechanism of spontaneous pneumomediastinum and subcutaneous emphysema was first postulated by Macklin and Macklin in 1994 [12]. The Macklin effect states that alveolar rupture will occur if a large enough pressure gradient is generated against a closed glottis as in sneezing, excessive vomiting, labor, artificial ventilation, asthma, and excessive cough [13]. Other causes of spontaneous bilateral pneumothoraces and pneumomediastinum include cocaine intoxication, marijuana, choline gas and paraquat [14].

Pneumopericardium and pneumomediastinum are rare presentations seen mostly in the context of chest trauma or mechanical ventilation. Pulmonary barotrauma and its sequel are recognized complications of exposure to rapid changes in environmental pressure e.g. during aviation and diving, Valsalva maneuver, and from positive pressure ventilation through a face mask [15,16]. Valsalva maneuver is one of the more commonly described causes of pneumomediastinum and pneumopericardium [17]. Pneumopericardium has also been described when direct fistulation where continuity has occurred between the mediastinum or pericardium and air containing structure such as the pleural space, pulmonary substance, bronchial tree or gastrointestinal trac [18]. However in thyroid surgery pneumothorax, pneumomediastinum and pneumopericardium are usually associated with difficult dissection towards the pleura and the mediastinum [19]. In our patient where the surgery was difficult and extensive, a similar communication could have probably happened between the pleural and the mediastinum when level 7 lymph nodes were dissected resulting in the pleura been inadvertently violated resulting in air dissecting and tracks through the cervical fascial planes under low pressure, finding its way to both the mediastinum and the pericardium.

The tragic late tracheal rupture on day 10 postoperative was the cause of the epistaxis and hematemesis as well as the difficult intubation and respiratory and cardiac arrest. Iatrogenic tracheal rupture is very rare mostly described after bronchoscopic procedures or esophageal or neck dissection. Tracheal injury during thyroidectomy is usually promptly treated intraoperatively. There are two possible points of inadvertent tracheal injury, one at freeing the isthmus from the trachea and the other at dissecting the lateral and posterior aspect of the trachea close to the area where the recurrent laryngeal nerve enters tracheal cartilages, more so when excessive electrocautery is utilized [20]. Delayed tracheal rupture after total thyroidectomy and neck dissection represents a very rare but life threatening complication. It has an incidence of 0.06% [21]. The injury might show itself during surgery or may undergo necrosis in the early postoperative period. Devascularization of the tracheal wall through thermal coagulation injury or necrosis of an ischemic area are the most likely causes [21-23]. Although the diagnosis is easy to make, yet the therapeutic approach remains debatable. Some surgeons propose a conservative approach, others do en-block tracheal resection as suggested by Grillo [24]. When this approach is not feasible musculo-cutaneous or muscular flaps remain a safe therapeutic option [25].

Review of pertinent literature suggests that immediate intervention is lifesaving and must be done as soon as the patient recovers the CPR.

Conclusion

The incidence of minor complications and their sequel after thyroidectomy are not infrequent and may sometimes result in prolonged hospital stay with all its bad consequences. It may require specialized care and long term follow up. However serious complications are rare but they can result in significant mortality and morbidity if not promptly detected and properly managed. With our patient we had considerable rates of undesirable results after thyroidectomy. Of these the most striking were the immediate and the delayed postoperative complications, associated with bilateral lung compression from pneumothorax, pneumomediastinum and pneumopericardium. The delayed spontaneous tracheal rupture was another extremely rare complication added a lot to the patient adverse outcome. Such serious complication has to be discussed and equally managed at a multi-disciplinary level.

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