

A CASE OF SURGICAL EMPHYSEMA WITH RESPIRATORY DISTRESS FOLLOWING THYROID SURGERY FOR MULTINODULAR GOITRE DUE TO BILATERAL PNEUMOTHORAX AND PNEUMOMEDIASTINUM

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ABSTRACT

BACKGROUND

A 35-year-old ASA PS I lady was posted for total thyroidectomy under general anaesthesia with endotracheal intubation. Her lab values, thyroid hormone status, CXR, ECG, were normal. She did not have any history of bronchial asthma, hypertension or previous thyroid surgeries. She was premedicated prior to surgery with midazolam, fentanyl and glycopyrrolate IV. Standard monitors were attached and induced with propofol and vecuronium and intubated with flexometallic tube and maintained on 2%-3% sevoflurane. VCV was used for ventilation. Intraoperative period was uneventful. At the end of surgery, she was reversed, extubated and shifted to SICU for postoperative care. There, immediate postoperatively, she developed desaturation and hypotension. On examination, she was found to have surgical emphysema and was in respiratory distress and SpO₂ was falling to below 80%, she was intubated immediately and shifted to operation theatre for re-exploration for suspected tracheal injury. On auscultation in OT, air entry was reduced on both sides, tension pneumothorax was suspected and confirmed by bedside USG and intercostal tube was inserted on both sides, the patient improved dramatically following that, neck was re-explored to rule out tracheal injury following thyroidectomy, was normal with no leak following saline flooding. The cause for bilateral pneumothorax was not clear as there was no tracheal injury on re-exploration and the dissection was limited to the neck during surgery and injury to the pleura was unlikely. Usual possible causes that lead to pneumothorax following thyroid surgery were pleural injury, ventilation problems or air tracking through fascial planes of the neck in deep dissections involving deep lymph nodes of the neck and third level fascia of the neck i.e. the prevertebral fascia and reaches the anterior mediastinum before bursting through the weak area in the lateral wall of mediastinal pleura into the thoracic cavity. Postoperative exaggerated respiratory efforts like bucking, coughing, laryngospasm, jet ventilation can also create more pressure gradients between atmosphere air and pleura and mediastinum and increase the chance of tracheal disruption especially in a background of tracheomalacia. Use of tracheal tube exchangers without proper care can also cause tracheal injury and pneumothorax in the postoperative period.

KEYWORDS

Pneumothorax, Post-thyroid Complications, Neck Surgery.

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BACKGROUND

Thyroid Surgery is a common neck surgery done in South India for various thyroid disorders like multinodular goitre, papillary carcinoma, thyrotoxicosis, etc. It is done by different surgical teams like ENT surgeons, General surgeons, Oncosurgeons, etc. The extent of dissection varies with the nature of disease and the surgeons involved. Sometimes it may extend to the mediastinum and thoracic cavity also. Most of the time it is limited to the neck. Commonly respiratory problems are related either to damage of neck structures like recurrent laryngeal nerve, tracheal cartilage in dissection of isthmus in malignant thyroid, or due to laryngeal oedema, bronchospasm, incomplete reversal from muscle relaxants or opioids, and haematomas leading to compression of airway.¹ Sometimes structure in the adjacent mediastinum or thoracic cavity may also be accidentally damaged leading to less common complications like cervical emphysema pneumothorax,

pneumomediastinum.² Here, we discuss a case of bilateral pneumothorax following thyroid surgery in which the dissection was limited to the neck without pleural injury in a straightforward case of total thyroidectomy in a patient without known respiratory disease.

CASE

A 35-year-old lady was posted for total thyroidectomy under general anaesthesia. She was a healthy lady with ASA PS I, no previous surgeries, normal lab values, normal TFT. ECG, X-ray chest, USG neck and x-ray neck were all normal. Preoperative ENT examination of vocal cord was normal with good mobility of vocal cords. She was premedicated the previous night and day of surgery with Diazepam 10 mg and Ranitidine 150 mg orally. In operation theatre, she was given Midazolam 1 mg, Fentanyl 100 mcg and Glycopyrrolate 2 mg. Induction was done with Propofol 100 mg and Vecuronium 6 mg and anaesthesia was maintained with Sevoflurane and Vecuronium, intraoperative period was uneventful and patient was extubated following recovery from muscle relaxant without violent bucking or coughing in deep plane. She was shifted to SICU for postoperative monitoring and care. In SICU after 30 minutes, she developed respiratory distress, surgical emphysema and cardiovascular collapse. She was intubated and ventilated without much improvement in SpO₂. An intercostal tube was inserted on one side with reduced air

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entry and expansion. Patient was observed for some time without much improvement in SpO₂ and haemodynamics.

The other side was auscultated again and there was reduced air entry on the other side, portable USG showed air in pleural space requiring another intercostal tube insertion on that side, following which the patient improved both in saturation and haemodynamics. Patient was shifted to operation theatre for re-exploration for suspected tracheal injury. Re-exploration was negative and no tracheal injury was found and saline was flooded on the field to look for air bubbles which was negative. Valsalva was avoided to prevent any sealed perforation from opening. She was shifted to SICU where she became stable and after 4 hours she was extubated. The rest of her postoperative period was uneventful. The ICD was removed on second day, and she was shifted to room on the third day without the need for supplemental oxygen. The exact cause for bilateral pneumothorax was not clear, re-exploration ruled out obvious tracheal injury, other causes like ventilation-induced alveolar rupture was unlikely as the patient was ventilated with moderate tidal volume and did not have previous lung disorders known to cause dynamic airway obstruction and intraoperatively her peak pressures were below 25 mmHg and PEEP was 5 only.

DISCUSSION

Pneumothorax is defined as collection of air in the pleural space. It is rarely seen during anaesthesia and it can be spontaneous or acquired. Spontaneous pneumothorax is seen in healthy tall adults and pregnant ladies following delivery without any predisposing cause. Acquired causes seen during anaesthesia are trauma, surgery involving thoracic cavity, extensive neck dissections, placement of central line, during violent coughing during extubation from anaesthesia, Valsalva manoeuvre, Mechanical ventilation, obstructive airway disease, dental surgeries. During surgeries, the incidence is very low and accounts to less than 3% of respiratory complication following anaesthesia.¹ Tracheal perforation during thyroid surgery as a cause of pneumothorax is still as low as 0.06% as described by J E Gosnell et al.² Inadvertent violation of deep cervical fascia especially the third level during deep lymph node dissection would allow air to enter the pleural cavity and can lead to pneumothorax by air tracking down to the pleura and mediastinum. Risk factors for pneumothorax are malignant thyroid surgeries with hard gland, extensive neck dissection surgeries, cases done with spontaneous ventilation or without neuromuscular agents for neural integrity monitoring. There is an increased risk as the patient can cough or retch suddenly leading to increased airway pressure and rupture especially if trachea is already weak. Rarely tracheal injuries can occur during intubations especially in difficult intubation and while using aids like stylet, tube exchangers. Surgeries done endoscopically for prolonged time also can lead to pneumothorax.

Late pneumothorax also can occur after thyroid surgery due to disruption of trachea during violent vomiting. Extensive electrocautery is also a risk especially when freeing the isthmus for delayed rupture. Although delayed tracheal rupture is rare in non-malignant surgeries, it can lead to severe patient morbidity and mortality if not diagnosed and treated appropriately.

Cause of pneumothorax during anaesthesia according to Macintyre is divided into 4 groups.³ They are as follows: Group

1, the alveolar rupture causes the air around the sheath near the vessel to flow out of the mediastinum, diffuse in the pleural cavity and cause pneumothorax. Group 2 involves rupture of the mediastinal pleura that follows damage to the fascial layer with the mediastinal emphysema. Group 3, the peripheral airway and pleura are connected directly. Group 4, damage of chest wall due to external injury. Alveolar rupture is likely to occur when airway pressure goes beyond 30-35 cm H₂O or application of PEEP of more than 18 mmHg.

Kirby et al Seung won Lee described a case with bilateral pneumothorax following thyroid surgery, the patient had bilateral pneumothorax with pneumomediastinum. Reports of surgical emphysema, pneumothorax, and pneumomediastinum has been reported after tonsillectomy by Panerari A C et al. They advised against instruments that can cause injuries during deep tonsillar dissection⁴ and care during ventilation and recovery by avoiding coughing violently, vomiting and care during ventilation while extubation.

There exists a continuous fascial plane between cervical soft tissue and mediastinum and air entrapment is possible from one space to another. Air might track in the neck through the prevertebral layer and then mediastinum and later through the weak area in pleura to pleural cavity leading to pneumothorax especially following vigorous respiratory efforts when patient breathes during surgery.⁵ Use of tube exchangers during extubation may cause damage to tracheal unintentionally^{6,7} and may cause pneumothorax in postoperative period. Pneumothorax ranges from small self-limiting asymptomatic patients, to tension pneumothorax, air embolism, and mediastinitis. In spontaneous breathing persons, it is usually absorbed with minor problem. Pneumothorax up to 10%-20% can be observed in ICU; however, in large pneumothorax cases or if patient is on ventilator intercostal tube is required. Symptoms of pneumothorax during general anaesthesia can be easily missed if not suspected, initially patient will have tachycardia and hypotension and then hypercapnia and hypoxia due to collapse of ipsilateral lung. On further progress, it can lead to Tension thorax reducing cardiac output and circulatory failure due to compression of vena cava. Early warning signs should not be missed before severe cardiovascular collapse occurs. Intraoperative tight lung may be due to pneumothorax, auscultation is very valuable for diagnosis. When in doubt, portable x-ray or USG may be done during surgery.

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