

Air Leak Conundrum following Oesophagectomy: A Case Report and Review of Literature

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ABSTRACT

Oesophagectomy is an established technique for treating oesophageal cancer. Pulmonary complications during the postoperative period can arise from intraoperative manipulation, thoracic structure injury, or anastomotic leaks. At our institution, it is standard practice to place a soft corrugated drain around the anastomosis in the neck to facilitate the drainage of any anastomotic leakage towards the skin. In this case report, a 55-year-old female underwent video-assisted oesophagectomy in the prone position after neoadjuvant chemoradiation. A corrugated drain was subsequently placed near the anastomosis site in the neck. On the third day postoperatively (POD 3), she developed a sudden pneumothorax and an air leak in the chest tube. Despite the placement of a second intercostal tube and normal findings on fiberoptic bronchoscopy, the air leak persisted. Unexpectedly, the air leak spontaneously ceased, and the lungs re-inflated after 24 hours. Upon analysis, it was discovered that the dressing over the neck drain, which had been changed on POD 3, did not completely cover the wound. This, combined with malpositioning, created a one-way valve effect, leading to pneumothorax. Therefore, the use of a corrugated neck drain following oesophagectomy may result in life-threatening pneumothorax and should either be airtight sealed with dressing or avoided.

Keywords: Corrugated drain, Pneumothorax, Postoperative complication, Surgical procedure

CASE REPORT

A 55-year-old female with no known co-morbidities or addictions presented with complaints of progressive dysphagia since July 2017 with associated unquantified weight loss. She was initially evaluated with upper gastrointestinal endoscopy and biopsy and whole-body Positron Emission Tomography Computed Tomography (PET CT) Scan which showed a Stage-III oesophageal squamous cell carcinoma of lower 1/3rd oesophagus. She received neoadjuvant chemoradiotherapy to a total dose of 4140cGy/23# with concurrent chemotherapy (Carboplatin+Paclitaxel) from 5th September to 7th October 2017. Post concurrent chemoradiotherapy, response assessment was done using whole body PET CT scan, which revealed a complete response.

On November 20, 2017, she underwent video-assisted McKeown's Oesophagectomy (hybrid technique). Intraoperatively, a growth was noted in the middle third of the oesophagus with a good response to neoadjuvant chemoradiotherapy. The oesophagus was densely adherent to the pericardium, but there was no injury to the lung. Following surgery, three drains were placed: one corrugated drain adjacent to the left-sided neck incision and bilateral chest drains.

The immediate postoperative period was uneventful; however, on the 3rd POD, she developed sudden onset tachypnoea with a wide swing in the Intercostal Drain (ICD) column and excessive bubbling suggestive of an air leak. Clinical examination and X-ray revealed a right-sided pneumothorax and collapsed right lung [Table/Fig-1]. Another ICD was inserted into the right hemithorax, but the air leak persisted. Fiberoptic bronchoscopy was performed to rule out a possible tracheobronchial tree injury, which was normal. A Non Contrast Computed Tomography (NCCT) of chest confirmed a right-sided pneumothorax with subcutaneous emphysema [Table/Fig-2]. With no improvement in her condition over 24 hours, re-exploration was planned due to a high suspicion of lung parenchymal injury. However, she suddenly improved after her dressing over the neck drain was changed. Her lung re-inflated within 15 minutes, the air leak stopped in the ICD, and her general condition improved. Upon analysis, it was realised that the neck corrugated drain was acting like a one-way valve through which air was being sucked into the chest. The issue was resolved by shortening the drain and applying a fresh dressing. A chest X-ray confirmed an inflated lung, resolution of pneumothorax, and the patient had an uneventful recovery thereafter [Table/Fig-3].



[Table/Fig-1]: Chest X-ray (PA view) depicting pneumothorax and chest drain in situ.

[Table/Fig-2]: Non Contrast Computed Tomography (NCCT) chest showing collapse of lung with subcutaneous emphysema and chest drain in situ.

[Table/Fig-3]: Chest X-ray (PA view) confirms resolution of pneumothorax. (Images from left to right)

DISCUSSION

Commonly encountered pulmonary complications following oesophagectomy include slipped chest drains, tracheobronchial injury, parenchymal air leak, ruptured bullae, anastomotic leaks, lung collapse, pneumonia, and pulmonary thromboembolism. Our present case highlights a rare and potentially life-threatening complication due to a malpositioned corrugated drain in the neck. Orringer MB et al., presented a series of 2,000 oesophagectomies, but did not mention this rare complication of postoperative respiratory distress following transhiatal oesophagectomy. The mentioned complications in their series were wound infection/dehiscence (3%), atelectasis/pneumonia (2%), intrathoracic haemorrhage, recurrent laryngeal nerve paralysis, chylothorax, and tracheal laceration (<1% each) [1].

During an oesophagectomy, communication between the thoracic cavity and neck is created by mediastinal mobilisation of the oesophagus and gastric pull-up for cervical oesophago-gastric anastomosis. Normally, the stomach tube sufficiently seals this communication, and the negative intrathoracic pressure is not transmitted to the neck. A neck drain is placed next to the anastomosis to drain any anastomotic leak. In present case, it was apparent that the corrugated drain in the neck was placed deeper than intended and was possibly acting like a stent with communication between the neck and chest (which otherwise gets plugged or sealed by the stomach tube). Once the dressing was changed to a loose one on the 3rd POD, atmospheric air got sucked into her chest with every respiratory effort, creating a tension pneumothorax along with a collapsed lung. This spontaneously resolved when a more occlusive dressing was put on. Additionally, once the cause of the leak was realised, the drain was also shortened, thus allowing the stomach tube to act like a natural seal.

Persistent massive air leak in a chest tube and collapsed lung in the early postoperative period are usually indicative of airway injury. In present case, there was no airway or lung injury intraoperatively, and there was no evidence of an air leak before the 3rd POD. Minor air leaks from lung parenchymal injury generally settle down within one to two days postoperatively. There was no air leak in the first two days because the neck drain was covered by an occlusive dressing, which was removed on the 3rd POD. A fibreoptic bronchoscopy also ruled out a tracheobronchial injury. A re-exploration was fortuitously averted just in time when the dressing was changed to an occlusive one, and the air leak resolved spontaneously. On literature review [Table/Fig-4], six similar cases reporting pneumothorax caused by malpositioned corrugated drains, three in transhiatal oesophagectomies [2-4], and three in transthoracic oesophagectomies [5-7]. This suggests that the use of corrugated neck drains may result in life-threatening complications of pneumothorax. The use of corrugated neck drains should be avoided, and alternatives like closed drains can be utilised instead. However, if a corrugated drain is used, proper airtight sealing of the drain site with a dressing is mandatory to prevent this complication.

S. No.	Authors	Publication year	Transhiatal, Transthoracic oesophagectomy	Interventions before removing the corrugated drain	Survival
1.	Guthrie GKJ et al., [2]	2008	Transhiatal	a) Three additional chest drains b) Flexible bronchoscopy under general anaesthesia	Yes
2.	Khan MA et al., [3]	2013	Transhiatal	a) Two additional chest drains b) Reintubation c) Fiberoptic bronchoscopy	Yes
3.	Kumar V et al., [7]	2015	Transthoracic	a) One additional chest drain b) Reintubation c) Fiberoptic bronchoscopy	Yes
4.	Ahuja D et al., [5]	2019	Transthoracic	None (Identified on observing air leak at corrugated drain site)	Yes
5.	Mato R et al., [6]	2021	Transthoracic	CECT chest	Yes
6.	Thammineedi SR et al., [4]	2020	Transhiatal	a) CECT chest b) Fiberoptic bronchoscopy c) Intubation	Yes
7.	Present case	2023	Transhiatal	Fiberoptic bronchoscopy non contrast CT chest	Yes

[Table/Fig-4]: Review of literature [2-7].

CECT: Contrast enhanced computed tomography

CONCLUSION(S)

A malpositioned corrugated neck drain placed during oesophagectomy may cause massive pneumothorax and is now well-documented in the literature. It is recommended to avoid the use of corrugated drains in the neck post-oesophagectomy. If a corrugated drain is used, proper airtight sealing of the drain should always be practiced.

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