

Oesophageal perforation, clinically obscure to radiologically overt!

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Section: Abdominal imaging

Area of Interest: Abdomen

Procedure: Barium meal

Imaging Technique: Fluoroscopy

Imaging Technique: CT-High Resolution

Special Focus: Abscess Pathology Infection Cavitation

Case Type: Clinical Cases

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Patient: 78 years, male

Clinical History:

Patient presented to ER with 2 days history of right-sided chest pain, dyspnoea and low-grade fever. Investigations revealed elevated total count (29,000), CRP: 259 mg/ml and D-dimer: 2200. Chest radiograph showed right moderate pleural effusion. Sputum AFB was negative. Sputum culture showed candida albicans.

Imaging Findings:

Chest radiograph AP view (Fig. 1) showed right moderate pleural effusion with haziness of right upper lung fields.

CT pulmonary angiogram (Fig. 2) was considered in view of elevated D-Dimer; showed patent main (yellow asterisk) and branch pulmonary artery with no evidence of thrombo-embolism; tracking of air was seen along right lateral mid-thoracic oesophageal wall (yellow arrow) into the multiloculated right pleural collection with multiple streaks of air along inner and outer pleural cavity (blue asterisk). Findings were suggestive of oesophageal perforation with thoracic empyema.

Fluoroscopy-guided gastrografin swallow (Fig. 3) was subsequently done to localise the site of perforation. Extraluminal leakage from right mid-oesophagus to lower pleural cavity was seen.

Endoscopy showed a large perforated ulcer. Biopsy was taken from the site, which revealed oesophageal squamous cell carcinoma. Oesophageal stenting was done and gastrografin administration under fluoroscopic guidance post-oesophageal stenting showed no persistence of leak.

Discussion:

Background

Oesophageal perforation occurs due to iatrogenic, foreign body impaction, post-traumatic events, Boerhaave

syndrome, corrosive material ingestion, oesophageal carcinoma or ulcer perforation. The lack of serosal layer covering the oesophagus makes it more susceptible to injury compared to other organs of the gastro-intestinal system [1].

Clinical perspective

Chest pain is the cardinal symptom of oesophageal perforation and is present in more than 70% of patients with a full thickness perforation of the intrathoracic oesophagus, other symptoms and signs are variable and nonspecific [2]. Early detection and initiation of appropriate management strategy is quintessential, as any delay in diagnosis accounts for most of morbidity and mortality [3].

Imaging perspective

- Plain radiograph: Usually has non-specific manifestation and presents as pneumomediastinum, pneumothorax, pleural effusion, widening of the mediastinal shadow etc.
- Fluoroscopy: With a suspected oesophageal perforation, the use of barium as contrast agent should be avoided as this can cause mediastinitis. A water-soluble contrast medium with patient examined in semi-supine position will reveal the extraluminal contrast extravasation in most cases of oesophageal perforation.
- Computed tomography: When fluoroscopy is equivocal or non-contributory in confirming a leak, and yet there is suspicion of perforation, contrast enhanced CT with oral contrast can aid in localising the site of leak. Extraluminal gas locules in the mediastinum or abdominal cavity, adjacent to the perforated site are highly suggestive [1]. Pleural effusion, empyema, pneumomediastinum, pneumothorax, consolidation, lung collapse etc can be seen as secondary signs.

Outcome:

Treatment strategy is to contain the perforation by methods ranging from nonsurgical conservative management to oesophagectomy or surgical exclusion and diversion. However, with an early diagnosis of uncontained perforation, surgery remains the mainstay of treatment [4]. The mortality rate in oesophageal perforation is estimated to be between 25-50% [1] and is significantly increased if the diagnosis is delayed beyond 24 hours [4]. Common complications are empyema, pneumonia, lung abscess, sepsis, acute mediastinitis etc. Tissue destruction may lead to development of fistula between the oesophagus and nearby structures like tracheo-bronchial tree, stomach and rarely the aorta [5].

Diagnostic pearls:

- CT chest/abdomen showing extraluminal gas locules in the mediastinum or abdominal cavity, adjacent to the oesophagus in appropriate clinical setting are highly suggestive of oesophageal perforation.
- In Boerhaave syndrome, the commonest site of involvement is distal left wall which classically results in pneumomediastinum and left pleural effusion.
- Cervical oesophageal perforation should be considered in the presence of cervical subcutaneous emphysema or a superior mediastinal fluid collection.

Differential Diagnosis List: Perforated oesophageal ulcer secondary to squamous cell carcinoma, pleural empyema, Boerhaave syndrome, Broncho-pleural fistula with empyema

Final Diagnosis: Perforated oesophageal ulcer secondary to squamous cell carcinoma, pleural empyema

References:

Grigoriy EG (2010) Black esophagus: Acute esophageal necrosis syndrome. World J Gastroenterol 16(26): 3219–3225. (PMID: [20614476](#))

Søreid JA, Viste A (2011) Esophageal perforation: diagnostic work-up and clinical decision-making in the first 24 hours. Scand J Trauma Resusc Emerg Med 19: 66. (PMID: [22035338](#))

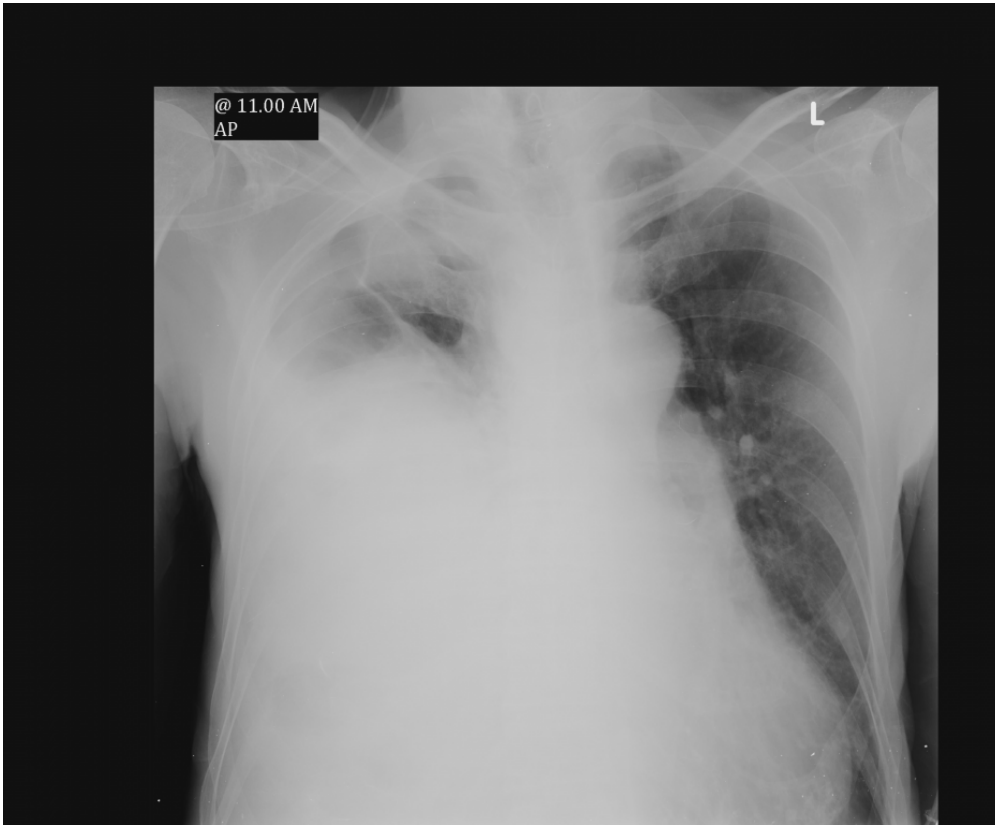
Port JL, Kent MS, Korst RJ, Bacchetta M, Altorki NK (2003) Thoracic esophageal perforations: a decade of experience. Ann Thorac Surg 75(4): 1071–1074 (PMID: [12683539](#))

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Figure 1

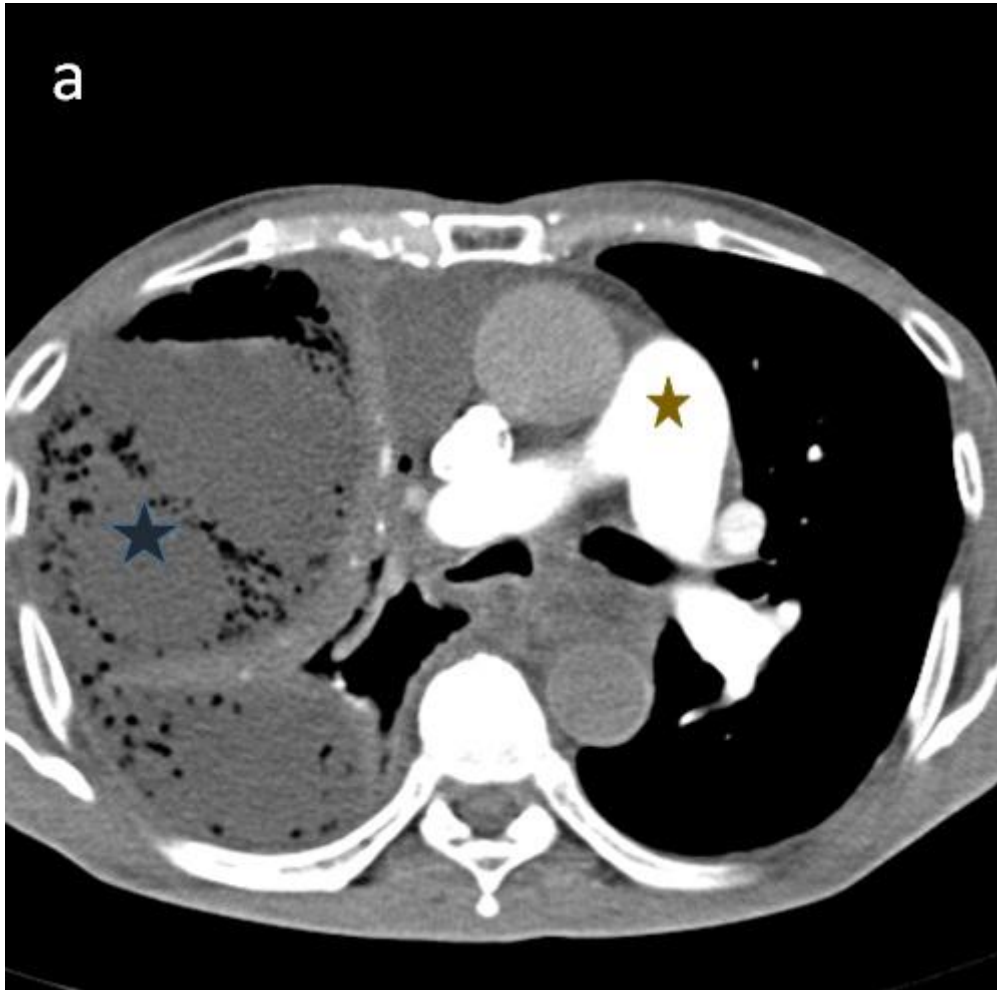
a



Description: Chest radiograph AP view showing right moderate pleural effusion and haziness of right upper lung fields. **Origin:** Dept of Imaging and Interventional Radiology. Kerala Institute of Medical Science, Trivandrum, India

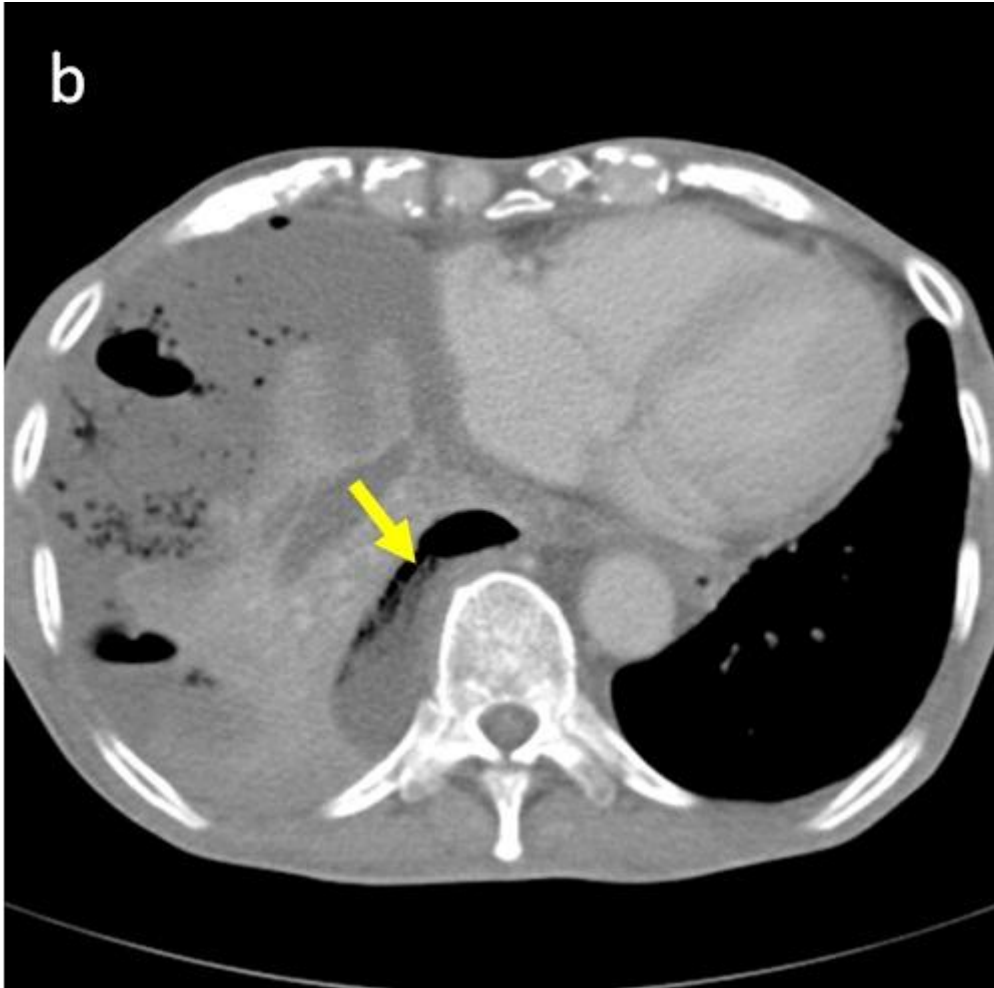
Figure 2

a



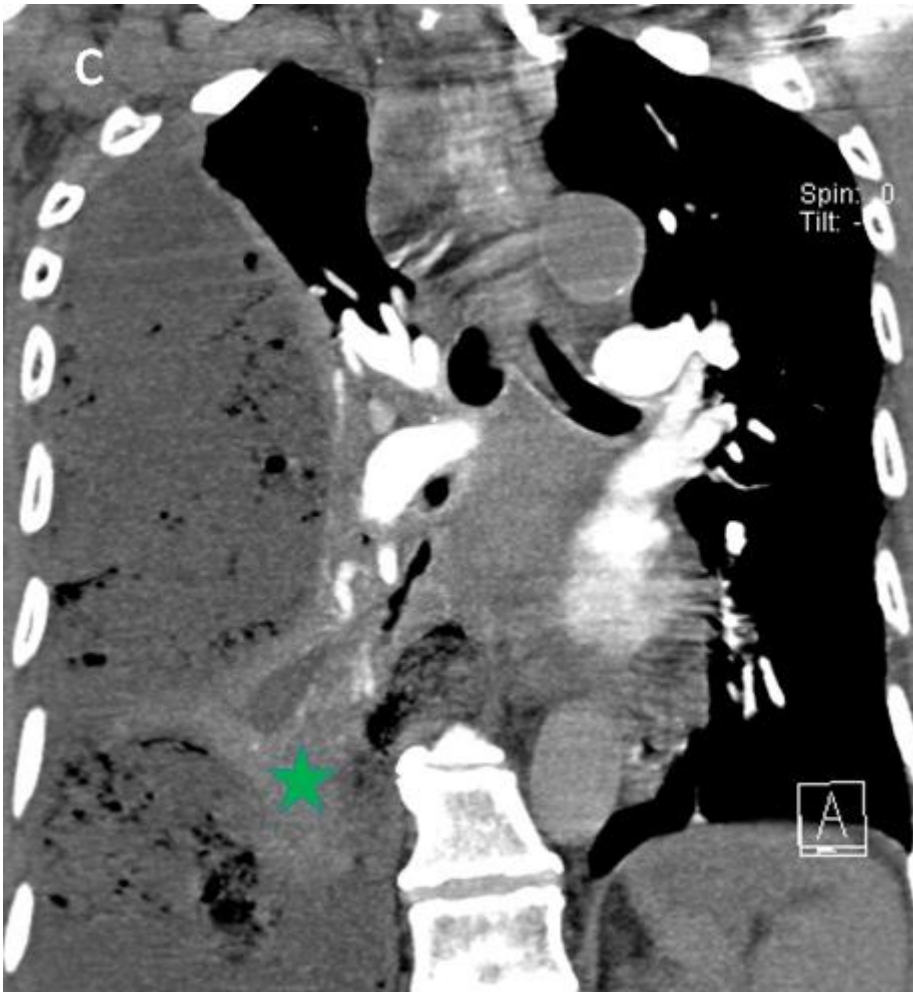
Description: Patent main (yellow asterisk) and branch pulmonary arteries. Right thoracic empyema (blue asterisk). **Origin:** Dept of Imaging and Interventional Radiology. Kerala Institute of Medical Science, Trivandrum, India

b



Description: A tracking of air was seen along the right lateral mid-thoracic oesophageal wall (yellow arrow) into the multiloculated right pleural collection, suggestive of oesophageal perforation with thoracic empyema. **Origin:** Dept of Imaging and Interventional Radiology. Kerala Institute of Medical Science, Trivandrum, India

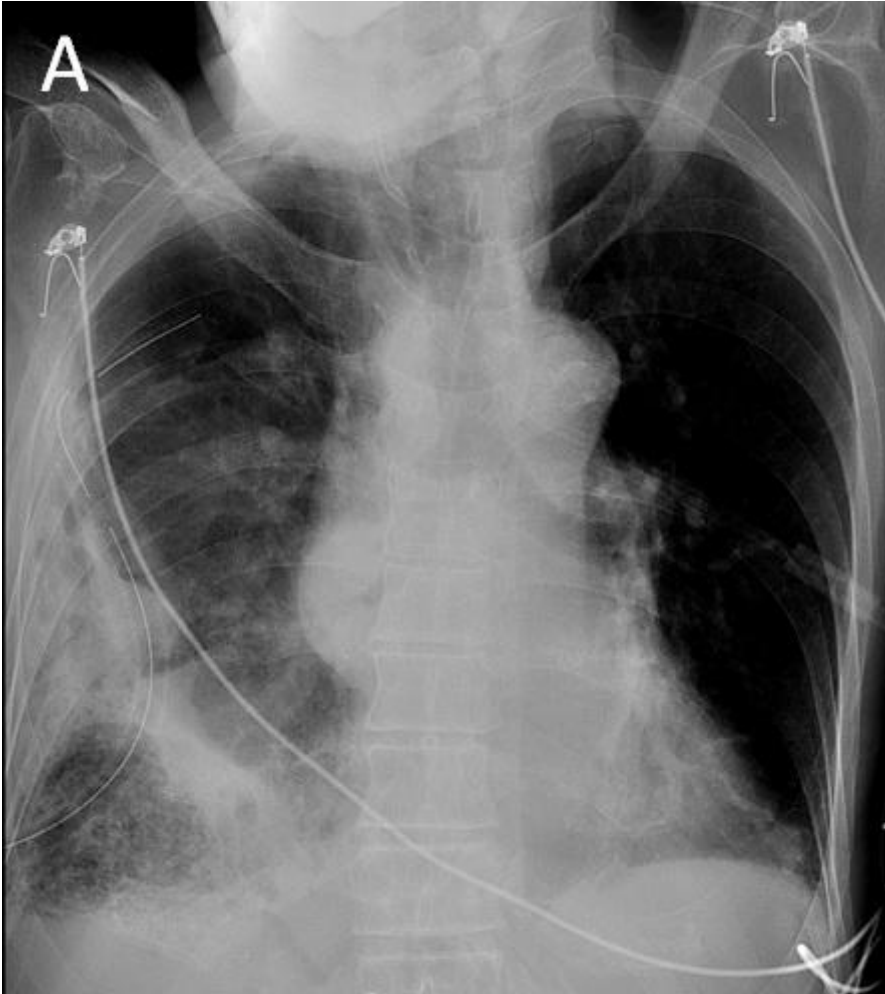
c



Description: Right lower lung fields showing collapse consolidation (green asterisk). **Origin:** Dept of Imaging and Interventional Radiology. Kerala Institute of Medical Science, Trivandrum, India

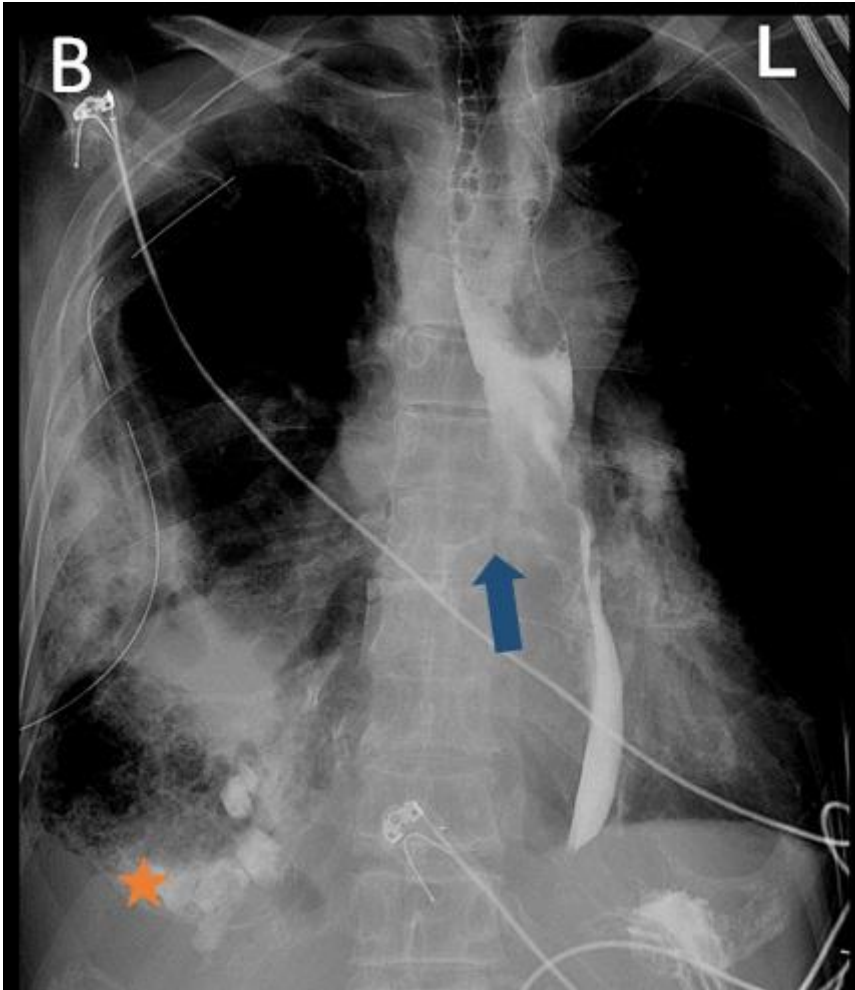
Figure 3

a



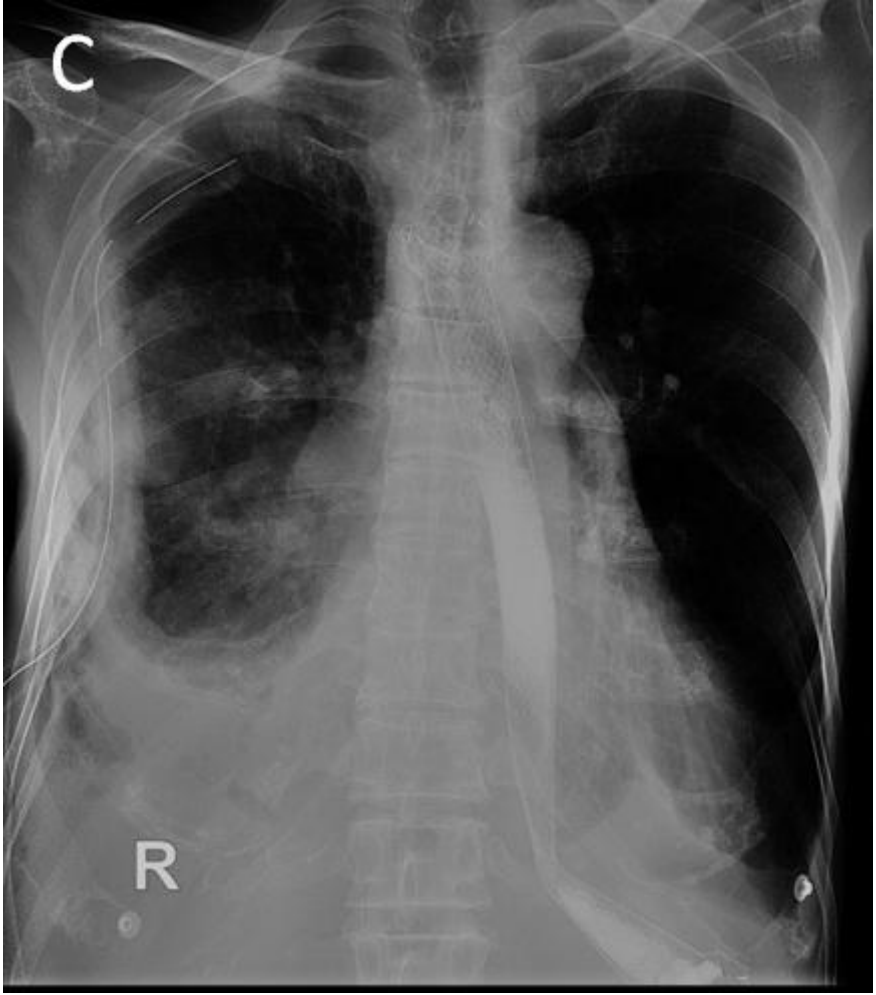
Description: Gastrografin swallow under fluoroscopic guidance. (a) Plain film **Origin:** Dept of Imaging and Interventional Radiology. Kerala Institute of Medical Science, Trivandrum, India

b



Description: Fluoroscopy-guided gastrografin swallow. Extraluminal leakage (blue arrow) of contrast was seen from right mid oesophagus to right lower pleural cavity (orange asterisk). **Origin:** Dept of Imaging and Interventional Radiology. Kerala Institute of Medical Science, Trivandrum, India

c



Description: Fluoroscopy-guided gastrografin swallow, post oesophageal stenting showing no evidence of leak. **Origin:** Dept of Imaging and Interventional Radiology. Kerala Institute of Medical Science, Trivandrum, India