Diagnostic value of pleural fluid cytology in ‘non-malignancy’: a case report on oesophageal perforation.

LUI Yin Wing, M.B.B.S., TING Shun Hin, M.B.B.S.

Abstract

Oesophageal perforation is a rare but life-threatening condition, often with non-specific presenting symptoms. Timely diagnosis and treatment are crucial to minimize mortality and morbidity. Different diagnostic modalities have been used, some more sensitive than others. We present a case of oesophageal perforation that was diagnosed with pleural fluid cytology and later confirmed by computer topography imaging. The patient was treated with endoscopic stenting, and made good recovery after a winding clinical course. This report serves as a reminder of the importance of vigilance when viewing pleural fluid cytology. Possible contaminants in pleural fluid and the value of urgent reporting of cytology are briefly discussed.

Clinical presentation and initial investigations

A 76-year-old male, smoker and drinker, presented with vomiting and dizziness. Initial blood sample showed elevated creatine kinase (1216 IU/L) and lactate dehydrogenase (293 IU/L) but normal troponin I level (<1.9 ng/L). Serum amylase was within normal limit. Chest X-ray showed left pleural effusion. The pleural fluid had a pH of 4.5 and was exudative, and chyle was negative. The amylase in pleural fluid was raised (1013 IU/L). The pleural fluid adenosine deaminase was increased (48 U/L) while direct smear and culture for acid-fast bacilli was negative. Pleural fluid culture showed mixed growth of bacteria and Candida. Computed tomography (CT) of thorax with intravenous contrast was performed and showed no evidence of oesophageal perforation, knowing that such assessment was not fully sensitive without oral contrast (Fig. 1).

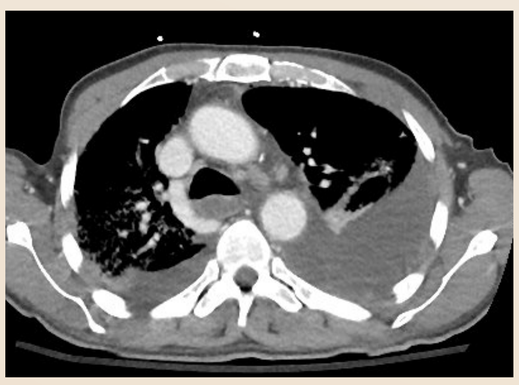

Figure 1. CT thorax with intravenous contrast

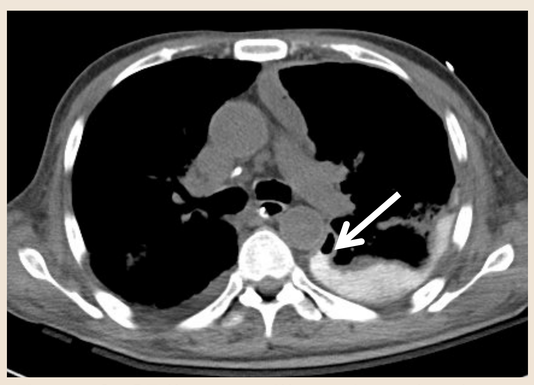

Figure 2. CT thorax with oral contrast. Note leakage of contrast (arrow) into left pleural cavity

Pleural fluid from left chest drain was sent for cytology examination.

Cytologic findings

Specimen was highly cellular with an empyema pattern, showing abundant neutrophils with suppuration. No neoplastic cells were found. However, in addition, there were elements unexpected in pleural fluid, including many mature squamous cells with low nuclear / cytoplasmic ratio and orangeophilic cytoplasm (Fig. 3c), fungal elements consistent with Candida sp. (Fig. 3d), and food material, mostly recognizable as plant fibres and degenerated skeletal muscle (Fig. 3a, 3b).

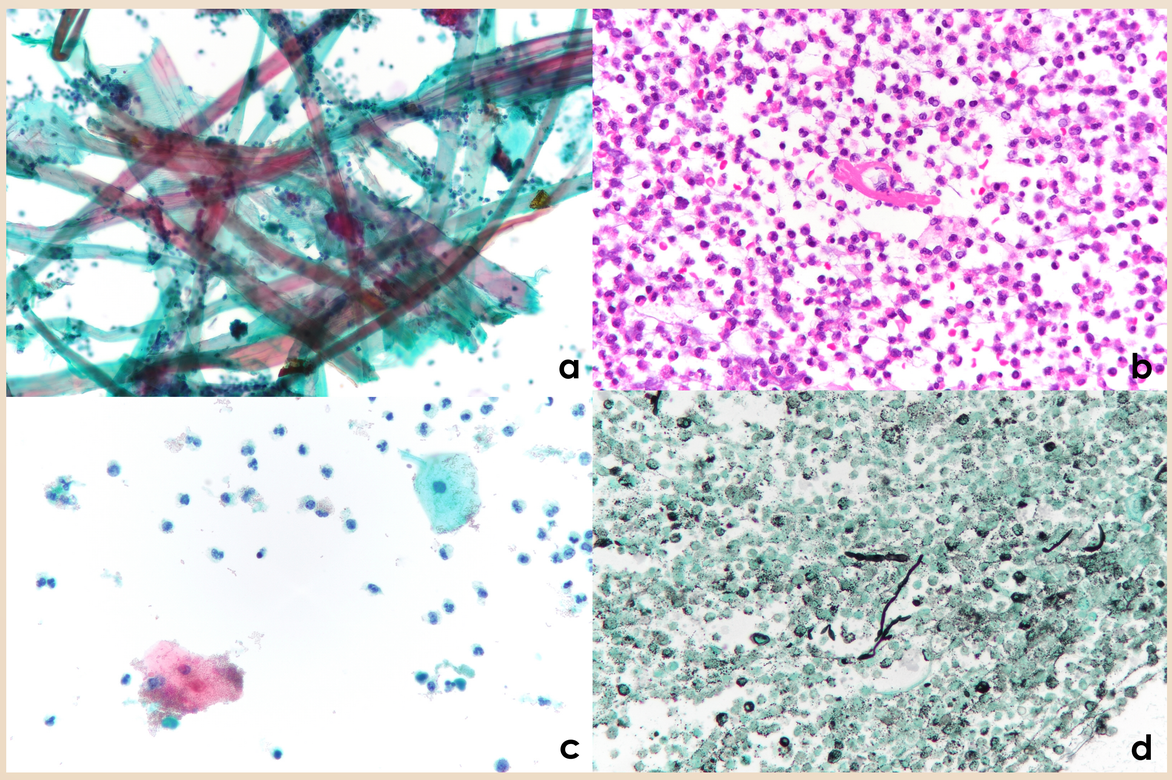

Figure 3. Skeletal muscle from food: Pap, 200x (a) and H&E, 400x (b);
Mature squamous cells, Pap, 400x (c); Candida and bacteria on Grocott stain, 400x (d).

Diagnosis and outcome

Prompted by these findings, a CT with oral contrast was done and oesophageal perforation was diagnosed (Fig. 2). He then underwent endoscopic stenting. Clinical course was fluctuating, with subsequent complications including respiratory failure, empyema necessitating surgical drainage and lung decortication, bronchopleural fistula, recurrent nosocomial pneumonia, and deep vein thrombosis. Nevertheless, 7 months after admission the patient was stable on 0.5L/min oxygen, speaking in full sentences.

Discussion

Pleural fluid cytology is mostly utilized to detect metastasis and mesothelioma. Its role in diagnosing critical non-neoplastic condition, in our case oesophageal perforation, is under-recognized. In many cases, a high level of suspicion coupling with knowledge of clinical scenario would help to make the correct diagnosis and determine if urgent communication with clinicians is needed. Our case nicely illustrates how the combination of clinical assessment, radiological examination, biochemical analysis and cytological examination of pleural cytology aids the diagnosis of oesophageal rupture [1]. Knowledge of sensitivity, specificity and limitation of each testing modality is important [2]. In case of doubt, repeating a test may make a difference.

Differential diagnosis of acute suppurative pattern on pleural cytology

Given the cytologic findings, apart from perforated viscus, top differential diagnoses include lung abscess and contamination from environment.

Empyema with or without underlying lung abscess is the most common cause of acute suppurative inflammation pattern on pleural cytology. Although lung abscess can be caused by fungus, Candida is an unlikely species as the aetiology, except perhaps in severe immunosuppression.

Contaminants in pleural fluid cytology: a mini-experiment

To get a better understanding of potential contaminants in the process of pleural tapping, we rinsed a variety of materials, namely skin/dandruff, food (meat), alcohol wipe, tissue paper and gauzes in CytoRich reagent, and these were subject to routine cytologic processing and stained with Papanicolaou stain.

Despite rigorous rinsing, preparations from alcohol wipe, tissue paper and food were acellular. In skin/dandruff sample, tubular structures suggestive of Demodex, spore-like globules and some anucleated cells were found. In the gauze sample, scanty amorphous clumps were seen (Fig. 4).

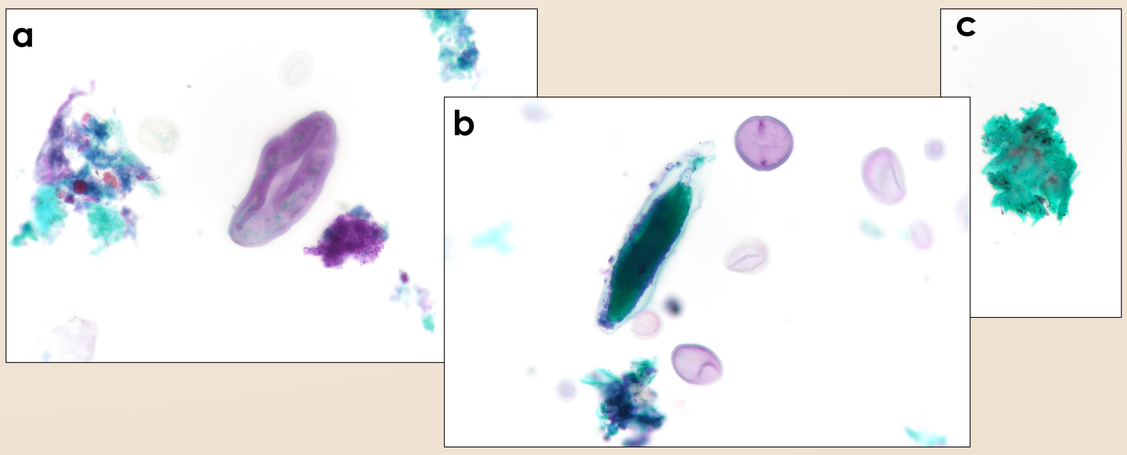

Figure 4. Skin/dandruff (a), Demodex-like structures and anucleated cells (b), gauzes (c). All stained with Pap, 400x.

Critical value reporting in cytology

The term “critical value” was introduced to cytology in 2004 [3]. Over time, this term has grown out of favour mainly because there were different opinions about what constituted a “critical” result. Therefore, more recent statements further stratified them into “urgent” and “unexpected” results [3]. In a survey, there was demonstrable discrepancy in perceptions of urgent diagnoses specific to cytopathology between pathologists and clinicians [4]. There was also a lack of audit for urgent diagnoses and standardisation of documentation of communication regarding urgent reporting [4, 5], limiting quality assessment in this aspect.

Learning from our case, it appears that cytologic findings suggesting the possibility of a perforated organ is a good candidate for consideration when constructing a list of scenarios in which urgent reporting should be mandatory.

PRACTICE PEARL: think twice if you see these on pleural fluid cytology
- ⌘ Mature, “benign” squamous cells
- ⌘ Acute suppurative inflammation pattern
- ⌘ Degenerated skeletal muscle, plant fibres
- ⌘ Candida

Conclusion

It is important to look out for non-malignancy conditions in pleural fluid cytology, oesophageal perforation being an example, and a significant one. When reviewing pleural cytology, it is always helpful to incorporate the clinical picture and chemical results into the interpretation. Careful consideration of possibilities should precede dismissal of diagnostic material as contaminants. A list of diagnoses that warrant urgent reporting should be discussed intra-departmentally and with clinicians. Facilitated by digital data-keeping, auditing of urgent reporting is helpful in quality assurance and establishing a consensus in the future.

References
1. Garas G, Zarogoulidis P, Efthymiou A, Athanasiou T, Tsakiridis K, Mpaka S, Zacharakis E. Spontaneous esophageal rupture as the underlying cause of pneumothorax: early recognition is crucial. J Thorac Dis 2014;6(12):1655-1658. doi: 10.3978/j.issn.2072-1439.2014.12.04
2. Tatiana Suarez-Poveda, Carlos Hernando Morales et. al., Diagnostic performance of CT esophagography in patients with suspected esophageal rupture, Am Soc Emergency Radiol 2014
3. Andrew A. Renshaw, George G. Birdsong, Issues in reporting cytology: From headers and critical values to categorical data and natural language parsers, Journal of the American Society of Cytopathology (2014) 3:37-41
4. Anthony D. Cretara, Christopher N. Otis, Perspectives and Perceptions of Urgent and Alert Values in Surgical Pathology and Cytopathology: A Survey of Clinical Practitioners and Pathologists, Cancer Cytopathology December 2018: 971-979
5. Raouf E. Nakhleh, Jeffrey L. Myers, et. al., Consensus Statement on Effective Communication of Urgent Diagnoses and Significant, Unexpected Diagnoses in Surgical Pathology and Cytopathology From the College of American Pathologists and Association of Directors of Anatomic and Surgical Pathology, Arch Pathol Lab Med—Vol 136, February 2012: 148-154