

CASE REPORT

A 79-year-old-man with a 'niveau' on a chest radiograph

Kanae Suu, Takao Kato, Moriaki Inoko

Department of Cardiovascular Medicine, The Tazuke Kofukai Medical Research Institute, Kitano Hospital, Osaka, Japan

Correspondence to

Dr Takao Kato,
takao-kato@kitano-hp.or.jp

Accepted 16 June 2015

SUMMARY

A 79-year-old man was referred to the emergency room following a sudden episode of 'spitting blood', with a blood pressure of 128 (systolic) and 75 mm Hg (diastolic) and a heart rate of 60 bpm. His medical history included the treatment of gastric cancer and untreated hypertension. At that time, his symptoms were limited without any chest, back or abdominal pain. After a presentation of haemoptysis was confirmed, a chest radiograph revealed an air-fluid level (a 'niveau') that was continuous towards the enlarged thoracic aorta and the thoracic cavity. Contrast-enhanced CT was subsequently performed, and revealed an aortic dissection and a pneumothorax adjacent to the dissection, accompanied by blood pooling in the thoracic cavity. The patient died 40 min after the admission to the emergency room due to an additional haemoptysis. The autopsy confirmed the diagnosis of a ruptured aortic dissection with pneumothorax.

level was 92% on room air. The ER physician heard him clearly and revealed that the patient's presentation was 'coughing up of a small amount of blood' (ie, haemoptysis).

A complete blood count revealed a normal platelet count of 189 000/ μ L. Moreover, the leucocyte levels were elevated (11 800/ μ L) and slight anaemia was observed, with haemoglobin levels of 10.2 g/dL and a haematocrit value of 34%. Other laboratory parameters were normal, including a creatine kinase level of 28 U/L and lactate dehydrogenase level of 292 U/L. However, the D-dimer and fibrin degradation product levels were not measured for the assessment of haemoptysis.

A chest radiograph revealed an abnormal air-fluid level (a 'niveau') on the right side of the chest in the middle lung field. The air-fluid level appeared to be continuous towards the enlarged thoracic aorta and thoracic cavity (figure 1), suggesting the rupture of a thoracic aortic aneurysm or aortic dissection and a perforation of the bronchus.

BACKGROUND

The air-fluid level (a 'niveau') is a well-known feature in the field of abdominal radiography. The presence of an air-fluid level on a chest radiograph, however, is a rare occurrence. It must be noted that the cause could be a life-threatening disease. We present a case of a 79-year-old man with massive haemoptysis, the aetiology of which was suggested by chest radiography, with subsequent unfortunate clinical course, and present the differential diagnosis that should be considered when observing air-fluid level (a 'niveau') on a chest radiograph.

CASE PRESENTATION

A 79-year-old man was referred to the emergency room (ER) for a sudden episode of 'only spitting blood'. The patient had undergone an endoscopic mucosal resection 4 years previously for the treatment of gastric cancer. The patient had also been found to be hypertensive, however, he had been left untreated for it.

The episode of 'spitting blood' had occurred spontaneously in the morning and intestinal bleeding was considered as the possible cause. At that time, the patient's symptoms did not include chest, back or abdominal pain.

Findings of physical examination and laboratories

The patient had walked into the ER unaided and appeared healthy. His systolic and diastolic blood pressures were 128 and 75 mm Hg, respectively. His heart rate was 60 bpm and oxygen saturation

OUTCOME

Clinical course: Contrast-enhanced CT was urgently performed and revealed an aortic dissection (Stanford type B) with a thrombosed false lumen, which was confirmed with the inward shift of calcification (figure 2). A pneumothorax was observed adjacent to the dissection and was accompanied by blood pooling in the thoracic cavity. The patient was subsequently diagnosed with rupture of thoracic aortic dissection with pneumothorax, and was admitted to the ER department.

Following this diagnosis, he was scheduled to immediately undergo surgery to repair the aortic dissection; however, the patient experienced a massive bout of haemoptysis and died 40 min after admission to the ER. The autopsy revealed a ruptured aortic dissection, with generalised atherosclerosis as well as

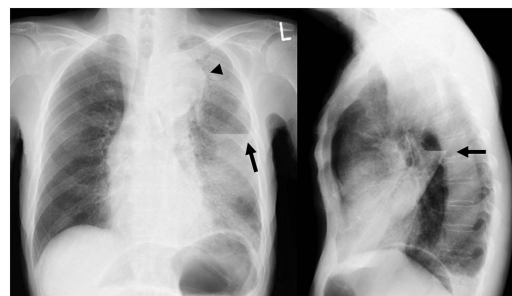
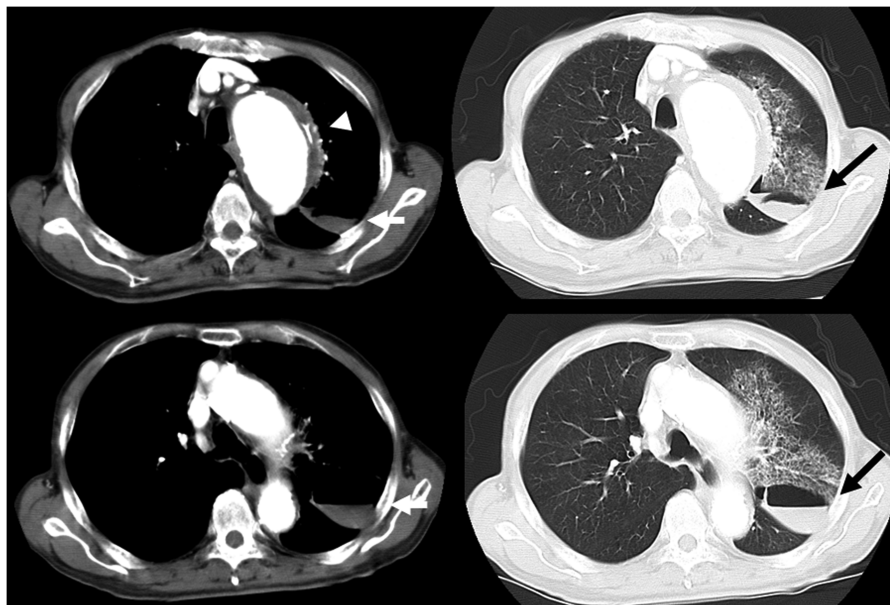


Figure 1 Chest radiography showing aortic enlargement (arrowhead) and an air-fluid level a 'niveau' (arrows) in the middle of left lung field.



To cite: Suu K, Kato T, Inoko M. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2014-208423

Figure 2 Contrast-enhanced CT revealing aortic dissection and a partially thrombosed false lumen (arrowhead), as well as a 'niveau' in the left lung and the radial spread of fluid (arrows).



a pleural fissure, which was partially but tightly adhered to the aortic wall (figure 3).

DISCUSSION AND DIFFERENTIAL DIAGNOSIS

In the present case, the patient did not experience any symptoms prior to the sudden episode of haemoptysis and could not depict it well. His symptom of 'spitting blood' was suggestive of gastrointestinal bleeding, but 'coughing up blood' led to the diagnostic imaging. Chest radiography was useful in eventually determining the true aetiology, which was rupture of a thoracic aortic dissection.

In cases where an air-fluid level is noted on a chest radiograph, the air may be a microorganism by-product originating in the gastrointestinal tract, lungs, or even in cavitory lung lesions (as is the case with pulmonary aspergillosis and tuberculosis). Moreover, the fluid could be derived from the pleural effluent, bleeding from the vessels or aorta, or possibly even gastrointestinal secretions.¹⁻⁶ Diaphragmatic hernia and achalasia, where the gastrointestinal tract is the source of both air and fluid, are also common causes of this anomaly.⁷ Haemothorax due to trauma or followed by spontaneous pneumothorax is another cause of an air-fluid level on a chest radiograph.⁸⁻⁹ In

addition, we have encountered cases where air-fluid levels are noted on chest radiographs as a result of malignancy and lung infarction, where cavitory bleeding is observed.

Among these differential diagnoses, life-threatening conditions include aortic or large-vessel dissection and haemorrhage, which require emergency medical treatment. Furthermore, patients who develop a haemothorax followed by a spontaneous pneumothorax are at risk of hypotension due to blood loss.⁵ Aortobronchial fistula formation can also lead to severe and fatal haemoptysis;¹⁰⁻¹¹ however, in some cases, a thrombus forms, which temporarily seals off the bleeding fistula site. Nevertheless, in these cases, an ensuing episode of haemoptysis is associated with a very high mortality rate. If untreated, haemoptysis from an aortobronchial fistula can be fatal within 1 year of initial presentation.

Haemoptysis is a non-specific symptom of various bronchopulmonary and mediastinal diseases, which leads to frequent misdiagnosis. When haemoptysis presents in patients with a known thoracic aortic aneurysm or with a history of thoracic surgery, the surgeon should have a high index of suspicion that an aortobronchial fistula could be the cause.³ Although the patient in the present case had no history of aortic disease or

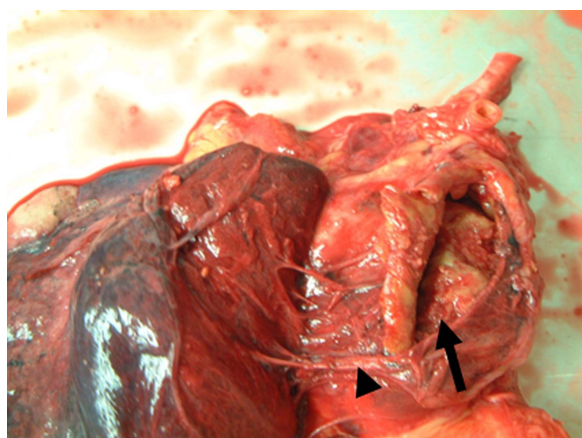


Figure 3 Aortic dissection was observed (arrow), with a break in the continuity of the visceral pleura (arrowhead) in autopsy.

Learning points

- ▶ An air-fluid level on a chest radiograph must be noted, as it could be the cause of life-threatening diseases such as aortobronchial fistula and rupture of thoracic aortic dissection with pneumothorax, which are conditions that require both careful assessment and prompt treatment.
- ▶ In this case, the air-fluid level being continuous towards the enlarged thoracic aorta and thoracic cavity was due to the rupture of a thoracic aortic aneurysm or aortic dissection with pneumothorax accompanied by blood pooling in the thoracic cavity.
- ▶ Careful inquiry into the patient's complaints and symptoms is always important in any clinical setting.

surgery, the characteristic features noted on chest radiography, which is an initial diagnostic technique, would help in making an accurate diagnosis.

In conclusion, diseases presenting with an air-fluid level on a chest radiograph can be fatal, and a high index of suspicion and sense of urgency in the investigative approach is necessary.

Contributors KS and TK wrote the manuscript and MI supervised.

Competing interests None declared.

Patient consent Not obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Prasad A, Shotliff K. Aortic dissection complicated by a mediastinal haematoma and haemoptysis. *Postgrad Med J* 1994;70:821–2.
- 2 LIMA MS, Vieira ML. Hemoptysis and hemothorax as presentation of thoracic aortic rupture. *Rev Bras Cir Cardiovasc* 2009;24:245–8.
- 3 Jackson H, Stark P. Tilted air-fluid interfaces on chest radiography. *AJR Am J Roentgenol* 1985;144:37–8.
- 4 Casadevall J, Alvarez-Sala R, Prados C, *et al.* Dissection of ascending aorta. A new cause of alveolar hemorrhage? *J Cardiovasc Surg* 1994;35:327–8.
- 5 Christensen JD, Heyneman LE. Case of the season: aorto-esophageal fistula complicating thoracic aortic aneurysm stent graft repair. *Semin Roentgenol* 2009;44:4–7.
- 6 Somasamudra P, Smith E, Tandan R. Aortic dissection presenting as pleural effusion. *BMJ Case Rep* 2011;2011:pii: bcr0320113956.
- 7 Hansell DM, Lynch DA, McAdams HP. *Imaging of diseases of the chest*. 5th edn. Mosby; 2010:881–1002.
- 8 Hsu CC, Wu YL, Lin HJ, *et al.* Indicators of haemothorax in patients with spontaneous pneumothorax. *Emerg Med J* 2005;22:415–17.
- 9 Hifumi T, Kiri N, Inoue J, *et al.* Tension pneumothorax accompanied by type A aortic dissection. *BMJ Case Rep* 2012;2012:pii: bcr2012007142.
- 10 Favre JP, Gournier JP, Adham M, *et al.* Aortobronchial fistula: report of three cases and review of the literature. *Surgery* 1994;115:264–70.
- 11 Ramirez MT, Alvarez-Sala R, Martinez M, *et al.* Thoracic aortic aneurysm: a new etiology of pulmonary cavity. *J Cardiovasc Surg* 1999;40:281–3.

Copyright 2015 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <http://group.bmj.com/group/rights-licensing/permissions>.
BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Become a Fellow of BMJ Case Reports today and you can:

- Submit as many cases as you like
- Enjoy fast sympathetic peer review and rapid publication of accepted articles
- Access all the published articles
- Re-use any of the published material for personal use and teaching without further permission

For information on Institutional Fellowships contact consortiasales@bmjgroup.com

Visit casereports.bmj.com for more articles like this and to become a Fellow