CASE REPORT

Air column beside the trachea

Vijay Hadda, Rohit Kumar, Karan Madan, Anant Mohan

Department of Pulmonary
Medicine and Sleep Disorders,
All India Institute of Medical
Sciences, New Delhi, India

Correspondence to
Dr Vijay Hadda,
vijayhadda@yahoo.com

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SUMMARY

A 60-year-old man, a non-smoker, was referred to us for evaluation of an abnormal chest radiograph that had been taken 2 months earlier when the patient had fever and cough. The fever and cough had subsided after treatment with antibiotics. The patient was asymptomatic at the time of presentation to us. Examination was unremarkable. The chest radiograph showed an air pocket in the right paratracheal region. The diagnosis and differential diagnoses are discussed in this case report.

BACKGROUND

Radiograph of the chest is a common investigation, often performed as screening for respiratory and non-respiratory conditions. Most of the time, abnormalities are not found in chest radiographs in the absence of respiratory symptoms. However, in a few patients, it can be a useful investigative tool to pick up abnormalities that are asymptomatic. The abnormality may be localised to the neck (paratracheal) or chest (lungs, pleura or bones) and may be diffuse or localised. We present a case of a patient who presented with respiratory symptoms and underwent a chest radiograph, which showed an abnormality.

CASE PRESENTATION

A 60-year-old man, a non-smoker, was referred to us for evaluation of an abnormal chest radiograph. The radiograph had been performed 2 months prior during a bout of fever and cough. At the time, he had no history of chest pain or haemoptysis. He had received oral antibiotics after which his fever and cough subsided. As the radiograph had shown an abnormality, he was asked to go to a specialist centre. When he came to the outpatient department of our hospital, he had no symptoms. He had no history of chronic cough, neck swelling, dysphagia, regurgitation of food, coughing after eating, weight loss or change in voice. He denied any history suggestive of tuberculosis, pneumothorax or connective tissue disease. On examination, he was afebrile with stable vital signs. He had no pallor and no significant peripheral lymphadenopathy. On examination, the trachea was deviated to the left. There was no swelling in the neck at rest or after Valsalva manoeuvre. Examination of the chest, abdomen, cardiovascular and nervous system was unremarkable.

INVESTIGATIONS

Blood examination revealed normal haemoglobin (13.8 g/dL) and leucocyte counts (8700/mm³). The patient's blood chemistry including sodium (144 mg/dL), potassium (4.7 mg/dL), urea (27 mg/

dL), creatinine (1.0 mg/dL), calcium (9.1 mg/dL), phosphate (3.3 mg/dL), bilirubin (0.4 mg/dL), serum glutamic-oxaloacetic transaminase (29 U/L) and glutamic pyruvic aminotransaminase (34 U/L), alkaline phosphatase (271 U/L), total protein (7.0 g/dL) and albumin was unremarkable. He was carrying the radiograph of the chest along with him (figure 1), which showed a tubular air pocket adjacent to the trachea, on the right side (figure 1). The air pocket was cylindrical in shape and had distinct borders separating it from the right lung apex and trachea. The radiograph also showed blunting of the right costophrenic angle. There was mild scoliosis of the vertebral column. A few fibrotic bands were also seen in the mid-zone and lower zone of the right hemithorax. The tubular air pocket that was seen on the right side of the trachea could have originated from the trachea, larynx, pharynx or apex of the lung. For further evaluation, CT scan of the chest and neck was carried out. The CT scan of the thorax showed a 2.4×3.7×5.7 cm air-filled sac, on the right side of the trachea in close proximity to the posterior-lateral wall of the trachea (figure 2). There were no cartilaginous structures in the walls of the sac. The tracheal and right and left bronchial diameters were 2.5 (transverse) × 2.0 cm (anterior posterior) and 1.2 (right) and 1.1 (left) cm, respectively. The air pocket had no communication with the pyriform fossa, larynx, oesophagus or the ipsilateral lung. It contained only air and had no fluid density and no lung markings within it. A few fibrotic bands were also noticed in the right lower lobe. The CT scan also showed pleural thickening on the right side. The mediastinal structures and overlying bones were normal. A flexible bronchoscopy performed did not show any opening in the trachea.

DIFFERENTIAL DIAGNOSIS

Tracheal diverticulum, laryngocoele, pharyngocoele, Zenker's diverticulum, apical hernia of the lung and apical paraseptal bleb or bullae.

TREATMENT

The patient was asymptomatic, therefore only a simple explanation was required. However, he was asked to remain in follow-up.

OUTCOME AND FOLLOW-UP

On the basis of the clinicoradiological picture, we made a diagnosis of tracheal diverticulum. A flexible bronchoscopy performed did not show any opening in the trachea. Since the patient was asymptomatic, conservative management was advised with regular follow-ups. He was last seen approximately 3 months following the first visit and was asymptomatic.

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Figure 1 Chest radiograph shows a tubular air pocket adjacent to the trachea, on the right side. The air pocket is cylindrical in shape and has distinct borders separating it from the right lung apex and trachea. The radiograph also shows blunting of right costophrenic angle due to incidental infection. There is mild scoliosis of the vertebral column. A few fibrotic bands are also seen in the mid-zone and lower zone of right hemithorax. The tubular air pocket that is seen on the right side of the trachea may have originated from the trachea, larynx, pharynx or apex of the lung.

DISCUSSION

Tracheal diverticulum presents as an air containing sac at the level of the thoracic inlet. CT scan is the most effective method for evaluating the presence and features of tracheal diverticula.¹ Tracheal diverticula may be acquired or congenital in origin.² An acquired tracheal diverticulum results from increased intraluminal pressure causing mucosal herniation through the weak points, most commonly in the right posterolateral trachea at the level of the thoracic inlet. The almost exclusive location of these diverticula is attributed to the relatively unsupported right posterior wall while the left posterior wall is supported by the oesophagus. The acquired diverticula usually present as a large single sac with a wide communication with the trachea. On CT scan, the wall of the sac is thin and lacks cartilaginous structure. Histological examination shows a thin-walled cyst lined with normal respiratory epithelium without smooth muscle and cartilage. In contrast, congenital tracheal diverticulum represents a malformed, vestigial, supernumerary budding of the trachea and consists of multiple sacs with a narrow communication. CT scan usually reveals single or multiple sacs containing mucous with a thick wall containing smooth muscle and cartilage. Histology shows the complete tracheal anatomy (ie, epithelium, smooth muscle and cartilage).^{3 4} These cysts are often seen in association with other aerodigestive anomalies such as Mounier-Kuhn disease and trachea-oesophageal fistula.

On CT scan, laryngocoeles are usually seen as well-circumscribed lesions arising beneath the false vocal cords. These are easily identified due to presence of air, and are reflected as very low density (approximately -1000 HU) lesions on CT scan. Communication with the laryngeal airway may be seen, particularly if thin sections are used.⁵ The pharyngocoele

Figure 2 CT scan of the thorax shows a 2.4×3.7×5.7 cm air-filled sac, on the right side of the trachea, in close proximity to the posterior-lateral wall of the trachea. There are no cartilaginous structures in the walls of the sac. It has no communication with the pyriform fossa, larynx, oesophagus or the ipsilateral lung. It contains only air and has no fluid density and no lung markings within it. A few fibrotic bands can also be seen in the right lower lobe. The CT scan also shows pleural thickening on the right side. The mediastinal structures and overlying bones appear normal.

commonly arises from the piriform sinus. CT scan is very helpful in differentiating pharyngocoeles from laryngocoeles. In cases of pharyngocoele, imaging can clearly demonstrate the communication with the air sac and the piriform sinus whereas the laryngocoele is seen arising from the dilated laryngeal ventricle.⁶ If the CT scans show continuity of radiolucency in the remainder of the lung, this can help to differentiate apical hernias from oesophageal diverticula. Similarly, air-fluid levels in oesophageal diverticula can differentiate oesophageal diverticula from apical lung hernias, which will show lung parenchymal markings.⁷

In most cases, CT scan of the thorax and neck can demonstrate the location as well as the communication of the air sac with the surrounding organ. However, sometimes the communication with airway, pharynx or oesophagus is not appreciated in CT scans. In such cases, delineation of the pharynx and oesophagus with barium swallow or direct examination of the trachea (bronchoscopy), and pharynx and oesophagus (pharyngo-oesophagoscopy) may be invaluable. A barium swallow can allow visualisation of the outpouching from the pharynx (in case of a pharyngeal diverticulum). At barium pharyngography, Zenker's diverticula are usually located in the midline or slightly to the left of midline on anteroposterior images, and extend posteriorly and inferiorly on lateral images.⁸ Pharyngo-oesophagoscopy may be used for direct visualisation of the communication of air sac with pharynx or oesophagus.

Bronchoscopy theoretically seems a useful tool to demonstrate the communication between air sac with the trachea, and a few case reports have shown it successfully.^{9 10} However, in one series, no opening was identified among all 19 patients with tracheal diverticula who underwent bronchoscopy.¹¹ This may be because the opening is too small to appreciate on bronchoscopy. Even percutaneous indocyanine green has been used to demonstrate the opening of the paratracheal sac in the trachea.¹²

Tracheal diverticula are rarely symptomatic and the majority are discovered as incidental findings on routine radiological investigations. Asymptomatic tracheal diverticulum does not require further treatment. However, in young, symptomatic patients (due to compression on surrounding structures or recurrent infection or haemoptysis), in whom conservative management, mucolytics and physiotherapy fail, surgical interventions are resorted to. The surgical approach most commonly described is resection via transverse or lateral neck dissection. Other techniques that have been tried include fulguration, endoscopic cauterisation with laser or electrocoagulation and endoscopic division with biopsy forceps.³

Learning points

- ▶ An asymptomatic abnormal air column beside the trachea on chest radiograph is uncommon.
- ▶ The differential diagnoses of such abnormalities include—tracheal diverticulum, laryngocoele, pharyngocoele, Zenker's diverticulum, apical hernia of the lung and apical paraseptal bleb or bullae.
- ▶ CT scan of the thorax and neck with or without bronchoscopy and barium swallow can establish the diagnosis.
- ▶ An asymptomatic tracheal diverticulum does not require treatment.

Competing interests None declared.

Patient consent Obtained.

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REFERENCES

- 1 Polverosi R, Carloni A, Poletti V. Tracheal and main bronchial diverticula: the role of CT. *Radiol Med* 2008;113:181–9.
- 2 Soto-Hurtado EJ, Peñuela-Ruiz L, Rivera-Sánchez I, *et al*. Tracheal diverticulum: a review of the literature. *Lung* 2006;184:303–7.
- 3 Teh BM, Hall C, Kleid S. Infected tracheocoele (acquired tracheal diverticulum): case report and literature review. *J Laryngol Otol* 2011;125:540–5.
- 4 Early EK, Bothwell MR. Congenital tracheal diverticulum. *Otolaryngol Head Neck Surg* 2002;127:119–21.
- 5 Huang BY, Solle M, Weissler MC. Larynx: anatomic imaging for diagnosis and management. *Otolaryngol Clin North Am* 2012;45:1325–61.
- 6 Holinger LD, Barnes DR, Smid LJ, *et al*. Laryngocoele and saccular cysts. *Ann Otol Rhinol Laryngol* 1978;87(Pt 1):675–85.
- 7 McAdams HP, Gordon DS, White CS. Apical lung hernia: radiologic findings in six cases. *AJR Am J Roentgenol* 1996;167:927–30.
- 8 Tao TY, Menias CO, Herman TE, *et al*. Easier to swallow: pictorial review of structural findings of the pharynx at barium pharyngography. *Radiographics* 2013;33:e189–208.
- 9 Carmona Soto P, Congregado M, Loscertales J. Acquired tracheal diverticulum as the cause of complicated orotracheal intubation. *Arch Bronconeumol* 2012;48:64–5.
- 10 Pinot D, Breen D, Piloni JM, *et al*. An incidental finding in a 34-year-old Male under investigation for haemoptysis. Diagnosis: the radiological and endoscopic images demonstrate a complex defect along the posterior tracheal wall consistent with acquired tracheal diverticulum. *Eur Respir J* 2009;33:1227–9.
- 11 Goo JM, Im JG, Ahn JM, *et al*. Right paratracheal air cysts in the thoracic inlet: clinical and radiologic significance. *AJR Am J Roentgenol* 1999;173:65–70.
- 12 Tanaka H, Igarashi T, Teramoto S, *et al*. Lymphoepithelial cysts in the mediastinum with an opening to the trachea. *Respiration* 1995;62:110–13.

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