Asymptomatic renal thoracic ectopia, pulmonary hypoplasia, and Bochdalek hernia

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Abstract
Right sided intrathoracic kidney associated with ipsilateral pulmonary hypoplasia and Bochdalek hernia in a 13 year old girl was diagnosed by computed tomography.

Renal ectopia in the thoracic cavity is very rare, being found in less than 0.01% of necropsies, and most cases occur in males and in the right thoracic cavity (the liver being supposed to impede migration on the right). We report a case in a girl who had a right thoracic kidney associated with pulmonary hypoplasia and herniation of liver into the thoracic cavity.

Case report
A 13 year old white girl was referred via the school BCG service after a positive response to the Mantoux test during routine screening. She was apparently fit and well, and denied any respiratory or systemic symptoms. She had no significant past medical history but had been given BCG vaccination at birth in accordance with the policy of the nursing home where she was born.

On examination she was of normal stature (height 1.70 m, weight 39.4 kg), and a scar was evident over the left deltoid. The radial pulse was 70/min (regular), blood pressure 90/65 mm Hg, and the apex beat 2 cm lateral to the right sternal border in the fourth interspace. Heart sounds were normal but heard maximally over the sternum. The trachea was central but the percussion note was dull in the right mid and lower zones. Breath sounds were quiet but vesicular over that area anteriorly; an area of bronchial breathing was audible posteriorly. Examination of the left hemithorax was normal except for the absence of physiological cardiac dullness. Abdominal examination showed nothing remarkable.

Posteroanterior and right lateral chest radiographs (fig 1) showed the heart to be displaced to the right and the right lung to be of reduced volume, with the aortic arch apparently lying to the left. An unusual vessel was seen in the right lower zone with a rounded opacity at the right base posteriorly. The overall appearances were thought consistent with a sequestration and associated hypoplastic lung. The electrocardiogram was within normal limits. Formal pulmonary function testing showed FEV₁ to be 1.4 and 1.5 litres (69% and 65%, predicted); total lung capacity was 2.08 litres (70%, predicted).

Thoracic computed tomography (fig 2) confirmed the right lung to be small and of

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**Figure 1** (a) Posteroanterior and (b) right lateral chest radiographs showing a rounded mass at the right base posteriorly and a second, smaller mass anteriorly. The heart is displaced to the right and the right lung is of reduced volume.
Figure 2  Computed tomogram of thorax with contrast enhancement showing intrathoracic kidney (K), liver (L), and heart (H).

diminished vascularity, consistent with hypoplasia; the left lung was normal. The thymus was seen to lie anterior to the aortic arch with the heart displaced considerably to the right. The opacity at the right base was shown to be kidney, occupying an oblique position in the costovertebral angle with its pelvis directed downwards. Contrast was both taken up and excreted normally. The second opacity, lateral to this, was seen to be liver.

Discussion

The clinical and radiological appearances of this case are of ectopic right thoracic kidney with associated hypoplasia of the right lung and herniation of liver into the thoracic cavity. As liver was present in the thoracic cavity we presume our case to be associated with herniation through the foramen of Bochdalek. This combination was originally thought to account for most cases of renal thoracic ectopia, but being supposed that failure of fusion of the pleuroperitoneal membrane with the septum transversum (normally complete eight weeks after conception) allowed the upward migration of the kidney from the pelvis to continue unimpeded into the chest. It has also been suggested that the hernial orifice might in fact be secondary to a disturbance of the involution of the upper mesonephros or a delay in its caudal migration such that it prevented closure of the diaphragm. More recently, however, only 0.25% of intrathoracic kidneys have been found in association with a Bochdalek hernia.

Our case, with its associated pulmonary hypoplasia, has several similarities with the case reported by Fusonie and Molnar. They also found sequestration of the right lower lobe, partial anomalous venous drainage, and a partial defect of the pericardium, though abdominal aortography, right heart angiography, and bronchography were required to elucidate the abnormalities. While intravenous urography has superseded the previously mandatory thoracotomy in the diagnosis of simple intrathoracic kidney, computed tomography must now be considered the investigation of choice even in more complex cases. The nature and adequate functioning of the radiologically abnormal structures were easily demonstrated by this method, and in the absence of symptoms it was neither necessary nor appropriate to proceed further.

Renal ectopia should always be considered in the differential diagnosis of a posterior thoracic mass. It and more complex abnormalities may now be confidently diagnosed without resort to invasive procedures.