CASE REPORT

A case of left Bochdalek hernia

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Abstract

Thoracic kidney is a very rare form of renal ectopia representing less than 5% of all ectopic kidneys. Ealry visualisation through functional radionuclide imaging, both pre- and post-surgery, helps in assessing the function and the location of the organs involved. We present a case of a 7-month-old boy with surgical closure of left-sided congenital diaphragmatic hernia. ^{99m}Tc-DMSA scan was performed to localise the kidney and estimate the split renal function and a ^{99m}Tc-MAA lung perfusion scan was performed to assess the relative lung function. The DMSA scan confirmed the presence of the left kidney in the left hemi-thorax and the perfusion lung scan showed reduced pulmonary perfusion on the left secondary to the left diaphragmatic renal hernia.

Key words*: Renal cortical scan, perfusion lung scan, intrathoracic kidney, Bochdalik hernia*

Introduction

Intrathoracic renal ectopia denotes either a partial or a complete protrusion of kidney above the level of the diaphragm into the posterior mediastinum. Thoracic kidney is a very rare form of renal ectopia representing less than 5 percent of all ectopic kidneys. We present renal cortical scintigraphy and pulmonary perfusion imaging in a case of a left sided renal diaphragmatic hernia where the radionuclide imaging provided relevant information on the organ function and location.

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Case report

A 7-month-old boy with prenatal diagnosis of congenital diaphragmatic hernia was operated 35 days after delivery for surgical closure of left-sided congenital diaphragmatic hernia. The patient was referred to the nuclear medicine department for a perfusion lung scan to assess individual lung function and renal cortical scintigraphy to localize the kidney and to estimate the split renal function. Perfusion lung scan was performed using a dual-headed gamma camera with low energy general purpose collimators. Multiple static images of the chest were acquired after IV injection of 74 MBq of ^{99m}Tc-macro aggregated albumin (^{99m}Tc-MAA). The perfusion lung scan showed severe diffuse reduction of uptake affecting the left lung with the right lung showing normal uptake (Figure 1). Next, a planar static renal cortical scan was performed in the anterior, posterior and posterior-oblique projection 2 hours after IV injection of 74 MBq ^{99m}Tc-DMSA (Figure 2). The DMSA renal scan confirmed the presence of the left kidney in the left hemi-thorax compressing the left lung but both kidneys were seen to contribute equally to the total renal function. An abdominal ultrasound was also performed as a part of the diagnostic workup of the patient (Figure 3).

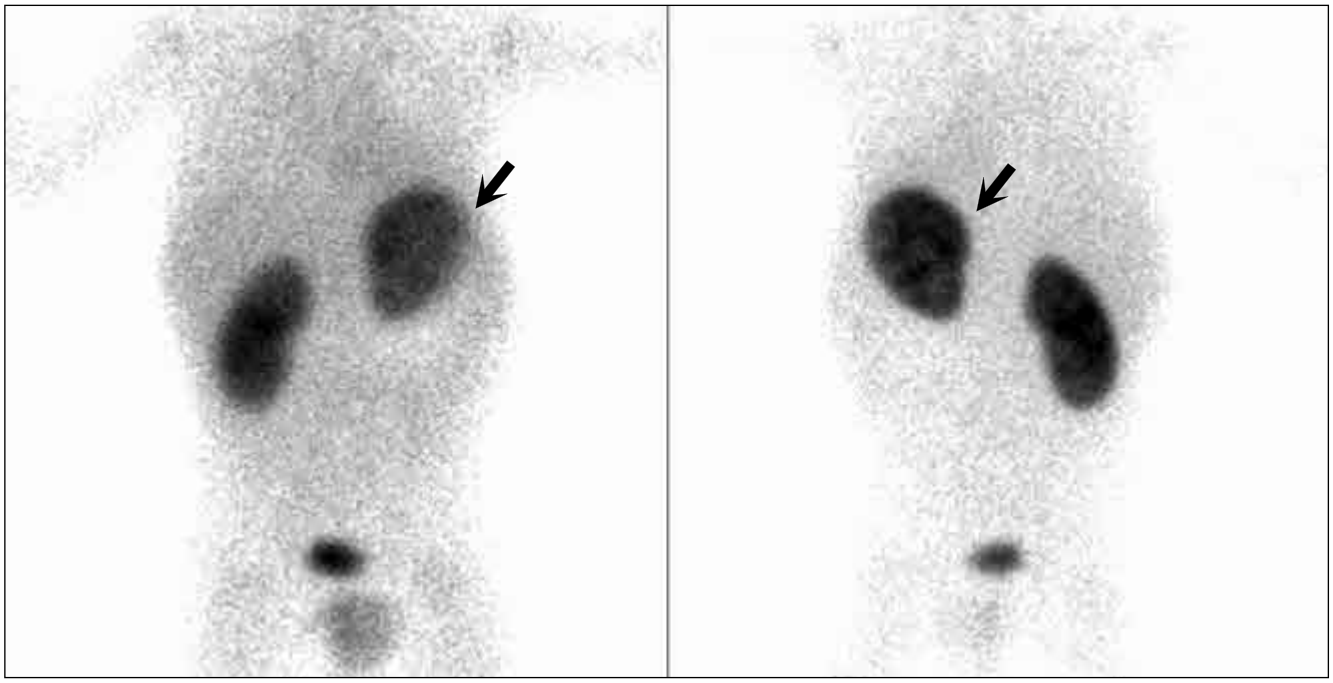

Figure 1 *^{99m}Tc-DMSA scan in the anterior (right) and the posterior (left) projections showing left kidney in the lower chest (arrows)*

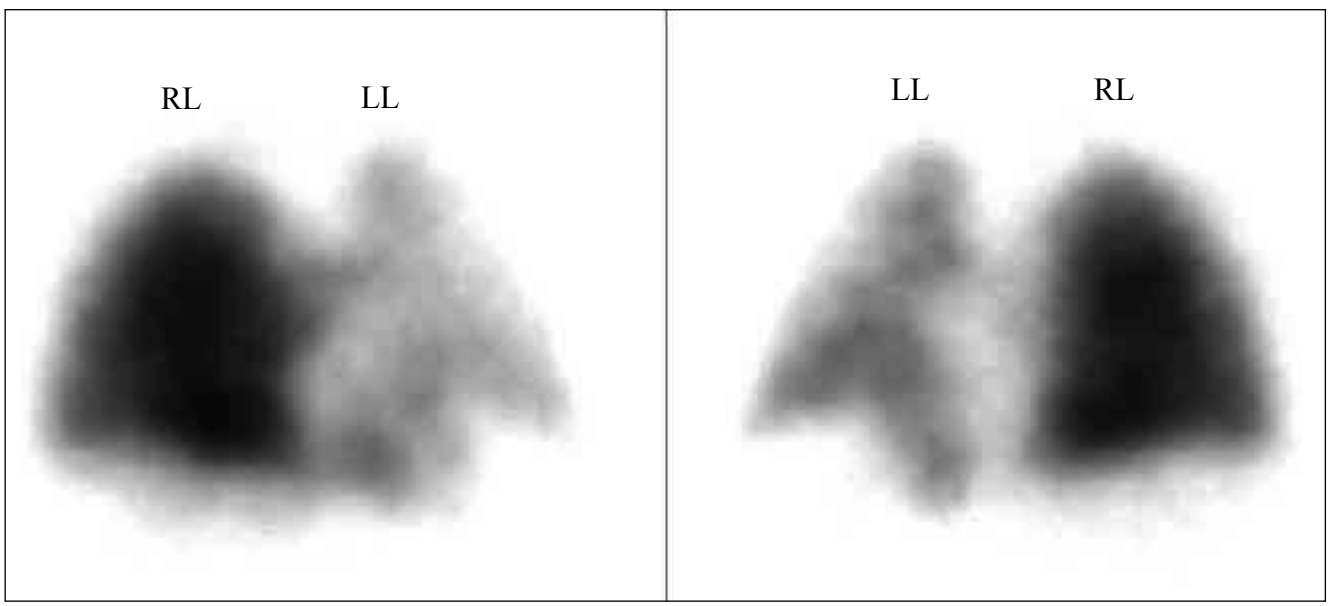

Figure 1 *^{99m}Tc-MAA perfusion lung scan in the anterior (right) and the posterior (left) projections showing a normally perfused right lung (RL) and a hypoperfused left lung (LL) with a focal defect (arrows) corresponding to the herniated left kidney*

Discussion

Congenital diaphragmatic hernias are usually a lethal birth defect, associated with a 30-50% mortality rate [1]. Two types of congenital hernias occur, anterior (Morgagni) and posterior (Bochdalek); both types can occur on either side but are more common on the left. The canal on the right closes earlier and is also "plugged" by the liver on the right

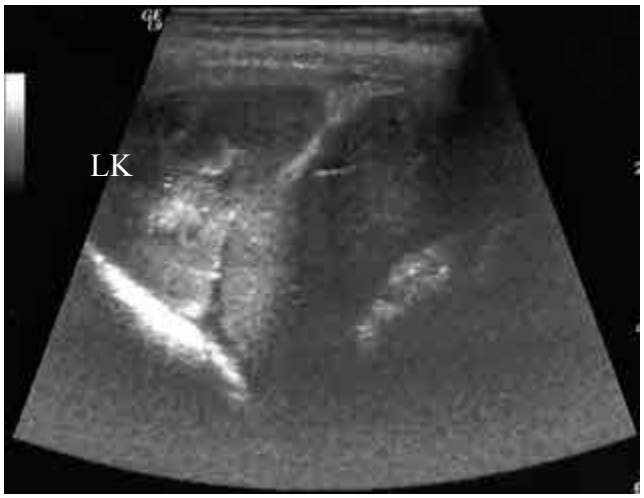

Figure 3 *Ultrasound showing the left kidney (LK) in the thorax*

accounting for hernias rarely occurring on the left. In 1848, Bochdalek first described the failure of fusion of the posterolateral foramina in the pleuroperiotnal folds and the resultant herniation. Most Bochdaleck hernias are diagnosed in neonates and children and present with acute respiratory symptoms. Since 1988, at least 140 cases with thoracic kidney have been reported in the literature with an apparent left-sided predominance and a male to female ratio of 2:1 [2].

Intrathoracic renal ectopia results in either a partial or a complete protrusion of kidney above the level of the diaphragm into the posterior mediastinum. The renal vasculature and the ureter enter and exit from the pleural cavity through the foramen of Bochdalek. The ureter is elongated to accommodate the excessive distance to the bladder. The lower lobe of the adjacent lung may be hypoplastic secondary to compression by the kidney mass [3]. Frequently CDH is associated with pulmonary hypoplasia involving the ipsilateral lung, which may lead to pulmonary hypertension and associated complications [4]. CDH is a disease of impaired lung development associated with, but not caused by, a structural defect of the diaphragm. In addition to pulmonary hypoplasia, numerous other disorders (e.g. surfactant deficiency, decreased anti-oxidant activity, increased vascular reactivity with decreased nitric oxide and increased endothelin-1 activity, and left heart hypoplasia may be associated with impaired lung development [5].. The diagnosis of pulmonary hypoplasia in patients with CDH is best diagnosed by a perfusion lung scan [6].

Both pre- and post-surgical assessment of the function of the organs herniated kidney and the affected lung is useful in patient management and surgical intervention. Nuclear medicine techniques are invaluable in the in vivo assessment of the function of the organs affected by the diaphragmatic hernia.

Conclusion

The scan findings here reflected the failure of the surgery to close the left diaphragmatic hernia after delivery, with a persistent ectopic left kidney in the chest. The DMSA renal scan not only delineated the physical location of the ectopic kidney but also confirmed the function integrity of the ectopic organ. The perfusion lung scan demonstrated the physiological sequelae of the diaphragmatic hernia on the pulmonary vasculature and function.

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