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Case report

Thoracoscopic repair of renal ectopia associated with congenital diaphragmatic hernia: Report of two cases

R.S. Kamble [a,*], R.K. Gupta [a], A.R. Gupta [a], R. Marchant [b], P.R. Kothari [a], V. Dikshit [a], G.A. Kekre [a], P.S. Patil [a], K. Mudkhedkar [a]

[a] *Department of Pediatric Surgery, LTMMC & LTMG Hospital, Sion, Mumbai, India*
[b] *Consultant Paediatrician, Ex Dean Wadia Hospital, Mumbai, India*

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Abstract
Renal ectopia is a rare anomaly which may occur due to an abnormal ascent of the kidney. It is usually asymptomatic and does not require treatment. Intrathoracic renal ectopia with concomitant congenital diaphragmatic hernia (CDH) is extremely rare. All symptomatic CDH cases must be treated with open or thoracoscopic repair. During plication of the diaphragm, care must be taken to avoid renal injury. Following, we present two rare variants of CDH with concomitant renal ectopia managed thoracoscopically. Post-operative recovery was uneventful. Doppler ultrasound study performed one month after surgery confirmed normal vascularity of the kidneys and the absence of urinary outflow obstruction.

Case presentation

Case 1

An 8-month-old female child presented with cough and fever of 5 days' duration. She had had similar episodes twice before. The results of hematological investigations and blood gas analysis were within normal limits. Chest radiography done on admission showed a round homogeneous shadow in the left lower part of the thorax in the para-vertebral region (Fig. 1). Thorax CT revealed herniation of the left kidney with its vascular pedicle protruding through a posteromedial defect in the diaphragm. No other organs were involved (Fig. 2).

After treatment of the patient's respiratory condition with antibiotics and nebulization, she was scheduled for thoracoscopic repair. Thoracoscopy revealed a posteromedial defect in the diaphragm with a thin membrane. The left kidney could easily be identified in the

* Corresponding author at: Department of Pediatric Surgery, LTMMC and LTMG Hospital, Sion, Mumbai, Maharashtra 400022, India.
E-mail address: drkambleravi80@gmail.com (R.S. Kamble).

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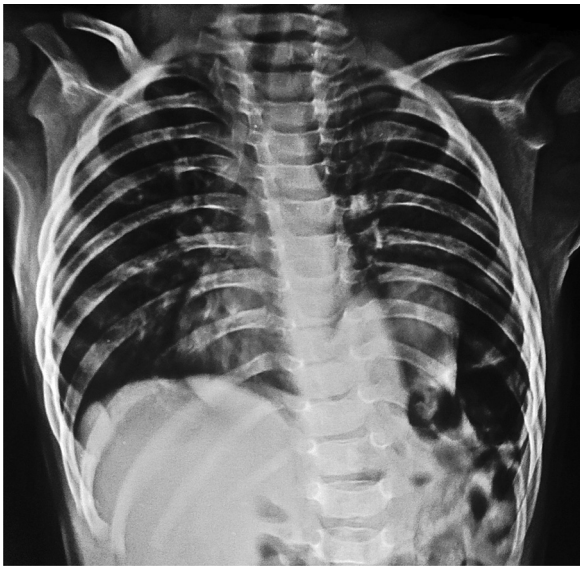

Figure 1 Case 1 – chest radiograph showing a round radio-opaque shadow to the left side of the heart.

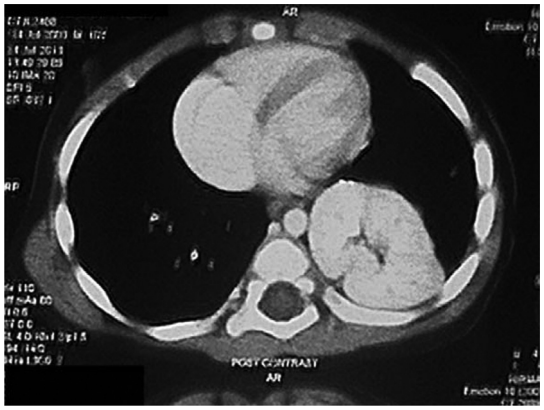

Figure 2 Case 1 – thorax CT showing isolated herniation of the kidney in the left thoracic cavity.

hernia sac (Fig. 3). A pneumothorax was created using the CO_2 insufflator at a pressure of 6 mmHg and a flow rate of 2 L/min. The hernial contents were reduced easily with a little push to the kidney. Plication of the diaphragm was done, taking care to place the sutures at a short distance from the kidney to avoid renal and vascular injury. Post-operative recovery was uneventful. One month after surgery, renal Doppler ultrasonography showed normal vascularity of the left kidney without any narrowing of the renal vessels or urinary outflow obstruction.

Case 2

A 10-year-old female child, a known case of Down's syndrome with a large ventricular septal defect (VSD) and convulsive disorder, presented with a history of dull aching abdominal pain of 2 months' duration. She had a history of repeated attacks of respiratory infection. Chest X-ray showed bilateral infiltrates. The results of hematological investigation were normal, as were those of blood gas analysis. Ultrasonography revealed that the right kidney had been dislocated into the thorax, just above the liver, and that it had

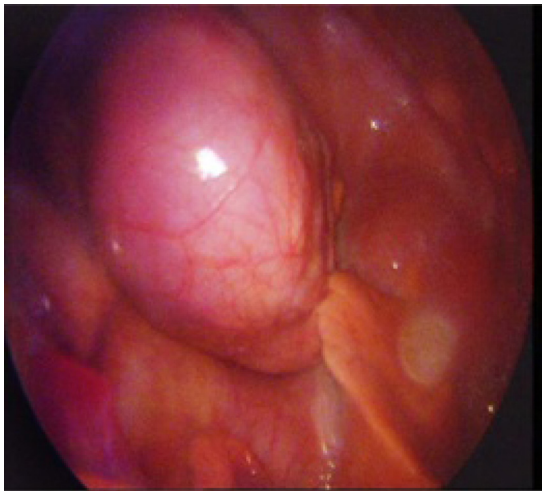

Figure 3 Case 1 – thoracoscopic view of the herniating left kidney.

herniated through a defect in the diaphragm along with some bowel loops. The liver and the left kidney were in their normal positions. CT scan revealed herniation of the right kidney with bowel loops through a posterolateral defect in the right dome of the diaphragm. The right kidney was malrotated and located high up above the liver (Figs. 4 and 5).

After treatment of the child's respiratory condition, she was scheduled for thoracoscopic repair. Thoracoscopy revealed a large posterolateral defect of the diaphragm with a thin membrane (Fig. 6). A bulge in the kidney was seen posteriorly. A pneumothorax was created using the CO_2 insufflator at a pressure of 8 mmHg and a flow rate of 2 L/min. The hernial contents were reduced and plication of the diaphragm was done, taking care to avoid renal and/or vascular injury. Postoperative recovery was uneventful. Abdominal ultrasonography with renal Doppler study carried out one month after surgery showed normal vascularity of the kidney and normal renal vessels without any narrowing or kinking. It also showed that the kidney was located just below the liver and was malrotated, but without any hydronephrosis or hydroureter.

Both patients are on regular follow-up and have not had any renal symptoms since.

Discussion

Renal ectopia is an anomaly, which may occur due to an abnormal ascent of the kidney. Ectopic kidney occurs in one in 1000 patients, but only 1% of these get diagnosed [1]. Mostly, these patients are asymptomatic and the condition is usually detected incidentally during evaluation for unrelated conditions. Intrathoracic renal ectopia is rare and represents less than 5% of all renal ectopia cases [1,2]. The first case of intrathoracic kidney was reported by Wolfromm in 1940 [3].

Pfister-Goedeke and Brunier [4] classified thoracic kidneys into 4 groups: thoracic renal ectopia with closed diaphragm, eventration of the diaphragm, diaphragmatic hernia (congenital diaphragmatic defects or acquired hernia such as Bochdalek hernia), and traumatic rupture of the diaphragm with renal ectopia. Congenital