

Intra-thoracic kidney: A case report and literature review

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Date Received: Sep 04, 2019

Date Accepted: Nov 16, 2019

Declaration of conflicting interests

The Authors declares that there is no conflict of interest.

Abstract: Intra-thoracic kidney is a rare entity with variable presentation ranging from asymptomatic to recurrent chest infections and more common in males. Various modalities can be used to diagnose the condition and its associated structural abnormalities. We hereby present a case of 5 years old child who had chronic cough and intra-thoracic kidney was found in right chest which was confirmed with CT scan. Radiological knowledge of this rare condition can avoid undue investigations and reduce morbidity to patient.

Key Words: Intra thoracic; Kidney; Diagnose

This case report may be cited as: Ahmad W, Gul P, Zaheer I, Mian M, Aleemi S. Intra-thoracic kidney: A case report and literature review. Pak J Chest Med 2019; 25 (4):189-191

Introduction

Intra-thoracic kidney is a partial or complete protrusion above the level of the diaphragm and it is a rare form of renal ectopia accounting for less than 5% of all renal ectopies.^{1,2} Its prevalence is 1:10,000 cases with incidence of about 0.5-5% and found three times more in males than females.² The occurrence is rarely bilateral and commonly involves left kidney. It usually presents as asymptomatic incidental mass on chest radiographs³ which can be confirmed by CT or MRI and does not require any surgical intervention.

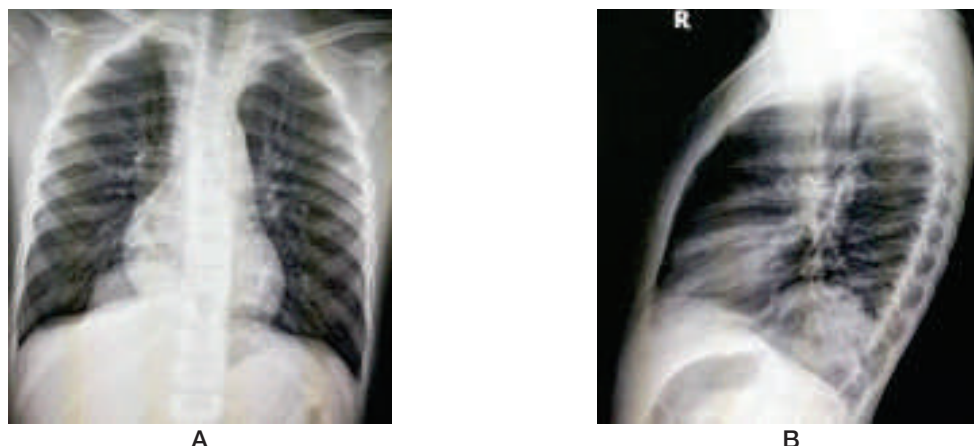
CASE REPORT

A 5-year-old male child presented to pediatric OPD clinic which symptoms of chronic cough and recent onset fever. No past history of trauma was

documented. He was febrile and had basal crepitations on clinical examination. His labs showed mildly elevated WBC with value of 14,000/mm. Other labs were unremarkable. Chest radiograph done as part of initial work up showed a well demarcated right medial basal opacity that was confirmed on subsequent lateral projection (Fig.1). Contrast enhanced CT chest including the upper abdomen was planned for further assessment that showed a right intra-thoracic kidney (Fig.2). It had normal venous drainage in to the IVC and the arterial supply was from the aorta. No associated structural anomalies were identified.

Discussion

Normal anatomical location of kidneys is along the transverse processes of T12-L3 vertebral bodies. They start developing in the pelvis in 4th week of



gestation and ascend to their normal position in 6th-8th weeks of gestation. An ectopic kidney results from incomplete, excessive or abnormal ascent. It may result from abnormalities of ureteric bud, metanephros, an abnormal vascular supply or genetic abnormalities. The most common sites of renal ectopia are left pelvis and lower abdomen that is caused by arrested ascend during the gestational period.⁴ In postmortem studies, the incidence of renal ectopia varies from 1 in 500 to 1 in 1290. In one study of 15,919 autopsies of children only one case of intra-

thoracic ectopic kidney was detected out of 22 cases of renal ectopia.⁵

Many embryological theories have been proposed for the intra-thoracic ectopia. It might be due to accelerated cephalic migration or delayed development of diaphragm where it may or may not be associated with a congenital diaphragmatic hernia.⁴ However this presumed mechanism of renal ectopia is still under discussion because only very small number of cases i-e < 0.25% is associated with congenital

Fig. 1. Chest radiograph frontal (A) and right lateral projection (B) showing postero-medial opacity in right lung base. The upper margin of the opacity was well demarcated (blue arrow).

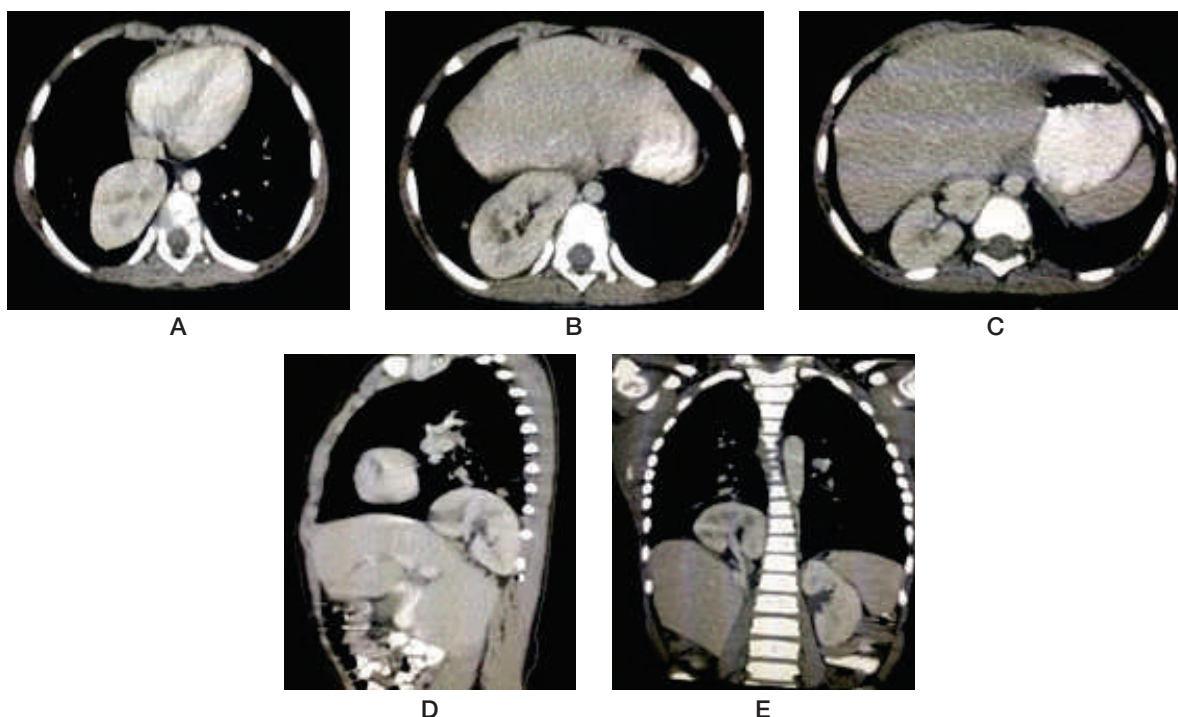


Fig. 2. Contrast enhanced CT axial (A, B & C), sagittal (D) and coronal (E) reformatted images showing mal-rotated, horizontally orientated right intra-thoracic kidney is seen in postero-medial lung base (blue arrows). Venous drainage into IVC is noted (white arrow).

diaphragmatic hernia.⁴ The other possible explanation could be due to inadequate influence of liver or adrenal glands or it might be due to intrinsic factors such as persistence of nephrogenic cord.³ Also the cephalic movement of metanephric blastema and involution of mesonephric tissue in the opposite direction are main factors determining the final renal position in the body. If there is delay in involution process, the kidney can be displaced superiorly due to excessive development of renal tract.

Intra-thoracic kidney occurs slightly more frequently on the left due to early development of pleuro-peritoneal membrane and partly due to liver. Almost 50% of cases remain asymptomatic and remain undetected.⁵ Generally intra-thoracic kidneys do not show dysplastic anomalies; however, there may be some associated structural abnormalities such as lobulated or deformed shape, long ureter, ectopic origin of the renal vessels, hilum facing inferiorly and medially rotated lower pole.² Additional malformations of cardiovascular, respiratory, genital and skeletal anomalies are also seen. Skeletal anomalies are mostly scoliosis and hemi-vertebrae. Some genetic disorders as trisomy 13 and 18 might be associated with it. 10 The contra-lateral kidney is abnormal in almost 50 % of the cases. Contra-lateral renal agenesis occurs in almost 10 % of cases.

The intra-thoracic kidney, in most of the cases, is detected incidentally when patient is investigated for some other respiratory illness or on abdominal ultrasound the search is made to locate the missing kidney in normal anatomical location. In paediatric patients, on CXR the differential would include Bochdalek hernia, neurofibroma or a pericardial cyst and in adults, posterior mediastinal, diaphragmatic, plural and pulmonary lesion are main differentials. It is essentially important to put the intra-thoracic kidney in differentials when dealing with basal chest lesions in order to avoid unnecessary investigations or interventions.

Ultrasound is a safe and non-invasive procedure to detect the ectopic kidney.³ CT, MR-Urography and nuclear scan are additional modalities for detecting the problem; however, DTPA scan should be performed to rule out any functional abnormalities. 6

Generally, no treatment is recommended for asymptomatic intra-thoracic kidney with follow up on regular intervals. The children with symptoms, generally with associated hernia and herniation of abdominal contents are treated with hernia repair and nephropexy.

Conclusion

Intra thoracic kidney is a rare condition which remains a challenge for the clinician. Radiological investigations remain main diagnostic tool for its detection and associated anomalies / possible complications and also to avoid any further unnecessary investigations.

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