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CASE REPORT

PREVALENCE OF RENAL ECTOPIA BY IMAGING

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ABSTRACT

Thoracic kidney is a rare anomaly; the rarest of all renal Ectopia types. Patients with thoracic kidneys are usually asymptomatic and the condition is discovered during radiological evaluation for other conditions. Here we describe a case of thoracic kidney in an 8 year old female who came with a history of pain in right iliac fossa; The Ultrasonography of abdomen showed the evidence of renal Ectopia on right side. No other anomalies were noticed.

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INTRODUCTION

Kidneys are normally located in the retroperitoneal position on either side of vertebral column; against the psoas major muscle; but when not at such position; it is called as renal ectopia or ectopic kidney (Muhammad Asghar, 2008). Thoracic kidney is a rare type of ectopia. It represents less than 5% of all patients of renal ectopia (Menshah and Forson, 2010; Yazici and Akgun, 2007). Most of the cases are asymptomatic and are discovered incidentally on routine chest radiography, thoracotomy, intravenous urography (IVU), ultrasonography (USG) which can indirectly suggest the possibility of thoracic ectopia, computed tomography (CT) or magnetic resonance imaging (MRI) (Menshah and Forson, 2010; Yazici and Akgun, 2007). The ectopic kidneys have been found in a frequency of 1:500 to 1:110 and one normal kidney and one ectopic kidney in 1:3000 (Amudha Govindarajan and Jamuna Meenakshisundaram, 2011). Ectopic kidneys with vascular anomalies are very common (Amudha Govindarajan and Jamuna Meenakshisundaram, 2011). Thoracic kidney is more commonly found in males than females; by a ratio of 2:1 (Menshah and Forson, 2010; Claudenei Leoncio Beraldo *et al*., 2005). In most of the cases; its structure and functioning are totally normal (Claudenei Leoncio Beraldo *et al*., 2005).

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Congenital anomalies of the urinary system affect approximately 10% of the population (Andrzej Drop *et al*., 2003). The prevalence of thoracic kidney is estimated at less than 1 in 10,000; and as this condition is asymptomatic it is not diagnosed in the neo-natal period and accidentally diagnosed in the adulthood (Kousaku Matsubara *et al*., 2002). Such rare type of anomaly about 94 cases are been reported in the world literature. There are two types of high renal displacement; congenital and traumatic. The congenital is usually a normal functioning organ which is found by co-incidence and should be included in the differential diagnosis of a mass in the lower posterior mediastinum. The traumatic displacement of a kidney into the thorax can cause diagnostic confusion in an injured patient (Karusseit, 1987). Thoracic renal ectopia has been classified into four types-

a) True renal ectopia with a normal developed diaphragm.
b) With Eventration.
c) With Diaphragmatic (Bochdalek's) hernia.
d) With Traumatic rupture of diaphragm. (Bates, 2005).

Thus discovery of this rare association prior to surgery is important in diaphragmatic hernia repair (Sozubir *et al*., 2005).

Case report

An 8 years old female was referred to the clinic for pain in abdomen in the right iliac fossa.

No trauma or any prior complaint of respiratory or urologic illness was reported. Subsequently we requested for abdominal ultrasound, which revealed absence of right kidney in its normal position. Hence we went for intravenous pyelography (Fig. 1) and contrast enhanced computed tomography (CECT) of chest and Cent saggital reconstruction (Fig.2) which showed an oval shaped area of extreme density at the base of right hemithorax and was diagnosed as renal Ectopia.

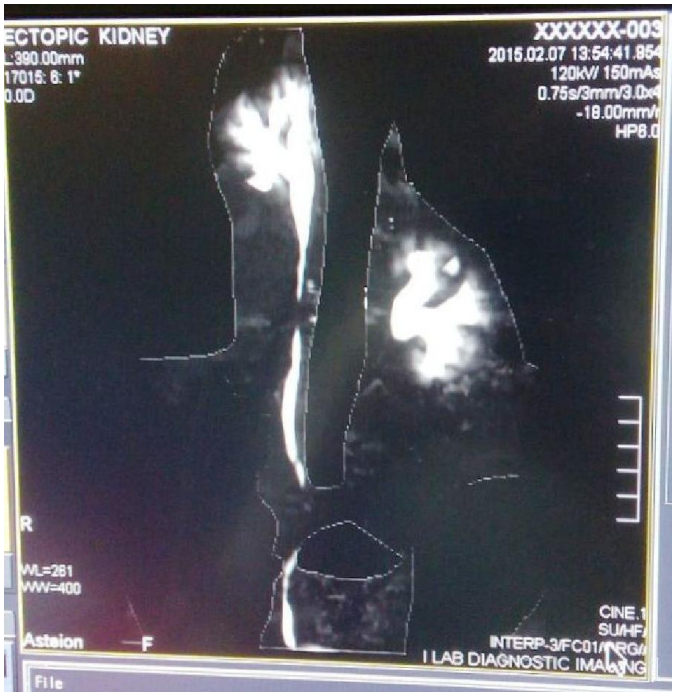

Fig. 1. CT Pyelography

Thus the right kidney was located in right thoracic space and its size was at least 2 cm smaller than left kidney. The right kidney was related to the 9th to 11th ribs posteriorly and the hilum facing infero-medially. No other anomalies were noticed in the right kidney. The renal artery supplying the right kidney originated at the normal level. The renal artery, renal vein and right ureter on right side passed through a 3 cms diaphragmatic opening in their normal antero-posterior sequence. The ureter is elongated to accommodate excessive distance to the bladder.

The renal function parameters were normal hence no other procedures were performed. The adrenal gland is present in its normal location below the ectopic kidney. There was no diaphragmatic hernia, no bowel displacement. Other abdominal organs were normal.

Embryogenesis

Kidneys develop from nephrogenic cord. The secretory component develops from metanephric blastema and collecting part develops from the ureteric bud which arises from mesonephric duct. Kidneys develop in the pelvis and migrate to the upper abdomen. A caudal growth in the embryo appears to assist in the migration of kidneys out of pelvis into its eventual retroperitoneal location in the renal fossa. They attain their adult position by the 9th week. Factors which interfere with development such as teratogens, genetic factors, ureteric bud; when it does not meet with nephrogenic blastema for normal nephrogenesis or metanephric maternal disease may result in abnormal migration of kidney in renal ectopia (Muhammad Asghar, 2008). An abnormal high ascent of metanephros will generate a diaphragmatic defect and subsequently an ectopic kidney. This condition is rarely bilateral (Muhammad Asghar, 2008).

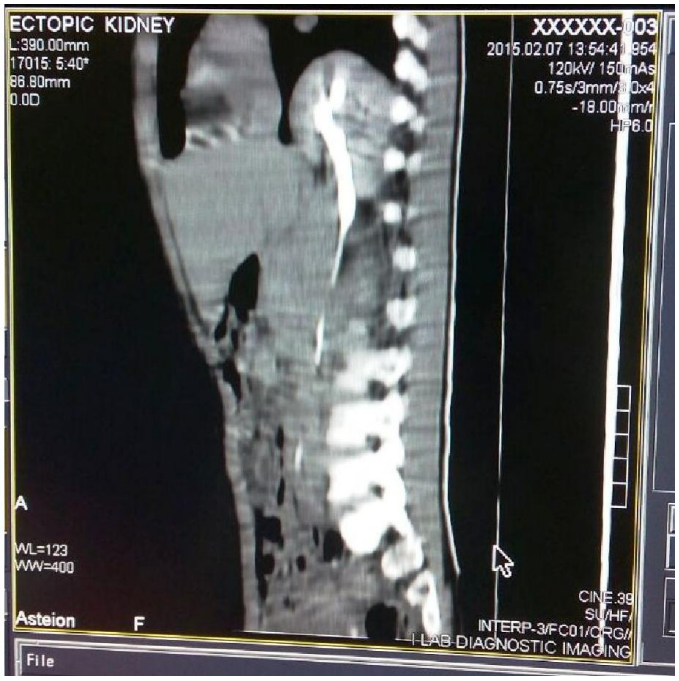

Fig. 2. Cent Saggital Reconstruction

Normally kidney reaches its adult location by the end of 8th week of gestation. At the time the diaphragm leaflets are formed as the pleuroperitoneal membrane separated from the pleura and peritoneal cavity. Mesenchymal tissues along with the membrane form the muscular component of the diaphragm. It is uncertain delayed closure of the diaphragmatic anlagen allows for protracted renal ascent above the level of the future diaphragm or the kidney overshoots its usual position because of accelerated ascent before normal diaphragmatic closure (Abbas Madani *et al*., 2006; Sumner *et al*., 1982). In such ectopic position the renal vasculature and the ureter enter and exit from the pleural cavity through the formen of Bochdalekh. The ureter is elongated to accommodate the excessive distance to the bladder but usually it never enters ectopically into the bladder or other sites (Sumner *et al*., 1982).

DISCUSSION

Unilateral thoracic renal ectopia is a rare anomaly. It denotes either a partial or complete protrusion of the kidney above the level of diaphragm into the posterior mediastinum. Our patient was 8 years old female who came with a complaint of pain in right iliac fossa, underwent abdominal ultrasonography and intravenous pyelography; which demonstrated a normal left kidney and thoracic right kidney. No signs of obstruction were observed. According to the findings the symptoms of the patient were not related to urinary system. The anatomical profile of a thoracic kidney is characterized by rotation anomalies, elongated ureter, high origin of renal vessels

(Menshah and Forson, 2010; Claudenei Leoncio Beraldo *et al*., 2005; Bates, 1996). In our case also the ectopic right thoracic kidney had elongated ureter and was related to 9 to 11 ribs and the hilum was facing infero-medially. Both the thoracic and contralateral kidney in patients with ectopic thoracic kidney are normal; while associated anomalies in other organ systems are extremely rare and not consistent. The incidence of complications such as calculi or infection is not increased unlike other types of renal ectopia (Menshah and Forson, 2010). In our case also no other anomalies were present and no complications were noticed. In most of the cases the suprarenal glands, spleen and renal vessels are normally situated (Menshah and Forson, 2010). which was observed in our case also? Generally ectopic thoracic kidney is asymptomatic and requires no surgical intervention (Menshah and Forson, 2010; Claudenei Leoncio Beraldo *et al*., 2005) and respiratory symptoms are rare (Abbas Madani *et al*., 2006; Sumner *et al*., 1982); this was in our case also.

Conclusion

Renal ectopia is a rare congenital anomaly. Ultrasonography and intravenous pyelography are the important investigations for its diagnosis and detection. This anomaly is important in the differential diagnosis of a mass lesion in the lower thorax. In incidental cases the diagnosis should be confirmed by intravenous pyelography and CECT abdomen; no further management is required as no complications are there. A correct diagnosis of such anomaly will save the patients from undergoing unnecessary surgical interventions and image guided biopsies. Detail knowledge of such anomaly is important for the surgeons and urologist which will help to give guideline for safe surgery. The high position of kidney can be mistaken for a sub-diaphragmatic abscess in plain radiographs of abdomen or misdiagnosed as mass in lower thorax.

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