

# Subdiaphragmatic High Renal Ectopia associated with Eventration of the Diaphragm: A Case Report

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## ABSTRACT

Subdiaphragmatic high renal ectopia and eventration of the diaphragm are unusual entities, and the combination of the two is extremely rare. We present a case of a young man with non-visualized left kidney in abdominal ultrasonography (USG). Static renal scan with <sup>99m</sup>Tc-DMSA showed an abnormally high, relatively smaller, and malrotated left kidney without any renal scarring. CT scan was also done to rule out possible associated abnormalities. It became evident that the left kidney was smaller and malrotated, lying posteriorly and much above the spleen and stomach as well, but immediately beneath the abnormally high left dome of the diaphragm at the level of the sixth rib. Apart from the abnormally high left dome, there were no other abnormalities seen in the diaphragm. The reported case of diaphragmatic eventration with high renal ectopia may be an important differential diagnosis of diaphragmatic rupture, a frequently encountered difficulty in clinical practice.

**Keywords:** Eventration, diaphragm, left kidney, <sup>99m</sup>Tc-DMSA, renal ectopia.

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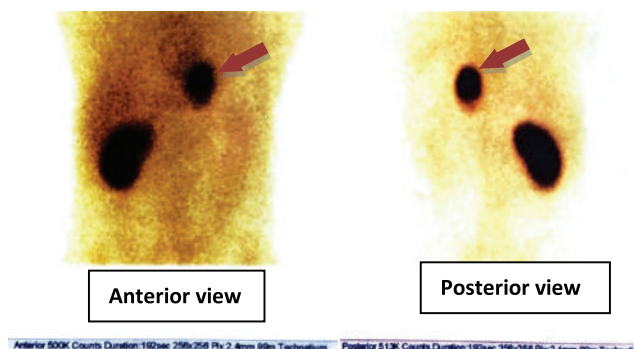
## INTRODUCTION

During organogenesis, the kidneys ascend to their normal position between the 6th and 9th weeks of gestation (1). Any disruption of this process may result in renal ectopia (2). Postnatal kidney migration is a rare occurrence. It is usually associated with congenital diaphragmatic hernias or trauma (3-5). Anomalies of the diaphragm, particularly eventration of part or all of the hemidiaphragm, are uncommon entities and are not encountered frequently in clinical practice. A majority of the adult patients with eventration of the diaphragm are asymptomatic and are usually detected only during radiological surveys or during investigations for

unrelated symptoms (6). Herein, we report a case of a 32-year-old male whose left kidney was found in a high ectopic position associated with an abnormally high left dome of the diaphragm.

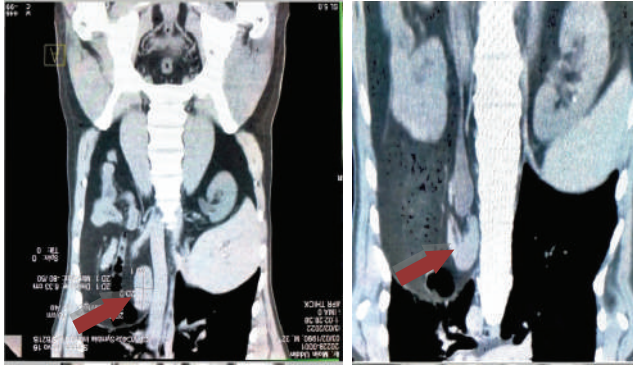
## CASE REPORT

A 32-year-old male was requested for a renal scan at INMAS, Sylhet during the course of clinical investigations of a non-visualized left kidney found in abdominal USG. Static renal scan with intravenous injection of 06mCi of <sup>99m</sup>Tc-DMSA was done using a Siemens dual headed SPECT gamma camera. Scan images showed an abnormally high, smaller, and malrotated left kidney with no definite scars (Figure 1). CT correlation was done to determine the exact location of the left kidney and possible associated abnormalities. CT images revealed normal right kidney and a small, malrotated left kidney with mildly dilated pelvicalyceal system. This kidney was located postero-superior to spleen and stomach, immediately beneath the



**Figure 1:** Image of <sup>99m</sup>Tc-DMSA scan showing the abnormally high up, relatively smaller left kidney without any renal scarring. Right kidney is normal in size, shape and position showing uniform tracer concentration.

abnormally high left dome of the diaphragm at the level of the 6th rib posteriorly. Apart from high left dome, both pleural and peritoneal surfaces of the diaphragm were unremarkable in CT.



**Figure 2:** CT coronal view of the abdomen and the chest. The abnormally high up left dome of diaphragm with malrotated high ectopic left kidney at subdiaphragmatic position.

## DISCUSSION

This case presents a rare opportunity to discuss the possibility of a combination of eventration of the left hemidiaphragm and an ectopic kidney. To the best of our knowledge, a search of the literature revealed only two similar cases, reported by Baurys et al. (7) and Bulgrin JG et al. (8), with such a combination.

Renal ectopia is not very uncommon (1–5 per 1,000), but only about 1 in 10 of these cases is ever diagnosed (9). A radiographic survey of symptom-free potential transplant donors found ectopic kidneys in 2 of 151 individuals (10). In renal ectopia, deviated or absent ascent during organogenesis causes the kidney to lie outside the renal fossa. The site of an ectopic kidney is usually the pelvis, but it can also be lumbar, iliac, or less commonly, intrathoracic or subdiaphragmatic. High renal ectopia is a rarer condition and reported as 1 in 22 cases of ectopic kidneys (11). It is four times more frequent in men and found on the left side twice as often as the right. It can present with ipsilateral hypochondrial pain and be accompanied by vesicoureteric reflux (12, 13). In this case, patient had no specific symptoms of reflux but mild calyceal dilatation was noted in left kidney. In asymptomatic cases, it can be an incidental finding when imaging is

performed for other reasons, same clinical scenario was noted in this patient who was asymptomatic and incidentally found to have a non-visualized left kidney in abdominal ultrasound examination. In the absence of trauma or anatomical defects, a high renal ectopia is presumed to be a congenital abnormality. Postnatal migration of a kidney is a rare occurrence. Acquired herniation of the kidney through the diaphragm has also been reported post-traumatically (17). However, there was no evidence of herniation in our case, both radiologically and clinically. There was no history of trauma as well. The sonographic finding of a non-visualized left kidney was confirmed by renal scan and CT. USG examination with expert sonographers might be able to look out more intensely for malrotated, ectopic positioned reniform structures using Doppler ultrasound. In this case, the left kidney was undiscoverable in USG but the unique imaging modality of DMSA renal scan with a minimum radiation exposure could diagnose this case of high renal ectopia with left hemidiaphragmatic eventration in no time at all. CT correlation was an extra aid that confirmed the findings and detected mild pelvi-calyceal dilatation.

Eventration of the diaphragm is broadly defined as the abnormal elevation of all or part of one leaf of the intact diaphragm (18). There are two distinct etiologic types of eventration: congenital and acquired (19, 20). Congenital eventration is a developmental abnormality characterized by muscular aplasia of the diaphragm, which represents most of the cases. The anatomical involvement of the diaphragm can be either complete or partial. In complete type, the entire dome of the diaphragm is involved, with only the peripheral attachments to the thoracic wall showing normal musculature. In partial type, only a localized segment of the diaphragm lacks adequate muscle fibers. It can be unilateral or bilateral, but it usually involves the left hemidiaphragm (21, 22).

Concerning a possible relationship between eventration and high renal ectopia, a literature search was done with the keywords containing: a) the possible embryologic relationship of these anomalies; b) reported cases of

high renal ectopia and the incidence of analogous anomalies; and c) renal position in reported cases of eventration. The diaphragm develops through a highly complex process, with the muscular elements derived from several sources and mesodermal cells from the wolffian body forming the right and left crura (23). Several authors demonstrated that congenital anomalies of this type may occur as a result of embryologic relationships, but in cases of eventration, the incidence of high renal ectopia is indeterminate.

## CONCLUSION

This case report and brief discussion may encourage radiologists to investigate individual cases of eventration with respect to renal position. As high renal ectopia may be associated with eventration of the diaphragm, that would be an immense aid in differentiation from diaphragmatic rupture, a frequently encountered difficulty, especially if there is no history of trauma. Clinicians, radiologists, and surgeons must be alert with a high degree of suspicion to define the details and try to understand the etiopathogenesis of this clinical situation.

## REFERENCES

1. Heptinstall RH. Heptinstall's Pathology of the Kidney. Lippincott Williams & Wilkins; 2007.
2. Woolf AS, Winyard PJ, Hermanns MH, Welham SJ. Maldevelopment of the human kidney and lower urinary tract: an overview. *The kidney*. 2003 Jan 1;377-93.
3. Sözübir S, Demir H, Ekingen G, Güvenç BH. Ectopic thoracic kidney in a child with congenital diaphragmatic hernia. *European journal of pediatric surgery*. 2005 Jun;15(03):206-9.
4. Rattan KN, Rohilla S, Narang R, Rattan SK, Maggu S, Dhulakhandi DB. Thoracic kidney associated with congenital diaphragmatic hernia. *Congenital anomalies*. 2009 Sep;49(3):118-20.
5. Kayıran PG, Gumus T, Kayıran SM, Bilge I, Gurakan B. Ectopic intrathoracic kidney with right-sided congenital diaphragmatic hernia. *The Journal of Pediatrics*. 2013 Oct 1;163(4):1226-.
6. Yoo DG, Kim CW, Park CB, Ahn JH. Traumatic right diaphragmatic rupture combined with avulsion of the right kidney and herniation of the liver into the thorax. *Korean J Thorac Cardiovasc Surg*. 2011 Feb 28;44(1):76-9.
7. Burke EC, Wenzl JE, Utz DC. The intrathoracic kidney: report of a case. *American Journal of Diseases of Children*. 1967 Apr 1;113(4):487-90.
8. Bulgrin JG, Holmes FH. Eventration of the diaphragm with high renal ectopia: a case report. *Radiology*. 1955 Feb;64(2):249-51.
9. Moore KL, Persaud TVN. Urogenital system. In: *The developing human. Clinically oriented embryology*. 8th ed. Philadelphia: WB Saunders; 2008. 24-456.
10. Frick MP, Goldberg ME. Uro- and angiographic findings in a "normal" population: screening of 151 symptom-free potential transplant donors for renal disease. *AJR Am J Roentgenol*. 1980;134(3):503-5.
11. Jefferson KP, Persad RA. THORACIC KIDNEY: A RARE FORM OF RENAL ECTOPIA. *The Journal of Urology*. 2001 Feb;165(2):504-.doi: 10.1097/00005392-200102000-00035.
12. Sheih CP, Liu MB, Hung CS, Yang KH, Chen WY, Lin CY. Renal abnormalities in schoolchildren. *Pediatrics*. 1989 Dec;84(6):1086-90.
13. Yuksel A, Batukan C. Sonographic findings of fetuses with an empty renal fossa and normal amniotic fluid volume. *Fetal diagnosis and therapy*. 2004;19(6):525-32. doi: 10.1159/000080166.
14. Kaur RP, Chawla D. Right subdiaphragmatic kidney. *The British Journal of Radiology*. 1980 Aug;53(632):809-10. doi: 10.1259/0007-1285-53-632-809.
15. Kundu AK, Goswami TK. Left subdiaphragmatic kidney: a case report. *J Indian Med Assoc*. 1995.
16. Muntaha Y. Subdiaphragmatic ectopic kidney: a case report. *Journal of Research in Medical Sciences*. 2004;11(1):51-53.
17. Yoo DG, Kim CW, Park CB, Ahn JH. Traumatic right diaphragmatic rupture combined with avulsion of the right kidney and herniation of the liver into the thorax. *Korean J Thorac Cardiovasc Surg*. 2011 Feb 28;44(1):76-9.doi: 10.5090/kjtc.2011.44.1.76.
18. Thomas TV. Congenital eventration of the diaphragm. *The Annals of Thoracic Surgery*. 1970 Aug 1;10(2):180-92.
19. Michelson E. Eventration of the diaphragm. *Surgery*. 1961 Mar 1;49(3):410-22.
20. McNamara JJ, Paulson DL, Urschel HC, Razzuk MA. Eventration of the diaphragm. *Surgery*. 1968 Dec 1;64(6):1013-21.
21. Visouli AN, Mpakas A, Zarogoulidis P, Machairiotis N, Stylianaki A, Katsikogiannis N, Tsakiridis K, Courcoutsakis N, Zarogoulidis K. Video assisted thoracoscopic plication of the left hemidiaphragm in symptomatic eventration in adulthood. *Journal of Thoracic Disease*. 2012 Nov;4(Suppl 1):6.
22. Paris F, Blasco E, Canto A, Tarazona V, Casillas M. Diaphragmatic eventration in infants. *Thorax*. 1973 Jan 1;28(1):66-72.
23. Harrington SW. Diaphragmatic hernia. *Archives of Surgery*. 1928 Jan 1;16(1):386-415.