Incidental Detection of Thoracic Ectopic Kidney with Bochdalek Hernia: A Case Report

[1]Noor-E Amrin Alim, [2]Muhammad Farhan Muhtasim, [2]Abdullah Al Persi, [3]Mahjabin Nobi Khan, [4]Md. Ajijul Hoq, [5]Mohammad Sazzad Hossain, [5]Anjuman Ara Akhter, [6]Pabitra Kumar Bhattacharjee

[1]Senior Medical Officer, [2]Medical Officer, [3]Scientific Officer, [4]Senior Scientific Officer, [5]Chief Medical Officer, [6]Director, Institute of Nuclear Medicine & Allied Sciences, Chattogram

Correspondence Address : Dr. Noor-E Amrin Alim, Senior Medical Officer, Institute of Nuclear Medicine & Allied Sciences (INMAS), Chattogram, Chittagong Medical College Hospital, Chattogram-4203. Email: nooreamrin03@gmail.com

ABSTRACT

A thoracic ectopic kidney is the rarest kind of ectopic kidney, occurring in one out of every 15,000 cases. This renal anomaly is frequently diagnosed incidentally. We report a case of a man who had a non-visualized left kidney and later found out to be having a left thoracic kidney associated with a left Bochdalek hernia.

Keywords: Non-visualized kidney, thoracic ectopic kidney, Bochdalek hernia

Bangladesh J. Nucl. Med. Vol. 27 No. 2 July 2024

DOI: https://doi.org/10.3329/bjnm.v27i2.79228

INTRODUCTION

Bochdalek hernia is a congenital postero-lateral diaphragmatic defect that allows abdominal viscera to herniate into the thorax (1). It is the most common type of congenital diaphragmatic hernia and occurs in approximately 1 in 2,200-12,500 live births, with much greater frequency on the left hemithorax and associated with a normal diaphragm (2, 3). Intra-thoracic kidney is a very rare finding, representing less than 51 of all renal ectopias, with the least frequency of all renal ectopias (4-6); most are found in males and asymptomatic. The incidence of intra-thoracic renal ectopia because of congenital diaphragmatic hernia was reported to be less than 0.25% (4). Due to its asymptomatic nature, it is often detected incidentally while one is investigating other unrelated pathological conditions.

Here a case of a 25-year-old male who was referred for renal scintigraphy with ultrasonogram findings of a non-visualized left kidney is reported. Tc-99m Diethylenetriaminepentaacetic acid (DTPA) renogram scan revealed a higher anatomical location of the left kidney, which was later confirmed as a Bochdalek hernia with an intrathoracic left kidney by a CT scan of the thorax and abdomen.

CASE REPORT

A 25-year-old normotensive and nondiabetic male presented with the complaints of burning sensation and increased frequency during micturition. Renal ultrasonogram revealed a normal-sized right kidney in the right renal fossa with normal parenchyma. The left kidney was not visualized in the left renal fossa, pelvis, or upper abdomen. Laboratory investigation, including routine urine medical examination, showed absence of pus cells or RBCs. Later he was advised to do a DTPA renogram. Dynamic images were acquired with the scintillator placed anteriorly and posteriorly after intravenous (IV) injection of 5 mCi of Tc-99m DTPA, and sequential cortical uptake and excretion images were studied. The renogram was done with the usual protocol, and the region of interest (ROI) revealed partial visualization of the left kidney at the lower pole, indicating its higher location. However, the right kidney was in normal position. Since the images and data were not sufficient to calculate the functional status of the left kidney, a repeat renogram was advised with an extended ROI, including the greater part of the chest this time. The results revealed a higher anatomic location of the left kidney, with normal morphology and functional status. Rather, the right kidney was relatively smaller in size compared to the left one, showed slightly short perfusion with low uptake, as well as delayed excretion.

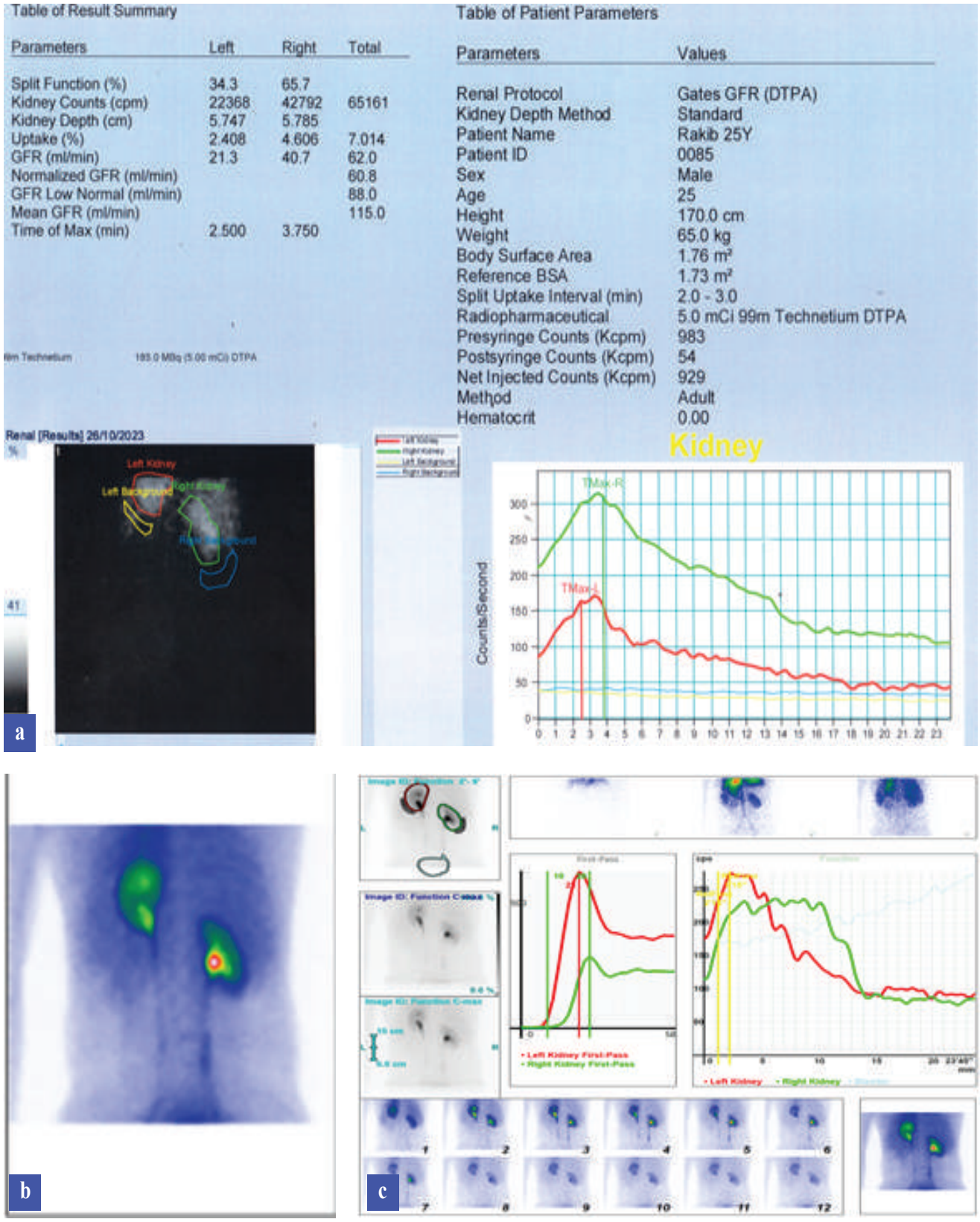

Figure 1: Initial renogram showing partial visualization of the left kidney (a). Repeat Renogram showing high location of the left kidney, with normal; parenchymal function (b,c)

A contrast-enhanced CT scan of the chest and abdomen was performed, which revealed herniation of the left kidney, surrounded by perinephric fat through a defect at the postero-medial aspect of the left hemidiaphragm (AP: 41 mm, transverse: 63 mm), with most of the kidney located within the chest cavity. Furthermore, it was found to be mildly mal-rotated, with the hilum facing antero-infero-medially. The left kidney was normal in size (9.4 cm). The upper pole of the left kidney was located at the lower border of T8 vertebrae and the lower pole at the level of upper border of T12 vertebrae, indicating its higher location. The left ureter and renal vessels were longer compared to the right side. Bilateral renal arteries originated at the same level as the abdominal aorta. Both renal veins also drained at the same level of the inferior vena cava. Contrast-enhanced CT showed normal parenchymal enhancement and excretion. There was no evidence of pelvicalyectasis, radio-opaque shadow, or mass lesion. The right kidney was normal in size (9.6 cm), shape, and position. Both the adrenal glands were normal in location. Other organs were unremarkable. There was negligible collapse, noted with indentation at the left lung base.

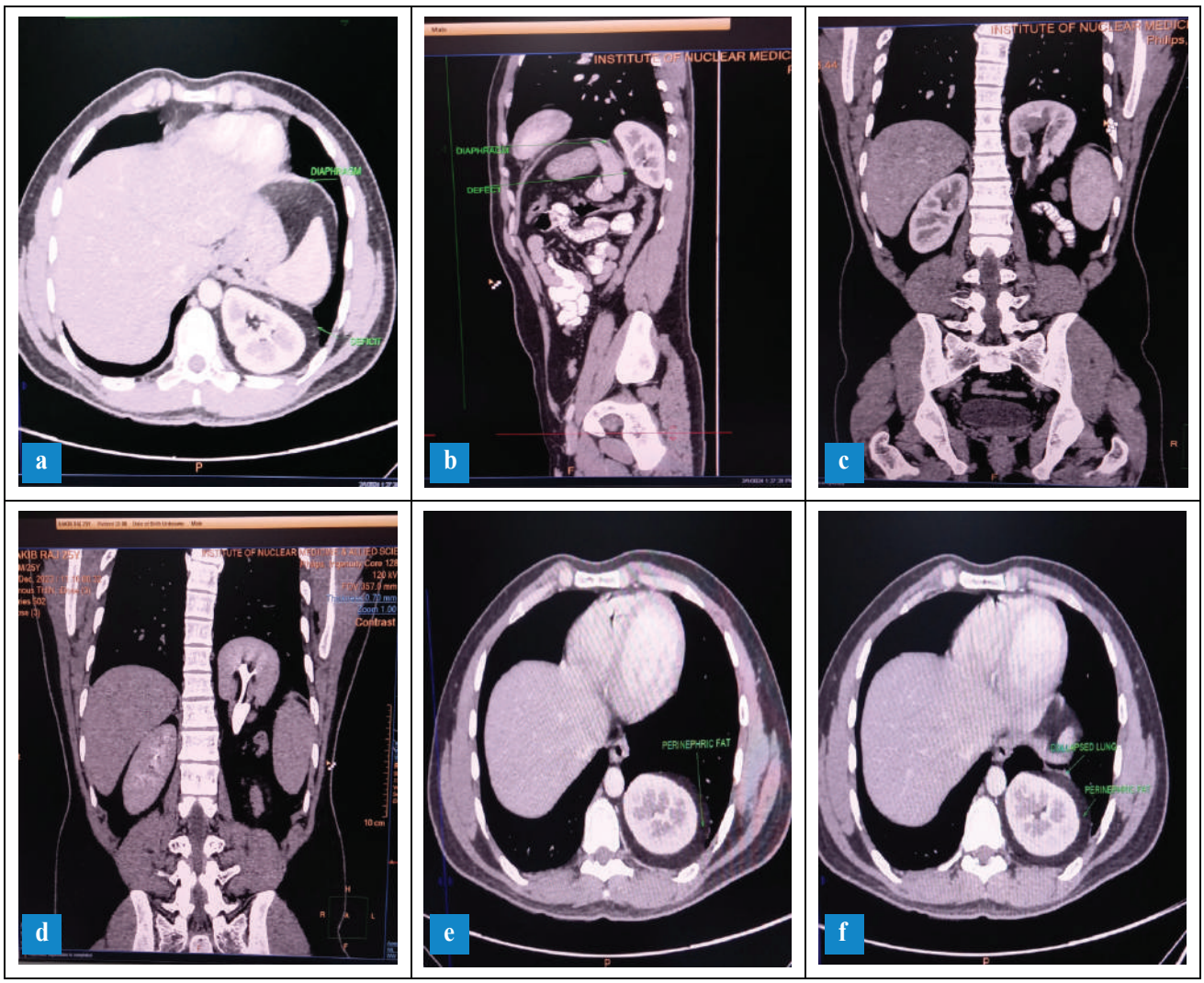

Figure 3: Contrast enhanced CT scan of chest and abdomen in axial and sagittal images showing diaphragmatic defect at postero-medial aspect with herniated left kidney, along with perinephric fat (a,b); coronal images showing diaphragmatic defect with malrotaion of ectopic left kidney with hilum facing antero-infero-medially (c,d) and axial images intrathoracic portion of the left kidney with perinephric fat and deficit of diaphragm, showing small part of collapsed left lung base (e,f).

DISCUSSION

In 1948, a Czech anatomist, Mr. Vincent Alexander Bochdalek, first described a posterolateral defect in the diaphragm through which an abdominal organ herniated into the thorax. Later it was named after him as the Bochdalek hernia (11). Bochdalek hernia usually occurs due to failed closure of pleuro-peritoneal ducts at the 8th week of gestation, causing primitive communication between the pleural and abdominal cavities (1). The factors that favor more incidences of left-sided positioning are

1. Earlier embryonic fusion of right-sided pleuro-peritoneal folds
2. Left hemi-diaphragm being a congenitally weaker structure than the right
3. Liver on the right side serving as extra support, with narrowing of the right pleuro-peritoneal canal by the caudate lobe

Bochdalek hernia is more common in males than females with a ratio of 2:1. A Bochdalek hernia on the left side can contain fat, omental tissue, gut, sometimes kidney, spleen, etc., and may not lead to any symptoms. In the case of a right-sided Bochdalek hernia, the contents may be the liver, kidney, fat, etc.

Bochdalek hernia may cause severe respiratory distress in neonates at birth or in the early days of life (1). Symptomatic cases are usually present in neonates. On the other hand, in adults there may not be any symptoms, and usually these cases are associated with better outcomes. Bochdalek hernia is also predominant on the left side in adults and can cause gastrointestinal symptoms such as recurrent pain and vomiting (10). Sometimes it may present as surgical emergencies due to strangulation of the gut, requiring prompt intervention (1).

Ectopic kidney is defined as the abnormal location of the kidney, rather than its normal site. Ectopic kidney is usually pelvic, iliac, thoracic, contralateral, or may be crossed fused. It may occur in approximately 1 in 1,000 births (11). Most of the cases are found incidentally, usually in lower abdomen or pelvic region failure to ascend during fetal life. Intra-thoracic kidney represents less than 5% of all renal ectopias with the least frequency (11). Intrathoracic kidneys are defined as partial or complete herniation of kidneys above the hemi-diaphragm into the posterior mediastinal compartment of the thorax (18). The kidney derives from the metanephros and ascends upwards to reach its final position by the end of the 8th week of intrauterine life. Any deviation from the normal development pathway may cause ectopia (19). Intrathoracic kidneys are located within the thoracic cavity, with renal vasculature and ureter on the affected side exiting the thoracic cavity through the foramen of Bochdalek, showing significantly longer than normally positioned kidneys. Most intrathoracic kidneys in adults remain asymptomatic throughout life (14).

In 1940, Wolfman reported the 1st case of an intrathoracic kidney (17). S.M. Donat and P.E. Donat reported more incidences in the left (62%) than the right (36%) in their study, and 2% of patients had bilateral intra-thoracic kidneys (4). Intrathoracic kidney is more common in males (63%) than in females (37%) (12). Anatomically, intrauterine kidneys have rotational anomalies such as posteriorly facing hilum, longer ureter, higher origin of renal vessels, etc. (13, 15, 16). However, despite their abnormal anatomical location, these ectopic kidneys do not exhibit any functional abnormalities, such as obstructive uropathies, etc. (4, 13, 14). Treatment is only required in cases when there is obstruction. In the case of ectopic kidneys, there is a risk of increased incidence of pelvi-ureteric junction obstruction, vesico-ureteric reflux, etc. (6, 14).

Fiaschetti et al. reported a case of adult intrathoracic kidney with Bochdalek hernia in 2010, which showed left-sided Bochdalek hernia with dilated colon loops and the left kidney situated within the pleural space. In addition, the hilum was placed in a posterior position with an elongated and expanded pelvi-ureteric junction. To compare these findings with our report, there was herniation of the left kidney, surrounded by peri-nephric fat in our patient. However, the hilum was facing antero-infero-medially, and there were no colon loops in our case.

To differentiate an intrathoracic kidney from other posterior mediastinal masses and assess the functional status, CT scans and Tc-99m DTPA renograms can serve as important diagnostic modalities. Since the patient reported no significant clinical symptoms, further medical or surgical treatment was not advisable, as recommended by studies conducted previously (12).

CONCLUSION

The case report emphasizes the significance of whole-body radioiodine scans in diagnosing ectopic thyroid tissues and atypical thyroid function tests, especially in cases of intrathoracic kidney in a patient with Bochdalek hernia, thereby reducing the need for unnecessary investigations and surgical interventions.

REFERENCES

1. Fiaschetti V, Velari L, Gaspari E, Mastrangeli R, Simonetti G. Adult intra-thoracic kidney: a case report of Bochdalek hernia. Case Reports in Medicine. 2010;2010(1):975168. https://doi.org/10.1155/2010/975168
2. Gale ME. Prevalence and CT characteristics. Radiology. 1985;156:449-52. 10.3919/ringe1963.58.1492
3. Losanoff JE, Sauter ER. Congenital posterolateral diaphragmatic hernia in an adult. Hernia. 2004 Feb;8:83-5. https://doi.org/10.1007/s10029-003-0166-5
4. SM D. Intrathoracic kidney: a case report with a review of the world literature. J Urol. 1988;140(1):131-3. https://doi.org/10.1016/s0022-5347(17)41506-0

5.0 Sumner TE, Volberg FM, Smolen PM. Intrathoracic kidney—diagnosis by ultrasound. Pediatric Radiology. 1982 Mar;12:78-80. https://doi.org/10.1007/BF00972436

6. BB S. Anomalies of the kidney and ureteropelvic junction. Campbell's urology. 1998. 7. Haller Jr JA. Professor Bochdalek and his hernia: then and now. InHistorical Aspects of Pediatric Surgery 1986 Jan 1 (pp. 252-255). Berlin, Heidelberg: Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-642-70825-1_18
8. Cullen ML, Klein MD, Philippart AI. Congenital diaphragmatic hernia. Surgical Clinics of North America. 1985 Oct 1;65(5):1115-38. https://doi.org/10.1016/s0039-6109(16)43732-1
9. De Oliveira F, Oliveira FJ. Congenital posterolateral diaphragmatic hernia in the adult. Canadian Journal of surgery. Journal Canadien de Chirurgie. 1984 Nov 1;27(6):610-1. 10. Panda B, Rosenberg V, Cornfeld D, Stiller R. Prenatal diagnosis of ectopic intrathoracic kidney in a fetus with a left diaphragmatic hernia. Journal of Clinical Ultrasound. 2009 Jan;37(1):47-9. https://doi.org/10.1002/jcu.20503
11. Shah AD, Ajay S, Adalia M, Rathi A. Bochdalek hernia with intrathoracic kidney. Lung India. 2012 Oct 1;29(4):373-5. https://doi.org/10.4103/0970-2113.102837
12. Natarajan A, Agrawal A, Purandare N, Shah S, Rangarajan V. Rare case of thoracic kidney detected by renal scintigraphy. Indian Journal of Nuclear Medicine. 2016 Jul 1;31(3):219-21. https://doi.org/10.4103/0972-3919.181863
13. Obatake M, Nakata T, Nomura M, Nanashima A, Inamura Y, Tanaka K, Nagayasu T. Congenital intrathoracic kidney with right Bochdalek defect. Pediatric surgery international. 2006 Oct;22:861-3. https://doi.org/10.1007/s00383-006-1772-y
14. Karaoglanoglu N, Turkyilmaz A, Eroglu A, Alici HA. Right-sided Bochdalek hernia with intrathoracic kidney. Pediatric surgery international. 2006 Dec;22:1029-31. https://doi.org/10.1007/s00383-006-1747-z
15. RJ S. Right diaphragmatic eventration with renal displacement. J Urol. 1952;68:804. https://doi.org/10.1016/s0022-5347(17)68285-5
16. Gondos B. High ectopy of the left kidney. The American Journal of Roentgenology, Radium Therapy, and Nuclear Medicine. 1955 Aug 1;74(2):295-8. https://doi.org/10.1155/2013/158494
17. MG W. Situation du rein dans l'eventration diaphragmatique droite. Mem Acad Chir. 1940;60:41-7. https://doi.org/10.1093/jscr/rjae757
18. Clarkson LM, Potter S. An unusual thoracic mass. The British Journal of Radiology. 2009 Feb 1;82(974):e27-8. https://doi.org/10.1259/bjr/54380238
19. Elumalai G, Laila AJ. Renal ectopia–embryological basis and its clinical importance. Chennai: Elixir Embryology. 2003. http://dx.doi.org/10.5414/CNCS109962