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Bochdalek hernia with right intrathoracic kidney: A rare association

Dr. M S Chennakesava rao[1], Dr. Dasari Ravi Kiran[2], Dr. Rupesh Mandava[3]
[1] Great Eastern Medical School & Hospital, Ragolu, Srikakulam, Andhra Pradesh, India
[2] Assistant Professor, Great Eastern Medical School & Hospital, Ragolu, Srikakulam, Andhra Pradesh, India
[3] HOD & Professor, Great Eastern Medical School & Hospital, Ragolu, Srikakulam, Andhra Pradesh, India
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Abstract
Objective: Bochdalek hernias are congenital posterolateral diaphragmatic defects arising from failure of the pleuroperitoneal foramina to fuse during embryogenesis, permitting intra-abdominal viscera to herniate into the thoracic cavity.[1,2] Intrathoracic kidney is an exceptionally uncommon form of renal ectopia, constituting fewer than 5% of all ectopic kidney placements.[3] The simultaneous occurrence of both anomalies in a single patient is exceedingly rare, with fewer than 100 adult cases documented in the global literature.[4] The majority of such cases are identified incidentally; a conservative approach is advocated for asymptomatic individuals.
Case Presentation: A 50-year-old male presented with easy fatigability, exertional dyspnea, and palpitations, and was subsequently diagnosed with severe iron deficiency anemia (Hb: 7.5 gm/dL). Chest radiograph disclosed a large homogeneous opacity superimposed on the right hemidiaphragm, raising differential diagnoses including lower-lobe pulmonary pathology, pleural disease, subdiaphragmatic mass or abscess, and elevated hemidiaphragm. Electrocardiography revealed sinus tachycardia at 102 beats/min; 2D echocardiography was unremarkable. Abdominal ultrasonography failed to identify the right kidney in the renal fossa or pelvic cavity. Contrast-enhanced computed tomography (CECT) of the abdomen confirmed a right-sided Bochdalek hernia with a normal-calibre intrathoracic right kidney. [5,6] Renal function tests and intravenous urography established bilaterally normal renal function.
Summary: The coexistence of a thoracic ectopic kidney within a Bochdalek hernia presents significant diagnostic and therapeutic challenges. Accurate diagnosis mandates a high degree of clinical suspicion and cross-sectional imaging. Surgical intervention should be reserved exclusively for symptomatic patients. [7]

Keywords: Bochdalek hernia, intrathoracic kidney, renal ectopia, congenital diaphragmatic hernia, right-sided hernia, posterolateral diaphragmatic defect

Introduction
Congenital posterolateral diaphragmatic hernia, first described by Vincent Alexander Bochdalek in 1848, results from impaired diaphragmatic development between the 4th and 8th weeks of gestation due to persistence of the pleuroperitoneal canal. [1] The condition occurs in approximately 1 in 2,500–3,000 live births and accounts for approximately 8% of all birth defects. [2] Left-sided involvement is substantially more prevalent (70%–90% across published series), while right-sided hernias are comparatively rare. [8] Adult prevalence ranges from 0.17% to 6% in various imaging and autopsy studies, with most cases detected incidentally on cross-sectional imaging performed for unrelated indications.[9] Although the majority of adult patients remain asymptomatic, a subset presents with respiratory or gastrointestinal symptoms resulting from herniation of abdominal viscera into the thorax.[10]
Renal ectopia is encountered in approximately 1 in 1,000 live births; the thoracic variant — wherein the kidney ascends above the diaphragm — represents fewer than 5% of all ectopic kidney positions and is therefore amongst the rarest of developmental urological anomalies. [3] When an intrathoracic kidney occupies a Bochdalek hernia sac, it may simulate a mediastinal or juxta diaphragmatic mass on plain radiography, mimicking pulmonary, pleural, or diaphragmatic neoplasia. [5, 6] Cross-sectional imaging — principally CECT permits definitive characterization and delineation of renal vascular anatomy. [6, 11]
In approximately one-third of cases, Bochdalek hernia is associated with developmental anomalies of adjacent organs, including renal ectopia. [4] A systematic review encompassing 34 adult cases of intrathoracic kidney within a Bochdalek hernia found that 68% of patients were symptomatic, 29% harboured significant renal complications, and 26% ultimately required surgical intervention — underscoring the importance of regular biochemical and imaging surveillance even in apparently stable cases.[11] Treatment of the intrathoracic kidney is not routinely required unless vesico ureteric reflux, hydronephrosis, or ureteric stenosis supervenes.

Table 1: Summary of Bochdalek Hernia by Side

Side of BH	Main Contents	Other Structures	Frequency of Symptoms
LEFT – 70–90%	Omentum, rarely kidney	Small or large bowel, spleen, left lobe of liver, pancreas, fat	Rare
RIGHT – Rare	Liver, kidney or fat	Part of intestine	Rare, but relatively more common than left-sided when symptomatic

Figure Legends

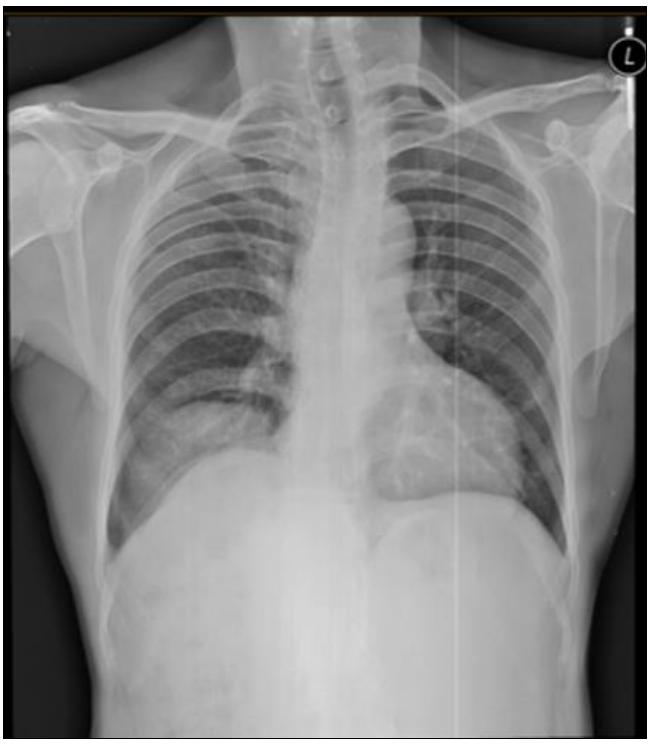

Fig a: Chest radiograph demonstrating a homogeneous opacity superimposed on the right hemidiaphragm in the right lower thoracic cavity

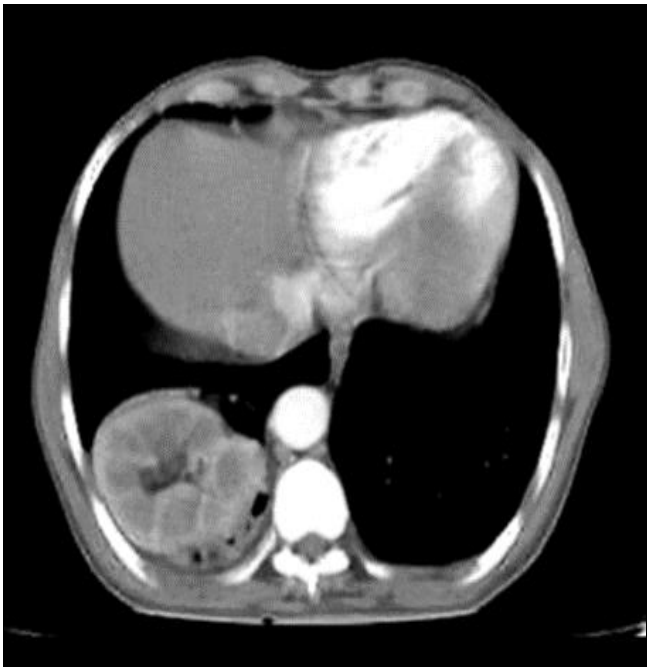

Fig b: CECT axial section confirming the presence of an ectopic reniform structure alongside bowel loops in the intrathoracic location on the right side

Conclusion

The concurrent occurrence of a thoracic ectopic kidney within a right-sided Bochdalek hernia represents one of the rarest and most diagnostically challenging associations in clinical medicine. [4, 11] Accurate diagnosis is achievable only when the treating clinician maintains a high degree of suspicion, particularly in the setting of a diaphragmatic opacity or an absent kidney on routine abdominal ultrasound. On plain radiography, an opacity overlying the diaphragmatic arch generates an extensive differential; cross-sectional imaging with CECT for definitive characterization. [5,6,9]

Surgical management should be reserved for symptomatic patients; conservative surveillance with periodic renal function testing and imaging is appropriate for asymptomatic individuals.[7,8,11] A precise pre-operative diagnosis prevents unnecessary surgical intervention and image-guided biopsies that carry procedural risk.[10] In the present case, pulmonary pathology was the initial clinical suspicion; however, systematic investigation led to the correct diagnosis of symptomatic right-sided Bochdalek hernia with intrathoracic kidney. Correction of the underlying iron deficiency anemia resolved the patient's complaints, and urography confirmed intact bilateral renal and ureteric function — consistent with contemporary evidence advocating non-operative management in selected asymptomatic or haematologically correctable presentations. [4,12,13]

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