Preperitoneal pelvic kidney: Revisiting the significance of variant anatomy to the clinician of the future

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INTRODUCTION

The kidneys are retroperitoneal organs applied to the posterior abdominal wall on either side of the vertebral bodies from upper border of T12 to L3. Grossly, the kidneys are bean-shaped structures and weigh about 150 g in the male and about 135 g in the female. Kidneys measure 10-12 cm in length, 5-7 cm in width, and 2-3 cm in thickness. While the normal kidneys show slight variations in position in their retroperitoneal abdominal location, ectopic kidneys are a common encounter in autopsies and the clinical set up. It is estimated that up to 40% of the urinary pathologies are a result of these anatomical variations (1). Renal ectopia have been associated with different pathologies ranging from incompatibility with life, increased incidences of renal cancers, systemic conditions such as hypertension to asymptomatic normal functioning kidneys (2,3). Despite these functional and clinical significances, these variations are scarcely emphasized in the anatomy books taught to the medical students—the surgeons of the future. Additionally, there are few clinical guidelines and management protocols that take variant renal anatomy into consideration. In the present paper we are reporting a rare case of bilateral pre-peritoneal pelvic renal ectopia with aberrant size, structure and renal vasculature. The ectopic kidneys displaced the pelvic viscera inferiorly.
Figure 2) Displacement and embedment of pelvic structures. SC Sigmoid colon; UB Urinary bladder; LRA Left renal artery; LRV Left renal vein; LCIA Left common iliac artery. The right common iliac artery and vein are embedded behind the right kind and hidden from view.

Figure 3) Frontal section of the right kidney showing renal pelvis deeply located into the parenchyma. RP Renal pelvis; RPY Renal pyramids; RC Renal capsule. Typical renal calyces, papillae and columns are missing.

Figure 4) Aberrant renal vasculature branching inside the pelvis and enter renal parenchyma at the superior pole. AA Abdominal aorta; IVC Inferior vena cava; RRA Right renal artery; LRA Left renal artery; LRV Left renal vein.

Figure 5) Posterior abdominal wall showing an empty usual position of the kidneys and the major abdominal vasculature. CT Celiac trunk; IMA Inferior mesenteric artery; IVC Inferior vena cava; LTV Left testicular vein; RTA Right testicular artery; RTV Right testicular vein; SMA Superior mesenteric artery; PAW Posterior abdominal wall.

DISCUSSION

Variant renal anatomy is extremely common and in many cases poses surgical and imaging challenges (1,5). The present case is a prototype of such cases. Similar findings have been reported previously. Renal pelvic ectopia occurs as a result of a defective or an incomplete ascent of the developing kidneys (3). Such defective ascent might explain the unusual bigger size of the kidneys in the present case. Clinically the unusually massive and irregular kidneys pressing the iliac vessels against the bony pelvis could easily cause vascular obstructions leading to several pathologies of blood circulations. Unlike the much spacious abdominal cavity, the pelvic cavity has a limited space and the occurrence of the kidneys in such aberrant location may lead to displacement and embedment of the pelvic viscera. Displacement of the ureters by the pelvic kidneys may lead to dysuria and other urological pathologies (8). Chances of renal vessel obstruction are high due to the abnormal course of the renal vessels as they cross the pelvic inlet. Pelvic nerve entrapment is also a likely feature. Generally the inborn urinary conditions occur in 1:25 of all live births (4) and accounts to about 40% of all urinary system pathologies (8). Of these, cases of renal ectopia are estimated at 1:500 to 1:110 (1). These major patterns and occurrence of variant renal anatomy need to be well documented and included in the anatomy test books for medical and specializing residents in different clinical specialties. For instance, these anatomical variations are not mentioned in three of the common standard anatomy text books for medical students and surgical residents worldwide—Gray's Anatomy for Students, Moore's Clinically Oriented Anatomy and Snell’s Clinical Anatomy by Regions. While the more extensive Gray's Anatomy puts some appreciable level of emphasis on the variant renal anatomy (6), the book is less used as a standard text book for anatomy teaching. Silence towards such potential abnormal findings creates a knowledge gap and may depict a distorted understanding of the functional anatomy by the future surgeon and hence setting a shaky foundation in managing cases of the genitourinary system.

CONCLUSIONS

Reports of extreme renal variations in structure and location are of radiological and surgical significances. Urologists and nephrologists and other clinicians need to have in mind these relatively common variations of the kidney for successful plans and outcomes of the clinical procedures. Due to its common occurrence, renal ectopia should be emphasized in normal anatomy class for medical students and surgical residents. Routine clinical and surgical guidelines should also take these relatively common variations into considerations.

REFERENCES

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