

Horseshoe Kidney: A Case Presentation

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Abstract

Introduction: Horseshoe kidneys are most common type congenital anomaly of excretory system. The incidence of this anomaly is approximately 1 in 400-500 adults. It is a condition in which there is fusion of both kidneys either at upper or at lower poles mostly fusion of lower poles. This knowledge will be very useful for radiological and surgical procedures. **Methods:** The present variation was observed during routine dissection 58 year old male cadaver in department of Anatomy of the institute. **Results:** Both the kidneys were placed at lower level as compared to their normal positions. The lower poles were fused to form the isthmus opposite to the L4 vertebra. As a result of this fusion the inferior pole of each kidney pointed medially. There was no extra renal anomaly such as polycystic kidney or renal cysts were observed. Weight of each kidney was approximately 200 g. While dimensions were length 100mm, width 20mm, and thickness 45mm for right kidney and 108mm, 18mm, 46mm respectively for left. Relation of structures in hilum was on right side from above downward renal vein, renal artery, renal vein and ureter. That on left side was from above downward renal vein, renal artery and pelvis; from before backward renal vein, renal artery. **Conclusion:** The horseshoe kidneys are usually asymptomatic. They themselves don't require any treatment and subject can have normal life expectancy unless any complications occur. But since horseshoe kidney can not only alter imaging appearance but also render the kidneys susceptible to trauma, stone formation and transitional cell carcinoma of the renal pelvis. It becomes essential to recognise their presence.

Keywords: Horse shoe kidney; Renal anomalies; Renal artery; Renal vein.

Introduction

Horseshoe kidneys are most common type congenital anomaly of excretory system. The incidence of this anomaly is approximately 1 in 400-500 adults. The condition is more commonly found in males. Higher incidence rate has been reported from patients having Down's syndrome and Turner syndrome.[1]

It is a condition in which there is fusion of both kidneys either at upper or at lower poles.

Horseshoe kidney is formed by fusion across the midline of two distinct functioning kidneys, one on each side of the midline. They are connected by an isthmus of functioning renal parenchyma or fibrous tissue. In the vast majority of cases the fusion is between the lower poles (90%). When superior or both the superior or inferior poles are fused, it is referred to as a sigmoid kidney. Horseshoe kidney is malrotated kidney. During embryonic life at the stage of migration of kidney the two metanephric blastomere come in contact mainly at the lower pole and in some cases at upper pole.[2]

It has also been postulated that during normal development, the kidneys rotate in such a way that the ureters leave the kidney from its medial aspect and the axis of the kidneys diverge. But in horseshoe kidney the normal rotation of the kidney is incomplete, so that the ureters leave the kidney from its ventral aspect and the longitudinal axis of the

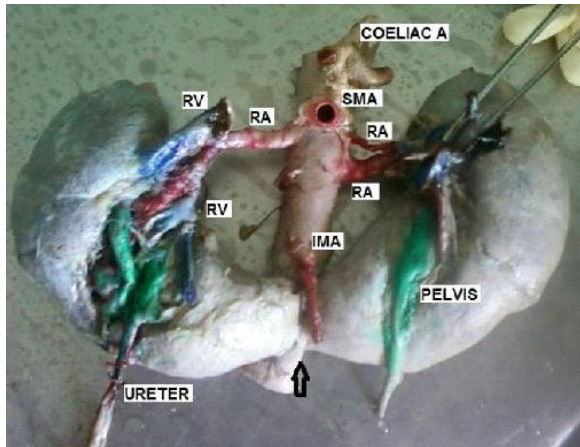
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Figure 1: Horse shoe kidney after removal from cadaver (Anterior view)



RV - Renal Vein, RA - Renal artery, SMA- Superior Mesenteric Artery, IMA - inferior Mesenteric artery,

kidneys converge.

In the present case, we have described the horseshoe kidney in detail. This knowledge will be very useful for radiological and surgical procedures.

Material and Method

The present variation was observed during routine dissection of a cadaver in department

of Anatomy, Dr. Vaishampayan Memorial Government Medical College, Solapur.

The cadaver was 58 years old male. After removal of perirenal fat, the kidneys were carefully examined. Its relation with various structures were carefully studied. All the morphological parameters were measured and recorded.

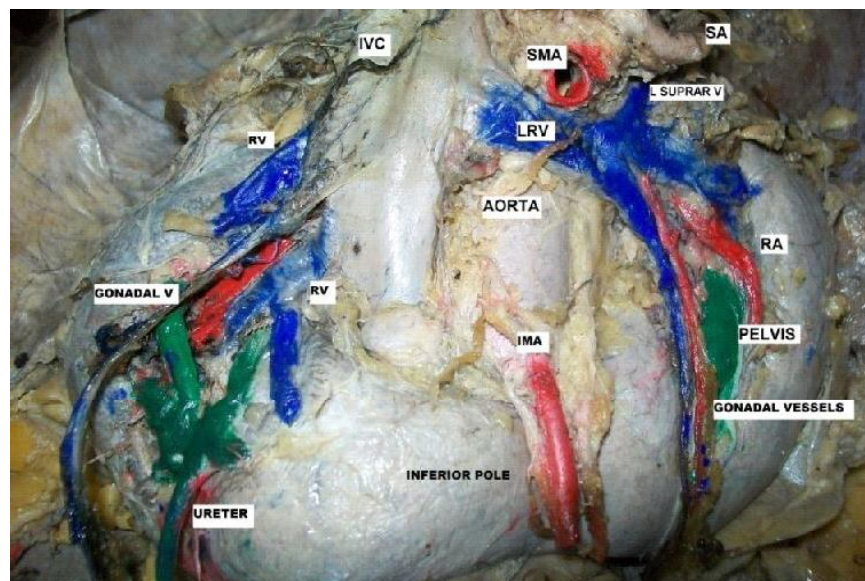
Result

Both the kidneys were placed at lower level as compared to their normal positions. The lower poles were fused to form the isthmus opposite to the L4 vertebra. As a result of this fusion the inferior pole of each kidney pointed medially. There was no extra renal anomaly such as polycystic kidney or renal cysts were observed.

Weight of each kidney was approximately 200 g. While dimensions were length 100mm, width 20mm, and thickness 45 mm for right kidney and 108 mm, 18 mm, 46 mm respectively for left.

The right and left renal arteries arose as lateral branches of the aorta just below the

Figure 2: Horse shoe kidney in situ (Anterior view)



RV - Renal Vein, RA - Renal artery, SMA- Superior Mesenteric Artery, IMA - inferior Mesenteric artery, IVC - Inferior Vena Cava, SA- Splenic artery, L SUPRA RV - left suprarenal vein

level of superior mesenteric artery. Their accompanying renal veins entered the inferior vena cava. One accessory left renal artery originated from lateral wall of the aorta above the main left renal artery. Then it ran downward behind left renal vein. Right kidney was drained by two renal veins separately into the inferior vena cava; one renal vein had two tributaries outside the hilum. Left gonadal and suprarenal veins drained into left renal vein.

Relation of structures in hilum was on right side from above downward renal vein, renal artery, renal vein and ureter (Figure 1). That on left side was from above downward renal vein, renal artery and pelvis; from before backward renal vein, renal artery.

The relations of other structure were as follows - Inferior mesenteric artery was hooked over the isthmus (Figure 1). The posterior surface of the isthmus was grooved by the aorta. From anterior surfaces of kidneys, the calyces emerged to form the ureters. There was no distinct kidney pelvis on right side. The ureters passed downward over lower poles, then across the terminal parts of the common iliac vessels, to enter the bladder in the usual manner.

Discussion

Embryologically, horseshoe kidney represents the most common failure of migration and rotation of the metanephric buds from their pelvic position during fourth – sixth week of gestation.[2] Horseshoe kidney, which cannot ascend out of the pelvic cavity because the inferior mesenteric artery prevents further migration. The vessels thus develop an abnormal relation to the renal pelvis and ureters.

Horseshoe kidneys can also be associated with other congenital renal anomaly such as pelviureteric junction obstruction. The obstruction is further precipitated by anomalous vessels crossing the ureter and the abnormal course of the ureter as it passes over renal substance. Horseshoe kidneys also have an increased incidence of stone disease,

probably as a consequence of areas of insufficient drainage.[3,4]

Horseshoe kidneys are also susceptible for injury since it lies lower than normal it is not protected by the ribs and costal margin. The large hydronephrotic kidney resulting from congenital obstruction associated with horseshoe kidney is susceptible to rupture by minimal trauma. They are also liable to parenchymatous diseases like nephritis, solitary cyst. Horseshoe kidneys are further associated with the Leriche syndrome. In this condition there is a thrombosis of the terminal aorta with claudication of the buttocks and lower extremities, impotence and diminished or absent a pulses beyond the aortic bifurcation.[4]

The horseshoe syndrome (Rovsing's syndrome) is characterized by nausea, vomiting and abdominal pain accentuated by hyperextension. Carcinoid tumours originate 60-85 times more often in horseshoe kidneys than normal one.

Conclusion

The horseshoe kidneys are usually asymptomatic. They themselves don't require any treatment and subject can have normal life expectancy unless any complications occur. But since horseshoe kidney can not only alter imaging appearance but also render the kidneys susceptible to trauma, stone formation and transitional cell carcinoma of the renal pelvis.[5] It becomes essential to recognise their presence.

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