



ORIGINAL RESEARCH PAPER

Clinical Anatomy

ANTERIORLY LOCATED RENAL PELVIS IN RIGHT KIDNEY: A CASE REPORT

KEY WORDS:

Kidney, Renal pelvis, Variation, Posterior Lumpectomy

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ABSTRACT

Background: The arrangement of structures which enter and leave the hilum of the kidney has been widely accepted in anterior to posterior orientation as Renal vein, renal artery and renal pelvis, (V-A-P) as per number of studies. **Aim:** To present a rare variation which was detected in the arrangement of renal hilar structures in the right kidney of a cadaver. **Methodology:** The arrangement of hilar structures in the right kidney was detected while performing routine cadaveric dissection during undergraduate teaching. **Results:** The arrangement of structures in the hilum of the right kidney from anterior to posterior was Renal pelvis (RP), anterior division of renal artery (AD), renal vein (RV) and posterior division of renal artery (PD), (RP-AD-RV-PD). **Conclusion:** The precise knowledge of normal and variations in arrangement of structures at renal hilum is very important prior to any surgical intervention of the kidney. Hence this reported anomaly should be taken into consideration before performing any urosurgical procedures to avoid complications.

INTRODUCTION

In each kidney, a deep vertical fissure opens anteromedially as the hilum of the kidney, which is bounded by anterior and posterior lips that contains the renal vessels, nerves and renal pelvis. The relative positions of main hilar structures are renal vein (RV), renal artery (RA) and renal pelvis in an arrangement from anterior to posterior as (V-A-P) or (RV-RA-RP) [1]. Although the variations in the hilar structures of the kidney have been well reported in the studies, but renal pelvis being the most anterior structure has not been reported in much of the literature.

Neeta et al in year 2019 reported renal hilar variations in 51 cadaveric dissected kidneys where normal hilar arrangement that is (V-A-P) was found in 25.5% of the kidneys, whereas 74.5% kidneys had variable arrangement [2]. Juao et al in year 2009 reported normal hilar arrangement as (V-A-P) in 83% of the kidneys, where total 113 kidneys were dissected and examined in Brazilian adult human cadavers, whereas 6% had arrangement as (V-P-A), another 1% had arrangement of (A-P-V) [3]. The precise knowledge of normal and variant anatomy of structures at renal hilum is very important prior to any surgical procedure of the kidney, especially as in posterior lumpectomy incision which allows certain operations like renal calculus ex. staghorn calculus removal, nephrectomy, nephrolithotomy, open renal biopsy, upper third ureterolithotomy where the approach to the kidney, renal pelvis and upper ureter is accomplished more rapidly with reasonably good exposure and less morbidity [4]. This case report reflects on the rare presence of renal pelvis in the anterior most position in the hilum of the kidney, which is important from surgical point of view, to take decision for the approach required to perform the surgery by the surgeon after duly conducting appropriate investigations and radiological correlation of the hilar arrangement of the structures in the kidney, ex. MDCT scan or Angiography.

CASE REPORT

This variation of (RP-AD-RV-PD) was found in the right kidney of the cadaver who was 72 years old at the time of his death, while performing routine dissection of the abdomen for undergraduate students. The size of the right kidney was approx. 10.5 cm (L) X 4.5 cm (W) X 3 cm (Antero - posteriorly) [Image 1], measured with the measuring tape which

coincides with the normal size of the kidney that is 11 cm (L) X 6 cm (W) X 3 cm (Antero - posteriorly) as per standard literature [1]. The length of the ureter was found to be approximately 21 cm which is normal.

The left kidney of the same cadaver was smaller in size in comparison to the right kidney having 7.5 cm (L) X 3 cm (W) X 2 cm and the arrangement of the structures in the left kidney were renal vein (RV), renal artery, renal pelvis in the form of (RV-RA-RP) [Image 1] widely accepted as normal arrangement of hilar structures Antero posteriorly. The location of both the kidneys was normal that is retroperitoneal and located against T12 to L3 vertebrae.

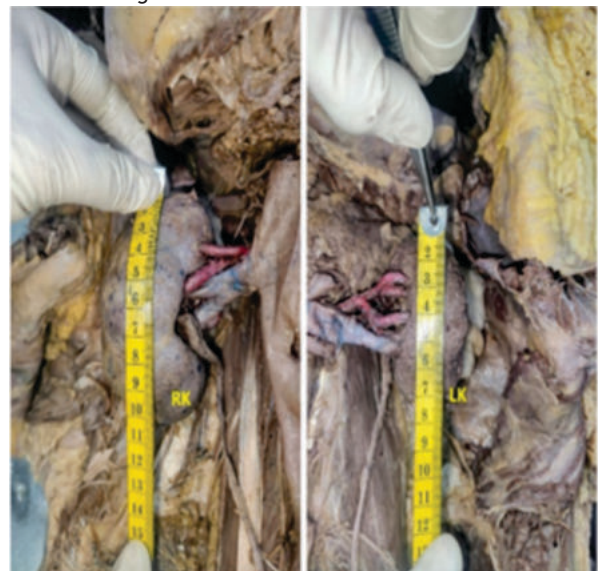


Image 1: Comparative measurements of the right & left kidneys, RK - Right Kidney, LK - Left Kidney

The images of the dissected kidneys in situ are presented to show the structural arrangement in the renal hilum of both the kidneys for comparison [Image 2] and on individual image [Image 3] of the right kidney showing the arrangement of hilar structures as (RP-AD-RV-PD) with renal pelvis being the anterior most structure and the ureter descending on the

anterior surface of the lower pole of right kidney.

DISCUSSION

The unique variation as described in this case report have rarely been reported in a normally located kidney. A thorough review of the literature was also done, but it failed to yield any such comparable study, except one case report where the renal pelvis was found to be the most anterior structure in the hilum of the kidney in a laparoscopic donor nephrectomy specimen of the patient, in which this type of variation was due to



Image 2: Right and left kidneys in situ showing structural arrangement in the hilum of Right kidney-(RP-AD-RV-PD) & Left kidney-(RV-RA-RP)

RK- Right Kidney, LK- Left Kidney, RP- Right renal pelvis, AD - Anterior Division of Rt Renal Artery, AA - Abdominal Aorta, RV - Renal Vein, PD - Post Division of Rt renal Artery, IVC - Inferior vena Cava



Image 3: Right Kidney showing the hilar structural arrangement as (RP-AD-RV-PD).

RK- Right kidney, RP - Renal Pelvis, RA - Renal Artery, RV - Renal Vein, AA - Abdominal Aorta, IVC- inferior Vena Cava

rotational defect in the kidney [4,5]. Whereas in this case report the size, location and appearance of the right kidney is normal except for the renal pelvis being located in the anterior most position in the hilum. The knowledge of rare variation in this case report is of crucial importance for surgeon to perform urosurgical procedures if he/she intends to use the posterior lumbotomy incision for rapid and safe access to the kidney, renal pelvis and upper ureter on the basis that, renal pelvis and the ureter is situated dorsally

(posteriorly), since a good exposure of the structures is obtained with this incision for above mentioned procedures [6].

Some of the studies are mentioned in under listed table which shows the incidence of finding the structural arrangement structures the hila of the kidneys in the form of (RP-AD-RV-PD).

Table 1: Incidence Of Hilar Arrangement Of Structures As (RP-AD-RV-PD) in comparison to various studies

Pattern - (RP-AD-RV-PD)			
S No	Study done by/ Ref	Year of study	Number
1	Neeta et al/ [2]	2019	zero
2	Joao et al/ [3]	2009	Zero
3	Adarsh et al/ [4]	2021	One
4	Divya et al/ [7]	2017	Zero
5	Trivedi et al/ [11]	2011	Zero
6	Present case report	2024	One

CONCLUSION

It is seen that the present case report has a rare arrangement of structures entering and leaving the hilum of the right kidney in the form of (RP-AD-RV-PD) with renal pelvis as the anteriormost structure with ureter descending in front of the anterior surface of the lower pole of the right kidney in comparison to the arrangement of the hilar structures in the form of (RV-RA-RP) in the left kidney of the same cadaver as shown in the [Image 2]. It is also seen that the other anatomical features of the right kidney are normal in view of its location, orientation, and size. Hence, the exact cause of such variation could not be established clearly. However, reporting of this variation signifies the paramount importance of conducting adequate investigations to determine the arrangement of the structures entering and leaving the hilum of the kidney in order to perform various urosurgical procedures by the surgeons, so that they have ample knowledge of these arrangements before deciding the surgical approach to be taken for the said surgeries, as collectively the number and arrangement of hilar structures in the kidney is highly variable as reported in various studies.

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