



## POSITION OF RENAL PELVIS IN RELATION TO THE RENAL SINUS OF KIDNEY – A CADAVERIC STUDY

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**ABSTRACT** The renal pelvis and major and minor calyces make up the pelvicalyceal system.<sup>[1]</sup> The major calyces are created when the minor calyces join up with their neighbours in two or three chambers. The infundibula are where the major calyces empty into.<sup>[2]</sup> The confluence of the infundibula forms the renal pelvis.<sup>[3]</sup> Comparable in frequency to a person's fingerprints are variations in the gross anatomy of the renal collecting system.<sup>[4]</sup> In this study 80 cadaveric kidneys, 40 right-side, and 40 left-sided were dissected to study the position of the renal pelvis. The variations if any present were also noted. In the present study, the most observed position of the pelvis is intra hilar -80% and the next observed position of the renal pelvis is mixed -18.75%, whereas the least observed position is extra hilar position present in 1.25%, and absence of pelvis was not observed in any of the specimens. The dissection of renal sinus structures is very challenging but is important for many surgical interventions on the renal pelvis, particularly for open stone surgery, percutaneous nephrolithotomy, and retrograde percutaneous nephrostomy safely and efficiently without many complications.

**KEYWORDS :** Renal pelvis, Intrahilar, Extrahilar, Pelvicalyceal system

### INTRODUCTION:

The kidneys are a pair of essential excretory organs that filter blood and maintain the ionic composition of extracellular fluid. T.B. Johnson in Gray's Anatomy described the relative position of the main structures in the hilus as follows: the renal vein in front, the renal artery in the middle, and the pelvis of the ureter behind. [5] The branches of the renal artery, renal vein, and major and minor calyces are the major structures seen in the renal sinus. Other minor structures are lymph nodes, adipose tissue, fibrous tissues, and nerves. [6]

### LITERATURE SURVEY:

According to the literature reviewed, there are only a few studies regarding the study of the renal pelvis

### METHODOLOGY:

80 adult cadaveric kidneys, 40 right-sided, and 40 left-sided were collected irrespective of age and sex from the Department of Anatomy, Sree Mookambika Institute of Medical Sciences, Kulasekharam. In each kidney, the anterior and posterior walls of the renal sinus were removed piecemeal by dissection. A clean coronal slice from the lateral margin toward the renal sinus was made and the major structures in the renal sinus such as major calyces, minor calyces, and renal pelvis were studied in each kidney specimen. The position of the renal pelvis was noted.

### RESULTS:

The major calyces unite to form infundibula which drain into the renal pelvis. According to Bruce et al classification, the renal pelvis position regarding the renal sinus was divided into three categories: intrarenal, extrarenal, and borderline.[7] In the present study, the position of the renal pelvis in the cadaveric kidney is noted and tabulated as follows in Table 1

**Table 1: Classification of Renal pelvis in the cadaveric kidneys**

Position of pelvis	Number of specimens		Total	Average
	Right side	Left side		
Extra hilar	1	-	1	1.25%
Intra hilar	32	32	64	80%
Mixed	7	8	15	18.75%
Absence of pelvis	-	-	-	-

**Figure 1: Classification of Pelvis**

From the above Table 1 Intrahilar pelvis was the most observed type of renal pelvis and is seen in 64 cadaveric kidneys (80%), followed by

Mixed type observed in 15 cadaveric kidneys (18.75%) , and least observed type is Extrahilar type seen in only 1 cadaveric kidney (1.25%) , whereas absence of pelvis is not seen in any of the specimens



**Figure 1 shows Intrahilar, Mixed and Extrahilar positions of renal pelvis**

### DISCUSSION:

The variations of the renal collecting system represent a complex and often confusing subset of urological variations. They manifest in many ways and often make preoperative diagnosis difficult. With the rare incidence of extrarenal calyces, it is important to bear this condition in mind when operating on a kidney with a distorted calyceal appearance in preoperative imaging studies.<sup>[2]</sup> There is considerable variation in the number of renal calyces and the shape of the renal pelvis, but there is also a marked variation in the position of the pelvis. Thus, a pelvis may lie almost entirely within the sinus, an intrarenal pelvis, or its main portion may be a dilated sac and lie outside the kidney proper, an extrarenal pelvis.<sup>[8]</sup>

The position of the renal pelvis varies in relation to the renal sinus. In the study by Anjana, et al, apart from intrarenal, extrarenal, and borderline positions, there was no demonstrable pelvis in 3% of the specimens. Intrarenal 79 %, Extrarenal 5%, Borderline 13%, Absent in 3%.<sup>[9]</sup>

Edwards et al in a study described the position of the renal pelvis depending on whether it lies inside or outside the renal sinus. They reinstated the idea that there are two different types of pelvic positions: intrarenal and extrarenal types.<sup>[10]</sup>

According to Garg et al, a rare congenital defect in which the renal pelvis and main calyces are external to the parenchyma of the kidney was observed in a study.<sup>[11]</sup>

Bilateral extrarenal calyces, where calyces and renal pelvis lie beyond the renal parenchyma and are associated with variations in renal arteries were noted in the study of Rao et al.<sup>[2]</sup>

In two instances the renal pelvis and major calyces that are outside of the renal parenchyma known as extrarenal calyces were reported by Gupta et al in a study conducted by them.<sup>[12]</sup>

A rare extrarenal calyces variation lacking a renal pelvis was observed in 1% of the specimens by Anjana et al.<sup>[9]</sup>

A study conducted on 196 cadaveric kidneys by Gandhi et al found that the intra-renal pelvis was found in 48.5% of specimens, and the extra-renal pelvis was found in 21.9% specimens. In 20.9% of specimens, the renal pelvis was having partially intra- and extra-renal in location. Bilateral symmetry was found in only 27.1%.<sup>[13]</sup>

## CONCLUSION:

The dissection of renal sinus structures is very challenging but is important for many surgical interventions on the renal pelvis, particularly for open stone surgery, percutaneous nephrolithotomy, and retrograde percutaneous nephrostomy safely and efficiently without many complications.

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