

ANATOMICAL VARIATIONS IN ARTERIAL PATTERN OF LOWER SEGMENTAL ARTERY AND ITS RELATION WITH COLLECTING SYSTEM

Gyan Prakash Mishra *¹, Shobha Bhatnagar ², Brijendra Singh ³.

*¹ Assistant Professor, ² Professor and Head, ³ Additional Professor.

^{1,2} Department of Anatomy, Career Institute of Medical Sciences and Hospitals, Ghaila, Lucknow, U.P, India.

³ Department of Anatomy, AIIMS, Jodhpur, India.

ABSTRACT

Aim of our study to observe the arterial pattern of lower segmental artery and its relation with collecting system. 50 fresh human Kidneys were studied by corrosion cast method. Moulding granules of butyl butyrate dissolved in acetone for 24 hours and prepared 20% homogenous solution. Solution was injected into renal vessel and ureter. Injected Kidney was corroded in concentrated potassium hydroxide solution and cleaned with running water. We observed three dimensional endocasts of collecting system and renal vessel. We found 5 types of variation in arterial pattern of lower segmental artery namely LSAT1, LSAT2, LSAT3, LSAT4, LSAT5 and they were seen in 70%, 4%, 2%, 4% and 20% Kidneys respectively. We also found two types of variation in relation between lower segmental artery and collecting system namely LSAG1 and LSAG2. LSAG1 seen in 80% Kidneys and LSAG2 in 20% Kidneys. The finding of our study is helpful for urologist in intrarenal operations, endourological stone removal, renal trauma management and to avoid post operative complications.

KEYWORDS: Lower Segmental Artery, Collecting System, Kidney, Corrosion Cast, Variation.

Address for Correspondence: Dr. Gyan Prakash Mishra, Assistant Professor, Department of Anatomy, Career Institute of Medical Sciences and Hospitals, Ghaila, Lucknow, U.P, India. Mobile +919454553551. **E-Mail:** gyanprakash.mishra88@gmail.com

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INTRODUCTION

Normally each Kidney is supplied by single renal artery. Near the hilum of Kidney renal artery divides into anterior and posterior division, which further divides into segmental arteries namely apical, upper, middle, lower and posterior. Segmental arteries are end arteries, each of which supplies one vascular segment of Kidneys. Lower segmental artery gives arterial supply to Lower vascular segment of Kidney. In its course lower segmental artery runs in close relation with collecting system. Objective of our study to observe arterial pattern of lower segmental artery and its relation with collecting

system.

MATERIALS AND METHODS

50 fresh human Kidneys were studied by corrosion cast method. Kidneys were obtained from mortuary within 24 hours of death. Moulding granules of butyl butyrate dissolved in acetone for 24 hours and prepared 20% homogenous solution. Washed the renal vessel with 0.9% saline solution till the renal vein showed the clear fluid coming out of it. 20% solution was injected into renal vessel and ureter. After injection renal vessel and ureter were tied

by thread and kept in 10% formal saline for polymerization at room temperature for 24 hours. Injected Kidney was corroded in concentrated potassium hydroxide solution and cleaned with running water.

RESULTS

In present study we observed variations in arterial pattern of lower segmental artery. On basis of its origin & course we have divided it in five types namely LSAT1, LSAT2, LSAT3, LSAT4 and LSAT5. LSAT1 arose from the anterior division. It was found in 35(70%) Kidneys (Figure 1). LSAT2 arose from posterior division. It was found in 2(4%) Kidneys (figure 2). LSAT3 arose from the renal artery and was found in 1(2%) Kidney (figure 3). LSAT4 arose directly from abdominal aorta and was seen in 2(4%) Kidneys. LSAT5 included two lower segmental artery one arose from anterior division and other arose from posterior division of renal artery. It was seen in 10(20%) Kidneys (figure 4). We also observed variations in relation between lower segmental artery and collecting system and these variations have been divided into two groups namely LSAG1 and LSAG2. LSAG1 ran at the anterior aspect of pelvis, divided into two branches. One branch was lying in front of lower major calyx and other branch was lying below and behind lower major calyx. It was observed in 40 (80%) Kidneys (figure 1, 3). LSAG2 included two lower segmental artery, one arose from anterior division and was lying in front of lower major calyx and the other arose from posterior division was lying behind lower major calyx. It was observed in 10(20%) Kidneys.

Fig. 1: Showing LSAT1 and LSAG1. A- Renal Artery, B- Anterior Division, C- LSAT1 and LSAG1, D- Lower Major Calyx.

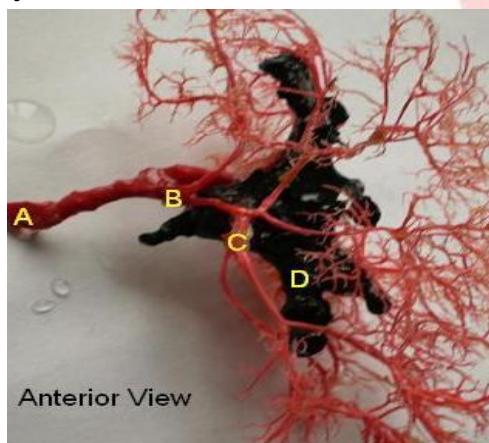


Fig. 2: Showing LSAT2. A- Renal Artery, B- Anterior Division, C- LSAT2, D- Lower Major Calyx, E- Posterior Division, F- Renal Vein.

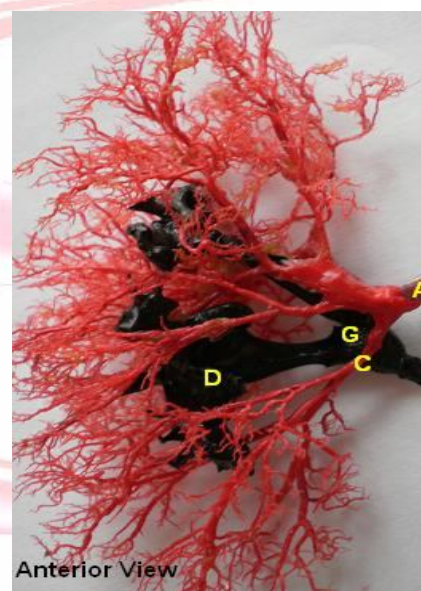
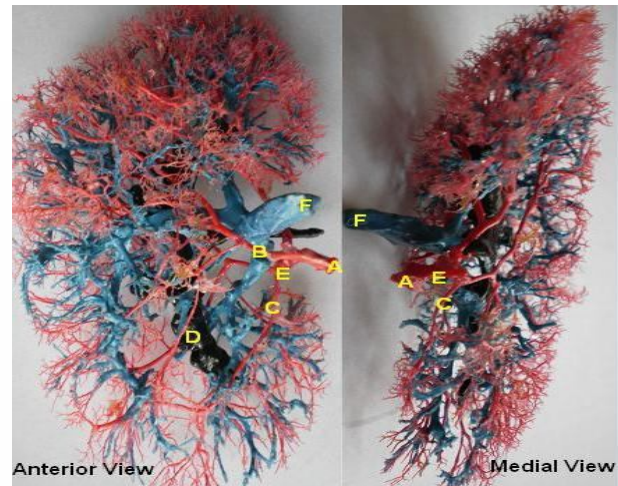
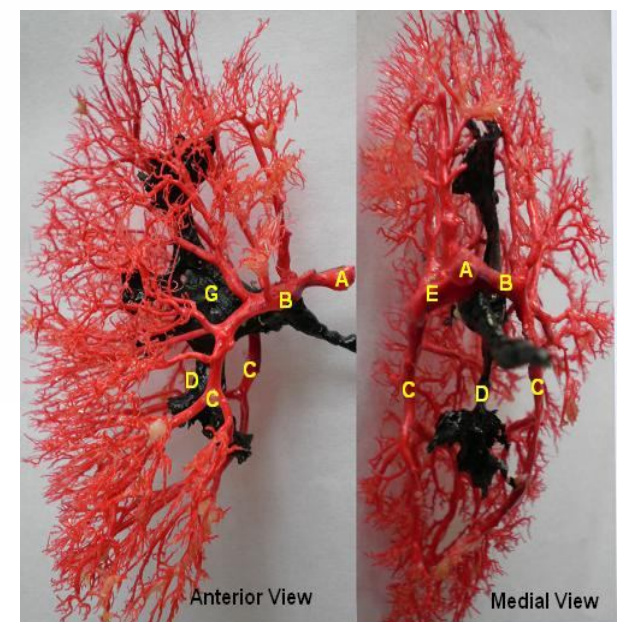


Fig. 3: Showing LSAT3 & LSAG1. A- Renal Artery, C- LSAT3 and LSAG1, D- Lower Major Calyx, G- Pelvis.

Fig. 4: Showing LSAT5 and LSAG2. A- Renal Artery, B- Anterior Division, C- LSAT5 and LSAG2, D- Lower Major Calyx, E- Posterior Division, G- Pelvis.



DISCUSSION

Types	Authors				
	Verma et al (1961)	Saxena et al (1973)	Longia G.S. et al (1984)	V.P. Raghavendra et al (2012)	Present study
LSAT1	87%	46.25%	82%	51.66%	70%
LSAT2	1%	20%	1%	8.33%	4%
LSAT3	3%	15%	5%	10%	2%
LSAT4	3%	10.25%	2%	28.33%	4%
LSAT5	3%	8.50%	10%	-	20%

Table 1: Showing comparative study on arterial pattern of lower segmental artery.

Anatomical variations in arterial pattern of lower segmental artery have been reported by other Authors. We studied 50 human Kidneys by corrosion cast method and found variations in arterial pattern of lower segmental artery. On the basis of its origin and course we have divided it into 5 types namely LSAT1, LSAT2, LSAT3, LSAT4 and LSAT5. We compared our observation with past studies by other Authors [1-5] (Table 1).

We also studied relation between lower segmental artery and collecting system and found two types of variations namely LSAG1 and LSAG2. LSAG1 found in 80% Kidneys and LSAG2 in 20% Kidneys. LSAG1 and LSAG2 shown in 62.2% and 37.8 % kidneys respectively[6].

CONCLUSION

In present study we found 5 types of variation in arterial pattern of lower segmental artery and 2 types of variation in its relation with collecting system. These findings are helpful for urosurgeons, radiologists and anatomists to understand anatomical variations of lower segmental artery and these variations are important to know before performing intrarenal operations, partial or complete segmental resection, endourological stone removal and renal trauma management.

Conflicts of Interests: None

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