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AN ANATOMICAL STUDY ON RENAL ARTERIES AND IT'S VARIATION

Anatomy

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ABSTRACT

In the present millennium, with tremendous recent advances in renal surgeries, it is prerequisite to have an extensive and sound knowledge, of the renal vascular anatomy and its variations, so that, the outcome of transplant surgeries, vascular reconstructions, urological and other radiological interventions have minimal or no postoperative morbidity or mortality on the patients. This study highlights about a possible anatomical variation in renal vasculature. Patients with variations of renal vasculature can be completely asymptomatic. The renal arteries are paired vessels arising from abdominal aorta. They branch and rebranch as segmental arteries to supply blood to the segments of the kidney. Precise knowledge of renal artery and its branching pattern is useful for surgeons while performing nephrectomies and renal transplantations. Variations can occur in origin, number, course and branching of renal arteries. A supplemental renal artery is an additional artery within the renal vascular pedicle which perforates the kidney to supply it. The supplemental renal artery can be either an accessory renal artery or an aberrant renal artery. An accessory renal artery is a one that is accessory to main artery accompanies the same towards the hilum and enters through the hilum to supply it. An aberrant renal artery supplies the kidney without entering the hilum. This study was conducted at Department of Anatomy, Government Medical College, Chennai -2 between June 2016- October 2017.

KEYWORDS

Abdominal Aorta, Renal artery abnormalities, Main renal artery, Supplemental renal artery, Accessory renal artery, Aberrant renal artery, Triple renal arteries and Unilateral .

INTRODUCTION:

The renal arteries are paired lateral branches arising from abdominal aorta, just below the origin of superior mesenteric artery (at the lower border of first lumbar vertebra). They take 20 percent of cardiac output to supply the renal organs which accounts to less than 1/100th of total body weight. The right renal artery is longer and often higher, passing posterior to inferior vena cava, right renal vein, head of pancreas and descending part of duodenum. On the other hand, the left renal artery courses behind and above the left renal vein. Near the hilum, the renal artery divides into anterior and posterior divisions which further subsequently , divide into segmental arteries and supply renal vascular segments[1].

OBJECTIVES:

The aim of the study was to asses any anatomical variation in the origin of renal arteries.

MATERIALS AND METHODS:

After complete approval from Institutional Ethical Committee for the research protocol. About ten adult cadavers (8 males and 2 females) aged between 50 - 75 years, were dissected in the department of Anatomy, Government Medical College , Omandurar Government Estate,Chennai-2. The adult cadavers were received from body donation after written informed consent. The cadavers were embalmed through femoral artery perfusion.

The methodology prescribed by Cunningham`s Manual of dissection2 was carried out for the exposure of renal arteries.

OBSERVATIONS:

TABLE:1 SITE OF ORIGIN OF RENAL ARTERIES (RA)

LEVEL OF ORIGIN OF RA	RIGHT (n = 10)	LEFT (n = 10)	TOTAL (n = 20)
As Lateral branch of Abdominal Aorta between L1 - L2	10 (100%)	10 (100%)	20 (100%)

In all the adult cadavers, the renal arteries arose as a lateral branch of abdominal aorta between L1 - L2 in 100 % of cases (20 / 20).

FIG 1 : ORIGIN OF RENAL ARTERIES FROM ABDO MINAL AORTA

TABLE :2 TYPE OF ORIGIN OF RENAL ARTERIES (RA)

TYPE OF ORIGIN OF RA	RIGHT (n = 10)	LEFT (n = 10)	TOTAL (n = 20)
Single vessel	9 (90%)	10 (100%)	19 (95%)
Triple vessels	1 (10%)	---	1 (5%)

In the present study, the renal artery arose in 95% (19/20) as a single trunk and as triple vessel in 5 % (1/20).

The triple renal vessels originated from right lateral side of aorta at lower border of first lumbar vertebra to supply the right kidney. The renal vessel sandwiched in the middle was considered as main renal artery, as it divided into anterior and posterior branches in front of hilum. There was an additional vessel coursing superior to the main renal artery, which gave the middle and inferior suprarenal branch to the right suprarenal gland just proximal to renal hilum. There was also another additional renal vessel coursing inferior to the main renal artery. Both the superior and inferior supplemental vessels had a similar and a parallel course as that of the main renal artery. The superior and inferior supplemental renal arteries and main renal artery were postcaval in origin. They entered the right kidney as supplemental renal arteries behind the plane of renal vein at renal hilum. The right and left renal veins were single.

FIG -2 MIDDLE AND INFERIOR SUPRARENAL ARTERIES ARISING FROM SUPERIOR ACCESSORY RENAL ARTERIES (AFTER PARTIAL REFLECTION OF INFERIOR VENACAVA)

FIG – 3 RETROCAVAL RELATION OF TRIPLE RIGHT RENAL ARTERIES WITH SINGLE LEFT RENAL ARTERY

DISCUSSION:

SITE OF ORIGIN OF RENAL ARTERIES

The renal arteries usually arises as one of a lateral branch of abdominal aorta between the lower third of the first lumbar vertebra and the cranial third of the second lumbar vertebra. In rare instances, it may arise from the aorta at a lower point than usual, in such cases the kidneys may lie below their usual position such as in iliac fossa / pelvic regions. [3]

The present study revealed, all the renal arteries arose from the abdominal aorta.

TYPE OF ORIGIN OF RENAL ARTERIIES (RA)

The observations in adult cadavers in the present study shows, renal arteries arose as a single vessel from abdominal aorta in 95 %, and as triple vessels in 5 % of cases.

TABLE 1 COMPARISON OF ORIGIN OF RENAL ARTERY AS A SINGLE VESSEL IN ADULTS

QUOTING AUTHORS	PREVALANCE OF RENAL ARTERY AS A SINGLE VESSEL
Hegedus [4]	120 / 138 kidney specimens (86.96%)
Lynn H. Harrison et al [5]	76 / 164 kidney specimens (40%)
K. S. Satyapal et al [6]	23.1 % (R - 18.6 % L - 27.6%)
Naveen Kumar et al [7]	3 / 96 (R -1 L - 2)
Present Study	19 / 20 kidney specimens (95%) (R – 90 % L - 100%)

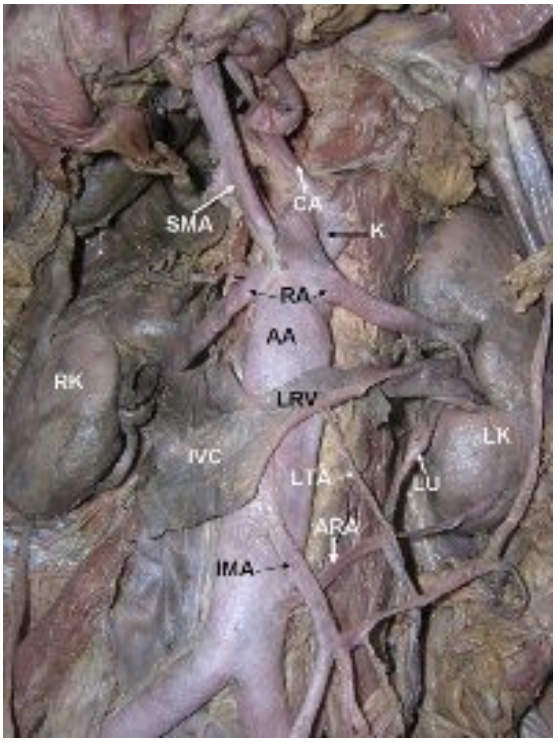
FIG 4 : TRIPLE RENAL ARTERIES ENTERING RENAL HILUM.

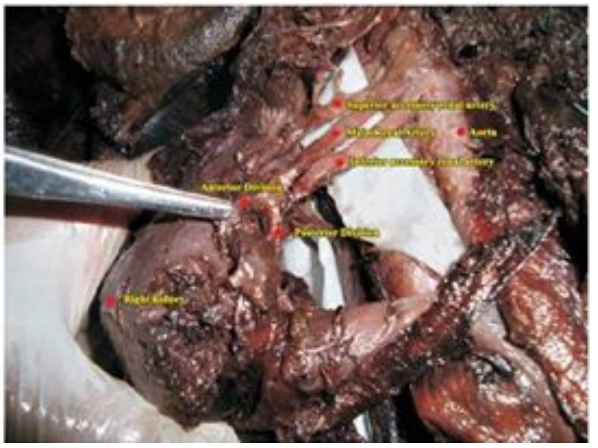
TABLE 2: COMPARISON OF ORIGIN OF RENAL ARTERY AS TRIPLE VESSELS IN ADULTS

QUOTING AUTHORS	PREVALENCE OF RENAL ARTERY AS TRIPLE VESSELS
Hegedus [4]	3 / 138 kidney specimens (2.17 %)
Lynn H. Harrison et al [5]	3 / 164 kidney specimens (1.83%)
K. S. Satyapal et al on > 2 additional renal arteries [6]	27.65 % (R- 23.3% L-32%)
Naveen Kumar et al [7]	16 /96 kidney specimens (16.7%) (R - 10.4%, L - 6.25%,)
Present Study	1 / 20 kidney specimens (5%) (R – 10 %, L - 0%)

CONCLUSION:

With kidney transplantation, becoming a very common procedure, adequate planning of the surgical procedure (especially of donor nephrectomies) has to be done. It is mandatory to perform preoperative angiography so as to prevent, vascular complications during the procedure.





LEGENDS FOR PICTURES

FIG : 1 NORMAL ORIGIN OF BILATERAL RENAL ARTERIES

FIG -2 MIDDLE AND INFERIOR SUPRARENAL ARTERIES ARISING FROM SUPERIOR ACCESSORY RENAL ARTERIES (AFTER PARTIAL REFLECTION OF INFERIOR VENACAVA)

FIG – 3 RETROCAVAL RELATION OF TRIPLE RIGHT RENAL ARTERIES WITH SINGLE LEFT RENAL ARTERY

FIG 4 : TRIPLE RENAL ARTERIES ENTERING RENAL HILUM.

REFERENCES

1. Susan Stranding, Gray`s Anatomy-The Anatomical basis of clinical practice (2008); fortieth edition page number :1231- 1233.
2. G.J. Romanes Cunningham`s Manual of Practical Anatomy Volume Two Thorax and Abdomen fifteenth edition page number:167- 170
3. Ronald A. Bergmann, Adel K. Afifi . Renal Arteries Illustrated Encyclopedia of Human Anatomic Variation: Opus II: Cardiovascular System : Arteries : Abdomen
4. HEGEDUS V, Arterial anatomy of the kidney. A three dimensional angiographic investigation, Acta Radiol Diagn (Stockh) 1972 Sep, 12 (5) : 604 - 618 {PubMed}
5. Lynn H. Harrison Jr, M. Wayne Flye, H. F. Seigler, Incidence of Anatomical Variants In Renal Vasculature In The Presence Of Normal Renal Function ANNALS OF SURGERY (Ann Surg. 1978 Jul : 188 (1) : 83 - 89.
6. K. S. Satyapal, A.A. Haffejee, B. Singh Additional renal arteries incidence and morphometry Surgical and Radiologic Anatomy April 2001, Volume 23, Issue 1, pp 33 –38
7. Naveen Kumar, Anitha Guru, Ashwini Ajithal. P, Evaluation of the Variant Anatomical Disposition of the Renal Hilar Structures in South Indian Adult Human Cadavers and Its Cinical Implications J Clin Diagn Res. 2013 Aug; 7 (8) : 1543 – 1546.