wjpmr, 2019,5(3), 195-198

SJIF Impact Factor: 4.639

WORLD JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.wjpmr.com

Research Article

ISSN 2455-3301

WJPMR

CADAVERIC STUDY OF VARIATIONS OF RENAL ARTERY AND ITS SURGICAL CORRELATIONS

Dr. Purvi Mishra*[1] and Dr. D. D. Ksheersagar[2]

[1]Lecturer, NKPSIMS & RC, Nagpur, India.
[2]Prof. and Head Department of Anatomy, NKPSIMS & RC, Nagpur, India.

***Corresponding Author: Dr. Purvi Mishra**
Lecturer, NKPSIMS & RC, Nagpur, India.

Article Received on 14/01/2019 **Article Revised on 04/02/2019** **Article Accepted on 25/02/2019**

INTRODUCTION

Each kidney is supplied by a single renal artery. Renal arteries are a pair of wide bored straight vessels arising at right angles from the antero-lateral part of aorta just below the superior mesenteric artery. The right renal artery is longer than the left artery because abdominal aorta lies on the left side of vertebral column. The renal arteries are of around 5mm in diameter.[1] Each renal artery divides into anterior and posterior divisions at or very close to the hilum of the kidney. Further it divides into segmental arteries to supply the respective segments of the kidney being themselves the end arteries.[2]

Sometimes extrarenal artery arising from aorta which is precocious origin of segmental artery.

Variations in renal arteries have been called aberrant, supernumerary, supplementary, accessory are among various terms.[3]

Renal arteries variations are divided into two groups—
1) Early division of renal artery: Ramification of the main renal artery into segmental branches more proximal to the hilum of the kidney.

2) Extrarenal artery: it is divided into two main divisions;
A) Accessory or hilar renal artery: enter the kidney through the hilum with the main renal artery.
B) Aberrant or polar renal artery: enters the kidney directly through the main capsule without entering through the hilum.

A single renal artery to each kidney is in approximately 70% of individuals.

Accessory renal arteries are common (30% of individuals) and usually arise from the aorta above and below the main renal artery and follow it to the renal hilum. They are regarded as Persistent lateral splanchnic arteries. The frequency of accessory renal artery show variability from 9% -76%. It is generally between 28-30% in anatomic and cadaveric studies.5

Variations in renal artery have been the subject of repeated study and a voluminous literature exists.
This study was undertaken to observe and report the variations of renal arteries in humans, to compare the previous studies, to report the incidence of important type of variations by cadaveric dissection.

MATERIAL AND METHOD

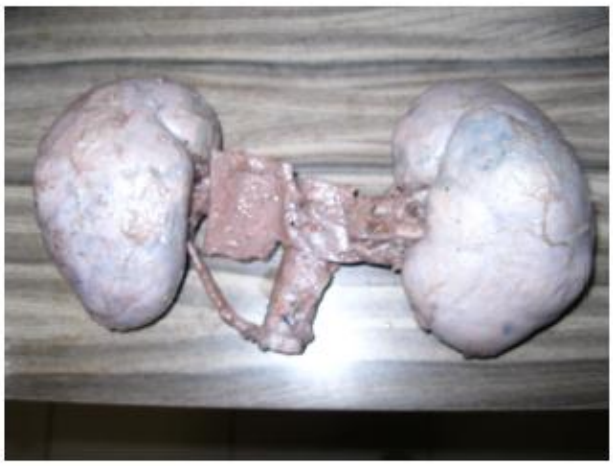
The study was conducted on 50 cadavers (100 Kidneys) of both sexes during routine abdominal dissection for medical undergraduates over a period of 2 years after taking due permission by the ethical committee of college.

Dissection was carried out to explore the vascular supply of kidney along the length of abdominal aorta below the origin of superior mesenteric artery.

RESULTS

Following parameters were observed
1) Regarding the number of renal arteries – 5 cases on right side 3 and on left side 2
2) Regarding the level of origin of renal arteries-no variation observed
3) Regarding branching of Renal artery –2 cases of early ramifications variations
4) Regarding presence of accessory renal artery – 2 cases of accessory renal artery variations
5) Regarding unilateral or bilateral accessory RA—one such variation in which bilateral accessory renal artery present. And one unilateral.
6) Regarding the type of accessory renal artery
A. Super hilar -1
B. Infra hilar -2

7) Regarding aberrant/polar renal artery – one such variation.



DISCUSSION

Different origins of renal arteries and frequent variations are explained by the development of mesonephric arteries.

These arteries form a vascular network feeding the kidneys, suprarenal glands and gonads on both sides of the aorta between cervical 6 and lumbar 3 vertebrae, a region known as rete arteriosum urogenitale. Over the time these arteries degenerate, leaving only one mesonephric artery which undertakes arterial circulation of the kidneys. Deficiency in the development of mesonephric arteries results in more than one renal artery.[7]

The various types of accessory renal arteries, their position, method of entry to the kidney and its segmentation were studied extensively by Skyes (1963).[8]

When there are two or more renal vessels, the vessels do not anastomose within the substance. Each artery supplies a separate part of kidney, hence none of the multiple arteries can be regarded as accessory. Obstruction of any renal artery leads to cessation of function and death of the part of kidney supplied by it; hence the term accessory is misleading be YASTHA, cause they are not extra but essential tissue sustaining arteries without anastomosis between them, which correspond to the segmental branches of a single renal artery (Sampaio and Passos, 1992; Madhyastha, Suresh and Rao, 2001).[9]

Main renal artery generally originate from the abdominal aorta, just below the superior mesenteric artery in the level of L1-L2 vertebre.[7]

With respect to vertebral column, right renal artery originate above left renal artery.

Kadir declared that in 75% of general population main renal artery originates from the level of L1-L2 vertebral disc and the other 25% originate somewhere between the lower end plates of T12 and L2.[10]

In our study most of the renal artery on left (44%) originated at the level of L1&L2 and at the level of L1 36% and at L2 20%.

Whereas on right side 77% originated at L1 level,20% at L1-L2 and 4% at L2 level ERA (extra renal arteries) are divided into two groups according to the way as they enter into the kidneys. ERA Entering to the kidney through hilus along with main artery are called accessory artery. The arteries entering to the kidney from poles are called as aberrant renal arteries.

In our study we found 2 cases of accessory renal arteries in which the accessory arteries where entering the kidney from hilus along with main artery. Out of 2 cases one was having bilateral accessory renal arteries.

We found one case of aberrant renal artery in which the ERA was entering the kidney through pole.

There are reports of renal arteries. Bordeii P et al (2004) studied renal vascularization and reported 54 of double renal arteries supplying one kidney and originating from aorta. In about 28 cases, supplementing renal artery entered the kidney through hilum, in 16 cases it was inferior pole and in 5 cases it was superior polar.[11]

Incidence of multiple arteries has been reported to be 20.2% and 19% on right and left sides respectively by Janschek EC et al in 2004. But Saldarringa B et al (2008) reported 97 out of 390 kidneys (24.9%) having additional artery and 10 (2.6%) had two additional arteries. The frequency of one additional artery was 43.5% on right side and 56.3% on left side. There was discrepancy regarding the side the additional arteries were presented, some authors have reported a higher frequency on left side while some other reported a higher frequency on right side.[12]

In present study we observed duplication of renal artery in 5 cases on right side 3 and on left side 2. Thus we observed 5% of duplication in renal arteries.

Accessory renal arteries are frequently found on left side and occurrence is as high as 30-35% cases.These arteries usually enter the upper or the lower pole of the kidney.[12]

In present study we found 2 cases of accessory renal arteries in which one was bilateral and one unilateral.

Prehilar multiple branching was observed by Rao M et al.(2009)

In our study we found 2 cases of prehilar multiple branching.

These branches were directed towards the various segments of kidney namely apical, superior, middle, inferior and posterior vascular segments.

Gray, s anatomy 40th edition mentions that the origin of the renal artery is below the origin of superior mesenteric artery which matches the present side. We found all renal arteries originating below superior mesenteric artery.

CONCLUSION

The abnormalities in renal arteries are mainly due to various developmental positions of the kidney. Different origin of renal arteries and their frequent variations are explained by the development of mesonephric duct.

The results of present study indicates that the renal arteries show frequent variations. most of the variations are in origin, branching, and presence of accessory and aberrant renal arteries.

The knowledge of such variation is of utmost importance the surgeons dealing with kidney transplantion, urologists and radiologists who perform endourological procedures and interventional techniques.

To plan adequate surgical procedure avoiding vascular complications, multidetector computer tomography (MDCT), angiography and arteriography should be performed to detect variations of renal artery.

REFERENCES

1. Standring S, ed. Gray's Anatomy. The Anatomical Basis of Clinical Practice. 40th Ed., Edinburg, Churchill & Livingstone, 2008; 1231-1233.
2. T Ramesh rao –aberrant renal arteries and its clinical significance. International journal of anatomical variations, 2011; 4: 37-38.
3. Anatomical variations of Renal artery and its surgical correlations: a cadaveric study from central India. Budhiraja V, Rastogi R, JainV and Bankwar V.
4. Renal artery Variations: a cadaveric study with clinical relevance. Vrinda Ankolekar, Ratnabali Sengupta. Int J cur Res, March 2013; 05(05): 154.
5. Cerny JC, Karsch D. Aberrant renal arteries. Urology, 1973; 2: 623–626.
6. Ozkan U, Oguzkurt L, Tercan F, Kizilkilic O, Koc Z, Koca N. Renal artery origins and variations: Angiographic evaluation of 855 consecutive patients. Diagn Interv Radiol, 2006; 12: 183–186.
7. Graves FT. The aberrant renal artery. J Anat, 1956; 90: 553–558.
8. SkyesD, The arterial supply of human kidney with special reference to accessory arteries. Journal of surgery, 1963; 50: 368 -374. PMID13979763http: //dxdoi.org/10.1002/Bjs.18005022204.
9. SampaioFJ, and Passos MA. Renal arteries: Anatomic study for surgical and radiological practice. Surgical and radiological Anatomy, 1992; 14(2): 113-117. PMid: 1641734.http:/dx.doi.org/ 10.1007/BF01794885.
10. Kadir S, Kidneys. Atlas of normal and variant angiographic anatomy. Philadelphia: W. B. Saunders Company, 1991; 397-429.

11. Bordei P, Sapte E, Iliescu D, Dina C, The morphology and its surgical importance of the gonadal arteries originating from renal artery, Surg Radiol Anat, 2007; 29(5): 367-371.
12. Saldarriaga B, Pinto SA, Ballesteros LE. Morphological expression of the renal artery.A direct anatomical study in Columbian half – caste population. Int J Morphol, 2008; 26: 31-38.
13. variations in branching pattern of renal artery and arrangement of hilar structures in the left kidney: clinical correlation, a case report. Poonam verma, Anterpreet K. Arora, Punit Sharma, Anupama Mahajan. Italian journal of Anatomy and Embryology, 2012; 117(2): 118-122.
14. Study on variations in the origin of Renal artery. Mr. Kishwor bandari, Mrs Sanju Acharya, Mr.Prakash Mane,Dr.Aruna Mukherjee, IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)e-ISSN: 2279-0861, 2014; 13(2): 55-57.
15. Renal artery variations: embryological basis and surgical correlations. Virendra Buchiraja,Rakhi Rastogi,A.K Asthana Romanian Journal Of Morphology and Embryology, 2010; 51(3): 533-536.
16. A study of renal artery variations in cadavers. Ephrain Vikram Rao K, Sadananda Rao Battula. Asian Pac J. Health Sci., 2015; 55-61.
17. Gurses IA, Kale A, Gayretli O, Bayraktar B, Usta A, Kayaalp ME, AriZ, Bilateral variations of renal and testicular arteries, International journal of Anatomical Variations, 2009; 2: 45-47.
18. Bergman RA, Cassela MD, Sahinoglu K, Heidger PM jr, Human doubled renal and testicular arteries, Ann Anant, 1992; 174(4): 313-315.
19. Kem DC, Lyons DF, Wenzl J, Halverstadt D, Yu X. Renindependent hypertension caused by nonfocal stenotic aberrant renal arteries: proof of a new syndrome. Hypertension, 2005; 46: 380-385.
20. Das S. Anomalous renal arteries and its clinical implications. Bratisl Lek Listy, 2008; 109: 182–184.
21. Bergman RA, Thomson SA, Afifi AK, Saadeh FA. Compendium of Human Anatomic Variation. Baltimore, Urban & Schwarzenberg, 1988; 81–83.