

*Case Report***Unilateral Double Right Renal Arteries - A Case Report**Naveen Kumar<sup>1</sup>, Ashwini Aithal P<sup>1</sup>, Swamy Ravindra S<sup>1</sup>, Jyothsna Patil<sup>1</sup>, Anitha<sup>1</sup>, Suhani S<sup>2</sup>, Mamatha H<sup>2</sup><sup>1</sup>Department of Anatomy, Melaka Manipal Medical College (Manipal Campus), Manipal University, Manipal, Karnataka, INDIA.<sup>2</sup>Department of Anatomy, Kasturba Medical College, Manipal. Manipal University, Karnataka, INDIA.

Corresponding Author: Ashwini Aithal P

*Received: 31/03/2014**Revised: 21/04/2014**Accepted: 25/04/2014***ABSTRACT**

Arterial pattern of the kidney is variable and often one or two accessory renal arteries may exist. Presence of multiple renal arteries is more common on the left side than on the right side. We report here a unilateral case of double renal arteries supplying the right kidney. Both the arteries were originating as lateral branches from the abdominal aorta about 1-1.5cm apart. The numeric aberrations involved in the arterial pattern of the kidney make it unsuitable for kidney transplantation. Failure to identify these variations during aorto-iliac interventions could result in occlusion of renal artery, which in turn could lead to ischemic renal injury. Prior knowledge on existence of double renal arteries is important for urologists and radiologists during the planning and execution of surgical and interventional therapeutic procedures.

**Key words:** renal artery, duplicated, accessory, kidney

**INTRODUCTION**

Vasculature of each kidney is generally provided through the single renal artery and a renal vein. The renal arteries are lateral branches of abdominal aorta, given off at the vertebral level of L2. Renal veins of both the kidneys terminate into the inferior vena cava. The renal artery from its origin move towards the medial border of corresponding kidney as a major content of renal hilum between the renal vein anteriorly and renal pelvis posteriorly. The renal artery then divides into anterior and posterior branches which in turn divide into segmental branches within the substance of the kidney.

[1] Very often the kidney receive additional arterial supply from more than one renal

artery which are frequently termed as multiple or accessory renal arteries.

Presence of accessory renal arteries, their position at renal hilar and pre-hilar region has been studied and well documented by various authors.

Multiple renal arteries can exist in two categories. It can be present as aberrant or polar arteries and accessory or hilar arteries. In the case of polar arteries, the renal artery supplies the superior or inferior poles of the kidneys without entering the renal hilum, whereas, the hilar arteries enter the renal hilum to supply the kidney. [2]

We report here in a unique pattern of congenital renal arterial variation in the right side of the kidney, which warrants surgical

and radiological importance. Detailed knowledge of renal vascular variations gains importance during surgical or interventional therapies involving renal transplantation, renovascular hypertension, renal vessel embolization and angioplasty and in vascular reconstruction procedures done for congenital or acquired lesions. [3]

### CASE REPORT

During routine cadaveric dissection of a male cadaver aged about 55 years, we noticed the presence of double renal artery for the right kidney [Figure 1]. Both the arteries were originating from abdominal aorta as its lateral branches. The superior renal artery had the normal level of origin from the abdominal aorta. About 1-1.5cm below this level, the inferior renal artery took origin. Both the renal arteries further coursed towards the right side deep to inferior vena cava. The superior renal artery entered the renal hilum, lying between right renal vein anteriorly and renal pelvis posteriorly. The inferior renal artery, at the right border of inferior vena cava, inclined downwards and entered the substance of the kidney through its lower pole bypassing the hilum [Figure 2].

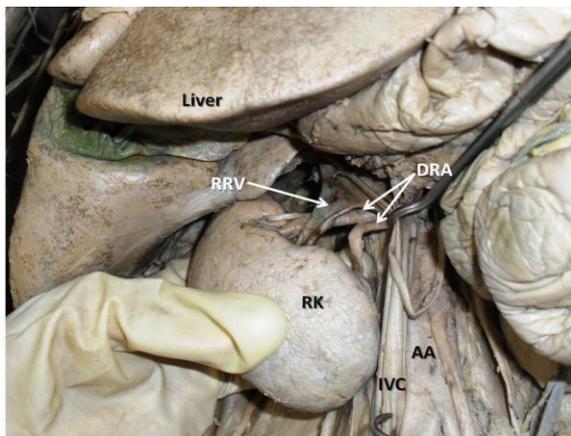


Figure 1: Showing the presence of double renal arteries (DRA) supplying the right kidney (RK). RRV: right renal vein, IVC: Inferior vena cava, AA: Abdominal aorta.

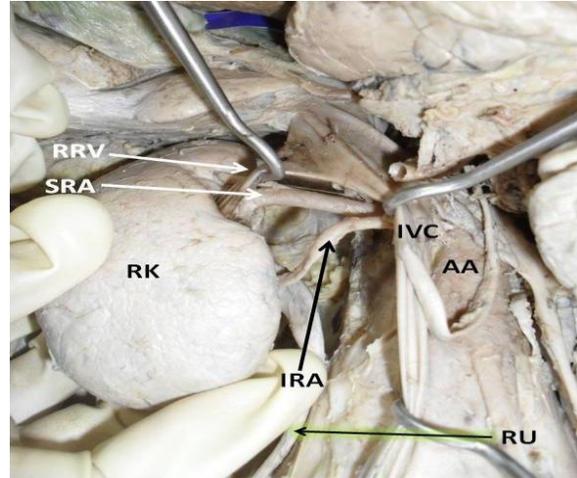


Figure-2: Closer view of presence of double renal artery supplying right kidney (RK). SRA- superior renal artery, IRA: inferior renal artery, RU: right ureter, IVC- inferior vena cava, AA: abdominal aorta.

### DISCUSSION

Variations in the renal vasculature are common and are regularly reported by anatomists, radiologists and surgeons. Frequency of double renal artery originating from abdominal aorta is not uncommon. In the majority of cases of existence of double renal artery, one of the arteries will have a larger calibre than the other. The larger renal artery nourishes the large portion of renal territory; while the other normally persists as supplementary to it. [4] In such cases, artery with the larger calibre is considered as main renal artery while others are considered as accessory renal arteries. In the current case, since both the arteries had the same calibre, nomenclature as double renal artery is most justified rather than accessory renal artery. Nevertheless, presence of accessory renal arteries cannot be ignored, as its ligation or damage results in adverse effect to the corresponding kidney. [5]

A case of persistence of bilateral double renal artery has been reported by Rusu and Bordei et al., [4,6] Incidence of double renal artery is twofold higher in hypertensive individuals than in the non hypertensive individuals. [7] Prevalence of double renal arteries in Indian population is

reported to be 13.5%, whereas it is much higher (31.3%) in African population. [8]

A simple classification of multiple renal arteries based on their source of origin has been designed by Macalister in 1883. [9] According to this classification, if the additional renal artery arises from abdominal aorta, it is of type 1, if it originates from arterial territory other than aorta, then it is regarded as type 2 category. If the accessory renal arteries arise from composite origin (involving both type 1 and 2), then it is said to be of type 3.

Embryologically, the numerical aberrations of renal arteries are due to persistence of lateral splanchnic arteries [10] or due to the persistence of blood supply from lower level than normal. [11] The kidneys develop in pelvic cavity. In its further development, it usually ascends to lumbar region. During its primitive position in pelvis, it receives its arterial supply from the branches of internal iliac or common iliac arteries. As it ascends, its arterial supply also shifts upwards from iliac territory to abdominal aorta. [5]

The morphological variation of renal arterial pattern is a challenge for the radiologists in interpretation task of renal angiograms and also for the urologists during laparoscopy procedures. [12] With the increased demand of transplantation, kidney with variant vascular architecture renders it to unsuitable for transplantation. Thus the detailed anatomical knowledge of renal vasculature and its numerical and morphological aberrations is obligatory for urologists and radiologists in order to prevent vascular complications before performing kidney transplantation and other invasive procedures.

## REFERENCES

1. Moore KL, Dalley AF. Clinically oriented anatomy. 4<sup>th</sup> ed.

- Philadelphia- Baltimore. Lippincott, William-Wilkins 1999; 286-87
2. Parimala NBS. Bilateral Aberrant Renal Arteries with Abnormal Left Renal Vein: A Case Report. *J Clin Diagn Res* 2013; 7(7): 1425-1426
3. Fernandes RMP, Conte FHP, Favorito La, Abidu-Figueiredo M, Babinski MA. Triple right renal vein: an uncommon variation. *Int J Morphol* 2005; 23: 231–233.
4. Bordei P, Sapte E, Iliescu D. Double renal arteries originating from the aorta. *Surg Radiol Anat* 2004; 26: 474–479
5. Nasir Syed M, Ashfaq Ul Hassan, Riyaz Rangrez, Sajad Hamid, Sabia, Tabish SA, Iqbal, Suhaila, Masarat, Zahida Rasool. Bilateral duplication of renal vessels: Anatomical, Medical and Surgical perspective. *Int J Health Sci (Qassim)* 2008;2(2):179-185
6. Rusu MC. Human bilateral doubled renal and testicular arteries with a left testicular arterial arch around the left renal vein. *Rom J Morphol Embryol* 2006; 47: 197–200.
7. Ashken MH. A study of the renal vascular patterns in hypertension, chronic pyelonephritis and other diseases. *Ann R Coll Surg Engl* 1967; 40: 82–99.
8. Satyapal KS, Haffejee AA, Singh B, Ramsaroop L, Robbs JV, Kalideen JM. Additional renal arteries: incidence and morphometry. *Surg Radiol Anat* 2001; 23: 33–38.
9. Macalister. Multiple Renal Arteries. *J Anat Physiol*. 1883; 17(2): 250–252
10. Willam P, Lawrence HB, Martin MB, et al. *Gray's Anatomy*. 38th edn. Churchill Livingstone; 1995. p. 1826.

11. Hamilton WJ, Mossman HW. Human Embryology. 4th edn. McMillan Press; New York: 1979. p. 392.
12. Hitendra Kumar Loh, Vanitha Gupta, Jyoti Arora, et al. Atypical twin renal

arteries with altered hilar anatomy. International Journal of Anatomical Variations 2009; 2: 124–26.

How to cite this article: Kumar N, Ashwini AP, Swamy RS et. al. Unilateral double right renal arteries - a case report. Int J Health Sci Res. 2014;4(5):335-338.

\*\*\*\*\*

**International Journal of Health Sciences & Research (IJHSR)**

**Publish your work in this journal**

The International Journal of Health Sciences & Research is a multidisciplinary indexed open access double-blind peer-reviewed international journal that publishes original research articles from all areas of health sciences and allied branches. This monthly journal is characterised by rapid publication of reviews, original research and case reports across all the fields of health sciences. The details of journal are available on its official website ([www.ijhsr.org](http://www.ijhsr.org)).

Submit your manuscript by email: [editor.ijhsr@gmail.com](mailto:editor.ijhsr@gmail.com) OR [editor.ijhsr@yahoo.com](mailto:editor.ijhsr@yahoo.com)