

## STUDY ON ACCESSORY RENAL ARTERY

Chandragirish S <sup>1</sup>, Nanjaiah C.M <sup>2</sup>, Suhas Y Shirur <sup>3</sup>, Shaik Hussain Saheb <sup>\*4</sup>.

<sup>1</sup> Assistant Professor of Anatomy, Travancore Medical College, Kollam, Kerala, India.

<sup>2</sup> Professor of Anatomy, JSS Medical College, Mysore, Karnataka, India.

<sup>3</sup> Assistant Professor of Physiology, Travancore Medical College, Kollam, Kerala, India.

<sup>\*4</sup> Assistant Professor of Anatomy, JJM Medical College, Davangere, Karnataka, India.

### ABSTRACT

**Background:** Knowledge of the variations of renal vascular anatomy has importance in exploration and treatment of renal trauma, renal transplantation, renovascular hypertension, renal artery embolization, angioplasty. The anomalies of accessory renal artery may be important from the clinical point of view. The importance of being familiar with the renal artery and segmental artery variability, which has become indispensable to urological surgery, has increased as a result of the large number of renal transplants and vascular reconstructions.

**Materials and Methods:** 100 kidneys (Fifty pairs) intact with abdominal aorta were collected from department of Forensic department, JSS Medical College and Mysore Medical College. For study of segmental variation Corrosion cast technique method was used. The variations of posterior division were observed and recorded.

**Results:** Accessory renal arteries were found in two specimens originating directly from aorta out of 100 specimens, it is recorded as 2%.

**Conclusion:** In present study we observed 2% of cases as accessory renal artery. The recent days the increasing demand for kidney transplantation, grafts from living donor is major source for that, with this concept the knowledge of accessory renal artery very essential for kidney transplantation.

**KEYWORDS:** Accessory renal artery, Arterial graft, Kidney transplantation, Abdominal aorta.

**Address for Correspondence:** Shaik Hussain Saheb, Assistant Professor of Anatomy, JJM Medical College, Davangere, Karnataka, India. Mobile +91-9242056660. **E-Mail:** anatomyshs@gmail.com

### Access this Article online

#### Quick Response code



DOI: 10.16965/ijar.2014.533

**Web site:** International Journal of Anatomy and Research  
ISSN 2321-4287  
[www.ijmhr.org/ijar.htm](http://www.ijmhr.org/ijar.htm)

Received: 20 Oct 2014

Peer Review: 20 Oct 2014 Published (O):30 Nov 2014

Accepted: 10 Nov 2014 Published (P):31 Dec 2014

### INTRODUCTION

The kidneys are very important organs in body forming the urinary system which excretes the excess water, salts and one of the vital organs in the human body. It receives the majority of cardiac output approximately 25% blood, through the renal arteries and these are end arteries with no anastomosis. Variations in the number and arrangement of the renal vessels are more common. The accessory arteries are in fact, normal segmental arteries. Embryologically development of kidney is very complex, as it develops from pronephros,

mesonephros and metanephros. Previous literature reports great variability in renal blood supply, the number of renal arteries mentioned being the most frequently found variation [1]. It is most common renovascular anomaly, occurrence ranging from 25%-50% of kidneys. One or two accessory renal arteries are frequently found, especially on the left side. Instead of entering the kidney at the hilus, they usually pierce the upper or lower part of the organ [2].

The anomalies of accessory renal artery may be important from the clinical point of view in that

they may cause; hydronephrosis due to occlusion or compression of the ureter by an inferior polar artery, nephrotosis and malrotation of kidneys associated with an inferior polar artery, arterial hypertension because of constriction of renal artery and subsequent renal ischemia, the risk of infarction in a kidney during urologic or oncologic surgical interventions and renal transplantations. As the polar artery is segmental artery, the erroneous ligation or division of it, is clearly hazardous resulting in necrosis of renal tissue[3].

The importance of being familiar with the renal artery and segmental artery variability, which has become indispensable to urological surgery, has increased as a result of the large number of renal transplants and vascular reconstructions. Laparoscopic partial nephrectomy has become available alternative to renal tumour patients[4,5,6]. Thus many workers, mostly surgeons, have confirmed, from time to time, the importance of the anatomy of the arterial renal segments. Accessory renal artery is the precocious origin of a segmental artery which sometimes arises from the aorta and supplies upper or lower pole of the kidney. The accessory artery is a remnant of mesonephric artery. The artery for the lower pole usually passes behind the pelvis of ureter[7]. Accessory renal arteries arise from the aorta but they may also arise from suprarenal, celiac, superior mesenteric artery, inferior mesenteric artery, common iliac, middle sacral or from external iliac artery[1].

The present study about the variations of the different segmental branches of the renal artery by corrosion cast method has been undertaken and accessory renal artery variations are observed carefully, because of its applied importance in making a relatively bloodless surgical approach to the kidney and in saving the healthy renal segments in partial nephrectomy.

## MATERIALS AND METHODS

Materials used for this study is Ice box, 10cc Syringe, Silicon Tube, Silicon Gun, Dissection Instruments, Tag, Formalin, Hydrochloric Acid, Digital Camera, Surgical Gloves, Plastic Bucket, Plastic Jar.

**Fig. 1:** Materials used for study.



## METHODOLOGY

100 Kidneys were collected from Forensic department, JSS Medical College, Mysore. Once the visceral organs are removed during postmortem the right and left kidneys along with the abdominal aorta were identified. The abdominal aorta was dissected carefully approximately at the level of upper pole and lower pole of the kidney. Care was taken to note the presence of any accessory renal arteries. Corrosion cast method is used for study of accessory renal artery.

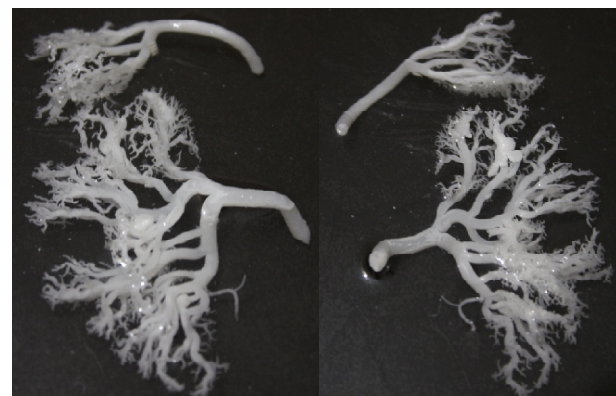
## RESULTS

Out of 100 kidneys 2 accessory renal artery found and recorded as 2%. Accessory renal arteries were originating directly from aorta and supplying the superior segment of the kidney[Figure 2,3].

**Fig. 2:** Renal artery divides into anterior and posterior division. Anterior division divides into four segmental branches. Posterior division gives rise to four segmental branches. Accessory renal artery arises from the aorta supplying superior segment.

**Anterior view**

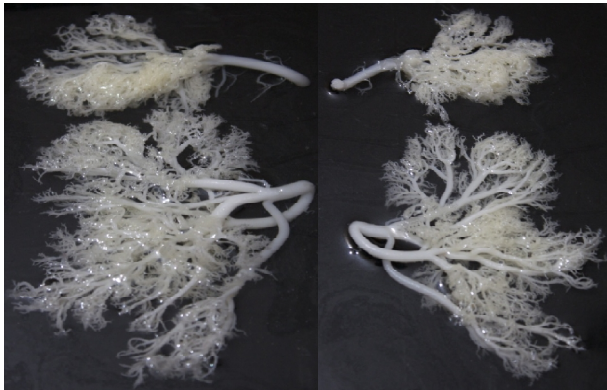
**Posterior View**



**Fig. 3:** Renal artery (1) divides into anterior (2) and posterior division (3). Anterior division divides into anterior superior segmental branch, anterior inferior segmental and inferior segmental branch. Accessory renal artery arising from the aorta supplies the superior segment.

Anterior View

Posterior view



## DISCUSSION

In present study only 2% cases accessory renal arteries were found, the earlier works on accessory renal artery presented only as case report but not as original studies and not reported the percentage of occurrence. The variations in the renal arteries are very important knowledge, the renal surgeons and radiologists should have knowledge of this variations during renal vascular surgeries. The most common variation in renal artery is accessory renal artery. The accessory artery denotes the artery arising from aorta and supplying the same renal segment, on the other hand term anomalous or aberrant vessel should be reserved for arteries that originate from other than aorta or main renal artery. The knowledge of aberrant renal arteries is important because they may be inadvertently damaged during renal surgery and their presence must be considered in evaluating a donor kidney for possible renal transplantation. Accessory renal arteries arise from the abdominal aorta either above or below the main renal artery and follow it to the hilum. It is important to be aware that accessory renal arteries are end arteries, therefore if an accessory is damaged, the part of kidney supplied by it is likely to become ischaemic [3]. Various chemical agents, growth factors and haemodynamic forces may all taken part in the selection and persistence of a particular congenital vascular channel. Embryonic signals that result in the formation of an accessory renal

artery is yet unknown [4]. An accessory renal artery or leash arteries passing to the superior or inferior renal pole are possible. They are regarded as persistent embryonic lateral splanchnic arteries, accessory renal vessels to the inferior pole of the kidney cross anterior to the ureter and may be by its obstruction cause hydronephrosis. The urosurgeon should take care into account the origin of accessory renal artery when operating the lower pole of the kidney, segmental resection [5].

According to Bergman RA aberrant renal arteries are common in fused kidneys. Aberrant arteries perforate the substance of the kidney rather than entering its hilum to supply it. These arteries could arise as high as inferior phrenic artery or as low as internal iliac arteries. The unusual vessels may originate from the aorta, as well as gonadal, common iliac, middle sacral, external or internal iliac or superior or inferior mesenteric arteries. Superior renal polar renal arteries are usually single. They arise as separate branches from the aorta or as branches of the renal artery, inferior suprarenal, inferior phrenic or superior mesenteric artery. Inferior renal polar arteries are usually single and arise from the aorta or renal artery. The inferior polar arteries are sometimes doubled, with one arising from the aorta and the other from the renal artery, or the pair from the either source. The inferior polar arteries have been implicated as an etiological factor in a form of hydronephrosis correctable by surgery [11].

## CONCLUSION

In present study the work on accessory renal artery concentrated as original work conducted in 100 kidneys and found 2% accessory renal artery. The knowledge of accessory renal artery variation very important during renal surgeries specially when dealing with multiple renal artery cases.

**Conflicts of Interests: None**

## REFERENCES

- [1]. Bergmen RA, Afifi AK, Miyauchi R. Virtual hospital: Illustrated encyclopedia of abdominal aorta, 2000. Available at <http://www.virtualhospital.com>. Accessed 10 December 2012.

- [2]. Merklin RJ, Michel NA. The variant renal and suprarenal blood supply with data on the inferior phrenic, ureteral and gonadal arteries. *J Int Coll Surg* 1958;29:41-76.
- [3]. Kocabiyik N, Yalgin B, Kilig C, Kiric Y, Ozan H. Accessory renal arteries and an anomalous testicular artery of high origin. *Gulhane Tip Dergisi*. 2005; 47:9 141-143.
- [4]. McDougall EM, Clayman RV, Anderson K, Laparoscopic wedge resection of a renal tumor: initial experience, *J Laparoendosc Surg*. 1993; 3(6): 577-581.
- [5]. McDougall EM, Elbahnasy AM, Clayman RV, Laparoscopic wedge resection and partial nephrectomy – the Washington University experience and review of the literature, *JSLs*. 1998; 2(1): 15-23.
- [6]. Kozlowski PM, Winfield HN, Laparoscopic partial nephrectomy and wedge resection, *J Endourol*. 2000; 14(10): 865-870.
- [7]. Dutta AK. *Essentials of human embryology*. 5<sup>th</sup> edi. Kolkata. Current books international; 2005: 213-222.
- [8]. Nayak BS (2008) Multiple variations of the right renal vessels. *Singapore Med J* 49: e153-e155.
- [9]. Pai MM, Vadgaonkar R, Rai R, Nayak SR, Jiji PJ, et al. (2008) A cadaveric study of the testicular artery in the south indian population. *Singapore Med J* 49: 551-555.
- [10]. Kocabiyik N, Yalcın B, Kiliç C, Kirici-Y, Ozan H (2005) Accessory renal arteries and an anomalous testicular artery of high origin. *Gulhane Med J* 47: 141-143.
- [11]. Bergman RA, Thomson SA, Afifi AK, Saadeh FA. *Compendium of Human Anatomic Variation*. Baltimore, Urban & Schwarzenberg. 1988; 81-83.

#### How to cite this article:

Chandragirish S, Nanjaiah C.M, Suhas Y Shirur, Shaik Hussain Saheb. STUDY ON ACCESSORY RENAL ARTERY. *Int J Anat Res* 2014;2(4):712-715. **DOI:** 10.16965/ijar.2014.533