Journal of Ayurveda & Holistic Medicine

https://jahm.co.in

eISSN-2321-1563

Case Report

Right Accessory Renal Artery: Anatomical, Clinical and Surgical Importance- A Cadaveric Case Report

[1*]Smitaraje D. Wader, [2]Ramesh Killedar, [3]M. B. Ramannavar, [4]Pradeep S. Shindhe

ABSTRACT:

Background: Renal artery variations are common anatomical findings, occurring in approximately 23% of kidneys. They are reported more frequently in males (30%) than females (11%), and are more common on the right side (60%) than the left (26%), while bilateral variations account for approximately 11% of cases. Accessory renal arteries most commonly supply the superior pole (41.7%), followed by the hilar region (29.2%) and inferior pole (29.2%). **Case Presentation:** During routine cadaveric dissection in the Department of Rachana Sharira, KAHER's Shri BMK Ayurved Mahavidyalaya, Shahapur, Belagavi, a variation in the right renal arterial anatomy was observed. The cadaver exhibited a right accessory renal artery in addition to the main renal artery. Morphometric measurements were obtained using a standard ruler for length and a Vernier caliper for arterial diameter, and the findings were systematically documented. **Findings:** A right accessory renal artery measuring 6.5 cm in length and 3 mm in diameter originated from the abdominal aorta just superior and slightly to the left of the origin of the main right renal artery. The accessory artery supplied the right suprarenal gland and the inferior pole of the right kidney. **Conclusion:** Recognition of a right accessory renal artery is clinically important because such vascular variations may influence renal transplantation, nephrectomy, vascular reconstruction, and other retroperitoneal surgical procedures. Awareness of these anatomical variations facilitates accurate preoperative planning and helps reduce the risk of inadvertent vascular injury and associated surgical complications.

KEYWORDS: Anatomical variation, Case Report, Renal artery, Right Accessory renal artery, Surgical importance

RECEIVED ON: 15-06-2026

REVISED ON: 20-07-2026

ACCEPTED ON: 03-08-2026

Access This Article Online:

Quick Response Code:

Website Link: https://jahm.co.in

DOI Link: https://doi.org/10.70066/jahm.v14i7.2864

Corresponding Author Email: smitarajewader@gmail.com

CITE THIS ARTICLE AS

Smitaraje D. Wader, Ramesh Killedar, M. B. Ramannavar, Pradeep S. Shindhe. Right Accessory Renal Artery: Anatomical, Clinical and Surgical Importance- A Cadaveric Case Report. Journal of Ayurveda and Holistic Medicine (JAHM) 2026; 14(7):145-151.

1. INTRODUCTION

The presence of accessory renal arteries (ARAs) during fetal life are more likely to represent a normal anatomical variation of the renal vasculature rather than a pathological features in the prenatal period. [1] ARAs exhibit considerable variation in their origin, number, and topography as a consequence of renal embryogenesis. [2] During routine dissection an anatomical variation of right accessory renal artery was found. Renal arterial variations were observed more frequently than renal venous variations. Among the arterial variations, accessory renal arteries were the most common, followed by polar arteries and early division of the renal artery. Lower polar arteries occurred more frequently than upper polar arteries, highlighting their clinical relevance. So, knowledge of these vascular variations is essential for anatomists, surgeons, radiologists. [3] During embryological development as the hepatic system develops, the kidneys simultaneously arise from the intermediate mesoderm. [4] The pronephros, the first renal tissue, starts to develop around the 4th week of gestation. [5] While the pronephros is a transient structure, the duct persists to eventually become the mesonephric duct. [5] The primary purpose of the mesonephric duct is to provide the primitive functioning glomeruli which are supplied by the mesonephric arteries. [5] These arteries arise from the dorsal aorta and supply the future adrenal glands, kidneys, and gonads. [3] As the fetal kidneys migrate upward, successive superior vessels branch off the aorta until a single main renal artery remains. [6] Failure of regression of these arteries results in the anatomical variant called accessory renal arteries (ARAs) or the supernumerary renal artery. [3] ARAs or Supernumerary arteries can originate from many different arterial sources such as from the aorta and the main renal artery. [7] In a study 30.76% of supernumerary arteries found originated from the aorta, while 12.82% from the renal arteries. [8] Supernumerary arteries and veins are much smaller than main renal arteries, they have a significant role, as damage to these can cause renal infarction because these renal vessels can go through either the renal hilum or the renal capsule supplying one of the renal poles. [7] These variants can cause polar infarction, mobilization, injury or even uteropelvic junction obstruction [9] Accessory renal arteries are the most frequent anatomical variations that explores its embryogenic development. They are often end arteries and may enter the kidney through renal hilum or directly at the upper or lower poles. [10] ARAs supply the kidneys alongside the main renal artery. Ligation of these vessels may result in ischemia of the renal segment they supply. So their direct role in renal transplantation, vascular surgeries and imaging interpretation becomes clinically significant. [11]

2. MATERIALS AND METHODS:

The study material consisted formalin embalmed cadaver from the Dissection Hall, Department of Rachana Sharira, KAHER's Shri BMK Ayurved Mahavidyalaya, Shahapur, Belagavi, Karnataka. Consent obtained from the relative of cadaver for usage of this donated body for medical education and research. Embalming of the cadaver was done by Gravity method. Dissection of the formalin fixed male cadaver was done by Dr. Smitaraje D. Wader on 17/10/2025. The embalmed cadaver was without evidence of previous abdominal surgery and trauma

Inclusion Criteria: Well embalmed adult human cadaver of both genders. Cadaver whose consent from their relatives were obtained for the usage of the donated body for medical purpose. The embalmed cadaver without evidence of previous abdominal surgery and trauma.

Exclusion Criteria: Poorly embalmed cadavers of both genders. Cadaver without consent of relatives. Cadaver with previous history suggestive of abdominal surgery and trauma. Cadaver with unknown cause of death.

Cadaveric Dissection:

During routine abdominal dissection conducted for undergraduates, the retroperitoneal dissection for the kidneys and renal vasculature was performed according to standard dissection technique described in Cunningham's Manual of Practical Anatomy [12]

The abdominal cavity was opened through midline incision taken from Xiphoid process up to Pubis. The anterior abdominal wall was reflected and greater omentum, stomach, small intestine, transverse colon and mesentery were removed as per Cunningham's Dissection sequence to expose the posterior abdominal wall. The posterior parietal peritoneum was carefully incised along the lateral border of the ascending and descending colon and reflected medially exposing the retroperitoneal structures. The kidneys were identified within the renal fascia. Gerota's fascia was opened by a longitudinal incision and the perirenal adipose tissue was removed by blunt dissection. Kidneys, suprarenal glands, renal hilum, ureters and associated vascular structures exposed keeping the integrity of vessels.

The abdominal aorta and Inferior vena cava were cleaned from surrounding tissues. Each renal artery is traced from its origin from the abdominal aorta to its entry into the renal hilum. The renal veins were similarly traced from the renal hilum to their termination in the inferior vena cava.

While doing dissection, Accessory Renal Artery was identified on the right side arising from just superior and little left side to the origin of main renal artery from abdominal aorta and supplying the kidney in addition to main renal artery. Accessory artery was carefully preserved and traced from its site of origin to its point of entry into the kidney. By using standard measuring scale ruler, the length and by Vernier caliper, the diameter of renal artery and accessory renal artery are taken. The parameters are recorded, documented and photographs of main renal artery, Right Accessory Renal artery with its branching pattern and related organs are taken.

3. OBSERVATIONS:

In routine dissection of abdomen two renal arteries were observed in right Kidney. The course, branching pattern, site of origin and entry of renal artery were keenly observed and documented.

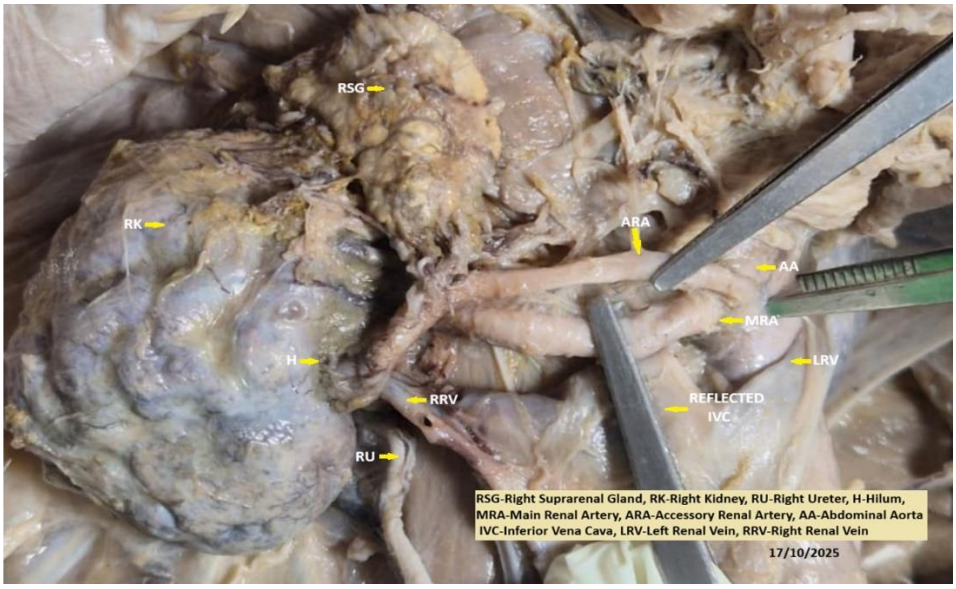

Figure 1: Origin and termination of Right Accessory Renal Artery

The main renal artery –

Originated at the level of L2 from abdominal aorta just below the level of superior mesenteric artery.

Course: It travels posterior to Inferior vena cava and right renal vein.

Branching: It gives three segmental branches S1, S2, S3 to Superior pole and middle part of kidney.

A right accessory renal artery –

Origin: Was observed arising from the abdominal aorta just superior and slightly left from the origin of main renal artery at the level of L2.

Course: It passes just superior, right lateral and parallel to the main renal artery giving small branches to suprarenal gland and entered the kidney at the inferior pole giving prehilar branches in front of right renal vein.

Entry point: Inferior pole.

Branching: It gives segmental branches - To right suprarenal gland (AS1) and two perihilar branches (AS2 & AS3).

Table: 1 Measurements

Sr. No.	Parameter	Main renal artery	Accessory right renal artery
1	Origin level	L2 Vertebra	L2 Vertebra
2	Length	5cm	6.5 cm
3	Diameter	5mm	3mm

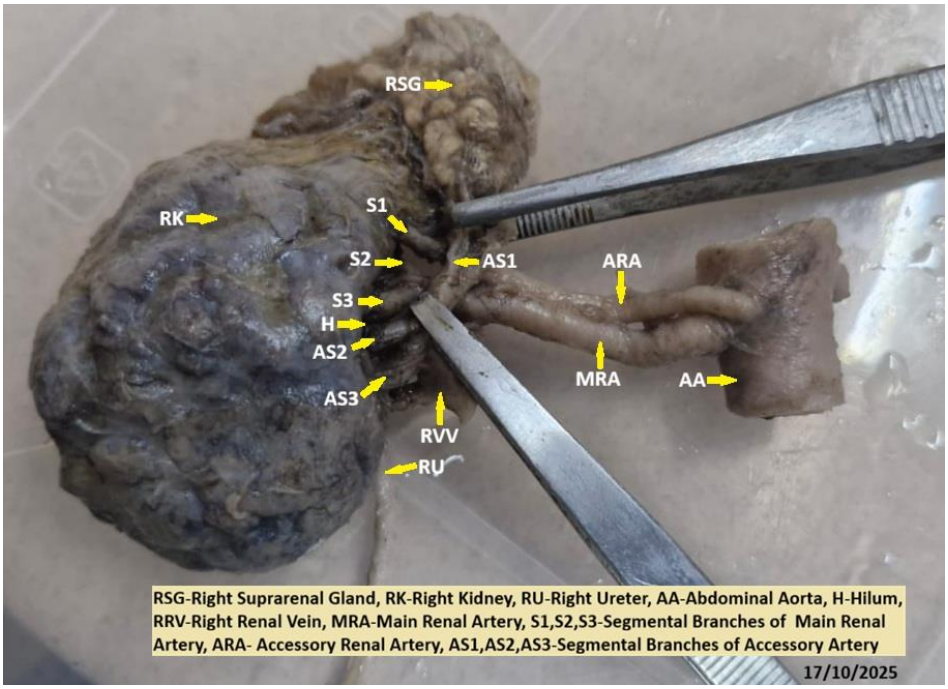

Figure 2: Segmental branches of Main Renal Artery and Right Accessory Renal Artery

Applied anatomy:

Branches of renal arteries are end arteries so in renal transplantation anastomoses must be made to all arteries of the donor kidney. [13] Ligation of Accessory renal arteries can lead to ischemia of the renal segment they supply. [11]

4. DISCUSSION:

Accessory renal arteries commonly originate from the abdominal aorta or iliac arteries, arising at any level between T11 and L4 vertebrae. These accessory renal arteries enter the kidney through renal hilum to supply upper and lower renal poles. Although uncommon, accessory renal arteries may also arise from the lower thoracic aorta, lumbar arteries or mesentric arteries. [13] As per previous case reports, three renal arteries were seen on right side and two on left side kidney arising from abdominal aorta; LRA1 from anterolateral aspect , LRA2 from posterolateral aspect and LRA3 from anterolateral aspect. [14] In this case shows presence of three accessory renal arteries entering and supplying the anterior surface and lower pole of kidney. [15] The possible etiology of these variations has been explained by embryological development. Presence of unilateral accessory renal artery is due to the persistence of lateral mesonephric arteries during embryogenesis. Failure of regression of previous renal arteries lead to accessory, multiple renal arteries or polar artery. [5] In sonography, it is observed, smaller the presence of main renal artery diameter than normal dimensions of usual kidney indicative of the presence of accessory artery. [10] Accessary artery particularly supplying the lower pole crosses the ureter anteriorly, it can compress the ureter leading to obstruction or

hydronephrosis. [6] Right accessory renal artery originating from the aorta has a significance, if it travels in front of the inferior vena cava, potentially causing compression. [13] Clinically Accessory renal arteries are significant in renal transplantation, Vascular surgeries for renal stenosis, renal trauma and radiological imaging. [11,16]

Table 2: Ayurvedic Concept of Rachana Sharira

Classical Concept	Contemporary Correlation	Integrative insight
Dhamani (Dhmanat Dhamanyaha) - Pulsating Channels	Renal Arteries (Including Accessory Renal Artery)	Like Renal artery, Accessory Renal Artery also functions as *Prana Vaha* (Carrying oxygenated blood) so can be seen as *Dhamani* (Artery) variation.
Sira (*Saranat Sira*) - Nutritive Channels	Renal Veins	Venous drainage complements arterial supply maintaining *Rakta Dhatu* balance
Srotas (*Sravanat Srotansi*) - Channels for transportation, circulation, excretion, absorption, Perfusion, secretion,	Kidneys, Ureters, Urinary bladder	The Accessory Renal Artery supports the integrity of *Mutravaha Srotas* by ensuring adequate perfusion for urine formation.
Srotas Vyapad (Disorders of Channels)	Vascular anomalies, Hypertension, Renal Ischemia	Variations like Accessory Renal Artery may predispose to altered renal hemodynamics, echoing classical descriptions of *Srotas Dysfunction.*

There are different interpretations regarding the identity and functional significance of Artery in the classical Ayurvedic texts. *Dhamanis* are corelated with arteries based on similarities in their physiological role. Arteries are described as pulsatile channels that transport nourishing substances throughout the body emphasizing their role. The characteristic *Spandana* (Pulsation) of Artery is regarded as an indicator of vitality and the presence of life. [17] Owing to the classical definition they are so named because they exhibit pulsation, they can be correlated with arteries.

Therefore, within this conceptual framework, an accessory renal artery may be interpreted as Anatomical, individual variation in the arrangement of Artery.

Strengths: Provides detailed description of origin, course, length, diameter and termination of Right Accessory Renal Artery, role of its embryogenesis and highlighting its importance of identification as anatomical variation in clinical, surgical, radiological practice as well as anatomical education. Novel Integrative approach combines cadaveric vascular variation with concepts from *Rachana Sharira* contributing to field of integrative anatomy.

Limitations: Classical texts do not describe an accessory renal artery. Relationship of accessory renal artery with *Dhamani, Sira and Srotas* is a conceptual framework.

5. CONCLUSION:

Accessory renal arteries may be polar, hilar and often end arteries so their ligation can lead to ischemia of the renal segment they supply. Knowledge of the unrecognized presence of aberrant or accessory arteries is important because they may be damaged during renal surgery so their presence must be considered in evaluating a donor kidney for possible renal transplantation, Reno vascular reconstruction and other uro-radiological procedures. To facilitate accurate preoperative planning, to prevent intraoperative complications during renal surgeries and improve the outcomes of renal surgical, endovascular procedures surgeons, radiologists, anatomists and interventional specialists must be aware of such anatomical variations which is vital for successful surgical outcome.

Key findings: During dissection Right Accessory Renal Artery measuring 6.5 cm in length and 3 mm in diameter was identified. It is seen emerging just superior slightly towards left side to the origin of main renal artery from abdominal

aorta and supplying to right suprarenal gland and the inferior pole of right kidney.

Key message: During dissection we found anatomical variations which are the consequences of embryogenesis. Knowledge of these anatomical variations are very important and help in guiding anatomist, renal surgeries, radiologists and endovascular procedures.

Abbreviation:

ARA - Accessory renal artery

AS1,2,3 – Accessory segmental branch 1,2,3

Declaration of Relatives Consent – The authors confirm that they have acquired a consent from the relatives of the cadaver, in which the relatives of the cadaver have granted permission for the publication of the case, including accompanying images and other clinical details, in the journal. The relatives of the cadaver acknowledges that their name and initials will not be disclosed, and sincere attempts will be undertaken to safeguard their identity. However, complete anonymity cannot be assured.

Authors Details:

[1*]Professor, Dept of Rachana Sharira, KAHER'S Shri B M Kankanawadi Ayurveda Mahavidyalaya, Shahapur, Belagavi, Karnataka

[2]Professor, Dept of Shalya Tantra, KAHER'S Shri B M Kankanawadi Ayurveda Mahavidyalaya, Shahapur, Belagavi, Karnataka

[3]Professor & HOD, Dept of Rachana Sharira, KAHER'S Shri B M Kankanawadi Ayurveda Mahavidyalaya, Shahapur, Belagavi, Karnataka

[4]Professor & HOD, Dept of Shalya Tantra, KAHER'S Shri B M Kankanawadi Ayurveda Mahavidyalaya, Shahapur, Belagavi, Karnataka

Authors Contribution:

Conceptualization and clinical management: SDW, RK, MBR, PS

Data collection and literature search: SDW, RK

Writing – original draft preparation: SDW

Reviewing & editing: SDW, RK, MBR, PS

Approval of final manuscript: All authors

Acknowledgements - Dr. Suhas Kumar Shetty, Principal & Medical Director KAHER's Shri B.M. Kankanwadi Ayurved Mahavidyalaya, Shahapur, Belagavi, Karnataka.

Declaration of Generative AI

The authors declare this manuscript was written without the use of generative artificial intelligence tools. All the content, including text generation, data analysis and references was developed and reviewed by the author without assistance from AI technologies.

Conflict of Interest – The authors declare no conflicts of interest.

Source of Support – The authors declare no source of support.

Additional Information:

Authors can order reprints (print copies) of their articles by visiting: **https://www.akinik.com/products/2281/journal-of-ayurveda-and-holistic-medicine-jahm**

Publisher's Note:

Atreya Ayurveda Publications remains neutral with regard to jurisdictional claims in published maps, institutional affiliations, and territorial designations. The publisher does not take any position concerning legal status of countries, territories, or borders shown on maps or mentioned in institutional affiliations.

REFERENCES:

1. Avcı, E.A., Bülbül, G.A., Tsakır, B. et al. Accessory renal arteries in prenatal hydronephrosis as a pathophysiologic contributor or incidental vascular finding: a prospective observational study. BMC Pregnancy Childbirth 26, 650 (2026). https://doi.org/10.1186/s12884-026-09169-z
2. Gulas E, Wysiadecki G, Szymański J, Majos A, Stefańczyk L, Topol M, Polguj M. Morphological and clinical aspects of the occurrence of accessory (multiple) renal arteries. Arch Med Sci. 2018 Mar;14(2):442-453. https://doi.org/10.5114/aoms.2015.55203
3. Triantafyllou G, Paschopoulos I, Węgiel A, Olewnik Ł, Tsakotos G, Zielinska N, Piagkou M. The accessory renal arteries: A systematic review with meta-analysis. Clin Anat. 2025 Sep;38(6):660-672. https://doi.org/10.1148/rg.2021200174
4. Leckie A, Tao MJ, Narayanasamy S, Khalili K, Schieda N, Krishna S. The Renal Vasculature: What the Radiologist Needs to Know. Radiographics. 2021 Sep-Oct;41(5):1531-1548. doi: 10.1148/rg.2021200174. https://doi.org/10.1148/rg.2021200174
5. El-Galley RE, Keane TE. Embryology, anatomy, and surgical applications of the kidney and ureter. Surg Clin North Am. 2000 Feb;80(1):381-401. https://doi.org/10.1016/s0039-6109(05)70411-4
6. Yufa A, Mikael A, Lara G, Nurick H, Andacheh I. Accessory renal arteries involved in atherosclerotic occlusive disease at the aortic bifurcation. J Vasc Surg Cases Innov Tech. 2020;6(03):425–429. https://doi.org/10.1016/j.jvscit.2020.06.003
7. Budhiraja V, Rastogi R, Anjankar V, Babu CS, Goel P. Supernumerary renal arteries and their embryological and clinical correlation: a cadaveric study from north India. ISRN Anat. 2013 Feb 20; 2013:405712. https://doi.org/10.5402/2013/405712
8. Beckmann CF, Abrams HL. Renal venography: anatomy, technique, applications, analysis of 132 venograms, and a review of the literature. Cardiovasc Intervent Radiol. 1980;3(1):45-70. https://doi.org/10.1007/bf02551962
9. Patel RK, Simmons CL, Ozen M. Embryology of the Vascular System: Implications for Variants. Semin Intervent Radiol. 2025 Feb 20;42(2):219-228. https://doi.org/10.1055/s-0045-1802308
10. Aytac SK, Yigit H, Sancak T, Ozcan H. Correlation Between the Diameter of the Main Renal Artery and the Presence of an Accessory Renal Artery. Journal of Ultrasound in Medicine. 2003 May;22(5):433–9. https://doi.org/10.7863/jum.2003.22.5.433
11. Mohammed S, AbdAlla E, Elhag A, El-Mardi A. The prevalence of accessory renal arteries in sudanese population in Khartoum State: a

cross-sectional CT study from 2017 to 2020. BMC Nephrol. 2024 Apr 15;25(1):135. https://doi.org/10.1186/s12882-024-03886-3

12. Romanes G.J, Cunningham's manual of practical anatomy, Vol2, 15th ed, New York Oxford university press;2005;83.
13. Manoharan MB, Kuppusamy R, Subramanian M. Exploring the occurrence and clinical implications of accessory renal arteries: A descriptive study in South Indian cadavers. Fukushima J Med Sci. 2025 Jul 3;71(3):155-161. https://doi.org/10.5387/fms.24-00021
14. Hazırolan T, Öz M, Türkbey B, Karaosmanoğlu AD, Oğuz BS, Canyiğit M. CT angiography of the renal arteries and veins: normal anatomy and variants. Diagn Interv Radiol. 2011 Mar;17(1):67-73. https://doi.org/10.4261/1305-3825.dir.2902-09.1
15. Loukas, M., Aparicio, S., Beck, A., Calderon, R. and Kennedy, M. (2005), Rare case of right accessory renal artery originating as a common trunk with the inferior mesenteric artery: A case report. Clin. Anat., 18: 530-535. https://doi.org/10.1002/ca.20194
16. Satyapal KS, Haffejee AA, Singh B, Ramsaroop L, Robbs JV, Kalideen JM. Additional renal arteries: incidence and morphometry. Surg Radiol Anat. 2001;23(1):33-8. https://doi.org/10.1007/s00276-001-0033-y
17. Gupta V, Altaf ST, Chaudhari P, Marwaha R, Conceptual study of Dhamani Sharir in Modern Perspective: A Review Study. J Ayu Int Med Sci.2025;10(6):320-326. https://doi.org/10.21760/jaims.10.6.44