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Original Research Article

Cadaveric Examination of Renal Artery Anatomical Variations

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Conflict of interest: Nil

Abstract

Objective: In the era of widespread MRD, cadaveric research on renal artery abnormalities can alert the doctor and help them avoid endangering vital nephrons. The purpose of the study was to document if adult human cadaveric kidneys have Extra Renal Arteries (ERA).

Method: Throughout July 2021 and July 2022, this study was conducted on embalmed cadavers at Department of Anatomy, DRIEMS Institute of Health Science & Hospital, Cuttack.

Results: EBRA was discovered in 11% of the cadavers examined, along with auxiliary renal arteries in 31% and aberrant renal arteries in 21%.

Conclusion: It was thought that this study of ERA would be very helpful in the development of laparoscopic renal operations and renovascular treatments.

Keywords: Nephron, Renal Artery Variations**,** Cadaveric.

Introduction

The terms "supernumerary," "many," "aberrant," "additional," and similar terms used to describe the auxiliary renal artery are confusing and contentious [1]. In addition to the primary renal artery, Graves proposed the terms auxiliary and aberrant to describe renal arteries that originate from sites other than the aorta [Figure 1;2].

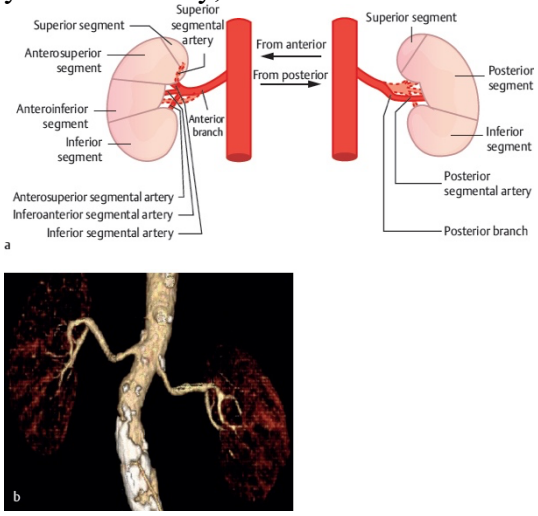

Figure 1: Renal artery

Patients with multiple renal arteries have a higher risk of post-interventional problems and nephron loss than those with single renal arteries in their kidneys. Auxiliary renal arteries often emerge from the aorta from an ostium that is distinct from the primary renal ostium and travels to the hilum. The aberrant renal artery originates from a different aorta but travels to the poles [3].

A renal artery is considered to be early branching if it divides within 15 mm of the renal ostium. At the L1-L2 gap, the aorta's lateral branches give rise to the renal arteries. Around the primary renal artery's origin, the abdominal aorta is the usual source of extrarenal arteries. Rarely can they develop from the common iliac arteries, SMA, celiac trunk, or aortic bifurcation. The top or lower border of L1, L2, or L3 level are possible origin levels for the renal artery. The incidence of accessory or aberrant ERA ranges from 27% to 30% [4].

Several renal arteries arise as a result of lateral splanchnic artery-mesonephric artery deficiency. If early branches are more than 10 mm from the major renal artery's origin, one ostium can be retrieved during lap donor nephrectomy [5].

In the absence of this, renal arteries must be built on the back table or a separate renal artery anastomosis to the recipient must be carried out. Prior mapping of the renal arteries is advantageous with the development of lap donor nephrectomy, lap nephron-sparing surgery, and renovascular surgical and radiological interventions, including those for RAS and Catheter-based renal sympathetic denervation and repair of aortic aneurysm, to name a few.

The purpose of this study was to determine whether accessory or aberrant renal arteries existed. It also sought to identify any early branching renal arteries and determine how far away from the primary renal ostium they were.

Methods

Study Design: This research was conducted from July 2021 to July 2022 at Department of Anatomy, DRIEMS Institute of Health Science & Hospital, Cuttack

Methodology: At the Department of Anatomy, 80 kidney samples from 40 adult human embalmed cadavers were dissected and examined using morphometric data collected with a Vernier caliper. To investigate the intricate morphological and numerical diversity, renal arteries were dissected and thoroughly examined. Renal arteries were defined as arteries coming from the abdominal aorta and feeding the kidney. Pre-hilar arteries are those that emerge from the renal artery before the hilum and supply the kidney. The study of renal artery variation includes both auxiliary and aberrant renal arteries. Moreover, early renal artery branching, which is crucial in donor nephrectomy, was seen.

Sample Size: 80 kidney samples from 40 adult humans were included in this study.

Ethical Consideration: The ethical committee of DRIEMS Institute of Health Science & Hospital approved of this study, after written consent was obtained from the participants.

Result

We looked for supplementary renal arteries, aberrant renal arteries, and early branching renal arteries in 40 cadaveric kidneys. 16 (11%) of the 40 specimens examined—cadaveric kidneys—exhibited renal arteries with early branching. (Table 1).

Table 1: Extrarenal arteries and early branching arteries

Artery	Percentage
Aberrant renal Artery	21%
Normal branching Pattern	37%
Accessory renal Artery	31%
Early branching Renal artery	11%

10.34 mm was the average distance from the major renal ostium [Figure 2].

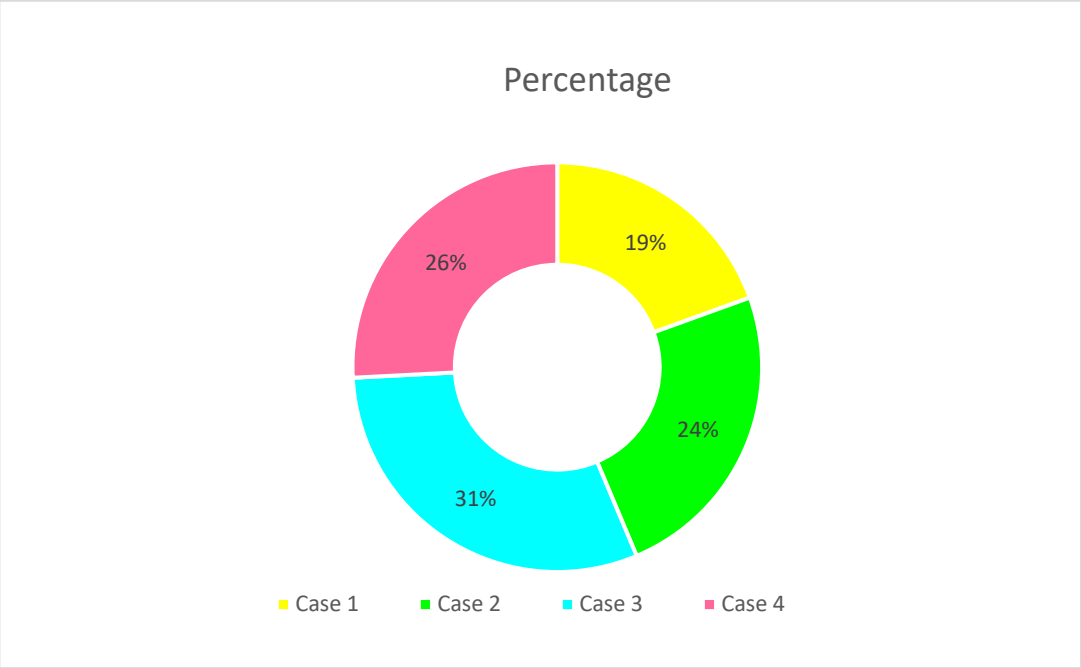

Figure 2: separation from the major renal ostium

Of the 80 examined specimens, 16 (31%) had auxiliary renal arteries, and 14 (21%) had aberrant renal arteries that started in the aorta and went to the upper or lower pole of the kidney. 58% of arteries reached the lower pole, whereas 42% reached the upper pole.

Discussion

At the L1-L2 gap, the renal arteries emerge as lateral branches of the aorta. Since a few years ago, clinicians have been interested in aberrant or auxiliary arteries, mostly because of the potential role the arterial may play in the development of hydronephrosis. The term "aberrance" has been used equally to refer to an additional artery in the renal pedicle as well as a vessel entering the kidney at either pole, whether derived from the main renal artery, from the aorta, or from a branch of the aorta [6]. However, it is clear from the numerous descriptions of these vessels in the literature that there is no established criterion for aberrance.

Rarely can they develop from the common iliac arteries, SMA, celiac trunk, or aortic bifurcation. The top or lower border of L1, L2, or L3 level are possible origin levels for the renal artery. A 27–30% occurrence of ERA can be accessory or aberrant. Several renal arteries arise as a result of lateral splanchnic artery-mesonephric artery deficiency. When the major renal artery is less than 4.15 mm in diameter, the presence of extra renal arteries is likely. EBRA occurs in 10-12% of cases.

Saldarriaga et al. examined the prevalence of accessories and discovered that 22.3% of people had a single accessory renal artery, 2.6% had two, and 52.4% of specimens originated from the lateral portion of the abdominal aorta and reached

the kidney through its hilum [7]. According to Kara et alresearch, .'s there are 17.6%, 2.3%, and 1% more accessory renal arteries in men than in women [8].

With comparable transplant outcomes to kidney grafts with a single renal artery, laparoscopic donor nephrectomy can be safely performed on donors who have multiple renal arteries. Multiple renal artery repair using this technique has also been successfully established [9]. Prior to surgery, it is critical to correctly interpret the CTA and to recognise the extra renal artery before performing the surgical dissection. If early branches are more than 10 mm from the major renal artery's origin, one ostium can be retrieved during lap donor nephrectomy [10].

Otherwise, separate renal artery anastomoses to the recipient must be made or renal arteries must be built on the back table [11]. Prior mapping of the renal arteries is advantageous with the development of lap donor nephrectomy, lap nephron sparing surgery, renovascular surgical and radiological interventions including those for RAS and Catheter based renal sympathetic denervation and repair of aortic aneurysm, to name a few [12].

In this investigation, EBRA was identified in 11% of cadaveric specimens, accessory renal arteriopathy in 31%, and aberrant renal artery in 21%. [13]

Conclusion

It is anticipate that this research on ERA will be useful to doctors as laparoscopic renal operations, renovascular surgery, and radiological procedures become more common.

References

1. Standring S, ed. In: Gray's Anatomy. The Anatomical Basis of Clinical Practice 40th ed. London: Elsevier Churchill Livingstone; 2008:1231.
2. Ames SA, Krol M, Nettar K, et al. Assessment of kidneys by magnetic resonance angiography and venography: accuracy and impact on outcomes. Am J Transplant. 2005; 5:1518–1528
3. Graves FT. The aberrant renal artery. J Anat. 1956; 90:553–558.
4. Munnusamy K, Kasirajan SP, Gurusamy K, et al. Variations in Branching Pattern of Renal Artery in Kidney Donors Using CT Angiography. J Clin Diagn Res. 2016; 10:AC01-3.
5. He B, Hamdorf J. Clinical importance of anatomical variations of renal vasculature during laparoscopic donor nephrectomy. OA Anatomy. 2013;1(3).
6. Graves FT. The aberrant renal artery. J Anat. 1956; 90: 553–558.
7. Saldarriaga B, Perez AF, Ballesteros LE. A direct anatomical study of additional renal arteries in a Colombian mestizo population. Folia Morphol. 2008; 67:129–134.
8. Kara A, Kurtoglu Z, Oguz I ˙dt., et al. Two accessory renal arteries with histological properties. Turk J Med Sci. 2006; 36:133–138.
9. Husted TL, Hanaway MJ, Thomas MJ, Woodle ES, Buell JF. Laparoscopic living donor nephrectomy for kidneys with multiple arteries. Transplant Proc. 2005;37629-30.
10. Pérez A. D., Valle D. M, Medina L. C. G, Burgos R. A. O, Reyes J. D. S., Solano O. I. A, Anguila J. J. M., & Rojas M. F. R., Assisted Therapy with Vacuum and Floating Stoma: A New Way to Treat a Periostomal Abscess. Journal of Medical Research and Health Sciences, 2021; 4(12), 1629–1635.
11. . Kok NF, Dols LF, Hunink MG, Alwayn IP, Tran KT, Weimar W. Complex vascular anatomy in live kidney donation: imaging and consequences for clinical outcome. Transplantation 2008;851760-5.
12. Chedid MF, Muthu C, Nyberg SL, Lesnick TG, Kremers WK, Prieto M.

Living donor kidney transplantation using laparoscopically procured multiple renal artery kidneys and right kidneys. J Am Coll Surg. discussion 152. 2013;217144-52.

13. He B, Mou L, Mitchell A, Delriviere L. Meticulous use of techniques for reconstruction of multiple renal arteries in live donor kidney transplantation. Transplant Proc. 2013;451396-8.