

รายงานจากศพดอง - ความผิดปกติแต่กำเนิดร่วมกันของหลอดเลือดเลี้ยงไตกับหลอดเลือดเลี้ยงอัณฑะและกรวยไตทั้งสองข้าง

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Combination of Bilateral Multiple Anomalies of Renal Blood Vessels Together with Testicular Blood Vessels and Renal Pelvises - A Case Report

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หลักการและวัตถุประสงค์: ในปัจจุบันการรักษาโดยการผ่าตัดไตมีแนวโน้มมากขึ้นเรื่อยๆ การมีความรู้ความเข้าใจเกี่ยวกับกายวิภาคของหลอดเลือดไตไม่ว่าจะเป็นหลอดเลือดแดง หลอดเลือดดำ รวมถึงแขนงต่างๆ ของหลอดเลือดเหล่านี้ถือว่าเป็นอีกจุดหนึ่งที่มีความสำคัญในการผ่าตัดไต

วิธีการศึกษา: เป็นการศึกษาแบบกรณีศึกษาในศพของชายไทย อายุ 79 ปี ที่บริจาคร่างกายให้แก่ ภาควิชากายวิภาคศาสตร์ คณะแพทยศาสตร์ มหาวิทยาลัยขอนแก่น

ผลการศึกษา: การศึกษานี้พบการเจริญผิดปกติแต่กำเนิดของหลอดเลือดเลี้ยงไต ร่วมกับการเจริญผิดปกติของหลอดเลือดเลี้ยงอวัยวะสืบพันธุ์และการเจริญผิดปกติของไต รวมถึงกรวยไต โดยพบว่าการเจริญผิดปกติของหลอดเลือดแดงและหลอดเลือดดำ อื่นพีเรีย แอกเซสซอรีรีนัล ทั้ง 2 ข้าง ส่วนหลอดเลือดแดงเทสทิคูลาร์ที่ผิดปกติพบว่าการวิ่งพาดอยู่ด้านหลังต่อหลอดเลือดดำใหญ่ อื่นพีเรียเวนาคาวา นอกจากนี้ยังมีหลอดเลือดแดงเทสทิคูลาร์ข้างซ้ายถึง 2 เส้น และวิ่งพาดขอบบนของหลอดเลือดดำรีนัลข้างซ้ายเพื่อไปอยู่หน้าต่อหลอดเลือดดำนี้ นอกจากนี้การเจริญผิดปกติของหลอดเลือดแล้วยังพบความผันแปรของกรวยไตทั้ง 2 ข้างด้วยเช่นกัน

สรุป: การศึกษานี้จะเป็นข้อมูลในการลดความเสี่ยงต่อการบาดเจ็บของหลอดเลือดขณะทำการผ่าตัดไตได้

Background: A number of the renal surgical interventions have recently been increased in the clinical fields. A better understanding of the anatomy of renal blood vessels including arteries, veins and their branches is critical to perform the renal surgical intervention.

Method: This is a case report study. A 79-year-old male Thai cadaver, who donated his body to Department of Anatomy, Faculty of Medicine, Khon Kaen University was studied.

Results: In the present report, the multicombed anomalies of bilateral renal blood vessels in accompany with anomalies of gonadal blood vessels and ureters as well as pelvises cadaver were found. The inferior accessory renal artery and vein were identified in both sides. The right testicular artery passed posterior to the inferior vena cava. Double left testicular veins were observed. The left renal artery passed over the superior edge of the left renal vein and located anteriorly to this vein. In addition to the vascular variations, bilaterally bifurcated renal pelvises were also identified.

Conclusion: The present finding is relevance information for reducing the chance of potential vascular injuries during the renal surgery.

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คำสำคัญ: หลอดเลือดแดงช่วยเลี้ยงไต หลอดเลือดดำช่วยเลี้ยงไต กรวยไตสองแฉก การผ่าตัดไต

Keywords: Accessory renal artery, Accessory renal vein, Bifid renal pelvis, Renal surgery

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Introduction

It is basically known that there is one renal artery on each side of the body and they arise directly from the aorta. While the renal veins empty to the inferior vena cava. Renal vein is usually singular to each kidney. However, diverse variations have been reported to occur in the renal vasculatures¹⁻⁶. Thus, an individual pre-operative depiction of the complete renal vascular anatomy is important for each surgical planning of the renal transplantation, renal trauma, renal artery embolization, angioplasty, and abdominal aortic aneurism involving the renal vasculature. This was the main reason why the present study analyzed the variation of the renal vasculature of Thai cadavers.

Methods

During the routine gross anatomy dissection course in 2015 for medical students in the department of Anatomy, faculty of Medicine, Khon Kaen university, complex renal vascular variations were found at both sides in a 79-year-old male Thai cadaver. The specimens were carefully dissected and photographed.

Results

1) Right renal vascular variations

The right renal artery (RRA) was approx. 0.45 cm in diameter and approx. 3.45 cm in length, and located posteriorly to the right renal vein (RRV), approx. 0.55 cm in diameter and approx. 1.65 cm in length. The RRA provided four anterior branches and one posterior branch, which entered the hilus of the right kidney.

The right inferior accessory renal artery (RIRA) was observed. It was approx. 0.25 cm in diameter and approx. 6.80 cm in length and was derived from the abdominal aorta (AA) at a site approx. 1.10 cm inferolateral to the inferior mesenteric artery (IMA) and approx. 6.50 cm inferior to the RRA. The RIRA ascended superolaterally at an angle of 80° to the AA, and traveled in front of the inferior vena cava (IVC) and posterior to

the right testicular artery and vein (RTA, RTV) and right ureter (RU) to enter the lower pole of the right kidney (Figure 1).

Another variation was the right inferior accessory renal vein (RIRV). It was approx. 0.55 cm in diameter and approx. 3.15 cm in length and was found to empty to the IVC in a direction almost rectangle (88°) to it. The empty point of the RIRV to the IVC was located approx. 3.20 cm inferior to that of the RRV and approx. 0.50 cm inferior to that of the RTV which ran in front of the RIRV. The RIRV traveled posterior to the proximal RU and the distal RIRA, and finally entered the lower pole of the right kidney just posterior to the RIRA (Figure 2).

In addition to the renal vascular variations, a variation of the RTA was identified. It was approx. 0.12cm in diameter and arched from the AA at a site approx. 2.50 cm inferior to the RRA and located approx. 3.00 cm superior to the left testicular artery (LTA) level. This artery further traveled posterior to the IVC before becoming in parallel to the RTV. Then, both of the testicular vessels passed over the RIRA and the RU down to the right testis (Figure 2).

Furthermore, the right renal pelvis (RRP) was found to be bifurcated and locate posterior to the renal blood vessels (Figure 2).

2) Left renal vascular variations

The left inferior accessory renal artery (LIRA) was found. It was approx. 0.2 cm in diameter and approx. 7.0 cm in length, and derived from the AA at a site approx. 1.1 cm inferolateral to the IMA and approx. 6.5 cm inferior to the left renal artery (LRA). The LIRA ascended superolaterally at an angle of approx. 42° to the AA, and further traveled posterior to the left testicular vessels and left ureter (LU) to enter the lower pole of the left kidney (Figures 2, 3).

In addition, the left inferior accessory renal vein (LIRV) was identified. It was approx. 0.30 cm in diameter and approx. 8.00 cm in length and located almost rectangle to that of IVC, similar to the RIRV, and

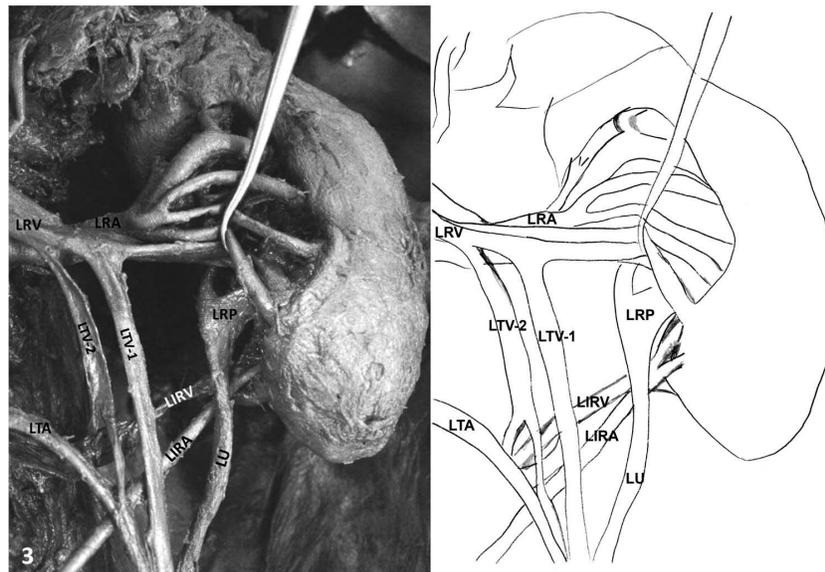


Figure 3 Enlargement of the area enclosed by a rectangle (B) in Figure 1, with clearer disclosure of the left renal hilus region by suspension of adjacent vessels with a forceps. Note bifurcated left renal pelvis (LRP) as well as duplicated left testicular veins (LTV-1, -2).

Abbreviations:

abdominal aorta (AA); inferior accessory renal artery (IRA); inferior mesenteric artery (IMA); inferior vena cava (IVC); left renal artery (LRA); left renal pelvis (LRP); left renal vein (LRV); left inferior accessory renal artery (LIRA); left inferior accessory renal vein (LIRV); right inferior accessory renal artery (RIRA); right inferior accessory renal vein (RIRV); right renal artery (RRA); right renal vein (RRV); left renal pelvis (LRP); left ureter (LU); left testicular vein (LTV); left testicular artery (LTA); right renal pelvis (RRP); right testicular v. (RTV); right testicular a. (RTA); right ureter (RU); superior mesenteric artery (SMA); testicular vein (TV)

Discussion

There have so far been several reports describing the variations of the renal blood vessels, especially renal arteries, with high frequencies of occurrence of 20-50%. The renal arterial variations have often been regarded as persistent lateral splanchnic arteries in embryos^{1,6-9}. However, as far as we know, no cases have so far been reported which contained combinations of multiple anomalies of renal blood vessels as well as ureters and pelvices in both sides.

In a study by Khamanarong et al.¹, the renal arterial supplies of 543 adults kidneys of Thai cadavers were classified into 6 types (A-, B-, C-, D-, E-, and F-types). However, bilateral accessory renal arteries corresponding to the present finding were not reported

to occur by those authors. Although the D-type (one hilar artery with one lower polar artery) of their classification is quite similar to the present finding, their case was described to occur at a unilateral side. In addition, no description about simultaneous variations of the renal vein together with the arterial variations was reported by them.

In another study by Trivedi et al.⁶, variations of the renal arteries were demonstrated by dissections (20 right kidneys and 16 left kidneys) of Turkish cadavers, corrosion casts (14 right and 14 left) and renal angiography (5 right and 3 left) of post mortem kidneys. In one of their total 72 cases, the RIRA arose from the AA at a site below the renal artery and passed behind the RU to distribute into the middle anterior, in addition

to the lower segments of the kidney. The findings above correspond to our finding RIRA. However, they did not describe a simultaneous occurrence of the venous variations together with the arterial one or the bilateral arterial variations, unlike the present case.

Bhattacharya and Chakraborty⁸ reported unilateral variations of the right renal artery and vein in Indian cadavers, and their finding on the bifurcation pattern was similar to the present study in that the RIRA and RIRV were identified. However, their accessory renal artery was found a little below the normal one and passed behind the IVC. In contrast to their report, different from their report, the occurrence of accessory renal blood vessels at both sides was detected in the present study.

Budhiraja et al.⁹ reported the unilateral occurrence of the IRA with the occurrence frequency of 7%, and that of multiple renal arteries originated from the AA with the frequency of 54% in 42 Indian cadavers. However, no occurrence of bilateral inferior polar arteries or variation of the renal vein together with arterial variation was reported by those authors unlike the present study.

On the other hand, Okamoto et al.³ reported two types of the IRA in terms of its relation to the ureter of Japanese cadavers: the one behind the ureter and the other in front of it. According to their finding, the IRA behind the ureter originated from the AA lower than the IRA in front of the ureter. The present locational relation of the IRA to the ureter in the present study is in accord with their finding. Those authors also found branches of the accessory renal arteries distributing into the ureter and gonad in some cases. However, such branch of the IRA to the ureter or gonad was not observed in the present study.

In addition, Xue et al.¹⁰ reported a case of duplicated TV accompanied by anomalies of the testicular arteries in a 90-year-old male Japanese cadaver. In their finding, the RTA originated from the anterior surface of the AA at the level of the LRA, passed posterior to the IVC, and accompanied the RTV running downwards in a similar way as this case. The higher origin and arching course of the RTA may be explained by the possible

persistence of a higher one of the cranial mesonephric arteries during the development, while the lower origin of the LTA may be explained by that of a lower one of the caudal mesonephric arteries¹¹. Moreover, the duplicated TV may influence the venous drainage in the kidney and gonads and can cause the varicocele¹².

The bifurcated pelvises of both kidneys found in this case may be an anomaly simultaneously developed with the present variations of renal blood vessels. Although the present case was not described to have been asymptomatic in any serious urinary system in the personal history, it was possible to have manifested various symptoms when complications might have developed such as results of reflux into the lower-pole ureter, obstruction of the upper pole with an ectopic ureterocele or a narrowed distal ureter with an ectopic orifice¹³.

Conclusion

As a consequence, this is the first report on the bilateral occurrence of the IRAs as well as the simultaneous occurrence of multiple types of variations of both renal arteries and veins. Full knowledge of variants of the renal vascular patterns including the present finding is significant to reduce the chance of vascular injury and hemorrhage.

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