

Bilateral triple renal arteries in a patient with iliac artery occlusion : a case report

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Summary. Multiple renal artery abnormalities in a surgical patient with iliac artery occlusion is presented in this case report. Angiographic and operative appearance has been reviewed. We found three renal arteries bilaterally. This abnormality has been compared with the literature and the clinical importance has been emphasized.

Arteres renales bilatéralement triples chez un patient présentant une thrombose de l'artère iliaque: a propos d'un cas

Résumé. Des variations artérielles rénales multiples découvertes chez un sujet présentant une thrombose de l'artère iliaque, sont rapportées. Il s'agit de trois artères rénales bilatérales pour lesquelles sont précisées les caractéristiques angiographiques et les données per opératoires. A cette occasion est faite une étude de la littérature et du retentissement clinique de cette variation.

Key words : Renal artery abnormalities — Iliac artery occlusions

Variations of the renal vasculature are frequent, which have been reported to have an incidence of 20-75% in various articles [2, 3, 8, 11, 12]. This anomaly was a concern of anatomists until early 1960's, who have described various types of abnormalities [2, 3, 12]. Since that time, clinicians had to face the problem of the renal artery abnormalities much more often not only because of the improvements in the renal transplantation surgery and surgical treatment of reno-vascular hypertension but also more angiographies are performed for lower extremity and aortic occlusive diseases. Variations in the renal vasculature have diagnostic and therapeutic implications, including surgical procedures for reno-vascular hypertension renal transplantation and abdominal aortic diseases. The knowledge of preoperative anatomy of renal arteries is also important to prevent the renal complications of surgical approaches to aorta.

Case report

A 48 years old, Caucassian male, was admitted to hospital with increasing symptoms of intermittent claudication in the last 3 years, in both lower extremities. On physical examination, the left femoral artery was not palpable, and the foot was cold and pale, with trophic changes. The right femoral artery pulse was diminished.

In the non-invasive vascular laboratory, the ankle-arm index at rest was calculated to be 0.5 for right and 0.2 for left lower extremity. He had a history of smoking for 15 years. He was neither diabetic, nor hypertensive. Renal functions were found to be normal. His blood chemistry showed no abnormal value, except a slight increase in lipid and cholesterol levels. Angiography revealed a total occlusion of left common iliac artery and a 50%, long segment narrowing of the right external iliac artery. This angiography also showed 3 arteries of the right kidney, one of them located just above the aortic bifurcation. Two left renal arteries were also visible with some difficulty (Fig. 1).

Concerning his age and active life, operation was decided. The aorta was explored with the transperitoneal approach. Inspection at the operation revealed three different renal arteries, leaving the aorta posterolaterally and entering the right kidney separately. Left lower and upper polar arteries were originating from the aorta anterolaterally and there was a third (hilar) renal artery which was totally occluded. Right hilar and lower polar arteries were 2 mm. in diameter and the upper polar was 3 mm. in diameter. Both of the upper and lower polar arteries of the left kidneys were 3 mm. in diameter. The left upper polar renal artery showed a kinking after leaving aorta. The hilar left renal artery was 2 mm. in diameter, but it was totally occluded with heavy calcification. The right lower pole and hilar arteries were locali-

zed in front of the inferior vena cava. Renal veins were completely normal. By using a side biting clamp on the aorta in the area between the two upper polar arteries, left aorto-iliac, right aorto-femoral 16/8 mm. bifurcated dacron graft was interpositioned. During this procedure the renal blood flows were not occluded.

The patient was discharged from hospital on his 8th postoperative day after an uneventful postoperative period. Two months later the patient had no symptoms and was perfectly normal at physical examination.

Discussion

Abnormal, accessory, extra-hilar, multiple, supernumerary, polar or aberrant terms were used to define the numerical abnormalities of the

renal arteries [5, 6, 8, 12, 13, 15]. Apart from numerical anomalies of the renal arteries which have received the attention of anatomists for many years, various configurational anomalies have also been reported [2, 6, 10]. Anson et al. reported the most common 12 types of renal artery variations [2]. Furthermore R.J.Merklin, who reviewed 11 000 necropsy studies, reported that, three renal arteries were found to be in 70 (0.6%) cases [15]. In articles about transplantation surgery, double renal artery anomalies or the importance of the upper and lower polar arteries have been emphasized [7, 8, 14, 15]. In our reviews of the literature on this subject, we have not met any case of bilateral triple renal arteries existing with another disease.

This kind of variation is explained by the disturbance of embryo-

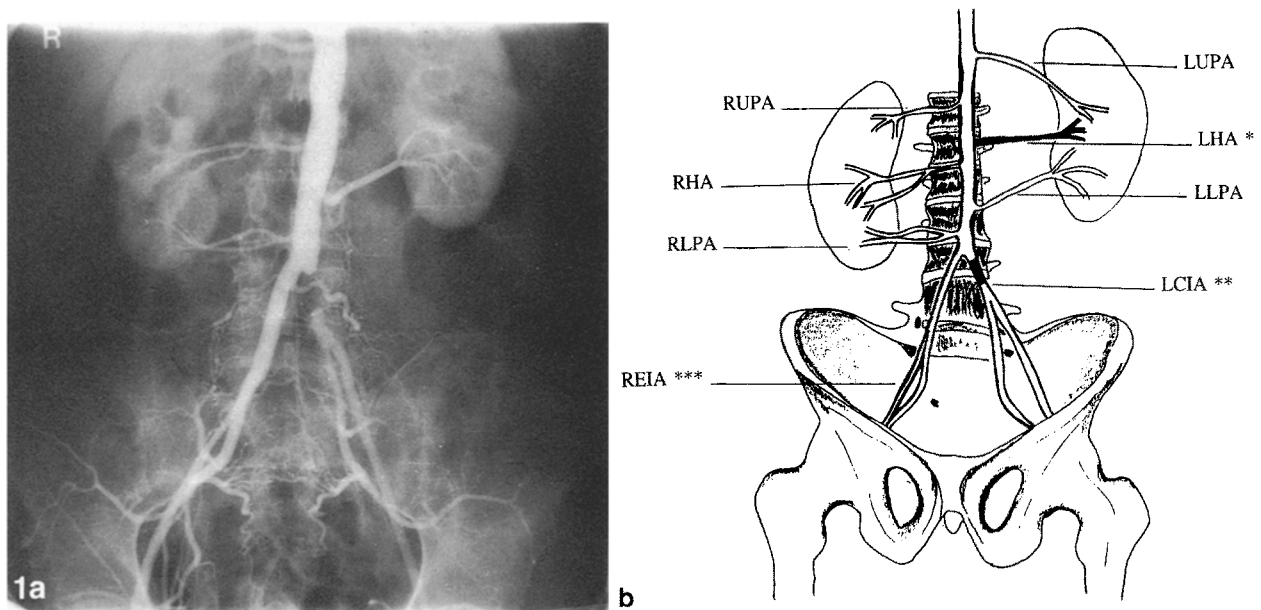


Fig. 1a,b

a Angiographic appearance: Left upper pole artery can hardly be seen. **b** Schematic representation, LUPA; left upper pole artery, LHA*; left hilar artery (totally calcific), LLPA; left lower pole artery, LCIA**; left common iliac artery (segmental 100% occlusion), RUPA; right upper pole artery, RHA; right hilar artery, RLPA; right lower pole artery, REIA***; right external iliac artery (50% stenosis)

a Angiographie : l'a.polaire supérieure gauche est difficilement visible. **b** représentation schématique des variations : L U P A a.polaire supérieure gauche, L H A a. hilaire gauche (totalement thrombosée), L L P A a. polaire inférieure gauche, L C I A a. iliaque commune gauche, (thrombose totale segmentaire), R U D A a.polaire supérieure droite, R H A a. hilaire droite, R L P A a. polaire inférieure droite, R E I A a. iliaque externe droite (sténosée à 50%)

logical development. During the transition phase from mesonephros to metanephros, persistence of some rete arteriosum urogenitale arteries results in this anomaly [2, 3, 10, 11], thus multiple renal arteries are persistent mesonephric arteries.

Our case was thought to be an original case report because of its infrequency and its co-existence in a patient who required a surgical procedure on the aorta.

References

1. Alexandre JH, Hureau J, Chevrel JP, Lassau JP (1965) Le dispositif artériel du mésonéphros et du métanéphros chez l'embryon humain de 17 m/m. Origine des artères rénales. Arch Anat Path 13: 83-87
2. Anson BJ, McVay CB (1971) Abdominal cavity and contents, chap 15. In: Anson BJ, McVay CB (eds) Surgical Anatomy, 5th edn. WB Saunders, Washington, pp 691-695
3. Anson BJ, Daseler EH (1961) Common variations in renal anatomy, affecting blood supply form and topography. Surg Gyn Obstet 112: 439-446
4. Arey LB (1962) Developmental Anatomy. WB Saunders, Philadelphia
5. Augier A (1923) Appareil urinaire. In: Poitier P, Charpy A (eds) Traité d'Anatomie Humaine, vol. 1. Masson, Paris, pp 88-103
6. Awojobi OA, Ogunbiyi OA, Nkposong EO (1983) Unusual relationship of multiple renal arteries. Urology 21: 205-206
7. Codd JE, Andersen CB, Gruff RJ, Gregory JG, Lucas AB, Newton TW (1974) Vascular surgical problems in renal transplantation. Arch Surg 108: 876-878
8. Goldman HM, Tilney LN, Vineyard CG, Laks H, Kahan GM (1975) A twenty years survey of arterial complications of renal transplantation. Surg Gyn Obstet 141: 758-760
9. Hamilton WJ, Boyden JD, Mossman AW (1962) Human Embryology. Hefter, Cambridge
10. Jeffery RF (1972) Unusual origins of renal arteries. Radiology 102: 309-310
11. Kissane JM (1974) Congenital Malformations. In: Heptinstall RE (ed) Pathology of the Kidney, 2nd edn. Little Brown, Boston, pp 69-81
12. Merklin RJ, Michels NA (1958) The variant renal and suprarenal blood supply with data on the inferior phrenic, urethral and gonadal arteries. J Int Coll Surg 29: 41-76
13. Nathan H, Glezer I (1984) Right and left accessory renal arteries arising from a common trunk associated with unrotated kidneys. J Urol 132: 7-9
14. Simmons LR, Tallent BM, Kjellstrand MC (1971) Kidney transplantation from living donor with bilateral double renal arteries. Surgery 69: 201-207
15. Spanos KP, Simmons LR, Kjellstrand MC, Buselmeier JT, Najarian SJ (1973) Kidney transplantation from living related donors with multiple vessels. Am J Surg 125: 554-558

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