

Aberrant renal arteries: General considerations

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Abstract

Aberrant renal arteries are also referred to as accessory arteries. These conditions pose serious concern to urologists due to the involvement of the affected vessels in the ethiology of hydronephrosis. The medical literature has well-documented and exhaustively characterized many cases of aberrant or accessory arteries, where the renal vessels have been reported to enter the lower pole of the kidney and to lie in such a position as to appear to obstruct the outflow of urine at the pelviureteric junction.

According to the international literature, the incidence of aberrant or accessory renal arteries varies widely based also on the fact that there is no fixed criterion for aberrance. From this point of view, this term is many times employed interchangeably to an extra artery in the renal pedicle, or to an artery entering the kidney at either pole, whether derived from the main renal artery, from the aorta or from a branch of the aorta.

Since many decades ago, it has been suggested that the arteries which have a proximal origin at the hilum or in the pedicle may be most likely a consequence of a variation in the degeneration of the rete arteriosum, whilst the arteries which arise from the aorta may be persistent mesonephric arteries.

The issue of aberrant renal arteries is also of particular concern in the urology practice at the University Hospital Center “Mother Teresa” in Tirana, Albania. In all cases, it is recommended that the affected arteries should be named together with an indication of their origin and type and the words “aberrant” or “accessory” should be avoided, because these terms bear little anatomical, or explanatory value in the clinical practice.

Keywords: aberrant renal arteries, accessory arteries, renal vessels, urology.

Aberrant renal arteries

Aberrant renal arteries are also referred to as accessory arteries. These conditions pose serious concern to urologists due to the involvement of the affected vessels in the etiology of hydronephrosis. The medical literature has well-documented and exhaustively characterized many cases of aberrant or accessory arteries, where the renal vessels have been reported to enter the lower pole of the kidney and to lie in such a position as to appear to obstruct the outflow of urine at the pelviureteric junction (1-3). According to the international literature, the incidence of aberrant or accessory renal arteries varies widely based also on the fact that there is no fixed criterion for aberrance. From this point of view, this term is many times employed interchangeably to an extra artery in the renal pedicle, or to an artery entering the kidney at either pole, whether derived from the main renal artery, from the aorta or from a branch of the aorta (1,4).

Since many decades ago, it has been suggested that the arteries which have a proximal origin at the hilum or in the pedicle may be most likely a consequence of a variation in the degeneration of the rete arteriosum, whilst the arteries which arise from the aorta may be persistent mesonephric arteries (1).

Links with hydronephrosis

Aberrant arteries may cause hydronephrosis. As a matter of fact, according to the scientific literature, Eustachius has reported the issue of aberrant arteries in one of his well-known plates which remained unprinted in the Papal Library until 1714 (1,4).

Gleason et al. have reported the presence of hydronephrosis in 15 of 58 cases with contralateral nonectopic kidneys. Of these 15 cases, 11 required surgeries mainly for the presence of vesicoureteral reflux disease (5).

On the other hand, Mustafa et al. have reported the aberrant renal vessel causing hydronephrotic changes, but it was associated with contralateral crossed ectopia without fusion (3).

In a more recent study, there was reported an

aberrant vessel causing pelvi-ureteric junction obstruction in the normally placed left kidney associated with the contralateral crossed-fused right kidney (4). This is not a common finding which is reported in the medical literature. In this study, the obstructed drainage in the ectopic right kidney was due to malrotation and compression effect of the hydronephrotic left kidney (4).

Accessory renal arteries

In 2008, Mir et al. introduced the simplest definition of accessory renal artery (6). Based on this work, the "normal" renal arteries were described as entering the kidney through its hilum, whereas the accessory renal arteries might enter the renal artery through the hilum or through the surfaces of the kidney (6,7).

Nevertheless, it should be pointed out that, from the sixteenth century until the present days, the terminology related to accessory renal artery has been controversial and vague (7-9). Of note, the first description of accessory renal arteries was provided in the sixteenth century. Hence, in 1564, Eustachi described the accessory renal arteries as end-arteries, which are not supplemental or accessory not making anastomotic connections after entering the kidney (7,10).

The most typical kind of renal vascularization contains accessory renal arteries, which are classified according to their origin, given by Merklin and Michels in 1958 as follows (11):

- accessory renal arteries originating from the aorta;
- accessory renal arteries originating from the main renal artery;
- accessory renal arteries originating from other sources.

In 1982, Stephens (12) held the position that as the vessels are not redundant or unnecessary but, on the contrary, they are essential non-anastomotic arteries corresponding to the segmental branch of a single renal artery. From this viewpoint, the terms

accessory, supernumerary or aberrant were not appropriate in these cases (12).

In 1992, Sampaio and Passos (13) introduced the terms hilar for the aortic branch penetrating the hilum; the term extrahilar for the branch of the renal artery with an extra-hilar penetration; the term superior polar for the aortic branch penetrating the superior pole; and the term inferior polar for the aortic or common iliac artery penetrating the inferior pole of the kidney (13). Furthermore, these authors retained that these vessels should be referred to as “multiple arteries”, because they are segmental end-arteries.

More recently, in 2010, Daescu et al. (14) have suggested a new classification: the renal arteries can be hilar and polar (superior/ inferior). The polar arteries are classified in four groups: (i) solitary; (ii)

pedicular, if the second artery is accompanied by a polar vein and a nerve plexus; (iii) false supernumerary, if it replaces the segmental artery, and; (iv) true supernumerary artery, if the respective segmental artery emerges from the renal artery (7,14).

Conclusion

The issue of aberrant renal arteries is also of particular concern in the urology practice at the University Hospital Center “Mother Teresa” in Tirana, Albania. In all cases, it is recommended that the affected arteries should be named together with an indication of their origin and type and the words “aberrant” or “accessory” should be avoided, because these terms bear little anatomical, or explanatory value in the clinical practice.

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