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CASE REPORT

Multiple variations of collateral branches of the abdominal aorta associated with pyelic duplication: A case report

Multiples variations des branches collatérales de l'aorte abdominale associées à une duplication pyélique : à propos d'un cas

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KEYWORDS
Abdominal aorta;
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Summary
Purpose. — We describe a rare case of anatomical variation of the collaterals of the abdominal aorta associated with a duplication of the pyelic.
Material and method. — A 51-year-old patient in whom an abdominal CT scan was performed as part of the exploration of a cystic left renal mass objectified on ultrasound.
Results. — A celiomesenteric trunk with two left renal arteries and a duplication of the left pyelon were found.
Conclusion. — The reported case is of interest in the rare association of these anatomical variants.

Résumé
But. — Nous décrivons un cas rare de variation anatomique des collatérales de l'aorte abdominale associée à une duplication pyélique de découverte fortuite.
Matériel et méthode. — Il s'agit d'une patiente de 51 ans chez qui un scanner abdominal a été réalisé dans le cadre de l'exploration d'une masse kystique rénale gauche objectivée à l'échographie.

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Résultats. — Il a été découvert un tronc coeliomésentérique avec deux artères rénales gauches et une duplication du pyélon gauche.
Conclusion. — Le cas rapporté tire son intérêt dans la rare association de ces variantes anatomiques.

Introduction

The celiac trunk and superior mesenteric artery originate from the ventral side of the abdominal aorta respectively at the level of T12-L1 vertebral disc and the first lumbar vertebra (L1). The right and left renal arteries are lateral branches of the abdominal aorta that originate at the level of the first lumbar vertebra [1,2]. The renal artery with renal pelvis and renal vein form the renal pedicle. These anatomical structures, including the celiac trunk, the superior mesenteric artery and the pelvis are subject to many variations reported in the literature [3].

We report a rare case of celiomesenteric trunk associated with duplication of the left renal artery and the left renal pelvis.

Clinical case

A 51-year-old woman patient to whom an abdominal CT scan was performed as part of the exploration of a cystic left renal mass found on ultrasound. Clinically, the patient complained of pain in the left lumbar region. She had no particular background. The result of the CT angioscan was a BOSNIAK type I left renal cyst (fluid density cyst with no regular contrast enhancement). A celiomesenteric trunk was also discovered with two left renal arteries and a duplication of the left renal pelvis.

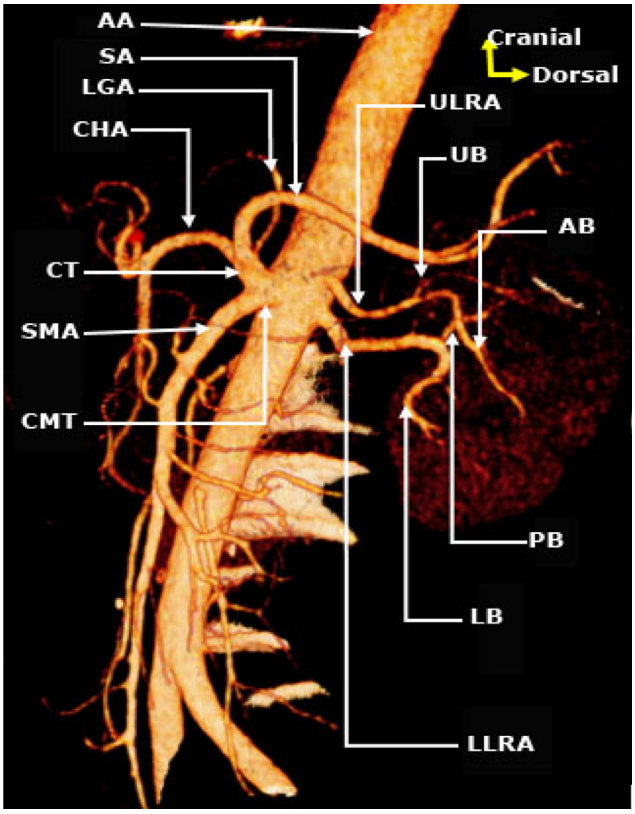

Figure 1 Left lateral view of the abdominal aorta in 3D volume rendering showing the coeliomesenteric trunk and the two left renal arteries. AA: abdominal aorta; SA: splenic artery; LGA: left gastric artery; CHA: common hepatic artery; CT: celiac trunk; SMA: superior mesenteric artery; CMT: celiomesentric trunk; LLRA: lower left renal artery; LB: lower branch; PB: posterior branch; AB: anterior branch; UB: upper branch; ULRA: upper left renal artery.

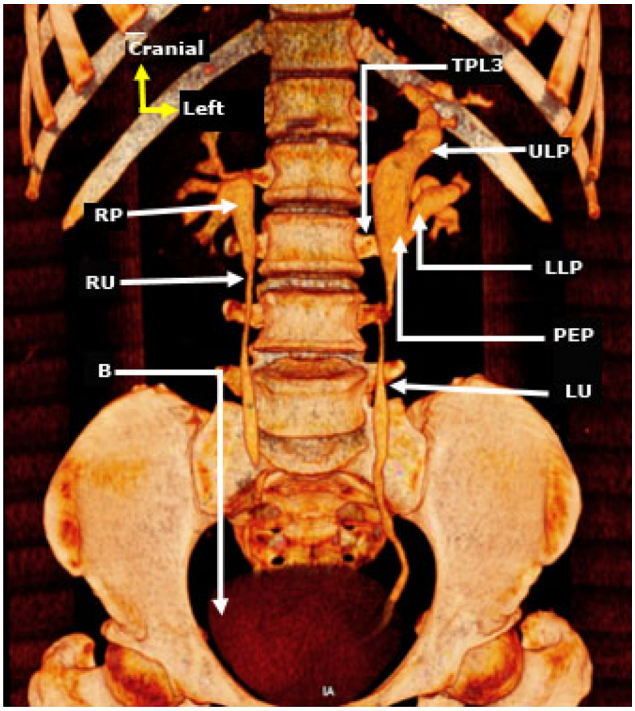

Figure 2 Anterior view of the urinary shaft showing pyelic duplication. RP: right pyelon; RU: rught ureter; B: bladder; LU: left ureter; PEP: point of entry of pyelons; LLP: lower left pyelon; ULP: upper left pyelon; TPL3: transverse process of the 3rd lumbar vertebra.

The celiomesenteric trunk arose from the anterior abdominal aorta at the L1-L2 intervertebral disc level, with a constant caliber of 14 mm. It emerged with a 90° angle from the aorta and divided into 2 arterial trunks, celiac axis and superior mesenteric artery, after a short 4 mm path. The celiac trunk and abdominal aorta formed an obtuse angle of 104°. The celiac trunk had a caliber of 9 mm at origin and then divided into the left gastric artery and a hepatosplenic trunk which later divided into common hepatic artery and splenic artery (see Fig. 1). The superior mesenteric artery had a caliber of 8 mm at origin and presented a descending path, it then emitted its classic branches. This celiomesenteric trunk was classified as type I according to the classification of HIGASHI [4].

The two left renal arteries arise from the left side of the abdominal aorta, the upper one facing the middle part of the body of L1 and the other, lower, facing the lower edge of the body of L1. Their origins were 7 mm apart. The left superior renal artery had a caliber of 5 mm at the origin, 3 mm at the end and 29 mm long with an arcuate trajectory with superior concavity and divided at the renal hilum level into two terminal branches, upper and anterior. The lower left renal artery was 6 mm in diameter at the origin, 4 mm at the end and 32 mm long with a complex path with double curvature; a first, prevertebral, concave at the top and the second lateroverteberal left, concave behind and medially. It ended at the renal hilum level in two terminal branches: posterior and inferior.

Concerning the urinary tree, there was two left renal pelvis, one upper and more calibrated and a lower second one. The left superior renal pelvis was formed in the renal sinus by the confluence of three major calyces of the same caliber. The lower left renal pelvis had the same shape. Subsequently, the two renal pelvis meet in front of the left transverse process of the lumbar vertebra L3 thus forming the left ureter (see Fig. 2).

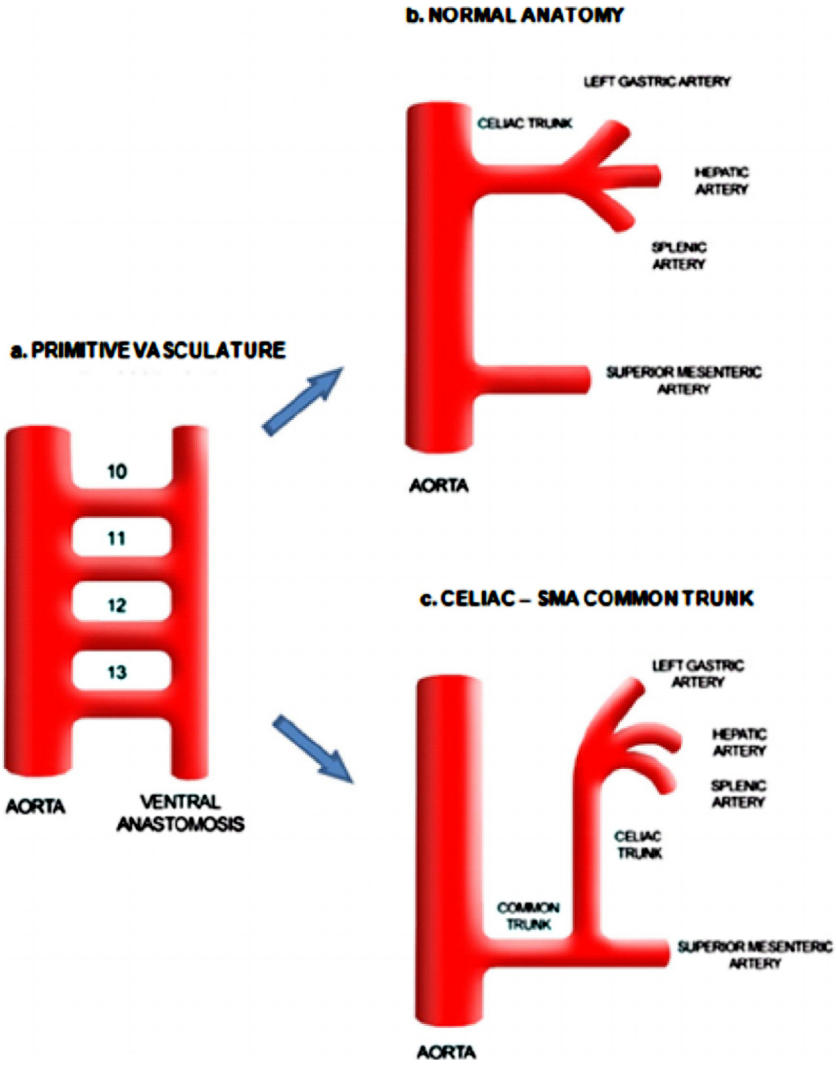

Figure 3 Embryology of the normal vascular anatomy and variant celiac-SMA trunk. In the primitive vasculature, (a) the 10th to 13th vitelline arteries connect the aorta with a ventral longitudinal anastomosis. In normal anatomy, (b) the 10th and 13th persist to invidually from the celiac axis and the superior mesentric artery; the remaining segments regress before birth. If the 10th to 12th vitelline arteries regress but there is abnormal persistence of the ventral anastomosis, a celiomesenteric trunk occurs (c) [8].

Discussion

Classically, the celiac trunk and the superior mesenteric artery arise separately from the anterior side of the abdominal aorta. However, in rare cases, 0.5 to 3.75%, these two arteries can come from a common trunk arising from the anterior side of the abdominal aorta [5—7]. During the embryonic life, the digestive vessels come from the 10^{th}, 11^{th}, 12^{th} and 13^{th} primitive ventral segmental arteries. They are connected by vertical intersegmental anastomoses. The regression of the initial segments of the 11^{th} and 12^{th} ventral segmental arteries and that of the intersegmental anastomosis uniting the 12^{th} to the 13^{th} leads to the modal configuration of the digestive arteries, notably the celiac trunk and the superior mesenteric artery (see Fig. 3) [8].

The development of the intersegmental anastomosis uniting the 12^{th} to the 13^{th} and the regression of the proximal segment of the 13^{th} segmental could explain the formation of a celiomesenteric trunk. Similarly, regression of the proximal segments of three of the segmental arteries leaving a single segmental in place could justify this rare anatomical variant.

Considering the renal arteries, they come on both sides from the abdominal aorta at the height of the superior mesenteric artery and are unique on each side. In the literature, cases of unilateral and bilateral variations in the number of renal arteries have been reported [9,10].

In the present case, there was a duplication of the left renal artery. This variant can be explained by embryonic development. Indeed, there are nine pairs of arteries supplying the mesonephros, metanephros, gonads and adrenal glands. These nine pairs are divided into cranial arteries.

Renal arteries develop from a single pair at the middle group. [11]. Then, regression of one of the intermediate arteries on one side 'instead of two) explains the existence on the left side of two left renal arteries. This change in the number of the left renal arteries is accompanied by a duplication of the renal pelvis related to an early bifurcation of the urethral swelling which must be done at the 6^{th} week in contact with the metanephrogenic blastema [12,13].

It should be noted from this case that it is important for any surgeon involved in abdomen surgery and any interventional radiologist to be aware of this for a correct diagnosis and treatment. In the same way, it possible to avoid certain risks of intraoperative abdominal hemorrhage and emphasizes the asymptomatic nature of these variants.

Conclusion

The celiomesenteric trunk remains a rare variant and this reported case is interesting because of the association with duplication of the left renal artery and duplication of the left renal pelvis. It is important to know these variations for diagnostic and therapeutic purposes.

Disclosure of interest

The authors declare that they have no competing interest.

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