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COMPARATIVE STUDY ON ANATOMICAL-IMAGING ABDOMINAL AORTA AND ITS BRANCHES

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Abstract: *We have noted a great variety of origins and distributions of arteries from the abdominal aorta artery. Clinical usefulness of this distribution shows the importance of context in vascular surgery, the variations being discovered "in vivo" using imaging methods. We have tried in this way to realize a small imagistic atlas of the abdominal vessels. The surgical importance of knowing this variants, derived from the possibility of planning and carrying some surgical procedures at the abdominal level, including laparoscopic interventions at the billiary tract level, in the kidney's surgery (nefrectomy and kidney transplant) or in the treatment of colo-rectal cancer.*

Key Words: *Ultrasound, Computer-tomography, Aorta.*

1. Introduction

1.1. Development of the Aortic Abdominal Branches

The development of the branches has the origin in the ventral intersegment arteries.

Celiac trunk

- permeate mezenteron
- it outlines in S5 till S7 end
- comes from the artery segment 10

Superior mesenteric artery

- pierce mezenteron
- comes from the segmentary arteries 12-14

Inferior mesenteric artery

- it has the origin in the segmentary artery 20 and descend 3 segments
- continues throughout intrauterine life, independent of the vitelline circulation
- after the birth it fibroses and remain like ombilcale ligaments

Renal arteries

- are formed from the intersegmentary arteries located at lower position corresponding with the initial position of the kidney
- in the ascension, the kidneys are taken over from the supradiacente intersegmentary arteries and other retrogress

Genital arteries

- have their origin in the high portion of abdominal aorta, and dislodge the with descending of the ovary / testicles

2. Material and Method

The study was conducted on 119 adults cadavers, preserved in formalin solution,

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8%, by dissection in the Anatomy Laboratories of The Faculty of Medicine, Braşov, and also on patients investigated in the last year, in the Department of "Policlinica de Diagnostic Rapid –Medis Brasov" by ultrasonography and computer-tomography.

3. Results

3.1. Abdominal Aorta

Fig. 1. *Longitudinal section ultrasound image of the abdominal aorta*

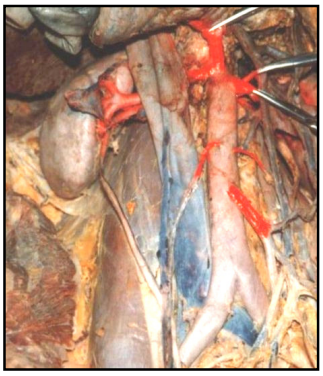

Fig. 2. *Abdominal aorta and inferior vena cava at the level of diaphragmatic hiatus - prepared by dissection*

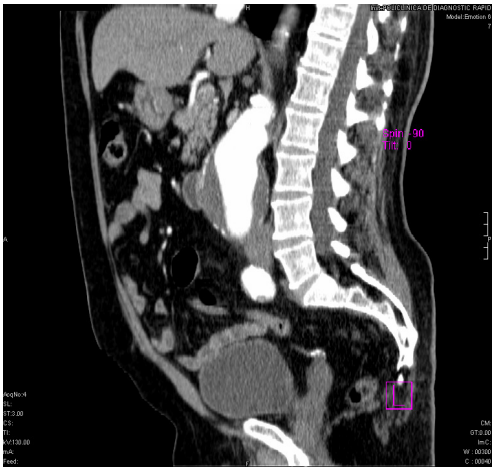

Fig. 3. *Abdominal CT with contrast substance sagital section (reconstruction). Dissect aneurysm of the abdominal aorta extended to the right iliac artery*

Fig. 4. *Ultrasound transverse section – dissecting aortic aneurysm*

3.2. Celia Trunk

Celiac trunk emerges from abdominal aorta immediately below the diaphragmatic and is divided to 3 branches: Left gastritis artery, Hepatica Commune artery, splenic artery.

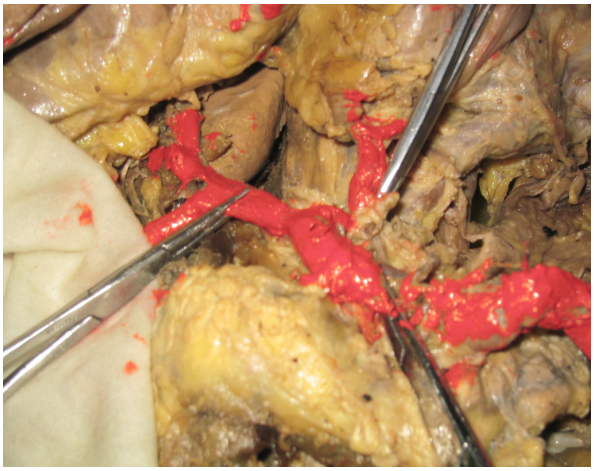

Fig. 5. *Celia trunk - dissection*

3.3. Lienal Artery

The lineal artery branches before the hilum in 3 lienal arteries, the left gastro-epiploical arteryhaving its origin in the superior one.

Fig. 6. *Lienal artery – dissection*

Fig. 7. *Transverse ultrasound section through the epigastrum – it highlights the retropancreatic path of the lineal artery, with posterior situation and of the lineal vein with anterior*

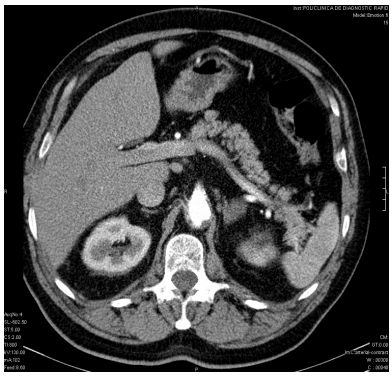

Fig. 8. *CT Axial section with contrast substance through epigastrium- same aspect*

3.4. Hepatic Arteries

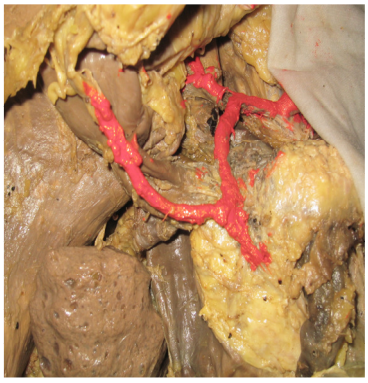

Fig. 9. *Dissection – shows the bifurcation of the commune hepatic artery in: the proper heapatic artery and gastroduodenal, as well as the bifurcation of the left gastroepiploic and superior pancreatico-duodenal artery*

Fig. 10. *Hepatic artery in liver pedicle - of dissection (anterior of the portal vein and left of the Coledoc duct).*

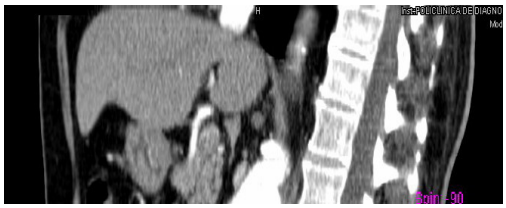

Fig. 11. *Abdominal CT with contrast substance, sagital section (reconstruction) highlights the ascending path of the hepatic artery through the hilum*

3.6. Superior Mesenteric Artery

Fig. 12. *Superior Mesenteric artery: commune trunk of the Ileocolic artery with the Middle Colic artery (anatomic variation – dissection)*

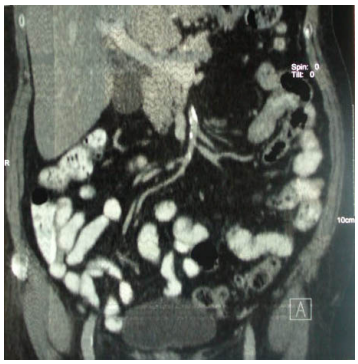

Fig. 13. *CT with contrast substance frontal section (reconstruction). Superior mesentery artery and its branches.*

Fig. 14. *Dissection – common emergence trunk of the Ilecolic artery with the Right Colic Artery*

Fig. 15. *Dissection – same variation on different case*

Fig. 16. *Longitudinal ultrasound section – highlights the origin of the celic trunk (superior) and of the superior mesenteric artery (inferior)*

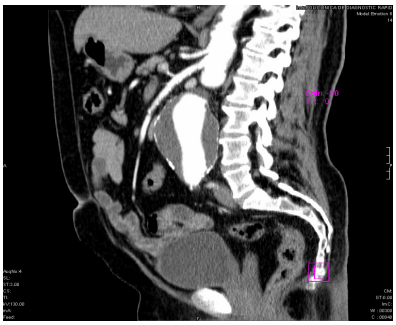

Fig. 17. *Abdominal CT with contrast substance, sagital section – it is pointing out the same aspect (a dissected aneurys is also shown)*

Fig. 18. *Ultrasound image in cross section through the epigastrium – reveals the aorto-mesenteric pence (between the aorta, located posterior and superior mesenteric artery located above)*

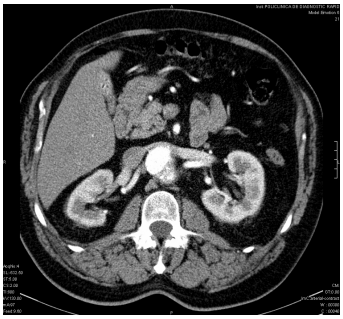

Fig. 19. *Abdominal CT with contrast substance – transverse section – same aspect*

Fig. 20. *Ultrasound image, cross section through epigastrium-emergence from a common trunk from the abdominal aorta of the superior mesenteric artery and the hepatic artery. (Anatomical variation)*

3.7. Renal Arteries

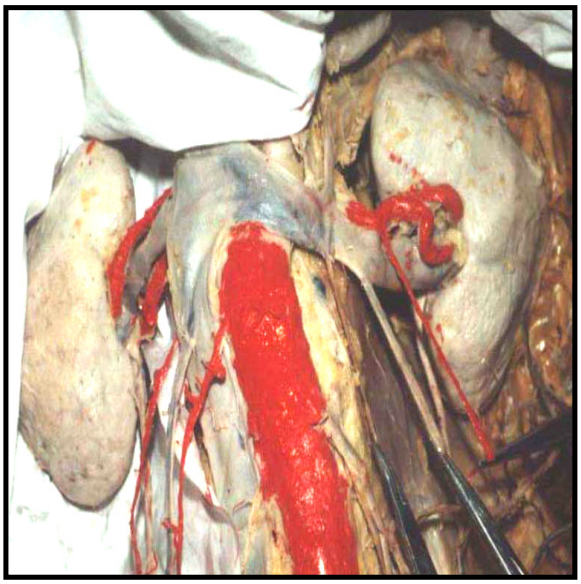

Fig. 21. *Dissection-renal arteries originating from abdominal aorta and renal veins flowing in the inferior vena cava inferior, the posterior trajectory of the arteries from veins; 2 testicular arteries are revealed: an artery with origin in prepielic artery and other origins in the aorta*

Renal arteries and renal veins – relations between these, the aorta and the inferior vena cava.

Fig. 22. *Ultrasound image in cross section through epigastrium (The origin of right renal artery with posterior path to the V. Cava Inferior).*

Fig. 23. *Ultrasound image in cross section through epigastrium (the origin from the aorta and both renal arteries)*

Fig. 24. *Transverse ultrasound section through the hepatic pedicle*

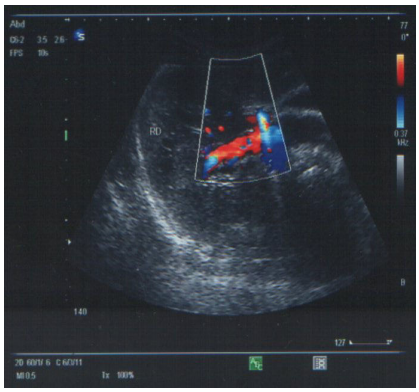

Fig. 25. *Same aspect – power Doppler mode*

Fig. 26. *Ultrasound image in cross section through epigastrum.- origin at the same level of the renal artery with right testicular artery*

Fig. 27. *Dissection – pointing out the origin of the testicular artery from the left renal artery*

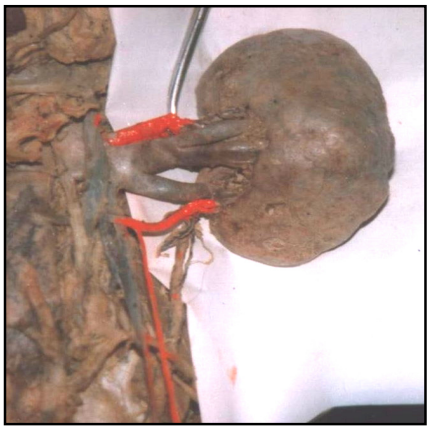

Fig. 28. *Dissection - left renal arterial duplicity and testicular artery origin in the left renal artery*

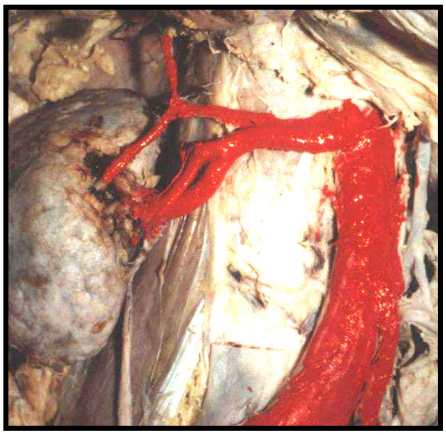

Fig. 29. *Dissection – the distribution of the right renal arteries*

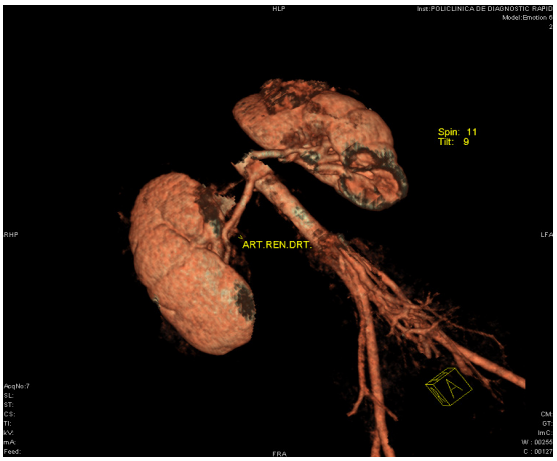

Fig. 30. *CT image, VRT reconstruction representing the renal arteries and inferior mesenteric artery*

4. Conclusions

1. The study revealed great variability in number and distribution of renal vessels and the clinical usefulness of this lies in the importance of the distribution of the renal vasculature in surgery of the kidney (partial nefrectomy or kidney transplantation).

2. It was found that variants of renal artery may be associated with variations of origin of genital artery, leading clinical importance in the context of renal surgery (to avoid the ligatures of renal artery that has a genital artery).

3. Knowing the variations underlie the planning and execution of surgical procedures of the upper abdomen including laparoscopic interventions of the biliar tract.

4. Knowledge of anatomical variations of origin and distribution of colic arteries is finding his importance in the colorectal cancer surgery.

5. The imagistic examination of the abdominal aorta offers detailed information about the analyzed anatomic structures as well as a correct (possibly post-operatory) evaluation of them.

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