

Classification of hepatic artery anatomic variants for intra-arterial therapy: Analysis of 4315 angiographic studies



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Purpose

To evaluate hepatic arterial variants and to propose new classification for interventional radiology.

Material and Methods

Hepatic arteriograms of 4315 patients were analyzed. All variants were divided into five types according to the "level of centralization" of arterial flow: common hepatic (central), celiac, celiaco-mesenteric, mesenteric and aortic. Degree of centralization is proportionally reduced from the central (all hepatic arteries arise from the common hepatic artery) to a maximum decentralized (the part of arteries from the aorta) types. Within the every type, variants were divided into groups according to the number of arteries supplying individually right (V-VIII segments) and left (I-IV segments) hemi liver (Rx/Lx).

Results

We identified 128 variants of arterial supply. According to N. Michels classification, 24 variants were distributed as follows: type I (65.3%), II (2.7%), III (7.0%), IV (0.6%), V (7.7%), VI (3.4%), VII (0.7%), VIII (1.9%), IX (1.9%) and X (0%). The remaining 104 variants (8.8%) could not be included in classification of N. Michels. According to new classification all variants were distributed: I. Central (common hepatic) type was observed in 68.6% of patients and included 6 groups: 1.R1/L1 (50.7%, 11 variants (n)); 2.R1/L2

(17.2%, n=6); 3.R2 / L1 (0.5%, n=9); 4.R1/L3 (0.1%, n=2); 5.R2/L2 (0.1%, n=4) and 6.R3/L1 (<0.1%, n=1). II. Celiac type (14.0%) included 7 groups: 1.R1/L2 (7.5%, n=11); 2.R1/L1 (4.2%, n=7); 3.R1/L3 (1.3%, n=3); 4.R2/L1 (0.8%, n=5); 5.R2/L2 (0.2%, n=8); 6.R3/L1 (<0.1%, n=1) and 7.R3/L2 (<0.1%, n=1). III. Celiaco-mesenteric type (14.3%), 5 groups: 1.R1/L1 (7.7%, n=5); 2.R2/L1 (3.5%, n=8); 3.R1/L2 (1.9%, n=7); 4.R2/L2 (1.1%, n=7); 5.R3/L1 (<0.1%, n=2). IV. Mesenteric type (2.1%), 3 groups: 1.R1/L1 (1.4%, n=6); 2.R1/L2 (0.6%, n=3) and 3.R2/L1 (<0.1%, n=1). V. Aortic type (1.0%), 5 groups: 1.R1/L1 (0.5%, n=5); 2.R1/L2 (0.3%, n=9); 3.R2/L1 (<0.1%, n=3); 4.R2/L3 (<0.1%, n=2) and 5.R2/L2 (<0.1%, n=1).

Conclusions

The number of possible variants of arterial anatomy increases with an increase in degree of blood flow decentralization, but its frequency is proportionally reduced. The proposed classification involves all potential variants of hepatic arterial anatomy including those that will be identified in the future. Our classification can be useful for planning and assessing the technical, economic and clinical effectiveness of regional therapy in patients with variant hepatic arterial anatomy.



LHA - left hepatic artery; RHA - right hepatic artery; CA - celiac artery; PRHA - posterior branch of RHA; LGA - left gastric artery; SMA - superior mesenteric artery; CHA - common hepatic artery; PHA - proper hepatic artery; GDA - gastroduodenal artery

