

Courtesy of Beáta Rozgoňová

Portocaval anastomoses

Portocaval anastomoses (or portocaval shunts) are connections between portal system and the system of superior and inferior vena cava. Importance of portocaval shunts applies in the case of portal hypertension. Dilated and varicose veins pose a risk of rupture and life-threatening bleeding. The most important are oesophageal varices.

Blue – tributaries of VCS or VCI

Purple – tributaries of portal vein

Highlighted – interconnecting veins, in fact the position of the anastomosis itself

1. Connections around oesophagus

1.1 Oesophageal varices – tela submucosa

v. portae → **vv. gastricae (v. gastrica sin.)** → tela submucosa in oesophagus and its **venous plexus (plexus vascularis submucosus oesophagei)** → **vv. oesophageales** → v. azygos + hemiazygos → v. cava sup.

1.2 Oesophagus – tunica adventitia („paraoesophageal veins“)

v. portae → **vv. gastricae (v. gastrica sin.)** → adventitia of oesophagus and its **venous plexus („paraoesophageal veins“)** → **vv. oesophageales** → v. azygos + hemiazygos → v. cava sup.

2. Connections around rectum –tunica adventitia + tela submucosa

v. portae → v. splenica → v. mesenterica inferior → **v. rectalis superior** → adventitia of rectum and its **venous plexus (plexus venosus rectalis externus)** + submucosa of rectum (**plexus venosus rectalis externus = plexus haemorrhoidalis**) →

a) **v. rectalis media** → v. iliaca interna → v. iliaca communis → v. cava inf.

b) **v. rectalis inferior** → v. pudenda interna → v. iliaca interna → v. iliaca communis → v. cava inf.

3. Connections in the anterior abdominal wall

3.1 Subcutaneous veins around umbilicus –**caput Medusae**

v. portae → **vv. paraumbilicales** (inside of lig. teres hepatis) → **vv. subcutaneae abdominis (caput Medusae)** →

a) **vv. thoracoepigastricae + vv. costoaxillares (+ vv. thoracicae laterales)** → v. axillaris → v. subclavia → v. brachiocephalica → v. cava sup.

b) **v. epigastrica superficialis** → v. saphena magna → v. femoralis communis → v. iliaca externa – v. iliaca communis → v. cava inf.

3.2 Muscular veins – inside of m. rectus abdominis

v. portae → **vv. paraumbilicales** (inside of lig. teres hepatis) →

a) **v. epigastrica superior** → vv. thoracica interna → v. subclavia → v. brachiocephalica → v. cava sup.

b) **v. epigastrica inferior** → v. iliaca externa → v. iliaca communis → v. cava inf.

3.3 Veins following chorda urachi – Burow's veins

v. portae → **vv. paraumbilicales** (inside of lig. teres hepatis) → **small vřine along chorda urachi (lig. umbilicale medianum) = Burow's veins** → **plexus venosus vesicalis** → vv. vesicales → v. iliaca interna → v. iliaca communis → v. cava inf.

4. Retroperitoneal (Retzius's) connections

v. portae → **v. mesenterica sup. + v. splenica** → small vřine inside of mesenteries and peritoneal folds = **Retzius's clutches** → **retroperitoneal veins** → tributaries for v. suprarenales sin., v. renalis sin., vv. lumbales, vv. lumbales ascendentes → v. cava sup. + v. cava inf.

5. Hepato - diaphragmatic connections

v. portae → **veins of capsula fibrosa hepatis (in region of area nuda)** → **veins of diaphragm** → vv. phrenicae superiores, vv. pericardiophrenicae, vv. musculophrenicae, vv. intercostales posteriores → v. cava sup. / vv. phrenicae inferiores → v. cava inf.

6. opened (recanalized) ductus venosus

v. portae → **ductus venosus reapertus** → **vv. hepaticae** → v. cava inf.

Cavocaval anastomoses

They are the links between v. cava superior and v. cava inferior. Blood can flow in both directions, depending on the placement of the obstacle.

1. Anterior abdominal wall

1.1 Subcutaneous veins around umbilicus

v. cava sup. → v. brachiocephalica → v. subclavia → v. axillaris → **vv. thoracoepigastricae + vv. costoaxillares (+ vv. thoracicae laterales)** → vv. subcutaneae abdominis → **v. epigastrica superficialis** → v. saphena magna → v. femoralis communis → v. iliaca externa – v. iliaca communis → v. cava inf.

1.2 Muscular veins – inside of m. rectus abdominis

v. cava sup. → v. brachiocephalica → v. subclavia → thoracica interna → **v. epigastrica superior** → veins inside of m. rectus abdominis (eventually. **v. intercostales anteriores** → veins inside of lateral abdominal muscles) → **v. epigastrica inferior (+ v. circumflexa ilium profunda)** → v. iliaca externa → v. iliaca communis → v. cava inf.

2. Posterior abdominal wall

2.1 Veins along vertebral collumn

vena cava superior → **v. azygos** (eventually. v. brachiocephalica sin. → v. intercostalis superior sinistra → v. hemiazygos accessoria → **v. hemiazygos**) → **v. lumbalis ascendens** → v. iliaca communis (eventually → connections into vv. lumbales) → v. cava inferior

2.1 Venous plexuses of vertebrae – plexus venosi vertebrales

v. cava superior → tributaries (v. vertebralis, v. vertebralis anterior, v. cervicalis profunda, vv. intercostales posteriores) → **plexus venosi vertebrales (externi et interni)** → tributaries (vv. lumbales, v. lumbalis ascendens, v. iliolumbalis, vv. sacrales laterales, v. sacralis mediana) → v. cava inferior