27 Surgery of Veins

27.1 Injury of the Large Veins

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A. Anatomy

The system of large veins of the trunk extends from the upper aperture of the thorax to the lacunae vasorum in both groins (see p. 247). It consists of four separate drainage systems (Fig. 27.1.1):

1. Superior vena cava,
2. Pulmonary veins,
3. Inferior vena cava,

I. Superior Vena Cava

The superior vena cava measures 4–5 cm in length and — separated from the thoracic wall — extends from the costomediastinal angle and the right first intercostal space to the sternal end of the third rib. At this point, it enters the pericardial sac obliquely. It is formed by the juncture of the two brachiocephalic veins. Because the junction of these veins is located behind the right margin of the sternum, the left brachiocephalic vein is longer than the right. As it descends obliquely downward and to the right behind the manubrium, the left brachiocephalic vein crosses the left subclavian artery, the left common carotid artery, and the bra-chiocephalic artery.

II. Pulmonary Veins

The pulmonary veins collect the blood from the pulmonary capillaries; in addition, the blood from the small bronchial veins empties into these vessels. Like the branches of the pulmonary artery, they follow the course of the bronchial tree and form in general two upper and two lower venous trunks in the pulmonary hilus. The superior pulmonary vein lies anterior to the hilus and the inferior pulmonary veins caudal to the respective bronchus. The part which lies within the pericardial sac is characterized by a perivascular cuff of heart muscle which keeps the vessel open and prevents kinking during systole [8].

III. Inferior Vena Cava

The inferior vena cava is formed by the junction of the two common iliac veins at the level of the fourth lumbar vertebra. This junction is situated caudal and to the right of the aortic bifurcation by which it is partially covered. At the level of the second lumbar vertebra, it runs to the right
return. Its major tributaries are the iliac veins, the renal veins, the three hepatic veins, the lumbar veins (usually four), the testicular or ovarian veins, the suprarenal veins, and the phrenic veins [8].

IV. Portal Vein

The portal vein is formed by the confluence of the superior mesenteric and the splenic vein. A short distance distal to this junction, the inferior mesenteric vein drains into the splenic vein. The junction is situated behind the head of the pancreas; from there the portal vein continues cephalad for 5 cm behind the first part of the duodenum and reaches the hilus of the liver as part of the hepatoduodenal ligament [8]. Between 65% and 80% of the perfusion of the liver is derived from the portal vein. The liver is usually drained by three veins which enter the inferior vena cava beneath the diaphragm and contribute approximately 50% of the entire blood volume that passes through the inferior vena cava.

B. Causes of Venous Injuries

Venous injuries can be caused by trauma, or they can be iatrogenic.

I. Traumatic Venous Injuries

Traumatic venous injuries are caused by blunt or penetrating trauma of the thorax or the abdomen. Isolated injuries to the veins are rare because of their protected position deep within the cavities of the body. Usually, other structures, such as arteries, parenchymatous organs, or the gastrointestinal tract, are injured simultaneously.

II. Iatrogenic Venous Injuries

With advances in medicine and the increasing use of invasive diagnostic and therapeutic manipulations, the incidence of iatrogenic venous injuries has increased rapidly. They make up approximately 10% of all vascular injuries, but this is probably an underestimate [14, 27, 31]. One distinguishes intraoperative iatrogenic injuries and lesions caused by catheters.