13 Phlebography and Lymphography

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13.1 Phlebography

Phlebography is defined as a specific radiological diagnostic method which is closely connected to the development of injectable contrast medium (CM) and therefore relatively young. The first to describe it were Berberich and Hirsch (1923), who conducted systematic experiments on living persons. The examination consists, firstly, of morphological assessment but also of functional phleboscopic assessment of the venous system of a certain body region. With this method it is possible to recognize, describe, and evaluate venous changes.

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13.1.1 Equipment

As equipment for the ascending phlebography of the lower extremities, a tiltable target X-ray apparatus is used, the pedestal of which can be adjusted to a higher position in order to cover the foot or malleolus veins. The X-ray tube may be arranged as an upper table tube or a lower table tube. All X-ray devices today are combined with an image-intensifying television chain. At the sides of the table there are adjustable handles for the support and safety of the patient. The table itself can be moved horizontally and vertically. The examination is documented, partly with time lapse, on cassette formats of 35 × 35 cm or 35 × 43 cm with the possibility of subdivision. On average, between four and six radiograms are made. The crural and genual regions are visualized generally in two layers. It takes 10–20 min from puncture to radiogram of the extremity. The time of fluoroscopy ranges from 30–60 s. Depending on the weight of the patient, the area dose product varies between 400 and 1000 cGy cm².

13.1.2 Technique

For ascending phlebography of the lower extremities, the 60-degree (Fig. 13.1) positioning of the patient has gained wider acceptance than horizontal positioning. The leg to be examined should bear as little weight as possible. This is ensured by an additional block of wood on which the leg not examined, the pivot leg, can stand firmly during the whole course of the examination.

Before examination, a warm footbath or a fomentation is desirable to make it easier to find a vein that can be punctured, if inspection indicates such a necessity.

Before application of a supramalleolar tight tourniquet the leg, in case of a marked superficial varicosis, is bound with an elastic 8-cm wide bandage
under light pressure. For preoperative phlebograms it is additionally necessary to apply a measuring device to the exterior of the extremity; this may be, for example, a metal chain with marked intervals. Also, the extent of an ulcer cruris is marked on the bandage or the skin. The dorsal foot vein is then punctured with an 18-G Butterfly or a Venofix needle. With the help of a connecting extension tube, CM is manually applied in full view and while the malleolar block is continued (Fig. 13.2).

The radiological documentation is a standardized procedure: First of all, the lower leg needs to be visualized in an anteroposterior projection with slight exterior rotation. The caudal limitation of the picture is the foot or the malleolus. In the following step of the examination, the knee joint cleft is in the center ray. Transitions of the radiograms are always overlapping. With the third exposure, the superficial femoral vein is visualized. The infrainguinal region, including the cross (Fig. 13.3), and also the common femoral vein are X-rayed on a supplementary cassette (24 × 30 cm). If the pelvic veins and the inflow of the vena cava inferior are contrasted, their documentation will suffice on the 24 × 30 cm format. Depending on the findings and the problem that is looked for in the lower leg region, the final documentation will proceed in interior and exterior rotations as well as in a lateral projection. The diagnosis may suggest this kind of procedure at the very beginning; in this case, the pelvic region should be exposed at the end. This has the additional advantage of transporting CM by means of a passive muscle pump of the sura from the crural veins centripetally. In such a way the moistening time of the CM at the endothelium of the vein wall is reduced.

Orthostatic leg phlebography is indicated in the following cases:
- Suspected acute phlebothrombosis
- Preoperatively in case of varicosis, in order to assess subfascial veins and the perforating veins
- To assess the superficial venous system, but not for verification of a superficial thrombophlebitis
- To diagnose venous insufficiency (Fig. 13.4)

13.1.3 Phlebography of Leg and Pelvic Veins

In ascending phlebography of the lower extremities, the deep leg and pelvic veins, including the muscular vessels, are visualized. At the same time, by means of Valsalva’s maneuver it is possible to show insufficient perforating veins. Also, insufficient transfascial connections can be objectified in order to exclude a