COMMON FEMORAL VEIN ENDOPHLEBECTOMY

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Chronic venous obstruction from the common femoral vein (CFV) through the femoral vein (FV) to the deep femoral vein (DFV) is not easy to treat due to poor inflow (Figure 20.1). Endophlebectomy is a specialized surgical procedure to remove this trabeculated obstruction. In this highly selected group of patients, endophlebectomy can be combined with iliac vein stenting to provide adequate inflow, thereby reducing the risk of early stent thrombosis.

This chapter ensures a comprehensive overview of the endophlebectomy technique, reflecting the nuanced approach necessary for successful outcomes.

SURGICAL TECHNIQUE

Preoperative care, anesthesia, and positioning

Endophlebectomy should be performed under general anesthesia, as the adjunct iliac balloon venoplasty is painful and, due to the intraoperative administration of anticoagulation, regional anesthesia carries a high risk of bleeding. The patient is placed in supine position with both the groin area adequately exposed. The contralateral femoral access is used for phlebography to mark the exact extend and site of the occlusion. The right side of the neck should also be prepped and draped in case an access through the internal jugular vein is necessary. Prophylactic antibiotics are usually appropriate; however, in patients with active infected ulcers, targeted antibiotics are needed. A urinary catheter and calf pumps for deep vein thrombosis (DVT) prophylaxis should be placed preoperatively.

Incision and exposure

After successful recanalization of the iliac vein cranially, a vertical incision is made. For the arterial anastomosis of the arteriovenous fistula (AVF), the common femoral artery is dissected first. Dissection after thrombosis is much more difficult, as the inflammatory response is usually not limited to scarring within the FV, but also involves the surrounding tissue. The great saphenous vein, the CFV, and all its tributaries are meticulously dissected and controlled by vessel loops. The collateral veins should be handled carefully, as they are the key to maintain adequate inflow.

A 7-9 mm vertical venotomy of the CFV is then performed, beginning just above the origin of the saphenous vein, along the drainage points of all major deep FV branches to the femoral junction (Figure 20.2).

Endophlebectomy procedure

The main goal of adequate endophlebectomy is to clear all intraluminal trabeculae, which may adhere heavily to the vein wall. As there is no natural plane of dissection, the intraluminal synechiae should be removed by means of a sharp dissection. Particular care is taken to ensure that the residual thin wall

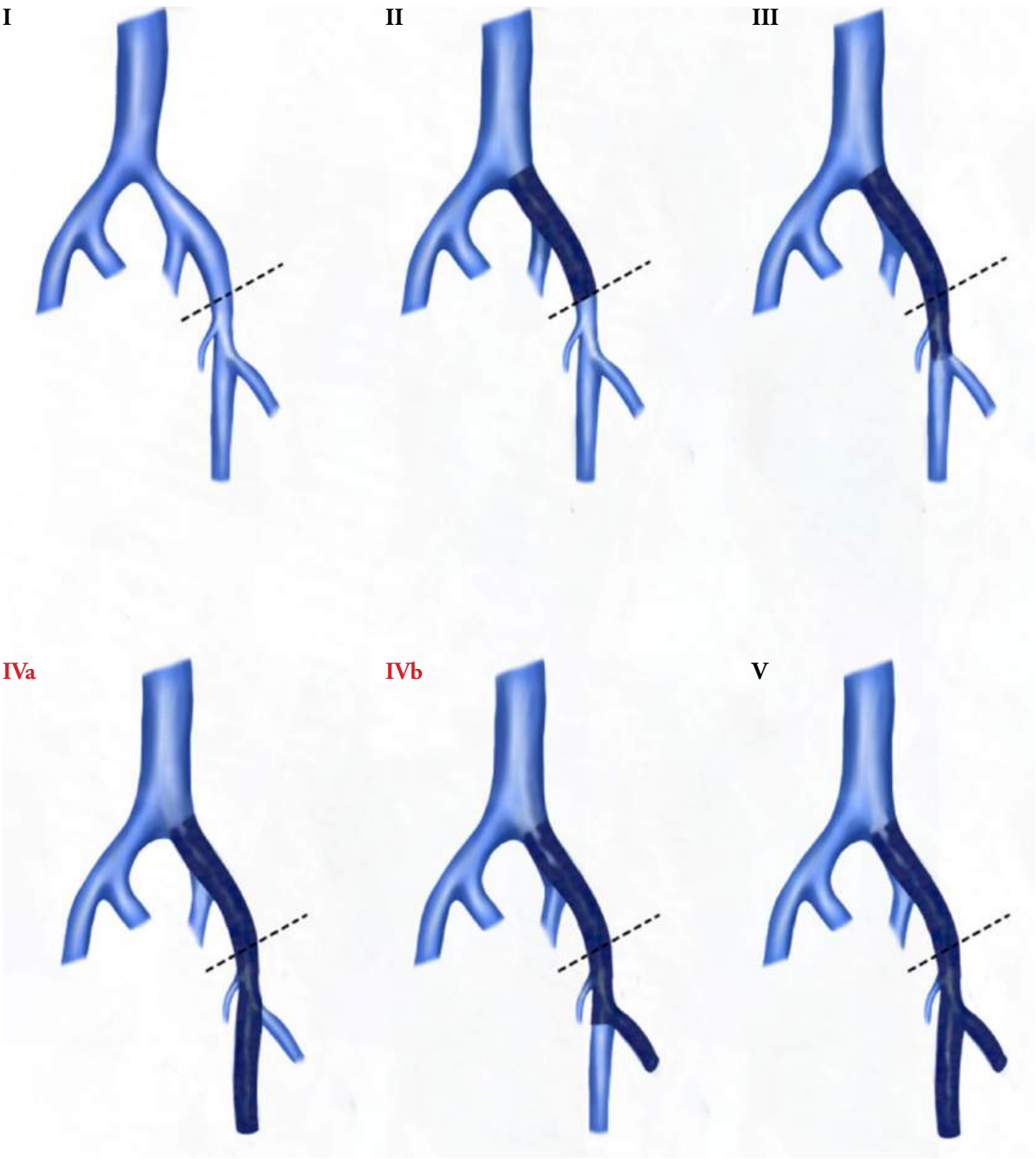

Figure 20.1. Classification based on anatomical expansion of the post-thrombotic trabeculation (>50% lumen reduction). Endophlebectomy may be indicated in patients with Class IV.

of the CFV is preserved and that perforation is avoided (Figure 20.3). Endophlebectomy should be performed up to the level of the inguinal ligament. Venous inflow from all side branches is achieved by endophlebectomy as far as possible into the orifice, and mechanical dilatation is achieved beyond this

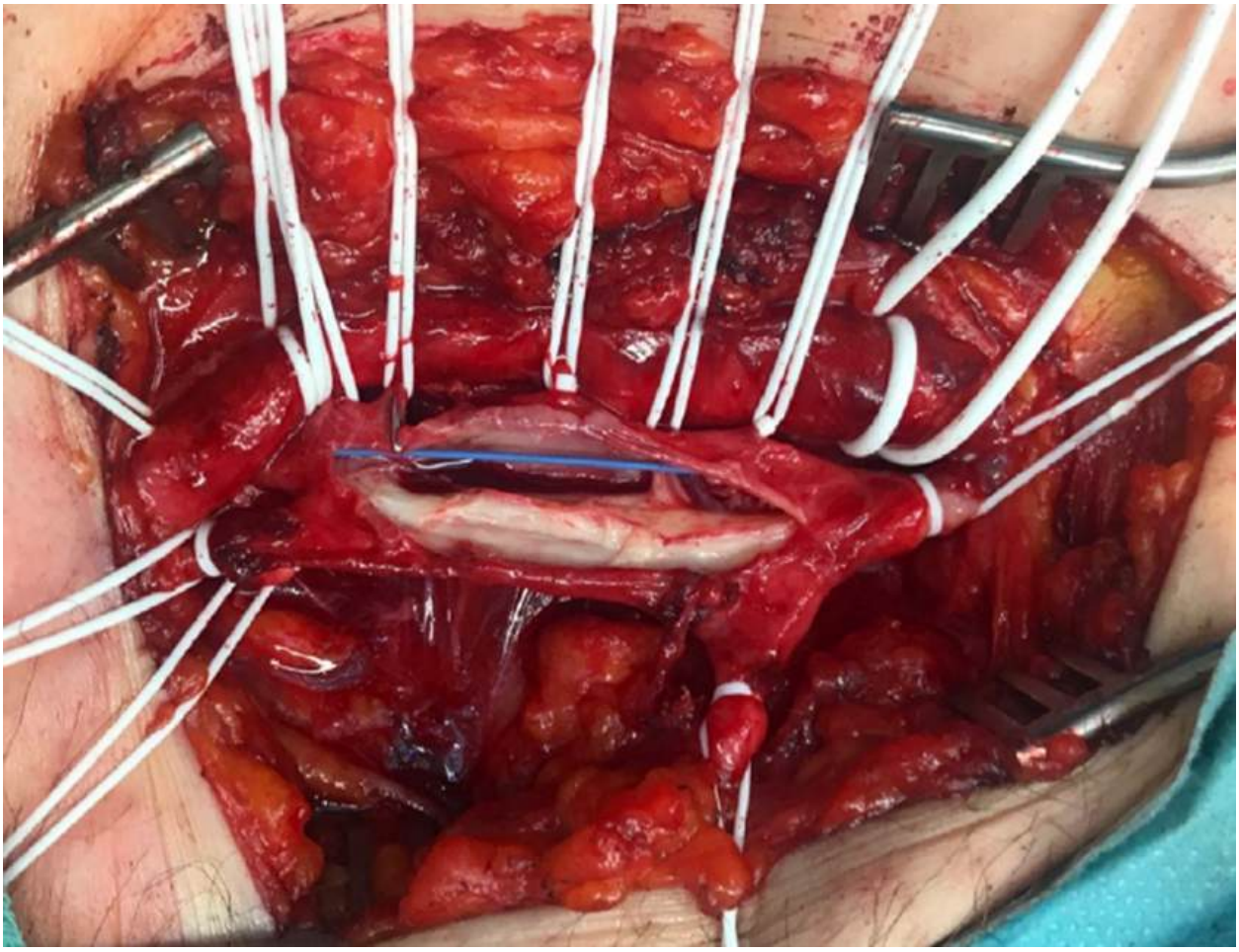

Figure 20.2. Intraoperative image of common femoral vein and its tributaries, as well as the scarred post-thrombotic fibrosis.

by using a clamp to provide good inflow. Depending on the vein diameter, the venotomy is closed with a 6.0 prolene suture, either primary or with a bovine patch. The use of synthetic materials (Dacron® or polytetrafluoroethylene [PTFE]) is avoided due to the risk of infection in the groin. All branches should be flushed prior to finishing the suture.

Adjunct arteriovenous fistula creation

Creation of between CFV and CFA may be considered to enhance the inflow during the early postoperative period. Venous anastomosis is created cranial to the ostium of the main tributary of the DFV, where the stent is to be deployed distally. The fistula is looped to facilitate percutaneous plug occlusion, after the vascular graft is cut approximately 50 mm in length (Figure 20.4). This is followed by an anastomosis procedure, and the flow of the created fistula is controlled. To determine the exact distal stent position under fluoroscopy, the venotomy should be marked cranially with two clips.

After endophlebectomy, percutaneous transluminal angioplasty (PTA) is performed with 12 to 16-mm non-compliant balloons to the iliofemoral level and stenting is performed. As marked by the clips, the caudal landing zone of the stent should be just cranial to the PTFE anastomosis. The stents are post-dilated and flow is controlled by venography. The AVF is occluded using an endovascular plug within 3 to 6 months. Though, the AVF may also become thrombosed spontaneously.

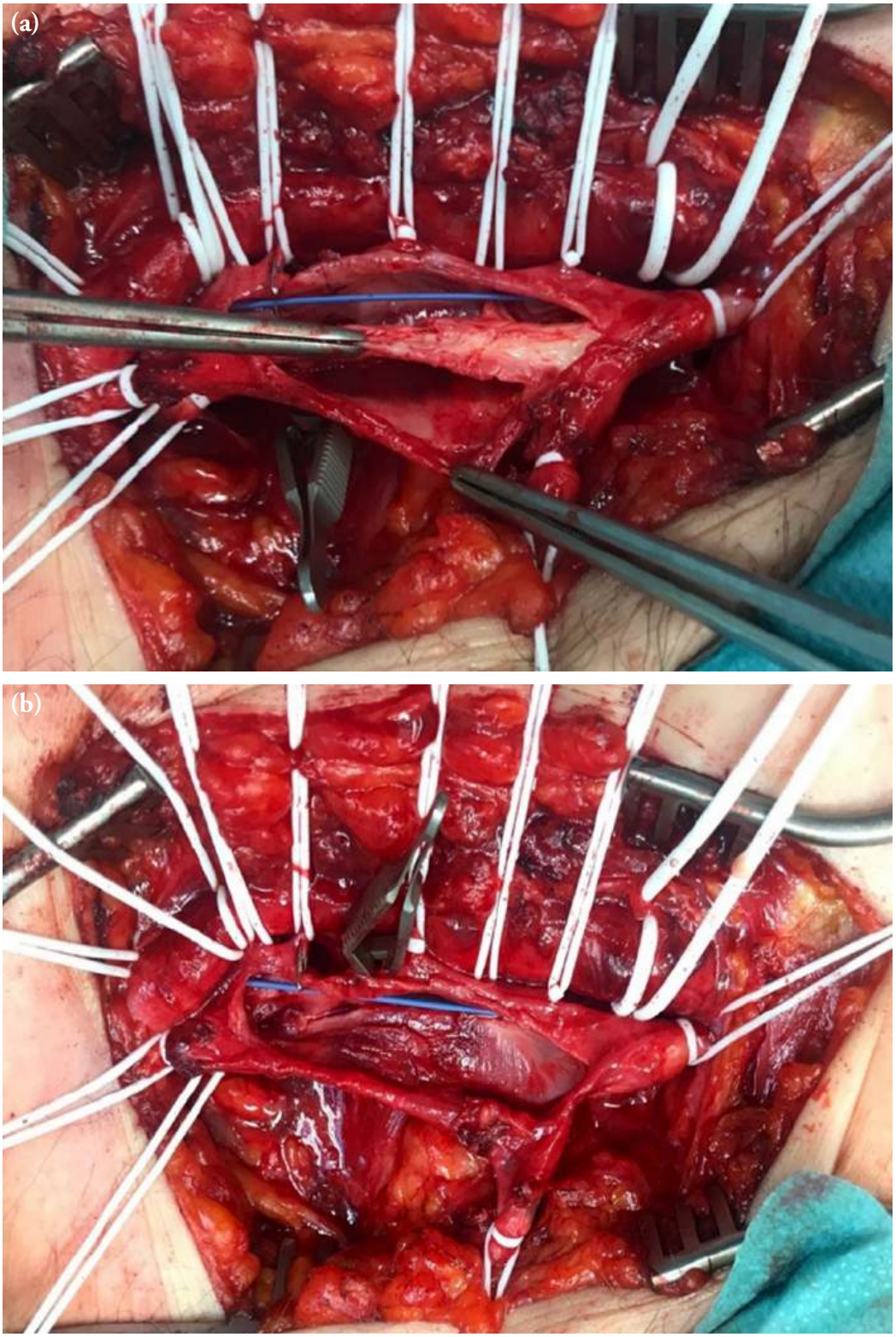

Figure 20. 3. Intraoperative image demonstrating **(a)** dissected intraluminal synechiae and **(b)** cleared vein post-endophlebectomy. The guidewire *in situ* shows, that the recanalization has already been successfully been performed.

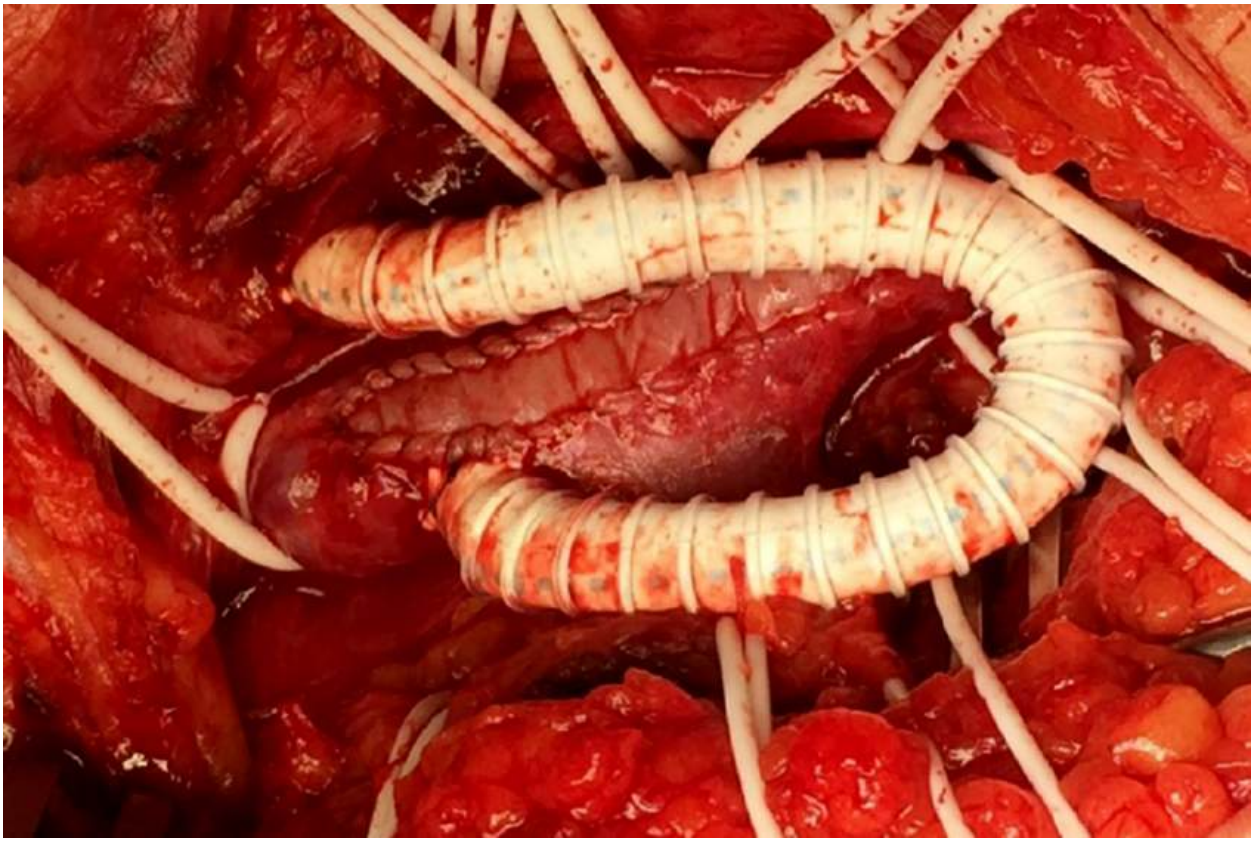

Figure 20.4. Patchplasty and looped arteriovenous fistula between common femoral artery and vein.

COMPLICATIONS

1. Wound complications: These include infection, hematoma, and seroma formation.
2. Lymphatic injury: Injury to lymphatic vessels during surgery can lead to lymphocele formation or lymphedema.
3. Re-thrombosis: Early and late thrombosis of the treated vein segment remains a concern.

TIPS & PITFALLS

- In patients with severe post-thrombotic syndrome, endophlebectomy should be combined with iliac vein stenting and the creation of an AVF.
- Based on the classification according to the anatomical extent of post-thrombotic trabeculation, endophlebectomy is indicated for Class IV patients, but contraindicated for Class V patients.
- To prevent the risk of early stent thrombosis, iliac vein stenting should be performed together with endophlebectomy.
- The distal landing zone of the stent should be at the DFV ostium.
- Intravascular ultrasound imaging should be used before and after stenting to check the distal landing zone at the CFV level.
- Care should be taken during surgery, as the collateral veins are crucial.
- Endophlebectomy should extend to the level of the inguinal ligament.
- A bovine patch is recommended for patchplasty.
- Venous anastomosis should be created cranially, above the ostium of the main branch of the DFV.
- If AV fistula does not become thrombosed spontaneously, it should be closed using an endovascular plug within 3 to 6 months.

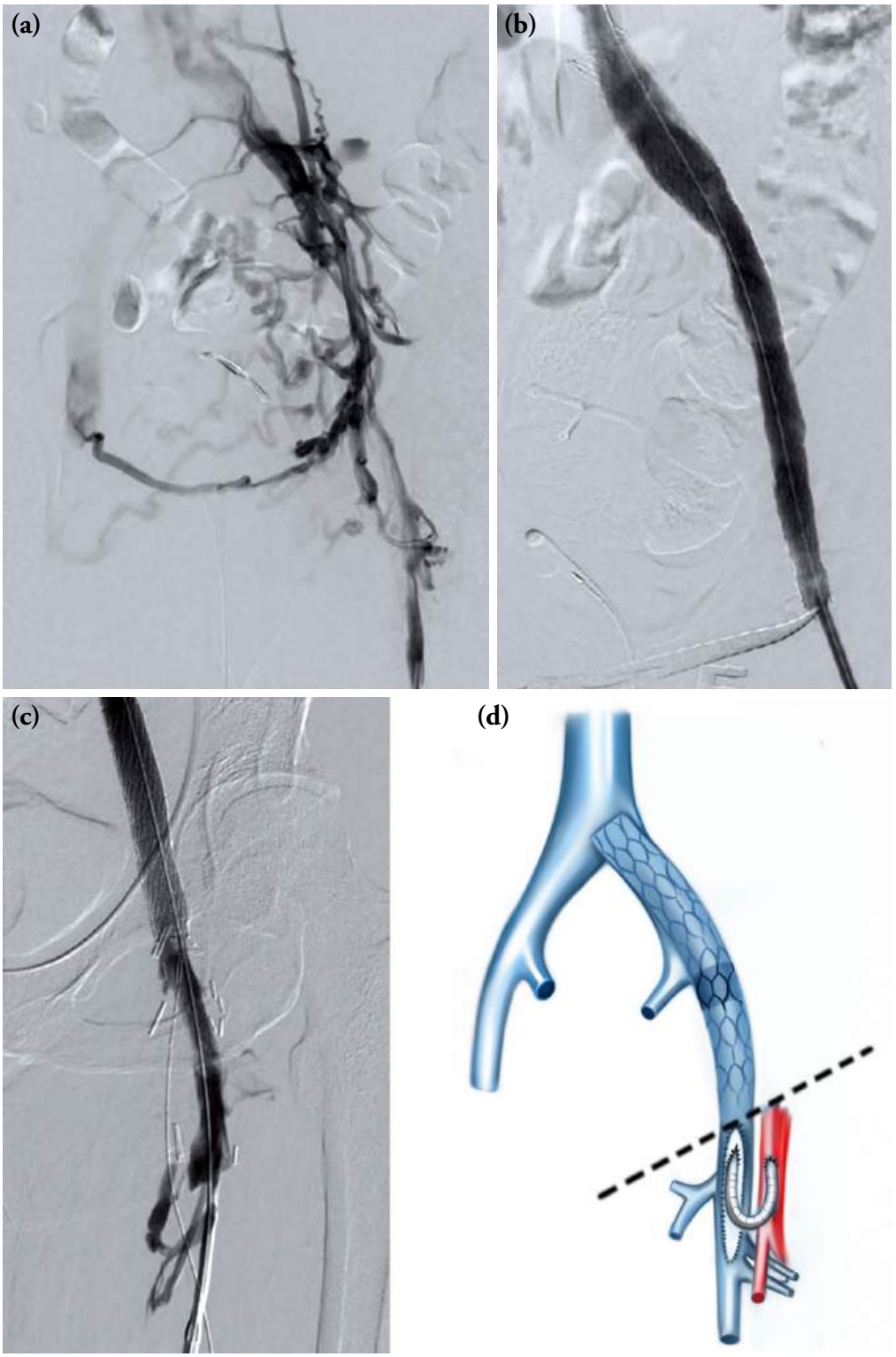

Figure 20.5. **(a)** Initial phlebogram of chronic venous obstruction of left femoroiliac tract with post-thrombotic alterations including the deep femoral vein; **(b)** final phlebogram after femoroiliac recanalization, endophlebectomy and stenting; **(c)** closed-up view of the endophlebectomy site; **(d)** illustration of the hybrid technique.

- Regular duplex ultrasound examinations are essential for monitoring venous patency and detecting early signs of thrombosis or stenosis.

TROUBLESHOOTING

- Early thrombosis or graft stenosis may occur, leading to the recurrence of symptoms.
  - Duplex ultrasound or venography is performed to assess the patency of the restructured vessel.
  - Initiate anticoagulation therapy (low-molecular-weight heparin or oral anticoagulants) early in the postoperative period.
  - Consider endovascular interventions such as balloon angioplasty or stenting, if stenosis or re-thrombosis occurs.

- Large incisions in the groin, proximity to groin lymph nodes, and the presence of foreign material (patch, graft) increase the risk of infection.
  - Administer perioperative prophylactic antibiotics.
  - Ensure proper postoperative wound care and monitoring.
  - If an infection develops, consider targeted antibiotic therapy along with debridement and/or removal of foreign material.

- Disruption of groin lymphatics during surgery may lead to lymphatic leakage, causing lymphorrhea.
  - Meticulously use lymphatic dissection techniques during surgery and ligate lymphatic vessels.
  - For persistent postoperative lymphatic leakage, use drainage and compression.

- Although rare, dislodged thrombus fragments during surgery may travel to the lungs, thereby causing pulmonary embolism.
  - Continue intraoperative and postoperative anticoagulation therapy.
  - Closely monitor the patient postoperatively for signs of respiratory distress or chest pain.

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