

PREPARING THE SAPHENOUS VEIN GRAFT

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SAPHENOUS VEIN

In CABG, the left ITA (LITA) and RA are frequently used arterial grafts. However, the saphenous vein remains an indispensable graft owing to its ease of access and preparation. Before using the saphenous vein, the patient's history of previous venous thrombosis, venous insufficiency, saphenofemoral insufficiency, and the presence of varicose veins should be investigated. Preoperative ultrasonic mapping of

the saphenous vein to determine its location and prevent additional incisions during surgery can be beneficial (Photo 3.1). Additionally, although there is no clear consensus on the appropriate diameter of the saphenous vein, a diameter of at least 2 to 3 mm is considered important for graft patency. The removal of the greater saphenous vein (GSV) is currently performed using three different methods: the conventional (standard) method, the bridging (tunnel) method, and the endoscopic method. The endoscopic and tunnel methods are also described as minimal invasive techniques.



Photo 3.1. Prior to surgical draping and painting, the patient is examined ultrasonographically to identify and mark the course of the saphenous vein graft. This mapping process is highly beneficial to prevent potential complications.

HARVESTING - Conventional Technique

After the patient is properly draped and covered with sterile surgical drapes, the extremity from which the saphenous vein will be harvested is positioned with external rotation of the hip joint and flexion of the knee to create height under the extremity and maintain the given position. Sterile green drapes are folded and placed under the extremity for these purposes (Photo 3.2). The saphenous vein is palpated between the medial malleolus anterior and the anterior tibial tendon, and a 2 to 3-cm incision is made with a No. 21 scalpel. Using appropriate scissors, the subcutaneous tissue is dissected to identify the saphenous vein (Photo 3.3). The skin and subcutaneous tissues are opened with 3 to 4-cm

incisions to expose the required length of the saphenous vein graft (Figure 3.1). The fascia of the saphenous vein is dissected with scissors. Both the graft and the venous branches on the patient's side are ligated with 3/0 silk sutures. The saphenous vein is tied with a 1/0 suture at the beginning of the incision, and a venous cannula is inserted to distend the vein (Figure 3.2) (Photo 3.4). To prevent excessive distension that can increase the risk of intimal damage, the saphenous vein is inflated to a pressure not exceeding 100 to 150 mmHg. Harvesting it with the “no-touch” technique as much as possible has a positive effect on the prolonged patency of the graft (Figure 3.3). Manual control of bleeding is performed with autologous heparinized saline, and the saphenous vein is dissected (Photos 3.5 and 3.6). The graft is cut to the appropriate size and removed (Photo 3.7). Until needed, the graft is kept in a heparinized solution. At this stage, to prevent



Photo 3.2. After surgical draping, the leg is positioned.



Photo 3.3. The first incision is made at the peak point of the medial malleolus to determine the vein tract.

Preparing the Saphenous Vein Graft

Completely open technique

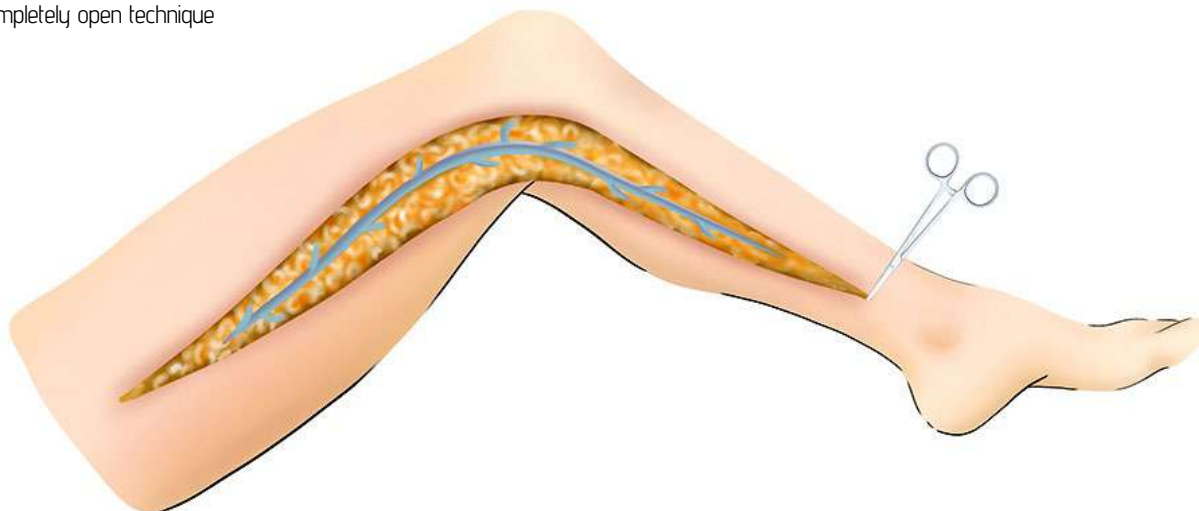


Figure 3.1. Side branches are exposed by dissecting along the course of the saphenous vein, followed by clamping the distal end and placing a cannula. Some surgeons may choose to preserve the saphenous vein graft *in situ*, similar to the radial artery graft.

Saphenous vein harvest complete

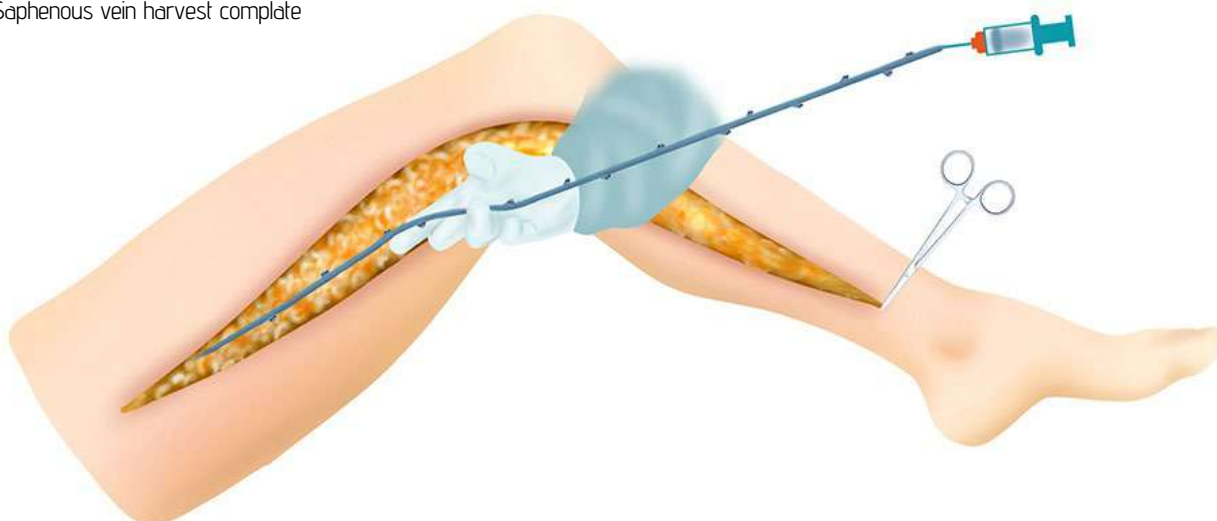


Figure 3.2. Once the length and quality of the graft are determined, the distal end is clamped and cut.

possible twisting and kinking of the saphenous graft, a line can be drawn along its length with a sterile pencil (Photo 3.8).

After controlling bleeding at the harvested site, the subcutaneous tissue and skin are closed with absorbable sutures. After the operation, the incision is dressed, and the saphenous vein harvested

extremity is wrapped with a sterile elastic bandage, starting from distal and moving proximal.

TIPS & PITFALLS

- Harvesting the saphenous vein can be challenging, if proper positioning with external hip rotation is not achieved.

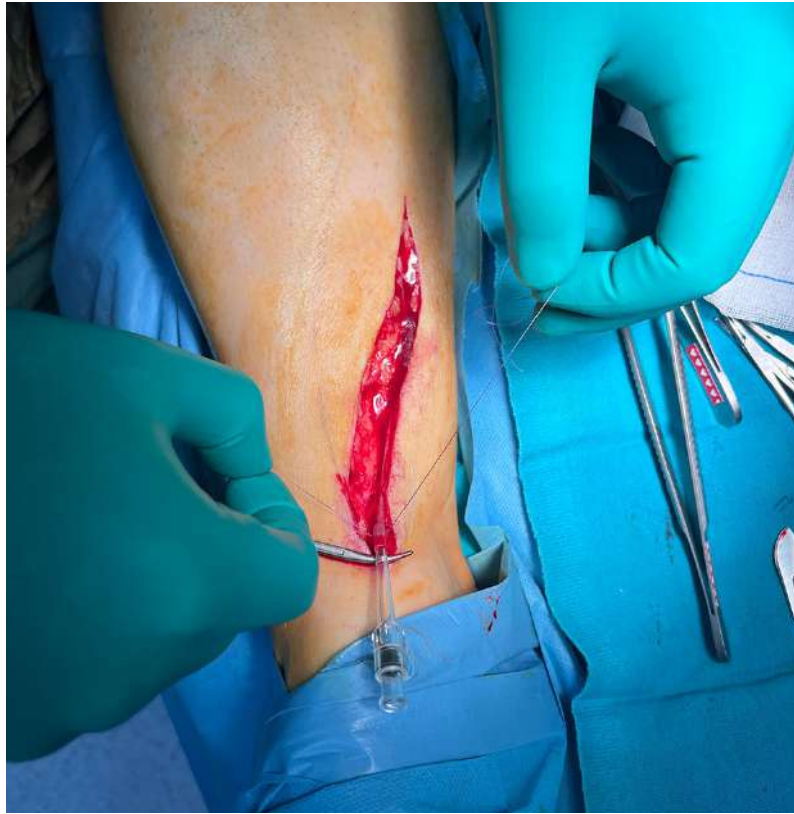


Photo 3.4. With the distal end clamped, the cannula placed facilitates better visibility of the side branches.

No-Touch Technique

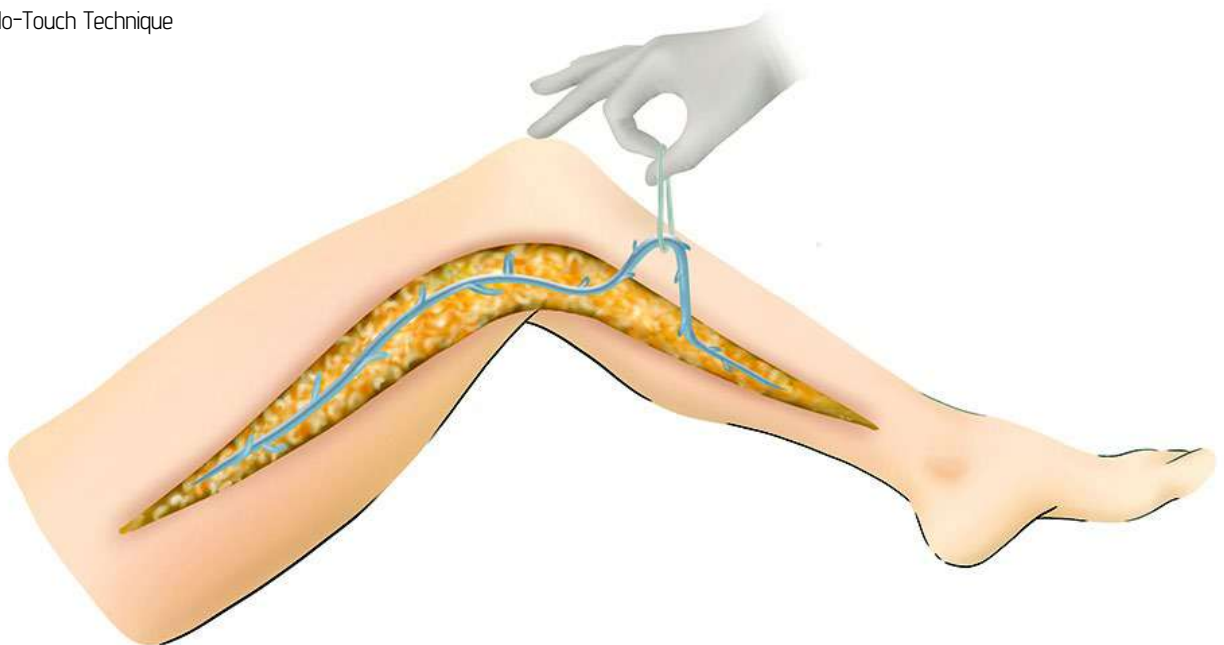


Figure 3.3. In the “no-touch” technique, venous graft preparation is done using flexible vascular tapes without touching or applying pressure to the graft, and it is kept *in situ*.



Photo 3.5. The liquid provided through the cannula helps to visualize both the vein graft and its side branches. It provides an understanding of the diameter of the graft. During this stage, pressure should be avoided to prevent damage to the intimal layer.



Photo 3.6. While ligating the side branches, they should be tied to the saphenous vein from 1 to 2 mm away. Otherwise, when the vein graft swells, it may lead to constrictions. While cutting the side branches, they should be cut 1 to 2 mm away from the knot; otherwise, they may separate from the knot site.

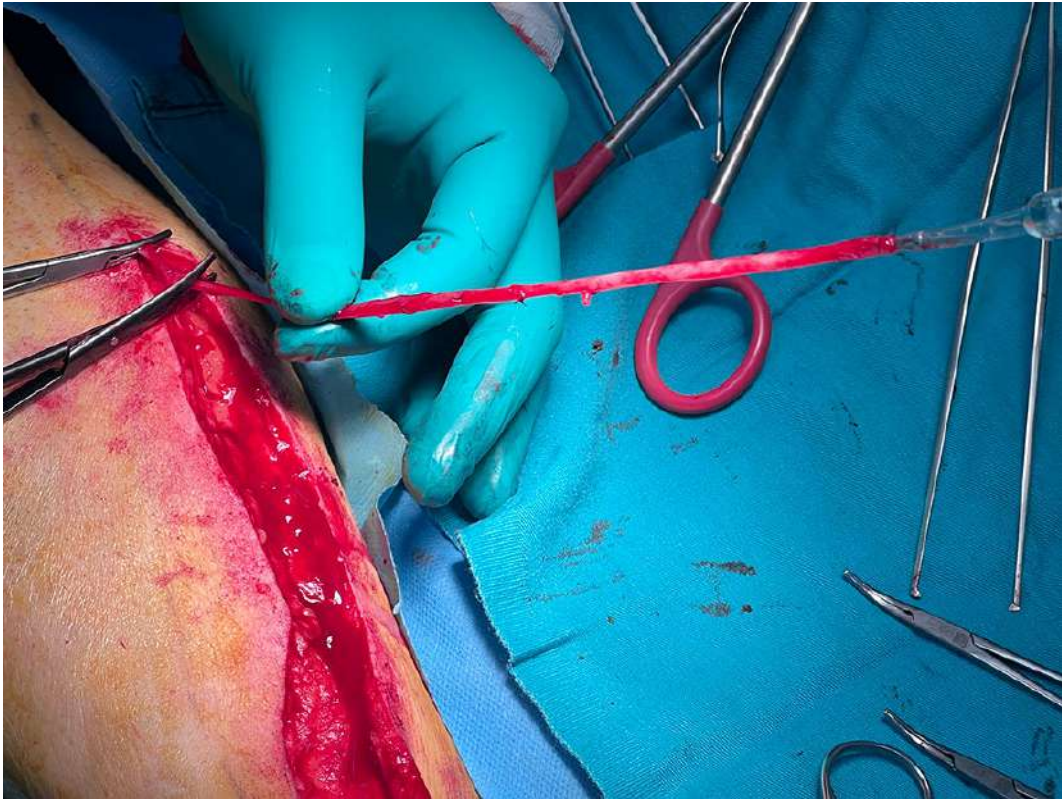


Photo 3.7. When deciding on the length and quality of the graft, the distal end is clamped and cut.



Photo 3.8. Once the graft is prepared and checked for bleeding from the side branches, it can be marked with a sterile pen. This is a useful method to prevent possible twists during anastomosis.

- Some saphenous veins may have branches as long as the length of the saphenous vein itself. Saphenous veins with their branches can be used for two distal anastomoses.
- The saphenous vein may become superficial just above the knee; caution should be exercised to avoid injury.
- The saphenous nerve follows the course of the saphenous vein. Care should be taken not to cut the nerve to prevent postoperative paresthesia.
- Avoid manual manipulation as much as possible and refrain from excessive pressurized distension.

TROUBLESHOOTING

- Never pull the graft during saphenous vein dissection, as it is fragile and can tear the intimal layer, leading to early graft occlusion.
- Local varicosities may be seen on the graft; these can be corrected by placing metal clips parallel to the graft wall. Damages to the saphenous vein graft are repaired with 7/0 or 8/0 sutures, with stitches being longitudinal.

HARVESTING - Bridging Technique

The saphenous vein is palpated between the medial malleolus anterior and the anterior tibial tendon, and a 2 to 3-cm incision is made with a No. 21 scalpel. With the help of appropriate scissors, the subcutaneous tissue is dissected to find the saphenous vein. Using a Farabeuf® retractor, an incision is made, and the area around the saphenous vein is dissected with long scissors 10 to 15 cm subcutaneously. Venous branches are cut 2 to 3 mm away from the saphenous vein. An incision is made from the most distant point reached under the skin, the saphenous vein is found, and with the help of Farabeuf® retractor, the incision is lifted, and the subcutaneous area around the saphenous vein is dissected with long scissors. The incisions are made at 10 to 15-cm intervals, until the required length of the saphenous vein graft is achieved (Figure 3.4). The saphenous graft is removed, when the desired length is reached. The cut branches are tied with 3/0 silk sutures. The saphenous vein is filled with a venous cannula, and manual control is performed with heparinized saline. Areas that need repair are sutured with 7/0 polypropylene. The graft is placed in a heparinized solution until needed.

Bridged technique

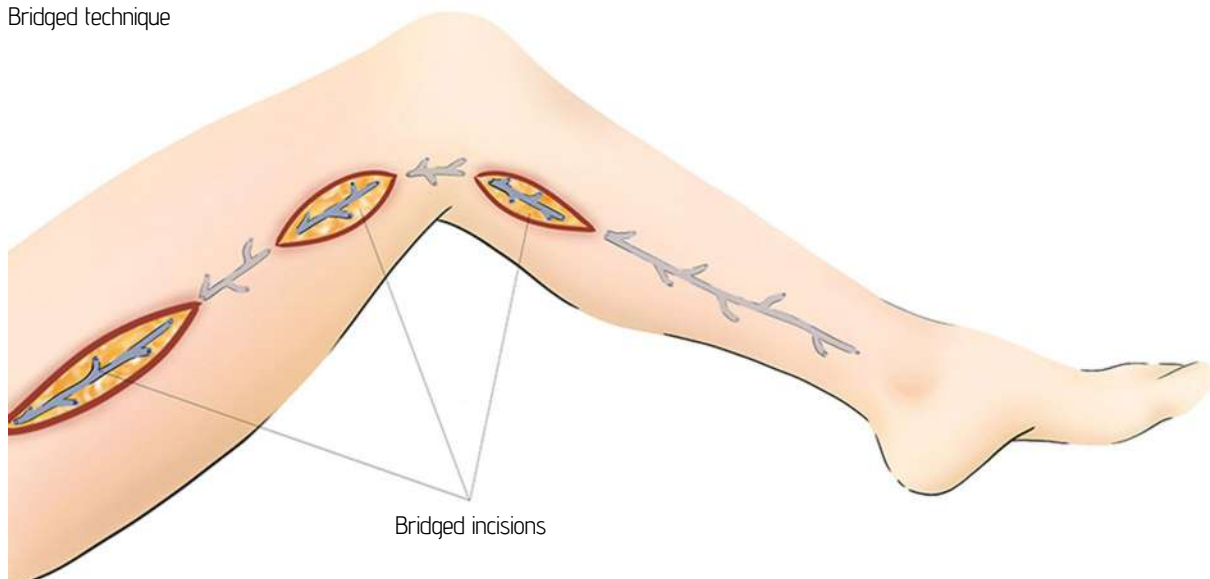


Figure 3.4. Interrupted incisions can be made to facilitate wound healing. In particular, the tunnel-shaped removal of the knee region, which is a mobile area, provides comfort to the patient.

Each skin incision is closed with absorbable subcutaneous and skin sutures. Before the end of the operation, the incisions are dressed, and the extremity from which the saphenous vein is taken is wrapped with a sterile elastic bandage from distal to proximal. The bandage is not opened for 24 hours.

TIPS & PITFALLS

- Small Farabeuf® retractors are more effective in removing the saphenous vein.
- The branches of some saphenous veins may be as long as the length of the saphenous vein. Saphenous veins with their branches can be used for two distal anastomoses.
- In patients with diabetes, it can be beneficial for wound healing.

TROUBLESHOOTING

- Accessing the saphenous vein may be challenging in patients with obesity.
- Not recommended for use in emergency cases.

HARVESTING - Endoscopic Technique

After the patient is properly draped, the extremity from which the saphenous vein will be harvested is positioned. An incision is made above or below the knee in the medial region in line with the GSV. The GSV is identified and released from surrounding tissues. A subcutaneous tunnel is prepared by moving proximally. The dissector inserted through the port is used to free the GSV circumferentially along the desired length, exposing its side branches. All side branches are cut using

bipolar coagulation scissors. An incision is made 1 cm from where the GSV was released, and a dissector is used to capture the GSV, which is then pulled out through the 1 cm incision. The proximal and distal ends are tied, and the GSV is transected. After the distal 2-cm incision, side branches are tied with 4-0 silk. The graft is placed in a heparinized solution.

Proximal and distal incisions are closed with absorbable subcutaneous and skin sutures. If a large dead space is created during dissection, a soft drain should be placed in the endoscopic field. Before the end of the operation, the incisions are dressed, and the extremity from which the saphenous vein is taken is wrapped with a sterile elastic bandage from distal to proximal. The bandage is not opened for 24 hours.

TIPS & PITFALLS

- Preoperative intravenous heparin is applied to prevent intraluminal thrombus formation.
- Effective dissection of the saphenous fascia increases the visibility of the saphenous vein.
- Ports can be placed above and below the knee.
- Not recommended for use in urgent saphenous vein needs.
- Care should be taken to avoid hematoma in the harvested saphenous vein area.

TROUBLESHOOTING

- The use of carbon dioxide during endoscopic dissection may cause venous compression and stop blood flow.
- Excessive stretching of the vein during endoscopic tunneling can cause intimal damage and branch rupture, which can be prevented by extensive dissection.