How to Do It

Divided Saphenectomy for Varicose Vein in Ambulatory Surgery

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We performed divided saphenectomy (DS) for varicose vein in ambulatory surgery with minimal incisions. Under tumescent local anesthesia, this procedure ligates all perforators in the thigh, preserving a route of venous drainage, and reduces bruising by ligating all tributaries. Also, DS does not need any special surgical instrument. Subcutaneous inguinal hemorrhage was observed in 4.9% (3/61), mild bruises were observed in 19.7% (12/61), and saphenous nerve neuralgia was 1.6% (1/61). Wound infection, deep venous thrombosis, and edema were not observed. DS is a minimally invasive, simple, and cost-effective procedure.

Keywords: varicose veins, divided saphenectomy, ambulant surgery

Introduction

Stripping of the great saphenous vein (GSV) was the standard procedure for treating varicose veins of the lower extremity. We performed ambulatory conservative hemodynamic management of varicose veins (Cure Conservatrice et Haemodynamique de l’Insuffisance en Ambulatorie; CHIVA). The long-term outcome of CHIVA were revealed, and the overall recurrence rate with CHIVA was superior to that with stripping because it preserved the route of venous drainage. However, we experienced some recurrence cases. The three major causes of recurrence were reflux from the main GSV trunk to new incompetent tributaries, new insufficient perforators (Hunterian or Dodd’s perforators) in the thigh, and GSV recanalization. Although these recurrence patterns are certainly avoided by stripping the GSV trunk, stripping has minor complications such as bruising, hemorrhage, and saphenous nerve neuralgia. To reduce such complications and recurrence cases, we performed divided saphenectomy (DS) with minimal incisions. This procedure ligates all perforators in the thigh, preserving a route of venous drainage, and reduces bruising by ligating all tributaries. We aim to report the precise method of DS and the preliminary results of our experience.

Methods

Subjects

The medical records of patients were reviewed retrospectively. Between March 2013 and February 2014, DS was performed in 61 patients (men, 29; women, 32; mean age, 67 years; range, 34–86 years). The right and left lower limbs were treated in 29 and 32 patients, respectively. All patients had GSV reflux duration of >0.5 s, as measured in the standing position. Four patients were recurrent cases after saphenofemoral junction (SFJ) ligation or CHIVA. The causes of recurrence were an incompetent perforator in the thigh (2 patients) and GSV recanalization (2 patients). In the standing position, the mean GSV diameter at 2 cm distal to SFJ was 7.2 mm (range: 5.4–13.2 mm). The Clinical, Etiological, Anatomical, Pathophysiological (CEAP) clinical class was C2–C5, E0, any A, and any P. The outcome is operation time, the number of skin incision regarding aesthetics, and complications. Written informed consent for DS was obtained from every patient.
Procedures
Preoperative mapping of the blood stream of GSV was imperative. Perforators of the thigh and lower limbs were always marked and checked to determine whether they were insufficient. Operation was performed with sedation using midazolam. First, under local anesthesia, 1-cm small skin incisions were made at SFJ, at the middle of the thigh, and above or below the knee position, and GSV was ligated and dissected (Fig. 1). At SFJ, groin veins were preserved as draining veins. Ultrasonography was used in difficult cases of vessel encircling. Second, tumescent local anesthesia (TLA) was injected around the dissected GSV at the first 1-cm incisions (Fig. 2). Third, the stump of GSV was grasped with forceps, and the tissue around GSV was removed using metzenbaum scissors (Fig. 3). TLA helps in the removal of the tissue around GSV. The small (<2 mm) competent tributaries of GSV were heated using a bipolar electric knife, and perforators and incompetent tributaries in the thigh were ligated using 3-0 silk. After the sufficient removal of the tissue around GSV, vessel activity was determined under the subcutaneous tissue and the vein was stripped (Fig. 4). Using the stab avulsion technique, phlebectomy of the non-draining tributary in the lower limbs was performed with an 18-G needle puncture incision. Re-entries of the ligated incompetent tributaries and of GSV in the limb into the femoral vein were always preserved. Skin closure was performed with a 4-0 nylon buried suture. Stab avulsion skin incisions were closed using Steri-Strips. After operation, oral antibacterial drugs, non-steroidal anti-inflammatory drugs, and Keishi-bukuryo-gan were prescribed. Compression of the surgical site (along GSV in the thigh) with elastic bandages was required on postoperative day 1. A clinical follow-up to check for postoperative pain, bleeding, and symptomatic deep vein thrombosis was scheduled at 5 days, 1 month, and 3 months.

Results
CEAP clinical class was following: C2 was 26, C3 was 4, C4 was 28 and C5 was 3. DS was performed with no complications, such as unintended vascular or nerve injuries. During operation, some patients complained sickness or pain. In such case, increasing concentration of midazolam could make the complaints acceptable. In particular, after operation, almost all patients didn’t remember the intra-operative pain. The mean number of 1-cm incisions was 3 (range: 2–5), and 2-mm stab avulsion incisions was 2 (range: 1–4). The number of incisions was decided by the place and function of the perforator. The mean total operation time, including stab avulsion and SFJ ligation, was 63 min (range: 24–103 min). In cases with a deeply located GSV, encircling of GSV was difficult. In such cases, we used ultrasonography. The number of such cases was 4 (7%). A deeply located GSV was most the frequent cause of long operative time. Stab avulsion in the lower limbs was used in only 5 patients (8.2%). Mild nerve neuralgia was observed in 1 patient (1.6%). Subcutaneous inguinal hemorrhage was observed in 3 patients (4.9%). Mild bruises were
observed in 12 patients (19.7%), but they disappeared after 2 weeks in all cases. Seroma was observed in 1 patient (1.6%). Wound infection, deep venous thrombosis, and edema were not observed. No patients required hospitalization after surgery.

**Discussion**

GSV stripping was the standard procedure for treating varicose veins of the lower limbs. Although recently less invasive treatments such as endovenous laser ablation (EVLA), radiofrequency ablation (RFA), and foam sclerotherapy were introduced, in Japan, stripping and SFJ ligation are the standard procedures.

We performed CHIVA, which was first reported by Franceschi in 1988. CHIVA aims to not only preserve GSV for future use as a vascular graft but also maintain its drainage eliminating reflex points when changing vascular compartments. The recently revealed overall recurrence rate with CHIVA is superior to that with stripping; however, the recurrence pattern is valuable. The pattern mainly observed with stripping was the lack of draining saphenous systems.  

The main recurrence pattern with CHIVA was reflux from the main GSV trunk to a new incompetent tributary. In our experience, the three are major causes of recurrence are reflux from the main GSV trunk to new incompetent tributaries, new insufficient perforators in the thigh (Hunterian or Dodd’s perforators), and GSV recanalization. Although these patterns are certainly avoided by stripping of the GSV trunk in the thigh, stripping procedures have minor complications such as bruising, hemorrhage, and saphenous nerve neuralgia. We performed DS for ligating all perforators in the thigh, preserving a route of venous drainage, and for reducing bruising by ligating all tributaries. Moreover, stripping induces neovascularization; therefore, ultrasonography managed stripping is inferior to CHIVA. Although it may be controversial, we preserve saphenofemoral confluence for reducing neovascularization.

DS involves less complications. Josep, et al. reported the following stripping complication rates: subcutaneous inguinal hemorrhage, 3.8%–4.4%; bruising, 72.3%–80.1%; and saphenous nerve neuralgia, 3.8%–5.1%. The complication outcomes of DS are similar to those of CHIVA (bruising, 47.5%; subcutaneous inguinal hemorrhage, 3.8%; and saphenous nerve neuralgia, 0%); however, DS involves less bruising. We obtained positive results probably because of increased ligation or heating of the tributaries. Most tributaries were ligated or burned; therefore, compression of the surgical site with elastic bandages was sufficient on postoperative day 1. EVLA and RFA may be too expensive for some institutions, and foam sclerotherapy has specific complications such as deep venous thrombosis or central nervous system.
damages. DS can be performed with simple surgical instruments, so DS is more cost effective than any other procedure. Also, DS does not have severe complications.

However, DS involves increased numbers of skin incisions than EVLA or stripping. Regarding aesthetics, minimal 1-cm incisions along the cleavage lines of the skin and buried sutures quickly become unnoticeable. Although CHIVA could be performed to preserve GSV for future use as a vascular graft, GSV cannot be preserved with long ranging in DS. That is the least favourable disadvantage of DS.

In countries such as Italy and Spain, where surgeons perform their own duplex ultrasound examinations, CHIVA is more commonly used. However, if performed incorrectly, results may be far worse. Our previous unsatisfactory clinical results may have been caused by our poor quality of the understanding of hemodynamics or ultrasound techniques. Conclusively, although long-term outcomes of DS are unknown, we believe DS is a minimally invasive, simple, and cost-effective procedure.

Disclosure Statement

The authors declare no conflict of interest.

References


