

Subfascial Endoscopic Perforator Surgery (SEPS) for Patients with Chronic Venous Insufficiency: Peri-operative Outcomes

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Abstract

Background: Chronic venous insufficiency (CVI) is an uncomfortable condition which may result in pain and ulceration, especially in patients who fail compressive therapy. In this situation Subfascial Endoscopic Perforator Surgery (SEPS) is a treatment option for general surgeons who are familiar with endoscopic surgery. The author practiced and examined the effectiveness of SEPS in this group of patients.

Methods: Patients diagnosed with CVI who failed to compressive therapy and underwent SEPS between April 2007 July 2017 were included in this study. Peri-operative outcomes were reviewed.

Results: Ten patients had complications of CVI. Six patients have active ulcers and four patients suffered pain and swelling of their legs from lipodermatosclerosis. After the SEPS operation pain was relieved in 2 weeks and the mean of time to ulcers healing was 34.17 days.

Conclusions: SEPS is an effective alternative treatment for patients with CVI who fail compressive therapy and have active ulcer or lipodermatosclerosis.

Keywords: Chronic venous insufficiency, lipodermatosclerosis, subfascial endoscopic perforator surgery

INTRODUCTION

Chronic venous insufficiency is an uncomfortable, often painful and distressing medical condition that may result in a change in lifestyle, disability and loss of working days. The patients suffer from pain and swelling of their legs from lipodermatosclerosis or have chronic ulcers. Non-operative management can usually heal the ulcer, but time to healing is frequently prolonged, adherence to compression treatment is cumbersome and in a warm climate wearing elastic stockings is annoying for many patients. Most importantly, ulcer recurrence remains an unsolved problem¹. Frequently the pain is not subsided and the ulcers are not healed

by compression treatment. Subfascial endoscopic perforator surgery (SEPS), division of incompetent perforating veins of the calf to treat patients with venous ulcers was first recommended by Robert Linton in 1938². His procedure included a long skin incision made on the medial aspect of the leg to access all incompetent communicating veins that connect the superficial with the deep venous system. The original Linton operation to prevent reflux through incompetent perforators and to decrease ambulatory venous hypertension at the ankle area is rarely performed today. Wound complications, associated with the long skin incision made in diseased skin,

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were frequent and hospitalization was prolonged². Therefore, variations of Linton's techniques were developed in subsequent years. These included the use of short longitudinal or transverse skin incisions to lessen the risk of wound complications, ligation of perforators above rather than under the fascia, or blind avulsion of the perforators by passing a shearing instrument in the subfascial space⁴⁻⁸. While wound complications were fewer, these operations were lacked of adequate visual control and undoubtedly missed important incompetent perforating veins. Endoscopic techniques have clear advantages because they improve visual control of perforator interruption, decrease wound complications and shorten hospital stay⁹.

The aim of this study was to determine the peri-operative outcomes of chronic venous insufficiency who had active ulcers or lipodermatosclerosis which were treated with SEPS in the author's institution.

MATERIALS AND METHODS

Data of patients with chronic venous insufficiency who had active ulcers or lipodermatosclerosis who underwent SEPS by the author from April 2007-July 2017 were extracted for this study. Their medical records were reviewed. All patients were treated on in-patient care.

The extracted data included age, sex, clinical presentation of chronic venous insufficiency, numbers of perforator veins clipped and transection and the peri-operative outcomes. This information is presented

in Table 1.

Operations were performed on 10 limbs in 10 patients. Six patients had an active ulcers, which had been refractory to conventional therapy attempts such as compression. Four patients had lipodermatosclerosis. Relevant previous medical history is given. All patients were evaluated using Trendelenburg test, and duplex ultrasound. Nine patients had perforator veins reflux but no superficial veins reflux. One patient had a combination of superficial and perforator veins reflux, and all patients had no deep venous obstruction.

Indication

Patients with advanced CVI, who belong to clinical Class 4 (lipodermatosclerosis), Class 5 (healed ulcer) or Class 6 (active ulcer), based on the updated classification of the Committee of Reporting Standards of the Joint Vascular Societies¹⁰, are potential candidates for the operation. Pre-operative evaluation should reveal the etiology of the disease (primary or post-thrombotic), the underlying pathophysiology (reflux, obstruction or both) and the site of the venous pathology (superficial or deep perforating veins, alone or in combination).

Endoscopic surgical technique

The patients are placed supine on the operating table. The affected leg is raised and a rubber band is wrapped around firmly continuously from the foot to the thigh to drain the blood from the leg. Then tourniquet is applied to the thigh. After prepping and

Table 1 Patients with CVI underwent SEPS with/without high ligation

Case number	Sex	Age (year)	Active ulcer	Lipoderma to sclerosis	Operation	Number of Perforator Vein transected	Time to Relieve Pain (days)	Time to Healed ulcer (days)	Complication
1	Male	54	YES		SEPS	5		30	NO
2	Female	58		YES	SEPS	4	14		NO
3	Female	56		YES	SEPS	3	14		NO
4	Male	55	YES		SEPS	4		30	NO
5	Female	56	YES		SEPS+HL+VS	4		40	SSI
6	Female	59	YES		SEPS	5		45	NO
7	Female	57		YES	SEPS	5	14		NO
8	Female	56		YES	SEPS	4	14		NO
9	Female	57	YES		SEPS	4		30	NO
10	Female	42	YES		SEPS	4		30	NO

SEPS, Subfascial Endoscopic Perforator Surgery; HL, High ligation; VS, Venous stripping

draping the entire affected extremity, the leg is placed in a position of mild degree flexion of the knee using some pieces of cloth support under the knee. A 5 mm. diameter forward-looking endoscope is laid on the leg at the calf about 7 cm. medial to the boarder of the Tibia, ensuring that the proposed level of port placement allows the scope to reach the site distally just above the medial malleolus medially. The site at the point of entry at the skin is marked. A 10 mm. transverse skin incision is then made at the site. Blunt and sharp dissection is made to the subcutaneous fat until the enveloping fascia of Gastrocnemius muscle is found. A transverse 20 absorbable suture is made superiorly and the other suture is made inferiorly to the entry point of the port on the fascia about 10 mm. apart. The two previous sutures is hang up and a small longitudinal incision is made between the hanging sutures. A 5 mm port with trocar is inserted under direct vision. The trocar is removed and the two sutures are tied to prevent air leak during the operation. At this point the subfascial space has been entered. The scope is inserted and the CO₂ gas tube is connected to the port. CO₂ gas is insufflated to 30 mm/Hg. The scope with the port is moved side by side and advanced further to create subfascial space to the site corresponding for the second port to insert at 2 cm. medial to the boarder of the Tibia. A 5 mm. Transverse incision is made at the site. A 5 mm. port with trocar is inserted under direct vision by the scope.

Blunt and sharp dissection by endodissector and endoscissors with electric cauterization is made to the bridging fascial band to expose the perforating veins, (Figure 1). The upmost perforating vein is dissected

free from the surrounding fat and bands until enough space for clipping superiorly and inferiorly. Clipping is applied and division by endoscissors is made between the clips. Caution to stop any tiny points of bleeding is made to prevent obscuring the vision of the scope. Dividing the perforating vein further opens the space, permitting more distal visualization and dissection. The same manner of clipping and division is done advancing the scope and the endodissector distally towards the ankle. The space is opened from the medial tibial border to the midline posteriorly and from the level of the port, to as far distally as dissection can comfortably proceed (generally 2-3 cms above the medial malleolus).

At the end of the procedure the most superior perforating veins just below the second port are search again because of more space is seen for assuring completion of all the perforating veins are transected. At the completion of the procedure, the ports are removed, the fascial defects are left opened and the skin incisions are closed using absorbable suture and sterile strips. An elastic bandage is applied from the foot upward to the leg and distal thigh prior to deflating the tourniquet.

RESULTS

The operating time was 90 to 150 minutes. The average numbers of perforators divided were 4.2. Mean hospital stay was 3 days (range, 2 to 5 days) and the adjunctive procedures was stripping of the saphenous vein (N=1). With a mean follow-up of 18 months (range 12 to 24 months), there was complete healing

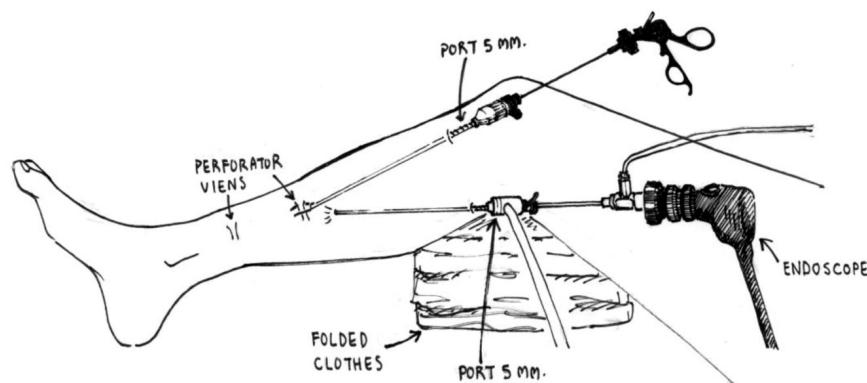


Figure 1 Showing the instruments used in the endoscopic subfascial ligation technique.

in 6 of 6 ulcers, and patients with clinical class 4-5 were improved in clinical symptoms. The average time to relief of pain was 14 days, and the average time to ulcer healing was 34.2 days. All patients were encouraged to wear 35-45 mm/Hg compression stockings for two weeks. No thromboembolic complications occurred. There was one complication noted: wound infection consisting of cellulitis around the port site. No any nervous complication is found.

DISCUSSION

A systematic review of SEPS showed favorable results, with a reported ulcer healing rate of 88% and ulcer recurrence rate at a mean time of 21 months of 13%. For patients with severe CVI and active venous ulcers (C6), an intervention that improves healing and prevents recurrence has the potential to improve quality of life and reverse disability associated with this condition. The healing and recurrence outcomes after SEPS are, reportedly, much better than those in most trials of conservative therapies¹¹. Despite the fact that we service a large referral population with CVI, the majority of our patients are managed quite well with conservative therapy emphasizing compression, elevation, and good skin care. Saphenous stripping or ligation is commonly offered when saphenous reflux is noted, but currently only patients who have recurrent or refractory disease are considered for further surgical intervention. Although most of these patients have multilevel venous disease, we routinely approach the superficial and perforating venous systems first. Surgical ablation of incompetent superficial and perforating veins is easier than deep venous reconstruction, and recently these limited interventions have been noted to improve deep venous insufficiency without deep venous repair¹².

SEPS combined with superficial venous surgery leads to successful healing with a low recurrence rate in patients with open and healed ulcers¹³. However, concomitant surgeries deemed necessary at the time of perforator interruption masked the effects of perforator vein intervention alone, as opposed to solitary ablation of superficial reflux. However, in a report from North America², during an average follow-up period of 5.4 months, ulcer healing was achieved in 21 of 27 C6 limbs (78%) in which the only manipulation was perforator interruption¹⁴.

CONCLUSION

SEPS is a safe, minimally invasive procedure which should become an important part of the surgical armamentarium in treating patients with chronic venous ulcers. SEPS is an effective alternative treatment for CVI with complications. The series of the author predict the satisfactory outcomes.

REFERENCES

1. Mayberry JC, Moneta GL, Taylor LMJ, Porter JM. Fifteen-year results of ambulatory compression therapy for chronic venous ulcers. *Surgery* 1991;109: 575-81.
2. Linton RR. The operative treatment of varicose veins and ulcers, based upon a classification of these lesions. *Ann Surg* 1938;107:582-93.
3. Cikrit DF, Nichols WK, Silver D. Surgical management of refractory venous stasis ulceration. *J Vasc Surg* 1988;7:473-8.
4. Cockett FB, Jones BD. The ankle blow-out syndrome: a new approach to the varicose ulcer problem. *Lancet* 1953;i:17-23.
5. Dodd H, Cockett FR, editors. The management of venous ulcers. In: pathology and surgery of the veins of the lower limbs. New York: Churchill-Livingstone; 1976. p. 269-96.
6. DePalma RG. Linton's operation and modification of the open techniques. In: Gloviczki P, Bergan JJ, editors. Atlas of endoscopic perforator vein surgery. London: Springer-Verlag; 1998. p. 107-13.
7. DePalma RG. Surgical therapy for venous stasis: results of a modified Linton operation. *Am J Surg* 1979;137:810-13.
8. Edwards JM. Shearing operation for incompetent perforating veins. *Br J Surg* 1976;63:885-6.
9. Pierik EG, van Urk H, Hop WC, Wittens CH. Endoscopic versus open subfascial division of incompetent perforating veins in the treatment of venous leg ulceration: a randomized trial. *J Vasc Surg* 1997;26:1049-54.
10. Porter JM, Moneta GL. Reporting standards in venous disease: an update. International Consensus Committee on Chronic Venous Disease. *J Vasc Surg* 1995;21:635-45.
11. Tenbrook JA, Iafrati MD, O'Donnell TF Jr, et al. Systemic review of outcomes after surgical management of venous disease incorporating subfascial endoscopic perforator surgery. *J Vasc Surg* 2004;39:583-9.
12. Padberg FT Jr, Pappas PJ, Araki CT, et al. Hemodynamic and clinical improvement after superficial vein ablation in primary combined venous insufficiency with ulceration. *J Vasc Surg* 1996;24:711-8.
13. Nelzén O, Fransson I. True long-term healing and recurrence of venous leg ulcers following SEPS combined with superficial venous surgery: a prospective study. *Eur J Vasc Endovasc Surg* 2007;34:605-12.
14. Gloviczki P, Bergan JJ, Menawat SS, et al. Safety, feasibility, and early efficacy of subfascial endoscopic perforator surgery: a preliminary report from the North American registry. *J Vasc Surg* 1997;25:94-105.

บทคัดย่อ การผ่าตัด Subfascial Endoscopic Perforator Surgery ในผู้ป่วยที่มีภาวะหลอดเลือดดำอุดตันเรื้อรัง และมีภาวะแทรกซ้อนแผลเรื้อรัง หรือภาวะ Lipodermatosclerosis: ผลการรักษาหลังผ่าตัด

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ความเป็นมา: ภาวะหลอดเลือดดำอุดตันเรื้อรังเป็นโรคที่ทำให้ผู้ป่วยประสบความทุกข์จากแผลเรื้อรังที่ไม่หาย หรือปวดจากภาวะ Lipodermatosclerosis ผู้ป่วยจำนวนมากได้รับการรักษาโดย Compressive Therapy และไม่ประสบความสำเร็จ การรักษาโดยการผ่าตัด Subfascial Endoscopic Perforator Surgery เป็นการรักษาทางเลือกหนึ่งของศัลยแพทย์ทั่วไปที่คุ้นเคยกับการผ่าตัดรักษาโดย Endoscopic Surgery ผู้วิจัยได้ปฏิบัติและศึกษาผลสำเร็จของการผ่าตัดในผู้ป่วยกลุ่มดังกล่าว

วิธีการศึกษา: ผู้วิจัยรวบรวมผู้ป่วยที่มีภาวะหลอดเลือดดำอุดตันเรื้อรังและมีภาวะแทรกซ้อนแผลเรื้อรัง หรือภาวะ Lipodermatosclerosis ระหว่างเดือนเมษายน 2007 ถึงเดือนกรกฎาคม 2017 และติดตามผลการรักษาด้วยวิธีข้างต้น

ผลการศึกษา: จากข้อมูลเวชระเบียน ผู้วิจัยพบผู้ป่วยที่เข้าเกณฑ์ข้างต้น 10 ราย ผู้ป่วย 6 รายมีแผลเรื้อรังที่ไม่หาย และผู้ป่วย 4 รายที่ปวดและมีภาวะ Lipodermatosclerosis ภายหลังการผ่าตัดรักษา อาการปวดทุเลาจนหายที่ 14 วันหลังผ่าตัด และแผลเรื้อรังหายที่ระยะเวลาเฉลี่ย 34.17 วันหลังผ่าตัด

สรุป: การผ่าตัด SEPS เป็นวิธีการรักษาทางเลือกหนึ่งที่มีประสิทธิภาพในการรักษาผู้ป่วยภาวะหลอดเลือดดำอุดตันเรื้อรังและมีภาวะแทรกซ้อนแผลเรื้อรัง หรือมีภาวะปวดและมีภาวะ Lipodermatosclerosis ที่ไม่หายด้วยการรักษาด้วย Compressive Therapy
