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ENDOSCOPIC VERSUS OPEN SUBFASCIAL DIVISION OF INCOMPETENT PERFORATING VEINS IN THE TREATMENT OF CHRONIC VENOUS INSUFFICIENCY

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Purpose: *Subfascial division of incompetent perforating veins plays an important role in the surgical treatment of patients with chronic venous insufficiency of the lower leg. To minimize the high incidence of postoperative wound complications after open exploration, endoscopic approaches have recently been developed. This study compares between open and endoscopic treatment of these patients concerning ulcer healing and postoperative wound complications.*

Methods: *Patients with current venous ulceration on the medial side of the lower leg were allocated to open exploration by the modified Linton approach (Group I) or endoscopic exploration by use of a laparoscope (GroupII).*

Results: *Fifty patients were allocated for this study. The incidence of wound infections after open exploration was 53%, compared with 0% in the endoscopic group (P< 0.001). Patients in the open group needed longer hospital stays (mean=8 days; range= 3 to 42 days) than patients in the endoscopic group (mean= 3 days; range= 1 to 6 days; P= 0.001). After the operation the ulcers of 84% of patients in the open group and 88% in the endoscopic group had healed. The patients were followed (6 to 24 months), recurrences had occurred in two patients in group I & one patient in group II.*

Conclusions: *Endoscopic division of incompetent perforating veins is equally as effective as open surgical exploration for the treatment of venous ulceration of the lower leg but leads to significantly fewer wound healing complications. Endoscopic division of the perforators is there fore the preferred method.*

Key Words: *Endoscopy, perforators, venous insufficiency, venous ulcer.*

INTRODUCTION

The incidence of venous ulceration of the lower leg in the current Western population is 1% to 2%.Venous ulceration was known to be a problem as early as the fourth century BC[1].

The association between venous disease and the ulcer on the lower limb was probably made by Hippocrates [2]. He was also the first to propose compressive bandaging as a treatment. Since then, many possible treatments and procedures have been tested. The procedures, as described by Linton [3], Cockett [4], and Dodd [5], were often successful in treating venous ulceration, but also had major disadvantages, such as a high percentage of wound problems.

Subfascial endoscopic division of incompetent perforating veins (SEPS) in the treatment of leg ulcers is now successfully used. Since the introduction of endoscopic techniques, several short- and midterm clinical series have validated high healing rates and low recurrence rates (6-8). Endoscopic techniques were found to have fewer postoperative wound complications than the open subfascial division of incompetent perforating veins (Linton procedure) [9, 10]

The results of a comparative study of ulcer healing and recurrence rates with SEPS and the modified Linton procedure are reported in this study.

PATIENTS AND METHODS

The present study was conducted on fifty patients, presented to Kasr El Aini Hospital during the period from April 1999 to January 2001. Patients were suffering from chronic venous insufficiency and included 23 males and 27 females who aged between 29 and 68 years. All patients had venous ulceration on the medial aspect of the lower leg (chronic venous insufficiency). Patients were divided in to two groups each 25 patient, group I for open surgery & group II for SEPS.

Patients were stratified for the presence or absence of superficial venous incompetence, for primary or recurrent ulceration, and for the presence or absence of diabetes mellitus. For each patient, age, gender, duration of the present ulcer period, primary or recurrent ulceration, and size of the ulcer were documented. All patients underwent investigation of their venous status by physical examination and duplex ultrasound scan before the operation and 6 weeks afterward. Duplex scanning was performed in all cases with a computed sonography machine coupled with a doppler colour and spectral tracing capability [11].

Ascending phlebography was done in selected cases to allow for proper localization of the incompetent perforating veins and areas of obstruction. It also demonstrated signs of postphlebitic changes including wall abnormalities, filling defects and absence of recanalization. Concomitant superficial venous incompetence was treated by flush saphenofemoral ligation and limited stripping of the long saphenous vein from groin to just below knee level.

All patients received a second generation antibiotic by intravenous injection before the operation. Open subfascial exploration was performed by means of the modified Linton approach. An incision on the medial side of the lower leg down to the level of the medial malleolus was made through the fascia. All perforating veins in the subfascial compartment were ligated [12]. All perforating veins on the medial and dorsal side of the lower leg that could be found were interrupted by the use of nonabsorbable sutures and divided. At the end of the operation, the deep fascia was left open and the skin was closed by 2/0 nonabsorbable sutures.

For endoscopic subfascial exploration, the patient was placed in 10 degrees Trendelenberg's position, the procedure was performed under tourniquet control on the proximal third of thigh, a pneumatic tourniquet was placed and inflated. Eight to ten cm distal to the tibial tuberosity, on the medial aspect of the calf, a longitudinal incision (12mm) was carried through the subcutaneous tissue and any varicosities (if present) were excised. The subcutaneous fascia was incised and the laparoscopic port was then inserted beneath the fascia and carbon dioxide was then insufflated after making a purse string with 2/0 Vicryl around the port and a laparoscope with a zero degrees lens was inserted. A second longitudinal (12mm) incision was made, 5 cm distal from the first one, and the second 10 mm laparoscopic port was inserted under visual control (Fig. 1). Under videoscopic control, all connective tissue, bridging between muscles and fascia, was dissected with forceps. Perforating veins, bridging in the same area were isolated and clipped (Fig. 2), and then divided with endoscopic scissors (Fig. 3). For complete visualization of all perforating veins, all the area down to the medial malleolus, laterally to the posterior midline & medially to the tibial edge; was dissected. Finally the instruments and the ports were removed and the tourniquet was released. The wound was sutured with 2/0 absorbable sutures for the subcutaneous tissues and 4/0 nonabsorbable sutures for the skin.

Patients were mobilized on the first postoperative day and were treated with ambulatory compression therapy until the ulcer healed. Elastic stockings were prescribed for lifetime when ulcer healing occurred. The patients in this study were followed as outpatients for a period ranging from 6- 24 months.

RESULTS

50 Patients were randomized; half of them was subjected to open surgery subfascial ligation of perforating veins (Group I) and the other half was subjected to endoscopic approach for subfascial vein ligation (Group II).

Both groups appeared well matched regarding various characteristics (Table 1).

Table I-*Patient characteristics*

	Group I *Open approach (n=25)*	*Group II* *Endoscopic approach (n=25)*
Age (years)	52(29-68)	54(32-65)
Sex ratio (M/F)	11/14	12/13
History of D.M	2	1
Recurrent ulceration	18	17
Side affected		
• Right	9	9
• Left	12	13
• Bilateral	4	3
Total duration of complaint (Months)	110 (18-240)	139 (22-300)
Etiological findings (DVT)	6	4

The preoperative investigations are summarized in (Table II)

Table II – *Preoperative investigations*

	Group I *Open approach (n=25)*	*Group II* *Endoscopic approach (n = 25)*
• Duplex scanning		
Superficial incompetence	18	19
Deep incompetence	17	16
Incompetent perforators	21	23
• Phlebography	16	15

Clinical results and operative data were summarized in (Table III).

Table III – *Operative data & Clinical results*

	Group I *Open approach* *(N = 25)*	*Group II* *Endoscopic approach* *(n = 25)*	*Statistical* *Significance*
• Mean operative	47(25-80)	35(25-90)	NS
• Time (Minutes)			
• Number of perforating veins found at operation	3.0	2.9	NS
• Hospital stay (days)	8(3-42)	3(1-6)	P=0.001
• Readmission	4	0	P=0.001
• Healing rate	84%	88%	
• Recurrences	2	1	

Table IV shows the postoperative complications in both groups. Postoperative pain became minimal in the group II patients as compared to the group I patients. Also early mobilization was reported in the endoscopic group more than the open one.

Table IV – ***Postoperative wound complications***

	Group I *Open approach* *(n= 25)*	*Group II* *Endoscopic approach* *(n=25)*	*Statistical* *Significance*
Wound infection	10(40%)	0	P<0.001
Superficial	3(12%)	0	P=0.11
Deep	7(28%)	0	P=0.003

NS = Non – significance
P< 0.05 is of significance

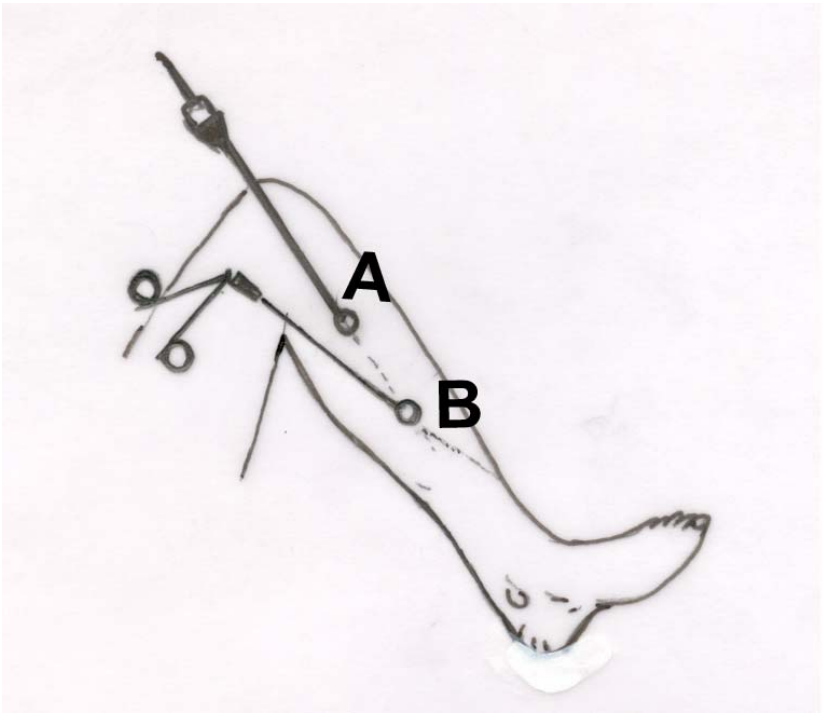

Fig. (1) : Sites of ports for endoscopic subfascial ligation.
A- Site of trocar used for the introduction of the laproscope.
B- Site of working trocar for dissection clipping & dividing the perforators.

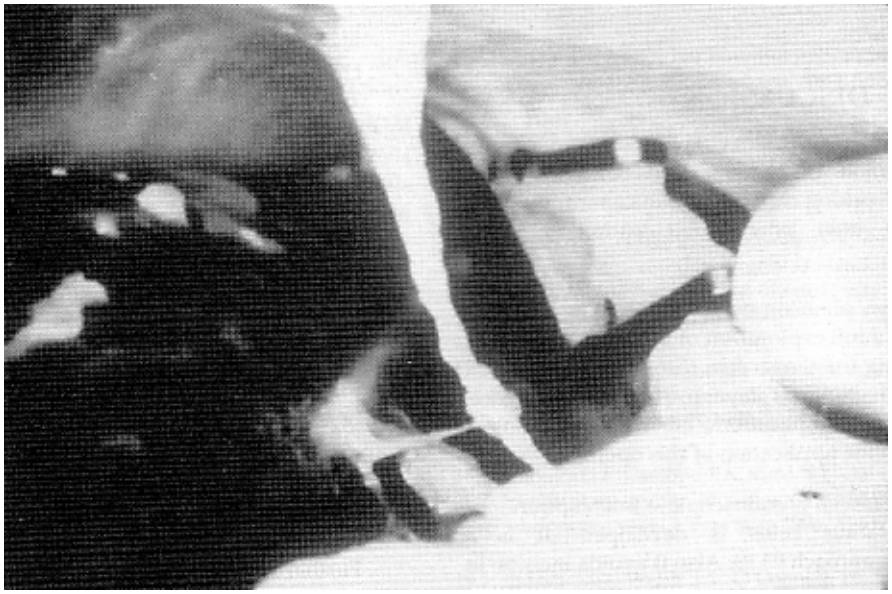

Fig. (2): In endoscopic approach, application of the endoclips on the perforator vein.

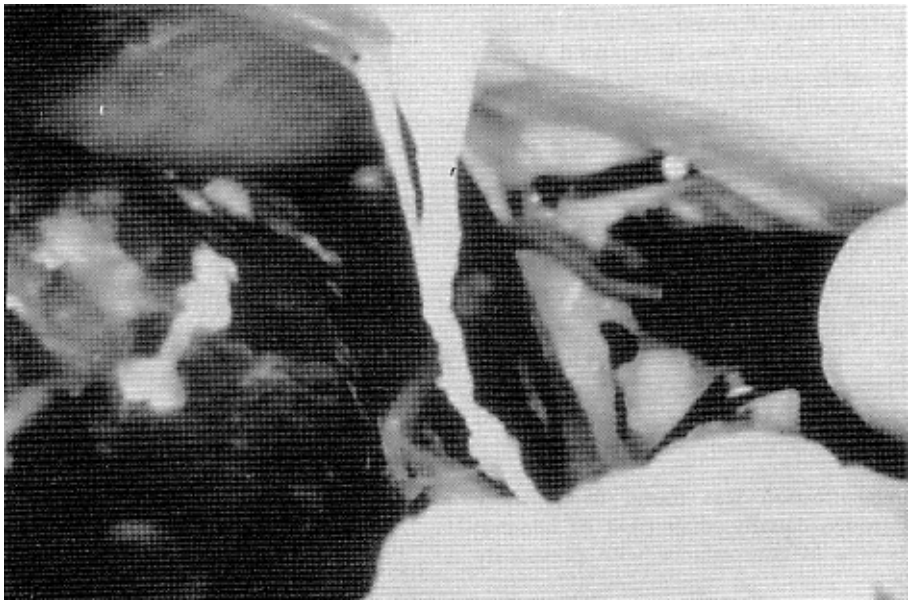

Fig. (3) : Division of incompetent perforating vein between two clips with endoscopic scissors

DISCUSSION

Chronic venous insufficiency is a common clinical problem and common cause of serious disability. The disease affects the working capacity of the community with the resultant less man power and national income reduction[13].

Surgical ligation of incompetent perforating veins of the lower leg needs a full exploration of the subfascial space. This necessitates long incisions often through compromised cutaneous and subcutaneous layers. As a consequence, postoperative wound complications are frequently noted, which discourages wide application of this operation [14].

Recently, subfascial endoscopic interruption of incompetent perforating veins is developed. It is a minimally invasive approach [15, 16]. Also it avoids incision in markedly unhealthy areas as well as permitting visualization of more veins for ligation than conventional methods [17].

In our study, we report the prospective trial of endoscopic versus open subfascial exploration of the lower leg in patients with chronic venous insufficiency.

Both groups were matched as regards age & sex distribution. Both parameters were also similar to those in the world literature [18 & 19]. Our analysis reported a mean age of patients of 52 and 54 years for the open & endoscopic groups respectively. Although others [20] reported older age group with a mean of 64 years.

As regard sex affection; it was found that there was no predominance of either males or females similar to other studies reported in the literature [18-20].

The total duration of patients complaint showed a mean of 110 months in the open group versus 139 months in the endoscopic group. [15], and other studies [19, 20] reported a mean of 148 and 144 months respectively in their studies on the endoscopic procedure. This difference may be explained by the variation of age at presentation.

Left lower limb affection was found to be more prevalent, in both groups equally, than right or bilateral limb affection. This was in concordance with previously reported findings [15] .

Recurrent ulceration was present in more than half of patients of both groups. Similar results were reported [18]. However incidence of less than half of patients, were reported by others [21].

Duplex revealed no occlusion of deep venous system with reflux similar to results of other researchers [15].

As regards the mean operative time for the endoscopic ligation of perforators, it was found that there was significant difference between it and that of the open surgical procedure (mean of 35 minutes versus 47 minutes respectively). Similar results were reported [15, 20].

The hospital stay in patients of the endoscopic group, showed a mean of 3 days versus a mean of 8 days in the open group. This was statistically highly significant (P=0.001). Reported results in the literature for the endoscopic approach ranged from 1.6 days [21] to 4 days [15].

No patients subjected to endoscopic approach were readmitted in comparison with the 4 patients subjected to the open procedure who were readmitted. Again this encourages the preference of the endoscopic approach.

Furthermore, the healing rates of more than 80% were present in both groups (88% in the endoscopic group versus 84% of the open group). This supports the concept of eradicating reflux in treatment of chronic venous insufficiency.

Only one case showed recurrence in the current study in the endoscopic group as compared to two cases in the open group. This supports the importance of continued ambulant compression therapy postoperatively and thereafter prescription of elastic stockings in every patient with associated deep venous incompetence. This combined treatment strategy was recommended by many authors [22 & 23].

In addition, the current data analysis showed 53% of patients had their postoperative course complicated by wound infection; in comparison with the zero % of the endoscopic group patients. These findings are in concordance with other reports that mention 44% to 58% wound complication rate for open procedures [15 & 23]. However other studies reported a wound lower complication rate in open surgery as low as 7% [24].

In the past decade there is a clear trend toward less-invasive procedures in general and vascular surgery. Endoscopic exploration of the subfascial area through a small incision offers little discomfort to the patient. This study shows that, compared with open exploration, incompetent perforating veins can be detected and interrupted with minor incisional trauma and with less blood loss. Presumably, there is reduction in postoperative pain and disability, early mobilization, and above all, a significant reduction in the incidence of wound healing complications. All lead to a significantly shorter hospital stay and fewer readmissions than open surgical exploration. We conclude that endoscopic division of incompetent perforating veins is superior to open surgical exploration of the subfascial space in patients with venous ulceration of the

lower leg. This minimally invasive procedure, in combination with ligation of the saphenofemoral junction and continued compression therapy, allows uncomplicated wound healing and a high ulcer healing rate in patients with chronic venous incompetence and makes the Linton procedure for these patients less desirable.

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