Patient-perceived outcomes of different anaesthetic techniques in classical surgical treatment of varicose veins of lower limbs

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AIM OF THE STUDY: *To evaluate the effects of spinal or locoregional anaesthesia versus local tumescent anesthesia during traditional surgical treatment of saphenous reflux, in terms of pain and postoperative functional recovery.*
MATERIALS AND METHODS: *From January to December 2014, 195 consecutive interventions of stripping of the greater saphenous vein for valvular incompetence were performed. In 114 cases spinal or locoregional anaesthesia was performed (group 1), in the remaining 81 cases local anaesthesia with the tumescence technique was carried out (group 2). All patients underwent an assessment of perceived pain by means of verbal rating scale before and at the end of surgery, at discharge and after a month. The times of recovery of ambulation during hospital stay and at the discharge were recorded and use of analgesic drugs during hospitalization and at home. At the end of the study, patients were asked to express their approval rating on the type of anaesthesia.*
RESULTS: *Patients in group 2 experienced mild to moderate intraoperative pain more frequently than patients in group 1 ($p<0.001$), while patients in group 1 had more mild adverse anaesthesia-related events than patients in group 2. Patients in group 2 had faster recovery of ambulation and earlier discharge than patients in group 1.Thirty-day results were similar in the two groups; however, patients in group 2 had a higher degree of satisfaction than patients in group 1 with regard to the type of anaesthesia ($p<0.001$)*
CONCLUSIONS: *Both locoregional and local tumescent anaesthesia are effective and well accepted by the patients, with similar intra-hospital and 30-day results.*

KEY WORDS: Great Saphenous Vein, Local tumescent anaesthesia, Pain, Stripping

Introduction

Stripping of the internal and external saphenous vein is a commonly performed surgical procedure employed to treat varicose veins due to valvular incompetence. Such interventions can be performed under different kinds of anaesthesia, such as general anaesthesia, spinal or locoregional anaesthesia and peripheral nerve blocks at different levels (femoral nerve, popliteal nerve and posterior cutaneous nerve). There is no current evidence of the superiority of one technique over the other in terms of complications, pain, postoperative recovery and patient compliance. In fact, data supporting each of these techniques can be found. Local anaesthesia has been recently demonstrated to provide comparable results to general anaesthesia in terms of postoperative recovery and degree of patient satisfaction; similarly, loco-regional anaesthesia with block of the peripheral nerves has been shown to provide satisfactory results. The most commonly employed loco-regional technique is the spinal or

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subarachnoid anaesthesia, during which anaesthetics are injected into the cerebral- spinal fluid, at the L2-L3 or L3-L4 level. Duration of the anaesthetic block is variable and depends on the type of drug used, its concentration and dose. On average, at least 2-3 hours are required for complete resolution of the block. Urinary retention due to block of the bladder detrusor muscles and orthostatic headache are among the most common side effects [1-7]. Local tumescent anaesthesia was originally introduced for cosmetic surgery, and it is now widely used for vein surgery. With the aid of duplex ultrasound, it is possible to perform a very precise perisaphenic tumescence, using anaesthetic drugs associated with vasoconstrictive agents. Lidocaine is the anaesthetic of choice due to its safety, and vasoconstriction can be safely achieved with the use of epinephrine, which allows a slower clearance of lidocaine from the tissues. [7-8]. To date, however, there is little data supporting the effectiveness of local anaesthesia with tumescence in classical surgical treatment of varicose veins, and there is a distinct lack of data comparison with other anaesthetic techniques. The aim of the present study was to evaluate the effects of traditional surgical treatment of saphenous reflux in terms of pain and postoperative functional recovery, comparing procedures performed under local anaesthesia with tumescence and spinal or locoregional anaesthesia in a single-centre experience.

Materials and Methods

From January to December 2014, 195 consecutive interventions of stripping of the greater saphenous vein for valvular incompetence were performed at our institution. Stripping of the greater saphenous vein at the knee level and phlebectomies using the Muller's technique was performed in all the cases, in a one-day surgery hospitalisation. In 114 cases the intervention was performed under spinal or locoregional anaesthesia (group 1), in the remaining 81 cases, local anaesthesia with tumescence technique was used (group 2). The choice of the kind of anaesthesia was based on individual patients' and surgeons' preference. All patients underwent detailed preoperative mapping [9] of their varices by duplex ultrasound. Spinal anaesthesia was performed with hyperbaric Marcaine 1% at a tailored dosage (0.08 x height expressed in centimetres), with an average dose of 15 mg, using a 25-27 Whitacre needle. Perisaphenic tumescence was performed under ultrasound guidance using 20 ml of 2% lidocaine and 1 mg of epinephrine solved in 500 ml of 0.9% saline solution stored at 4°C to increase vasoconstriction and reduce bleeding (Fig. 1).

Fig. 1: After the injection of tumescent solution a wheal appears. The course of the saphenous vein is marked as shown in the figure.

The same solution was also injected at the groin level. Moreover, at the level of clinically evident varicose veins, anaesthesia was performed using 1% lidocaine and 7.5 mg of Naropin. At the time of stripping all patients underwent transient sedation with propofol (30 mg IV), to reduce pain and increase compliance. The groin wound was closed with a two layers suture, while the other wounds had sterile strips applied. At the end of the intervention, all patients wore a postoperative kit of elastic stockings, usually a compression class II.

Data concerning these interventions were prospectively collected in a dedicated database including more 50 variables and regarding demographic and clinical characteristics of patients, intraoperative technical details and main postoperative parameters.

All patients underwent assessment of perceived pain through verbal rating scale (VRS), (Fig. 2); the assess-

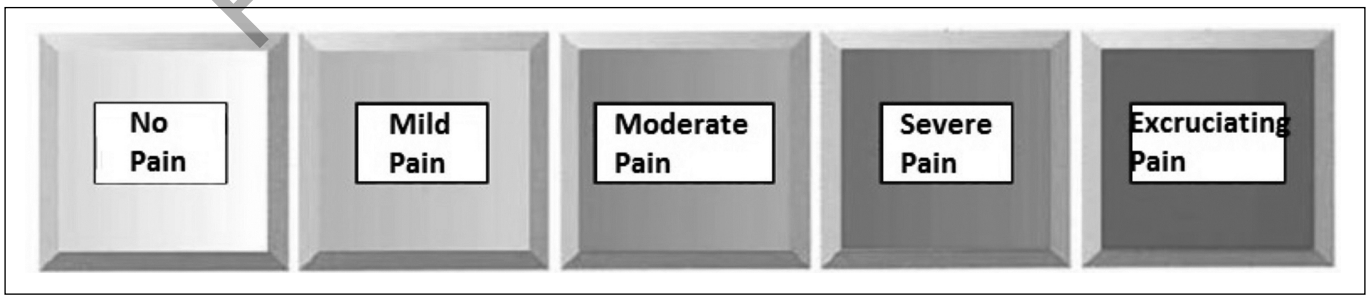

Fig. 2: Verbal rating scale (VRS)

ment was carried out before the intervention, at the end of surgery, at discharge and within the first postoperative month. The times of ambulatory recovery in the hospital and at the discharge were recorded. Use of analgesic drugs during hospitalisation were also recorded, and patients were asked about consumption of pain medication at home. Moreover, complications occurring at home were recorded. Patients were finally asked to express their approval rating on the type of anaesthesia and questioned on the possibility of recommending to family and friends the kind of performed anaesthesia performed. The pre- and postoperative parameters were compared using Fisher's test and χ^2 test.

Results

Study Group

Patients were predominantly females, with higher prevalence in group 1 (79%, vs. 62% in group 2, P = 0.05). Mean age was 54.4 years in group 1 and 50.4 years in group 2 (p = 0.02). The two groups were homogeneous with regard to clinical variables, and no differences in terms of preoperative CEAP classification of the operated limbs were found. Patients in group 1 more frequently had a BMI>25, reflecting the fact that the tumescent anaesthesia is less used in obese patients due to the inability to reach a proper level of analgesia (Table I).

With regard to intra-operative pain, no patient in group 1 reported significant symptoms, while approximately 20% of patients with local anaesthesia reported mild to moderate intraoperative pain (p <0.001) (Table III). Analyzing the possible side effects of anaesthesia, 36 patients in group 1 had symptoms in the immediate postoperative period, namely nausea or vomiting in 22 cases, hypotension in 7 patients, headache in 4 patients and urinary retention in 3; all were reported as mild. In group 2 only one case of postoperative vomiting was recorded.

Thirty-six percent of patients in group 1 and 96% in group 2 had complete ambulatory recovery at 6 hours following surgery (p <0.001). Analgesia during hospitalisation was required in 38% of patients in group 1 and

Table I - *Study group.*

	Group 1 (114 int.)	Group 2 (81 int.)	p
female	71 (62%)	61 (75%)	0.05
Mean age	54.5	50.4	0.02
CEAP 2	100 (88%)	70 (86%)	n.s.
CEAP 3	10 (8%)	10 (12%)	n.s.
CEAP 4	4 (4%)	1 (2%)	n.s.
BMI>25	35 (30.5%)	10 (12%)	<0.001

Table II - *Intraoperative pain.*

	Group 1 (114 int.)	Group 2 (81 int.)	p
No pain	114 (100%)	64 (79%)	<0.001
Mild pain	-	14 (17%)	<0.001
Moderate pain	-	3 (4%)	n.s.
Severe pain	-	-	-
Excruciating pain	-	-	-

Table III - *Immediate post-operatve results.*

	Group 1 (114 int.)	Group 2 (81 int.)	p
Ambulatory recovery within 6 hours	41 (36%)	78 (96%)	<0.00
Use of analgesic drugs during hospitalization	43 (38%)	20 (25%)	0.06
Discharge within 12 hours	48 (42%)	67 (83%)	<0.00

Table IV - *VRS at discharge.*

	Group 1 (114 int.)	Group 2 (81 int.)
No pain	67 (59%)	57 (70%)
Mild pain	30 (26%)	15 (19%)
Moderate pain	17 (15%)	9 (11%)
Severe pain	-	-
Excruciating pain	-	-

Table V - *Results at 30 days.*

	Group 1 (114 int.)	Group 2 (81 int.)	p
No pain	69 (60%)	54 (66.5%)	n.s
Mild pain	42 (37%)	25 (30.5%)	n.s.
Moderate pain	3 (3%)	2 (3%)	n.s.
Severe pain	-	-	-
Excruciating pain	-	-	-
Need for analgesic drugs	41 (36%)	25 (31%)	n.s.

Table VI - *Popularity at 30 days.*

	Group 1 (114 int.)	Group 2 (81 int.)	p
High rating	78 (68%)	78 (96%)	<0.001
Average rating	35 (31%)	3 (4%)	<0.001
No rating	1 (1%)	-	n.s.
Would recommend the same type of anaesthesia	112 (98%)	81 (100%)	n.s.

25% in group 2 (p=ns). Discharge occurred within 12 hours in 42% of patients in group 1 and 83% in group 2 (p <0.001) (Table III). At discharge, there were no clear differences in terms of perceived pain, although a trend favoured group 2, in which 70% of the patients were totally pain-free compared to 59% in group 1 (p = 0.07) (Table IV). At 30 days, there were no differences in terms of perceived pain (no pain in 60% of patients in group 1 and 66.5% of patients in group 2; mild to moderate pain in 40% of patients in group 1 and in 33.5% of patients in group 2); the need for anti-inflammatory and analgesic drugs was also similar between the two groups (36% and 31%, respectively) (Table V). The acceptance was greater for local anaesthesia with tumescence compared to spinal anesthesia (high rating in 68% of patients in group 1 and in 96% of patients in group 2, p <0.001); all patients in group 2, and 98% of group 1 patients would recommend the type of anaesthesia received to their acquaintances (Table VI).

Discussion

Greater saphenous vein stripping [10,11] has long been considered the gold standard technique for the surgical treatment of varicose veins of the lower limbs, and it is undoubtedly the most studied and the only one that was compared to sclerotherapy and ligation alone or associated with sclerotherapy. Saphenous stripping has been shown to provide excellent results, both post-operatively and long- term. Currently, it is considered a safe and effective alternative technique to contemporary obliterative endovascular procedures, as shown in recent systematic reviews and meta-analyses [13-18]. Saphenous stripping is an invasive procedure that may cause bleeding, leading to regional hematoma and postoperative pain. With the anaesthetic technique of tumescence, under duplex ultrasound control of saphenous vein and of its tributaries, it is possible to create a swelling around the main trunk and the largest varicose tributaries, creating a mechanical compression to minimize bleeding, which is further reduced by the presence in the solution of adrenaline with its vasoconstrictor effect. Epinephrine is important in reducing bleeding and at the dose of 1 mg, as used in our study, it is safe from systemic complications. Indeed, greater concentrations may also be used, without significant risk of complications [17]. In addition, the use of sodium chloride solution at low temperatures (4°C) per se causes vasoconstriction which further contributes to reduce the bleeding.

At our Institution, we routinely associate deep sedation to tumescent local anaesthesia at the time of stripping, in order to increase patients' compliance and comfort, as also suggested by other authors. Proebstle et al. reported that about 40% of their patients with tumescent anaesthesia alone experienced discomfort at the time of vein stripping and required intravenous sedation and analgesia in the intraoperative perioperative period [19]. In our experience, the tumescent anaesthesia associated with systemic sedation during the stripping was safe, reliable and effective for pain control. In fact, only three patients reported moderate pain and 14 mild pain during the intervention. In terms of complications, we had only one case of vomiting, while patients operated on with spinal anaesthesia had a larger amount of mild to moderate complications. Importantly, we observed faster recovery of the upright position and earlier discharge in group 2 patients compared to those undergoing spinal anaesthesia. This study has several limitations: it is not randomised, and the choice of the type of anaesthesia was left to the patient's and surgeon's preference. Moreover, a limited number of patients is included, with follow-up limited to the first 30 postoperative days. It would be interesting in future studies, to consider also other aspects and parameters to be assessed long-term, such as the aesthetic result in the light of a considerable reduction of perioperative bleeding, the recovery time for normal daily activities and work and their impact on social expenses. In spite of these limitations, we believe the present study provides a significant contribution to depict the advantages of this anaesthetic method, considering also the lack of data and experiences in the literature.

Conclusions

Data from our initial experience suggest that both locoregional anaesthesia and local anaesthesia are safe, effective and accepted by the patients, both immediately and in the first postoperative month. Local anaesthesia with tumescence allowed a faster recovery time and was associated with reduced postoperative side effects, although one fifth of patients still reported an incomplete control of intraoperative pain.

Riassunto

Nel nostro studio abbiamo valutato gli effetti del trattamento chirurgico tradizionale del reflusso safenico in termini di dolore e recupero funzionale postoperatorio, comparando interventi di stripping corto della vena grande safena eseguiti in anestesia locale a tumescenza ed anestesia spinale o locoregionale. Nell'anno 2014 sono stati analizzati 195 interventi, in 114 pazienti e stata eseguita anestesia spinale o locoregionale (gruppo 1), nei rimanenti 81 casi anestesia locale con tecnica a tumescenza (gruppo 2). Tutti i pazienti sono stati sottoposti a valutazione del dolore percepito mediante scala di valutazione verbale (VRS) prima e al termine dell'intervento, al momento della dimissione e dopo un mese dalla dimissione. Sono stati registrati i tempi di ripresa della stazione eretta in reparto e di dimissione. Abbiamo analizzato l'impiego di farmaci analgesici durante la degenza ed i pazienti sono stati interrogati sul consumo di farmaci antidolorifici al proprio domicilio. Abbiamo registrato le complicanze immediate e tardive occorse al proprio domicilio e l'indice di gradimento rispetto al tipo di anestesia eseguita. Nel trattamento dell'insufficienza venosa cronica degli arti inferiori, sia l'anestesia locoregionale che l'anestesia locale a tumescenza risultano efficaci e graditi al paziente, sia nell'immediato che a 30 giorni dall'intervento chirurgico. L'anestesia locale a tumescenza permette tempi di recupero piu rapidi e si associa a ridotti effetti collaterali postoperatori.

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