

Invagination Stripping of GSV in Modern Practice of Varicose Vein Surgery

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I. Introduction

Varicose vein surgery is one of the most commonly performed surgery in the modern practice. Varicose vein is defined as a superficial vein of the lower limb which has permanently lost its valvular efficiency, as a result of venous hypertension in standing position becomes dilated, tortuous and thickened. Traditional method was stripping of GSV with incompetent saphenofemoral junction. With advent of endovascular therapy such as LASER ablation, Radiofrequency ablation and sclerotherapy, the practice of stripping of GSV has reduced.

In modern practice, newer methods have gained popularity with promising results. Stripping of GSV still remains the mode of treatment for large varicose veins. Varicose vein surgeries are associated with recurrence due to recanalisation. Stripping of varicose vein is associated with least recurrence compared to other techniques.

Previously, evagination technique was used for stripping of GSV which had both intraoperative and postoperative complications such as hematoma formation, saphenous nerve injury leading to pain and paraesthesia. Saphenous nerve is a sensory nerve supplying medial side of lower thigh, anteromedial side of knee joint, medial side of foot and great toe.

The aim of the study is to compare invagination stripping from evagination stripping of GSV

II. Methods

60 patients who presented to Victoria hospital under Bangalore Medical College and Research Institute with varicose vein were enrolled in the study after satisfying inclusion and exclusion criteria as follows.

INCLUSION CRITERIA:

1. Patients with incompetent saphenofemoral junction confirmed by Doppler ultrasonography.
2. Patients who had no prior neurological abnormalities.
3. Patients who are fit for surgery.
4. Patients who gave written informed consent.

EXCLUSION CRITERIA:

1. Patients with competent saphenofemoral junction.
2. Patients who had prior neurological abnormality.
3. Patients who are not fit for surgery.

Patients were divided into two groups using computerised randomization tables. Patients underwent stripping of GSV by two different techniques as described as follows.

Evagination technique uses large olive head tip which is pulled up along the medial side of the thigh. In this technique, GSV gets everted during the stripping.

In invagination technique, endothelium of GSV gets inverted into the lumen and stripped.

Patients are assessed preoperatively for any neurological deficits. Intraoperative time, length of vein stripped are assessed and compared between each groups.

Postoperative pain assessment at 24 hours and 48 hours (Visual Analog Scale) are recorded, hematoma, wound infection are assessed.

After 6 weeks, patients of both groups are assessed for chronic pain and paraesthesia are assessed.

III. Results

After satisfying the inclusion and exclusion criteria, 30 patients are selected in each group. In conventional group, 13 are male and 17 are female with mean age of 38.9 years. In the invagination group, consists of 14 male and 16 female with mean age group of 39.5 years.

All patients presented with class 4 of CEAP clinical classification of chronic venous disease.

Outcomes of 2 types of surgery with respect to duration of surgery, length of vein stripped, amount of blood loss, post operative pain, paraesthesia, hematoma, wound infection and duration of hospital stay are assessed in both groups.

Time from skin incision to closure of wound in both groups found be similar with no stastical significance (CONV- 76.3 min INVG – 76.7 min p value – 0.792)

Blood loss in invagination group is significantly lower compared to conventional group with p value < 0.001 (CONV- 34 gm INVG – 22.5gm)

Post operative pain analysed at 24 and 48 hours using Visual Analog Scale is significantly less in invagination group as compared to conventional which is stastically significant. No patients in both groups developed paraesthesia along the medial side of leg.

Six patients in conventional groups developed hematoma and in which 2 patients got infected which is not significant. No patients in invagination group had either hematoma or wound infection.

The total duration of hospital stay in conventional group is 5.8 days and 5 days in invagination group.

AGE DISTRIBUTION

AGE IN YEARS	CONVENTIONAL	INVAGINATION
20-30	4	3
31-40	15	13
41-50	10	13
>50	1	1
TOTAL	30	30
MEAN ± SD	38.9±5.85	39.5±6.62

GENDER DISTRIBUTION

GENDER	CONVENTIONAL	INVAGINATION
MALE	13	14
FEMALE	17	16
TOTAL	30	30

COMPARISON OF DURATION OF SURGERY

DURATION OF SURGERY	CONVENTIONAL	INVAGINATION
60-72 min	13	10
72-90 min	16	19
>90 min	1	1
TOTAL	30	30

COMPARISON OF LENGTH OF VEIN STRIPPED

LENGTH STRIPPED	CONVENTIONAL	INVAGINATION
<40 cm	14	9
>40 cm	16	21
TOTAL	30	30

COMPARISON OF AMOUNT OF BLOOD LOSS

AMOUNT OF BLOOD LOSS IN GRAMS	CONVENTIONAL	INVAGINATION
<20	0	2
20-30	8	28
>30	22	0
TOTAL	30	30

COMPARISON OF PAIN AT 24 HOURS

PAIN AT 24 HOURS	CONVENTIONAL	INVAGINATION
NO DISTRESS	0	0
ANNOYING	1	9
UNCOMFORTABLE	13	19
DREADFUL	16	2
HORRIBLE	0	0
AGONIZING	0	0
TOTAL	30	30

Pain at 24 hours is significantly more associated with conventional $p < 0.001$

COMPARISON OF PAIN AT 48 HOURS

PAIN AT 48 HOURS	CONVENTIONAL	INVAGINATION
NO DISTRESS	1	10
ANNOYING	19	19
UNCOMFORTABLE	10	1
DREADFUL	0	0
HORRIBLE	0	0
AGONIZING	0	0
TOTAL	30	30

Pain at 48 hours is significantly less associated with invagination $p < 0.001$

COMPARISON OF PARAESTHESIA

PARAESTHESIA	CONVENTIONAL	INVAGINATION
PRESENT	0	0
ABSENT	30	30
TOTAL	30	30

COMPARISON OF HEMATOMA

HEMATOMA	CONVENTIONAL	INVAGINATION
PRESENT	6	0
ABSENT	24	30
TOTAL	30	30

Incidence of hematoma is significantly more in conventional compared to invagination with $p = 0.024$

COMPARISON OF WOUND INFECTION

WOUND INFECTION	CONVENTIONAL	INVAGINATION
PRESENT	2	0
ABSENT	28	30
TOTAL	30	30

COMPARISON OF HOSPITAL STAY

HOSPITAL STAY IN DAYS	CONVENTIONAL	INVAGINATION
<5	19	26
6-7	7	4
>7	4	0
TOTAL	30	30

IV. Discussion

The commonly practiced surgery for varicose veins are saphenofemoral ligation with removal of portion of insufficient GSV. Short portion of GSV is stripped out from groin to just below knee level to reduce saphenous nerve damage. Evagination method of stripping though ensures complete removal of saphenous vein trunk using a large acorn shaped stripper and also ensuring excellent long term results has a lot of disadvantages namely injury to saphenous and suraj nerve, definite soft tissue trauma, postoperative morbidity, prolongs convalescence, loss of income and due to large distal liberal incision also causes undesirable scarring.

In invagination technique the inverted venous trunk runs through its own path without harming the perivenous structures, and also the limited stripping from also reduces the chances of nerve damage and in turn neurological complications. Also invagination, and limited stripping performed with a small sized distal stab invasion is cosmetically preferred and slow using locoregional anesthesia is more cost effective.

Keller was the first one to describe the invaginated form of varicose vein stripping however because of frequent tearing of veins it wasn't very successful.

This was followed by Van der Stricht who used a nylon filament to improve the invagination technique reducing the time, operative trauma and also nerve injury.

This was further followed by Fullerton and Calvert who did invagination stripping using Meyers stripping but without acorn shaped heads. In this case post op trauma and nerve injury were minimal.

But both require distal skin opening to the saphenous vein trunk and also the intraluminal stripper.

But in 1993, Oesch used the most current and conservative method of stripping in which the stripping is done in a downward direction and the in which the strongest proximal vein segment is attached to the stripper head and invaginated first and hence the tearing of long saphenous trunk is reduced which could be otherwise used as a possible graft material.

Long term studies on invagination techniques are not available however vascular reference books claim superiority of invagination over other techniques.

In our study, the duration of study was found to be similar and not much of a difference found in the 2 groups.

Blood loss measured in grams showed a significant decrease in invagination(28 members had blood loss less than 30grams) compared to conventional technique(22 having more than 30 grams). It can be argued that reduced blood loss reflects attenuated tissue damage.

Post operative hematoma was significantly less in invagination (0) as compared to conventional (6) with $p < 0.024$.

Post operative pain measured at 24 (16 having uncomfortable pain) and 48 hours(10 having dreadful pain) was found to be significantly less in invagination as compared to conventional technique. This is mainly due to tissue damage by passing of a stripper.

Paraesthesia mainly caused by saphenous / sural nerve damage showed no significant difference on the 2 techniques.

Length of hospital stay in case of invagination technique , maximum had duration of less than 5 days compared to conventional wherein 4 out of 30 had a duration of stay more than 7 days.

Post operative wound infection was found in 2 members of conventional technique and not found in members of invagination stripping. It can be hypothesised that a possible accumulation of blood in the groin could contribute to delayed wound healing.

In conclusion , invagination technique is associated with a significant less surgical damage compared to conventional technique.

However long term studies involving the recurrences and neovascularisation and also including a larger study group need to be furnished before recommending invagination as the gold standard.

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