

## To Study the Role of Skin Grafting and Superficial Varicose Vein Surgery Simultaneously In Treatment of Venous Ulcers

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### Abstract

**Background:** Venous diseases are predominant causes of lower extremity venous ulcers. In spite of effective treatment by compression therapy, these patients have psychosocial issues such as anxiety, depression, and social deprivation. These distressing symptoms are due to persistence of ulcer with exudation for longer duration, continuous pain, loss of work, and cost to the wound care. **Aims and Objectives:** To study the response of skin grafting for venous ulcer plus surgical treatment for superficial varicose veins simultaneously. **Materials and Methods:** 37 patients who had findings of venous ulcers along with varicose veins were selected for the study. Patients were treated conservatively for 5-7 days followed by surgical intervention of venous ulcer and varicose veins simultaneously. The response to treatment was evaluated in terms of duration of ulcer healing and improvement of pain. **Results:** The duration of hospital stay was 8-12 days (mean=9.8). The preoperative days used for ulcer bed preparation varying from 3-7 days (mean=4.2). The patients were in the age group of 40-75 years (Mean= 57). Maximum patients were in the age group of 55-65 years. The duration of the ulcers was varying from 6 months to 7 years (Mean= 3.7 years). The ulcers size was varying from 2x1cm to 17x11cm. In 34 (91.89%) patients, the graft was taken completely. In 3 patient (8.1%), there was partial graft take (approx. 65-85% ulcer area). There were no cases of skin graft rejection. At the second follow up period (45 days), 32 patients were completely pain

free and remaining 5 patients had partial relief. **Conclusion:** There is high success rate in terms of healing the ulcer in a short duration and decreases the pain at the earliest. No recurrence of the ulcer was observed.

**Keywords:** Venous Ulcer; Varicose Veins; Saphenofemoral Junction; Elastic Compression Bandage.

### Introduction

Varicose veins primarily affect the lower limbs. The prevalence of varicose veins varies from 5% to 30% in the adult population [1]. The venous disease is responsible for 60-70% of all lower extremity ulcers. 25% of lower extremity venous ulcers are non-healing. Pain is a predominant symptom of venous ulcers and it is often overlooked and undertreated. Besides pain these patients have psychosocial issues such as anxiety, depression, a low self-esteem and social deprivation [2-5]. According to data from International Wounds Treatment Committee in 2001, the treatment cost of trophic ulcers was highest among all surgical treatments for wounds. So it is often discussed which treatment is most effective, heals chronic leg ulcers the faster and also cost effectiveness [6]. The etiology of venous ulcer includes inflammatory processes resulting in leukocyte activation, endothelial damage, platelet aggregation, and intracellular edema.

The treatment of lower extremity venous ulcer in many areas is to heal the ulcer first then treat the varicose veins. Compressive therapy is the mainstay of medical management. The full epithelization of a venous ulcer after conservative management may take many months or even years or sometimes it may not fully heal for several years. In very large ulcers, whose spontaneous healing is uncertain, simultaneous shave therapy with

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mesh graft shortens the healing process. The prognosis of venous ulcer due to deep venous insufficiency is poor and there may be early recurrence of ulcer. As conservative treatment alone seems to be insufficient and unsuccessful, the surgical procedures should be considered for nonhealing venous ulcers [7]. Split-thickness skin grafting (SSG) is a simple method of tissue replacement for venous ulcer, which is commonly utilized because of its simplicity, less morbidity and easily availability.

## Materials and Methods

The study was conducted from March 2013 to Jan 2014 and followed up till date. During this period, patients who presented to the surgical outpatient department (OPD) with lower extremity ulcers were evaluated clinically and investigated. The examination of the venous and arterial vascular system was done using duplex sonography as an imaging procedure. A correct diagnosis of venous ulcer with varicose veins and exclusion of peripheral arterial disease has been confirmed in 37 patients. Saphenofemoral junction (SFJ) and below knee perforators were incompetent in all 37 patients. Saphenopopliteal junction (SPJ) was incompetent in 5 patients in addition to SFJ and Perforators incompetence. Deep vein incompetence was noted in 5 patients (based on venous duplex study).

A swab sample was taken in these patients from the floor of the ulcer to identify the microflora of the ulcer. In 20 samples the bacterial growth was noted and remaining samples were sterile.

The most common organisms isolated were *Pseudomonas aeruginosa* and *Staphylococcus aureus*. Based on culture report, in 20 patients, antibiotic was started. Biopsy was taken from the ulcer edge, when malignancy was suspected clinically and it was taken in 4 patients on OPD basis.

Thirty seven patients, who included in the study were admitted for further management.

Ultrasound (USG) abdomen and pelvis was done to rule out secondary cause for varicose veins. Other investigations included were complete blood counts, urine investigations, electrocardiogram, Chest X-ray.

The ulcer was treated initially with Bisgaard regimen. This consists of elevation of the leg with massage; Active movements to the calf muscles in elevation and in standing; passive movements of leg and ankle. Educating the patient about correct method of walking, placing heel down first and using the calf muscles to lift the heel of the back foot giving 'spring' to the walk and hence improving the venous pump. An elastic compression bandage was applied, the movements in walking alternately stretch and relax the bandage, which produces an added venous pumping

effect. Initially ulcers were treated in the ward. The ulcer was cleaned with hydrogen peroxide and slough removal was done. Once ulcer was free of slough, then saline dressing was done daily. Healthy granulation tissue was noted in 27 patients. In remaining 10 patients, ulcer was clean but floor and margin was covered with fibrous tissue. Patients were posted for surgery when the ulcers are free of necrotic area.

The incompetent SFJ, SPJ and perforators were marked with permanent skin marker under imaging guidance. The patients underwent Trendelenberg operation and removal of short segment of GSV. Ligation and disconnection of SPJ was done in patients with SPJ incompetence. Subfascial ligation multiple perforators was done. Large varicosities were also excised. The ulcer bed was prepared with scraping the wound with the edge of a knife and SSG (autografting) was done. In 10 cases where floor and margin was covered with fibrous tissue, SSG was done following ulcer excision. Skin graft was stapled in place. The elastic crepe bandage was applied to the limb after the surgery. It was removed on the third post-operative day and operated sites, graft were inspected. Thereafter daily grafted area inspected. Patients were discharged on 5th-7th postoperative day and were advised to continue the elastocrepe bandaging/stockings and limb elevation. The staples were removed between 10th and 14th post-operative day. Patients were followed up after one week, then every month for 6 months, every three months thereafter.

### *Assessment of Pain*

The secondary outcome measure was pain scored by the patient till 6 months. Patients were instructed to score pain on a three point scale. Pain scores include the following: 1- pain unchanged (or even worse); 2- completely pain free; 3- partially relief.

## Results

The duration of hospital stay was 8-12 days (mean=9.8). The preoperative days used for ulcer bed preparation varying from 3-7 days (mean=4.2). The patients were in the age group of 40-75 years. Mean age was 57. Maximum patients were in the age group of 55-65 years. The duration of the ulcers was varying from 6 months to 7 years (mean was 3.7 years). The ulcers size was fluctuating from 2x1cm to 17x11cm. Biopsy from the ulcer edge was negative for malignancy. In 34 (91.89%) patients the graft was taken completely and in 3 patient (8.1%), there was partial graft take (approx. 65-75% ulcer area). There were no cases of skin graft rejection. Thirty seven patients were relieved of pain by the end of one and half month. Remaining five patients had partial pain relief (patients with deep vein incompetence).

## Discussion

Venous ulceration (stasis ulcer) is the most severe and debilitating outcome of chronic venous insufficiency in the lower limbs and accounts for 80 percent of lower extremity ulcerations [8]. Lower extremities venous ulcers are the major cause of morbidity and disability. The morbidity caused by them has a serious impact on daily activities and quality of life [9-11]. Because of distressing and psychological symptoms of venous ulcers few studies have been done to know the quality of life. One study concludes that vascular leg ulcers result in poor quality of life, with direct correlation to duration and size of ulcer. Pain is common and troublesome symptom [12].

## Pathogenesis

Originally it was thought that venous ulcers are due to venous stasis and hydrostatic back pressure. This was not confirmed by investigation. There are different theories to explain the exact pathophysiological pathways, which lead to ulceration and impaired healing.

Due to alteration and distension of the dermal capillaries, at the microvascular level, leading to leakage of fibrinogen into the tissues. Polymerisation of this fibrinogen into fibrin cuffs leads to perivascular cuffing that can impede oxygen exchange, this contributing to ulceration. It was hypothesized that these cuffs could act as a diffusion block. Another theory suggest that leukocytes adhere to the capillary endothelium and cause plugging with diminished blood flow. Venous hypertension and capillary damage leads extravasation of the haemoglobin. The breakdown products of haemoglobin are irritating and cause pruritus, skin damage.

At present, ambulatory venous hypertension is the only accepted underlying cause of ulceration.

Venous hypertension occurs due to incompetence of saphenous veins, incompetence of perforating veins or incompetence or obstruction of deep veins [13,14].

The venous leg ulcers require an average of 2 years to heal and approximately 15% never heal. The recurrence rate (once or multiple times) is 15%-71% of cases [15]. The 5-year recurrence rate in healed ulcerations is upto 40% [16].

Treatment options for venous ulcers include conservative management, mechanical treatment, medications, and surgical options. The mainstay of conservative treatment of venous leg ulcers includes compression stockings with 30-40 mmHg of tension, as well as proper wound and skin care are [14]. The compression therapy results in significant improvement in pain, swelling, activity and patient satisfaction, with 70%-80% compliance [17]. A study by Mayberry JC et al., concludes that structured regimen of compression

stocking therapy can achieve complete healing in less than half a year (mean time: 5.3 months) in majority of the patients with venous leg ulcers [18]. So compressive stockings are the most effective and economically sound method for treatment of venous leg ulcers.

The compressive therapy needs to be applied properly, if not high recrudescence. Improper compressive therapy produces even worse results than no therapy at all [19,20]. If compressive therapy is applied properly, the recrudescence was 10%-16% of cases, and in improperly applied cases it was 97%-100% [21]. The venous ulcers which are resistant to compressive therapy, can be treated effectively by debridement of the ulcer along with skin graft [22,23].

The surgical management includes sclerotherapy, endovenous radiofrequency ablation, venous valve reconstruction of the deep veins, open perforator ligation surgery or Subfascial Endoscopic Perforator Surgery (SEPS), Trendelenburg operation for saphenofemoral junction (SFJ) incompetence. Ligation of short saphenous vein, if the SPJ is incompetent. Ligation with stripping of the GSV results in significant improvement in venous hemodynamics and may eliminate concomitant deep venous reflux. This altered venous hemodynamics assists in ulcer healing, provides symptomatic relief and prevent ulcer recurrence [24-26].

The role of venous surgery for superficial varicose veins is to reduce venous reflux, hasten healing, and to prevent ulcer recurrence.

The success rate of ulcer healing by surgical management is upto 88%. The recurrence rate is 13% in 10 months [27]. Surgical intervention, either venous bypass or valve replacement for deep venous system remains disappointing [28,29]. Skin autografting decreasing the area of venous leg ulcers or heals them completely, thus improves a patient's quality of life.

According to literature survey, the grafted skin has an antimicrobial effect [21,30,31]. In one study, where they compared the functionality SSG with conservative measures for the management of venous leg ulcers (mean size = 254 cm<sup>2</sup>) in 44 patients for 6 months duration. All patients were having sleep disorders because of the ulcers. 34 patients were treated by skin grafting and 10 patients by conservative method. Follow up was after 3-6 months. In SSG patients, ulcer pain had decreased, whereas it remained the same in conservative group. In the group of surgically-treated patients, ulcers did not disturb sleep after 3 months of surgery, whereas the problem persisted in other group [32].

A study by Jankunas et al., where they have assessed the effect of skin grafting and the impact on the quality of life of patients with chronic venous leg ulcers. The study concludes that skin grafting decreases the limitation of function, improves the dysphoric mood and positively influences the quality of patients' lives significantly ( $p < 0.05$ ). The healing of ulcers by SSG,

had decreased the leg pain within 6 months, which was earlier than conservative treatment alone group. The amount of patients' personal expenditure on the care and treatment of ulcers was high on conservative treatment alone group. In fact the personal expenditure was decreased in patients of SSG group [33].

Even though the compression therapy is an established treatment, it has many drawbacks when compared to SSG and venous surgery simultaneously. There is wide range of success for compression therapy. It may range from 30 to 60% at 24 weeks, and after one year it was around 70 to 85% [34].

The studies already proved that the success rate is unpredictable, takes longer time to heal the ulcer and to reduce the leg pain. It has application difficulty and physical limitations, such as obesity, pain in the ulcers and contact dermatitis [35]. Improper application of stockings or compressive bandages produces even worse results than no therapy. The cost of the treatment is high.

The preoperative hospital stay in our study was 4.2 days and was used for ulcer preparation, removal of slough, elimination of bacteria, and the stimulation of granulation tissue. The mean duration of hospital stay was 9.8 days. The healing of the ulcer was complete in 91.89% of patients at the time of stapler removal and in remaining three patients by the end of one month. In 32 patients, complete pain relief by the end of 45 days. Remaining five patients had partial pain relief (patients with deep vein incompetence). Patients were followed up, till to date. There was no ulcer recurrence noted in the 2 1/2 year follow up. The advanced surgical techniques for venous ulcers includes bioengineered tissue, electrical stimulation. The electrical stimulation has good results in terms of wound healing, fewer adverse effects and shorter duration of healing. When compared with surgical intervention, healing rates are less for electrical stimulation and bioengineered tissues. Utilization of electrical stimulation in venous ulcer management has not been fully explored [36].

## Conclusion

The superficial varicose vein surgery with simultaneous skin grafting for venous ulcers has high success rate, decreases the leg pain in short time, and prevents recurrence.

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