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Closure of Chronic Heel Ulcer by Simple V-Y Flap

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ABSTRACT

Full thickness defects in the plantar surface of the foot especially heel area is challenging to reconstructive surgeon. Many procedures have been described to cover this area including skin grafts and variety of local flaps up to free flaps. For the plantar surface of the heel previously described medial plantar advancement flap can produce successful results. However this method leaves donor site which requires skin grafting. Here we present simple V-Y technique for closure of chronic heel ulcer.

From February 2013 to September 2014. 10 cases of chronic heel ulcers in the weight bearing area (plantar surface) of different causes with average size of the ulcer 4x8 cm^2 (Average 5x7) had been done in Al-Azhar University hospitals. After preparation of the wounds by proper dressing, proper antibiotics according to culture and sensitivity and surgical debridement, Simple V-Y advancement technique was done to close the defect. In spite of wound dehiscence in 2 cases which were diabetics, 8 cases healed well with satisfactory results.

Conclusion: Coverage of chronic heel ulcer with V-Y technique is technically simple, does not scarify major vessel, bring similar local tissue into the defect confirming the concept of like-with-like and eliminate the need for more sophisticated equipment's and microsurgical expertise. It proved to be safe, simple, and should be considered among other treatment choices for heel reconstruction in non-major heel defects.

Key Words: *Surgical flaps – Heel injuries – V-Y advancement.*

INTRODUCTION

Heel is the important integrated part of the sole of foot which is essential for smooth walking. Without heel the propelling function of the foot during walking is severely interrupted **[1]**. Reconstruction of soft tissue defects of the plantar surface of the heel (weight bearing) area present challenging problems for plastic surgeon. Soft tissue defects we there from recent trauma or from chronic lesions are difficult to cover and require well vascularized reconstruction having good durability and sensation **[2]**. Recognition of the fasciocutaneous flap as reliable alternative for obtaining vascularized tissue has developed since it's reintroduction by Ponten who applied the knowledge of the suprafascial plexus to design a transposition flap for coverage of injured areas in the lower extremity **[3]**. Distant pedicled flaps such as cross leg flap or delayed local skin flaps may cause un justifiable morbidity unless microsurgical capabilities are un available or not been successful **[4]**.

Full thickness defects to the plantar surface of the foot present challenging to the reconstructive surgeon. Skin grafts and variety of flap procedures have been described to resurface this site. But not all achieve a return to normal foot function. For the plantar surface of the heel, the previously described medial plantar flap can produce successful results however this method leaves donor site which requires skin grafting **[5]**. In this study we present simple V-Y technique for coverage of chronic ulcer in the planar surface of the heel with satisfactory results without morbidity.

PATIENTS AND METHODS

From February 2013 to September 2014, ten cases of chronic heel ulcers were treated by local V-Y advancement flap in Al-Azhar University hospitals. There were 6 male and 4 female with age range 25-45 years (Mean 36.3 Y).

The cause of ulcers were respectively, 2 cases post traumatic (20%), 2 cases post deep burn (20%) and 6 cases of diabetes (60%). The follow-up period was 7-12 months (mean 10.1). The defect size ranged from 3x5-6x7 (mean 4.5x5). The patient's demographic data are shown in (Table 1).

After preparation of the wounds by proper dressing, proper antibiotics according to culture and sensitivity and control of blood sugar for diabetic patients, surgical debridement was done.

Operative details:

After surgical debridement, marking of V shape flap was done as shown in (Figs. 1A,2A). Skin

incision up to plantar fascia to release the fibrous septa and to easily move the flap depending on the subcutaneous random base was done (Fig. 2C).

The defect then closed by the flap in Y fashion with non-absorbable sutures without tension and light dressing had been done.

Post-operative:

Patients are not allowed to ambulate for 2 wks. Dressing done every 2 days. Stitches were removed after 2 wks. Also patients were advised to wear special shoes with padding for 3 months.

Table (1): Data of the studied cases.

Cases	Sex	Age	Etiology	Defect size	Follow-up	Comorbidities
1	M	35yrs	Trauma	6x4cm	9m	Non
2	M	30yrs	Diabetes	5x3cm	7m	Diabetic
3	M	35yrs	Trauma	5x7cm	10m	Non
4	M	27yrs	Deep Burn	4x5cm	15m	Non
5	F	38yrs	Diabetes	3x4cm	11m	Diabetic
6	M	40yrs	Diabetes	4.5x6cm	10m	Diabetic
7	F	33yrs	Diabetes	3x4cm	12m	Diabetic
8	F	36yrs	Deep Burn	4x5cm	8m	Non
9	M	44yrs	Diabetes	6x5cm	9m	Non
10	F	45yrs	Diabetes	4x6cm	10m	Diabetic

Fig. (1-A): Male patient 35 years old presented by posttraumatic heel ulcer after debridement.

Fig. (1-B): Intraoperative view showing closure of ulcer with V-Y flap.

Fig. (1-C): 5 months postoperative view showing complete healing of the flap.

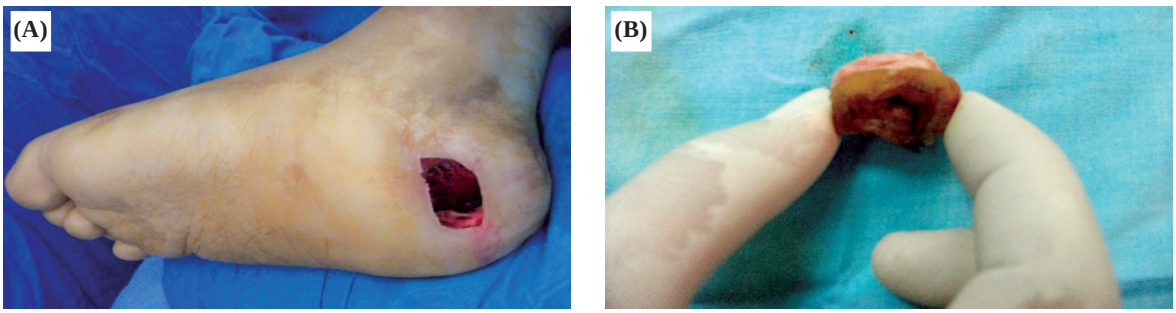

Fig. (2-A,B): Female patient 33 years old presented by old non healed diabetic heal ulcer that was excised.

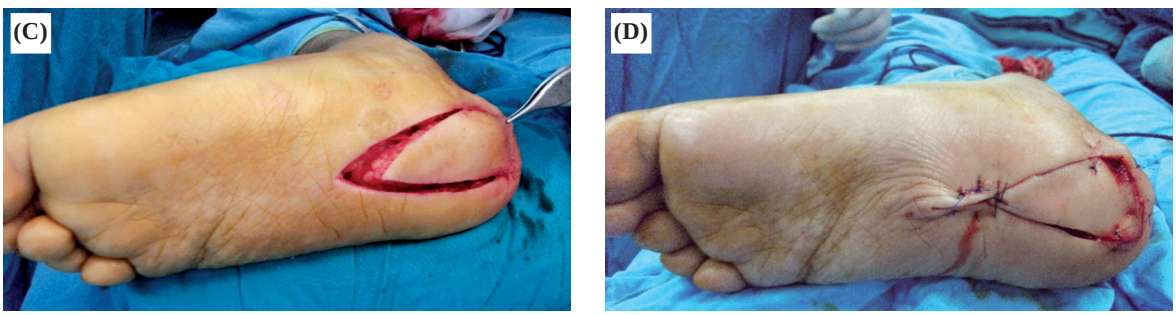

Fig. (2-C,D): Intraoperative views showing elevation of V-Y flaps and closure of donor site.

RESULTS

The patients studied were between 25 & 45 yrs. Of age with mean age (36.3) there was 5 male (60%) and 5 female (40%).

Follow-up period was up to 12 months mean period (10.1m), sound good healing occurred in 8 cases (80%) with satisfactory results regarding healing of the flap, sensation and weight bearing function.

Unfortunately wound dehiscence occurred in 2 case (20%) case n. 6 & case n. 10 due to wound infection which managed conservatively by proper anti biotic and proper dressing until complete healing.

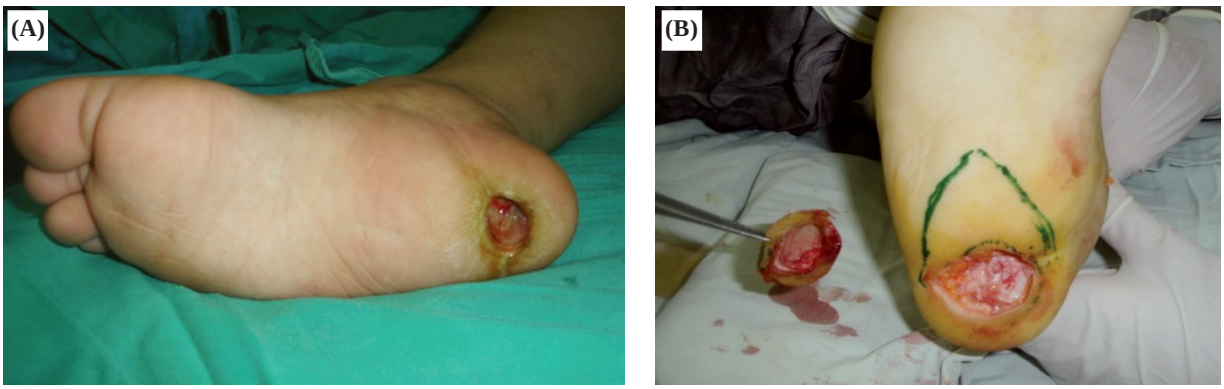

Fig. (3-A,B): Male patient 44 years old presented by old non healed diabetic heal ulcer that was excised.

Fig. (3-C): V-Y flaps Raised with closure of donor site.

Fig. (3-D): The foot after one month post-operative.

Table (2): Results of the studied cases.

Case	Follow-up	Complications	Healing	Sensation
1	9m	Non	Good healing	Good
2	7m	Non	Good healing	Fair
3	10m	Non	Good healing	Good
4	15m	Non	Good healing	Good
5	11m	Non	Good healing	Good
6	10m	Wound dehiscence	Healing after dressing	Fair
7	12m	Non	Good healing	Good
8	8m	Non	Good healing	Good
9	9m	Non	Good healing	Good
10	10m	Wound dehiscence	Healing after dressing	Good

DISCUSSION

Reconstruction of heel is a difficult problem to deal with. The paucity of local similar tissues around heel defects complicate the reconstructive procedure **[6]**.

There are several ways and options to overcome the problem of heel coverage. The techniques were applied for heel coverage starting from skin graft, to numerous types of flaps including muscle flaps, septocutaneous flaps, axial flaps and free flaps **[7]**.

Skin graft breaks up on repeated stress of weight bearing. A free flaps is also very technically demanding, mostly are bulky, and require high grade

of expertise and infrastructural support. Free flaps also are initially insensate, require more time for adaptive changes of weight bearing heel to achieve sensation. More over the incidence of flap loss is about 8% in an expert Centre **[8]**. Free flaps are also discouraged in case of diabetes by some authors for comorbidity and complication of prolonged operation **[9]**. Distant flaps like cross leg flap may be an option but it is a two stage surgery, carrying significant morbidity as patient's both legs are attached with each other, needs to stay in the hospital for more than three weeks and joints of the leg tend to become stiff **[10]**. Cross leg flap, despite its primitiveness, it is still very useful in some situation in the developing countries, where reconstructive surgery is yet to develop **[11]**.

Other well-defined lower extremity fasciocutaneous flaps based on named perforator or branch such as lateral calcaneal, lateral supramaleolar, and anterior-posterior perforating branch of the peroneal artery can be used to cover heel defects **[12]**. Also distally based flaps dependent on septocutaneous perforators of the posterior tibial artery or distally based sural island flaps can exist **[13]**. These flaps require much more meticulous dissection to determine the source perforator which frequently may be anomalous, and may scarify major limb vessel which may not be accepted in foot injuries **[14]**.

The random fasciocutaneous flaps have some additional advantages over the more complex composite tissue transfer these are; having less morbidity, avascular subfascial plane of dissection, little risk of hemorrhage, preservation of the major vascular structure of the lower limb and bringing similar local tissues into the defect **[15]**.

Suri et al., did study on 50 patients with post traumatic heel soft tissue defects. He covered the defects with various flaps depending upon the defect size, exact location, and associated injuries to select the most suitable method for soft tissue coverage of posterior heel defect. He concluded that reconstruction of posterior heel soft tissue defects is difficult because it needs sensate & stable coverage with minimal donor site morbidity.

Also he showed that it needs appropriate foot wear especially till the return of protective deep touch sensation **[16]**.

Robin et al., used medial plantar flap (axial pattern) by V-Y design to close plantar surface defect in the foot. His study included 3 cases with plantar surface defect. Case1 was spina pifida patient with 45mm wide heel ulcer, case 2&3 were 47&57mm defect after tumor excision. He followed the patients for 1 year regarding mobility, gait, and sensation.

He elicited that there was wound dehiscence in case 1 and it needs more robust and bulky flap. But in case 2&3 they were able to attain full unrestricted mobility and near normal sensation of the resurfaced skin. He concluded that this modified flap design retains the advantages of traditional medial plantar flap while minimizing its donor sit problem **[17]**.

In our study we did 10 cases with medium size chronic heel ulcer. The cause of ulcer was respectively 6 cases with diabetic ulcers (60%), 2 cases traumatic (20%), and 2 cases post deep burn (20%). We covered the defects by random pattern V-Y flap after good surgical debridement.

After follow-up for about 1 year 8 cases were healed soundly with accepted sensation and good mobility.

Unfortunately 2 cases developed post-operative wound dehiscence and managed conservatively with dressing.

We found that this technique is simple and safe to cover chronic heel ulcers with satisfactory results regarding healing, sensation and durability.

Conclusion:

Our study has shown that V-Y flap is a simple and safe technique for reconstruction of the weight-bearing chronic heel ulcer with medium size.

We recommend it as a good option in the treatment of chronic heel ulcer with better functional outcome.

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