

Punch grafts to treat lower limb intractable sores

“Punch grafts” nas úlceras de membros inferiores de difícil tratamento

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ABSTRACT

Lower limb recurrent ulcers, usually caused by prolonged decubitus, trauma, diabetes or burns, may not heal with conventional clinical or surgical treatment. Frequently, laminated skin grafts do not integrate with the recipient layer, and the only alternatives are neighbor microsurgical flaps. These have higher morbidity and create secondary defects, to be corrected with skin grafts, when fasciocutaneous or miocutaneous segments are removed for the treatment of the primary defect. We describe the non-conventional use of punch grafts in the treatment of lower limb ulcers, when conventional skin laminated graft failed, without the use of flaps. Since this is a very successful technique, its use should be considered as a valuable alternative for the treatment of recurrent lower limb ulcers. It is a simple and easy-learned technique that may be used by different surgeons, even in remote places without correct specialized hospital facilities.

Keywords: Skin Transplantation. Leg Ulcer. Biological Dressings.

INTRODUCTION

Lower limb deep ulcers usually do not heal, regardless the cause, and in most occasions are related to diabetes, trauma or burns. Best treatment depends on correct initial diagnosis and of etiological origin¹. In our country, non-surgical treatments, very popular, use expensive charcoal, silver and hydrocolloid dressings².

Any cutaneous lesion is subjected to epithelization phenomena and centripetal contraction due to miofibroblasts action³. This physiological response to trauma is not adequate to bigger ulcers, since it causes incomplete closure of the defect and/or covering with fragile epithelium, that usually harbors new ulcers, in-

fection, and in rare cases, development of squamous cell carcinoma, as it is observed in Marjolin ulcers⁴. The treatment of these lesions, when clinical management is unsatisfactory, usually is the use of laminated partial graft skin. Most times these grafts don't integrate or don't repair satisfactorily the defect, and, for that reason, it is necessary to use more complex reconstruction techniques with neighbor fasciocutaneous, muscular, miocutaneous or microsurgical cutaneous flaps. These are more technically challenging, with higher morbidity, risks and hospitalization time¹.

Punches are cut surgical instruments, that include a handle and a cylindrical tube, with cutting edge⁵. They are frequently used in Dermatology, particularly for biopsies of skin lesions. For biopsy, the

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use of punches are justified by the nature of the lesion, determining the correct diameter to be used⁶, from 2mm to 10mm⁵. In Plastic Surgery, their higher use was observed in the first surgical procedures to treat baldness: ten to 20 grouped hair follicles with 3mm to 4mm were transplanted. They were soon abandoned and replaced by micrografts: one to four hair follicles are transplanted, with a more natural result in relation to the artificial aspect of patients submitted to punches⁷. Their use as skin grafts is extremely rare in literature. We describe the unconventional use of punch grafts for skin transplantation, as a safe, simple and useful alternative to skin grafts, without the inconveniences of laminated partial skin grafts.

THECNICAL NOTE

We use regular punches, disposable or reusable, with large diameter (6 to 8 mm in diameter). Under local or spine anesthesia and eventual sedation, the ulcer is adequately washed and superficially debrided. After antisepsis, an area preferably at a sulcus or a flexion fold is infiltrated with 0.4% lidocaine with 1:200.000 adrenalin. After 15 minutes for correct adrenaline hemostasis, the punches are applied with rotation movements including the subcutaneous, collecting several punch grafts (Figure 1A). Using the same instrument, several perforations are made at the ulcer, with approximately 0.5cm between each hole, discarding the tissue removed (Figure 1B). With the aid of a delicate forceps, the punches, one by one, are inserted in each perforation (Figure 1C). If necessary, fat excess of the deep part of the punch graft may be excised before insertion. It is important to perform all perforations at the ulcer before starting the insertion of punch grafts, to avoid their extrusion caused by the more vigorous movement to make each perforation (Figure 2). A gauze with antiseptic cream is applied in the treated area and a compressive Brown dressing ends the procedure. The holes at the donor area are closed with "U" stitches of 4-0 nylon (Figure 1D). After ten days, the dressing is removed, and it is observed a whitish aspect of the visible surface of punch grafts (Figure 1E). After approximately three weeks, the punch grafts accrete and repair adequately the defect (Figure 1F).

We exemplify the technique used in two of our patients. One had a diabetic foot amputated, that was previously submitted to two partial skin grafts without success. In that corporal segment, the use of flaps depends on the localization, depth and extension of lesion, vascularization and particularly receptor area function: if it has to bear weight in the region⁸. The use of special footwear by a patient who lost distal part of foot requires underlying good quality and mechanically resistant tissues, to avoid ulcers, infection, or osteomyelitis¹. The use of microsurgical flap could be considered, but the concurrent diabetic vasculopathy could compromise morbidity, associated to particular risks and technical difficulties of microsurgical transplantation⁸. Figures 2 and 3 show surgery and final results.

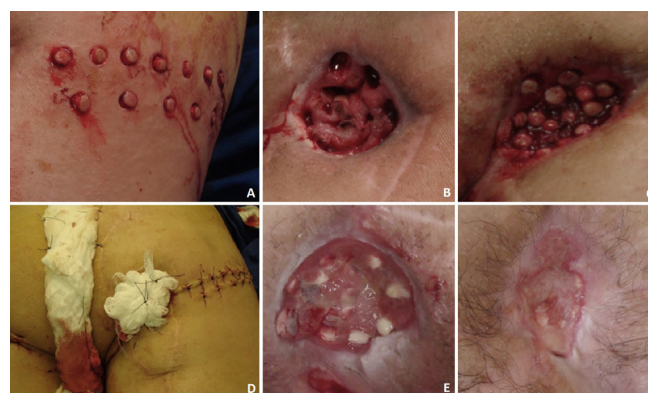


Figure 1. A-F) Punch grafts for the treatment of ischiatic ulcer.



Figure 2. Punch grafts to treat diabetic foot ulcer: operatory time.

The other patient was a martial arts professional, with rupture of calcaneus tendon. He was

submitted to tenorrhaphy, but developed a bothersome local fibrosis, treated with radiotherapy. Thirty years later, after using a tight shoe, he developed a deep and extensive ulcer at the region, with partial exposure of calcaneous tendon (Figure 4). He was submitted to non-surgical treatment with different dressings, without healing. Partial laminated skin grafts obtained



Figure 3. Post-operative of punch grafts treatment of diabetic foot ulcer.



Figure 4. Deep ulcer at the calcaneus: pre-operative.



Figure 5. Treatment of calcaneus ulcer with punch grafts: post-operative.

from the thigh, inserted twice, were unsuccessful and required two skin graft surgical procedures. Classically, for the posterior region of calcaneus, it is recommended the use of bilobed cutaneous grafts, reverse sural artery grafts, reverse fibular artery grafts, island flaps of the dorsum of the foot, and, in more severe cases, microsurgical flaps⁸. Patient did not agree with local flap, due to sensitivity and vulnerability of donor area, and other possible limitations of the professional or sportive use of the affected lower limb. Figures 4 and 5 show pre- and post-operative technique using punch skin grafts, and the healing of the treated defect.

DISCUSSION

When the ulcer area is deep or extensive with unsatisfactory trophic conditions, dressings usually do not repair correctly the defect, and partial skin flaps are used. Skin grafts are used to co-

ver cutaneous defects that could not be treated by direct approximation of borders and correct suture, without flanges or scars that harm limb movement. The more distal the lower limb defect, the lowest is the skin availability for advance and primary suture; therefore, skin grafts are very important to repair trauma and burn defects of lower limb and feet. However, in order to succeed, grafts should be applied in a trophic receptor bed, to ensure correct lymphatic soaking of graft and capillary neovascularization. Immobilization of graft for seven to 10 days is also important for success.

In deep lesions, the presence of tendons without epitendons, of bone without periosteum or prothesis exposure, skin grafts are not indicated, even with the advent of vacuum dressings, that occasionally stimulate tissue granulation, favoring graft integration⁸. Partial skin grafts integrate more easily than total skin flaps, but in regions of friction or weight support, they may be not as successful, particularly in labor aged people that regularly use shoes or slippers continuously⁹.

When skin grafts fail, the alternatives include cutaneous, fasciocutaneous and miocutaneous flaps. Most skin flaps do not present specific vascularization, and muscle and skin arteries are responsible for irrigation. These are connected to dermic and subdermal plexus. These flaps have reduced dimensions and many times require autonomization. A lesion of the subdermal plexus may cause partial or total loss of skin flap¹⁰. In view of the skin smallness and precarious cutaneous vascularization, lower limb frequently requires the use of fasciocutaneous, muscular (solum and gastrocnemius) flaps, followed by skin graft, or miocutaneous flaps, such as the fascia lata tensor muscle to correct trochanteric region defects, and hock muscles (Horteau) for correction of ischiatic region defects.

Fasciocutaneous flaps include skin, subcutaneous tissue and deep fascia, excluding muscle. They may be of axial or random types. Fasciocutaneous flaps safety is based on the rich vascularization of deep fascia. Another advantage is the low incidence of functional defects¹¹. Muscular flaps may feel deep spaces, and due to their rich capillary

net, they facilitate the deposition of antibiotics in tissues. These flaps respond more promptly to bacterial colonization and infections, and also facilitate fast deposition of collagen and growth¹².

Miocutaneous flaps have many particular qualities that ensure distinct advantage to be applied in lower limbs; they include several layers (skin, subcutaneous, fascia and muscle), providing volume, and a good reliability of vascular pedicle. One of the problems is muscular function harm¹³. All these flaps require major surgeries, and cause a secondary defect at the donor area, frequently repaired by direct closure, V-Y mobilization or skin transplantation. With higher surgical complexity and risks, microsurgical flaps, such as the forearm "Chinese flap" (pedicle in the radial artery) used to correct a diabetic foot amputation stump, or the miocutaneous flap of major dorsal muscle, to correct extensive loss of tissue of gluteus and trochanteric regions, may be used¹¹.

The use of punch grafts is proposed by the authors to be preferably used when special dressings and laminated partial skin grafts are unsuccessful, and when the above mentioned flaps were not used due to morbidity and risks, and/or aesthetic and functional damages of donor area. The use of punch grafts brings to the ulcer a complete skin segment with subcutaneous, dermis, appendices and epidermis. Due to their deep insertion, they are immobilized and protected, with lymphatic soaking and deep ulcer vascularization, favoring integration. On the contrary to laminated skin graft, some units may be lost and not all partial skin transplanted, as occasionally observed in difficult recurrent lower limb ulcers, submitted to the classic laminar technique.

Skin punch grafts use has been successfully reported by veterinarians, to treat race horse paws, with 60% to 95% of success¹⁴.

CONCLUSION

The old and frequently forgotten punch grafts are an efficient, simple, cheap and easy alternative for the treatment of recurrent lower limb

ulcers. Their use has been successful, when laminar skin flaps had failed, and may prevent the use of

more complex and with higher morbidity techniques, such as local and microsurgical flaps.

R E S U M O

As úlceras recidivantes de membros inferiores, decorrentes de decúbito prolongado, trauma, diabetes ou queimaduras, podem não responder adequadamente aos tratamentos convencionais, clínicos e cirúrgicos. Frequentemente, nestes casos, enxertos de pele laminada não se integram ao leito receptor, deixando o uso de retalhos de vizinhança e microcirúrgicos como únicas alternativas. Estes retalhos implicam em maior morbidade e criam defeitos secundários, a serem reparados por enxertos de pele, após fornecerem o segmento cutâneo, fasciocutâneo ou miocutâneo para o tratamento do defeito primário. Descrevemos o uso não convencional de enxertos em punch ("punch grafts") no tratamento de úlceras de membros inferiores, em situações em que a enxertia de pele laminada convencional não teve sucesso e retalhos não foram empregados. Pelo êxito desta técnica, seu uso deve ser considerado como uma valiosa alternativa no tratamento de úlceras recidivantes de membros inferiores. Sendo uma técnica simples e de fácil aprendizado, pode ser empregada por cirurgiões de diferentes especialidades, mesmo em locais remotos, onde inexistam as facilidades de um centro médico-hospitalar especializado.

Descritores: Úlcera da Perna. Curativos Biológicos. Transplante de Pele.

REFERENCES

1. Sarkar PK, Ballantyne S. Management of leg ulcers. *Postgrad Med J*. 2000;76:674-82.
2. Purser K. Wound dressing guidelines. Royal United Hospital Bath NHS Trust. 2007;747:2007.
3. Darby IA, Laverdet B, Bonté F, Desmoulière A. Fibroblasts and myofibroblasts in wound healing. *Clin Cosmet Investg Dermatol*. 2014;7:301-11.
4. Fazeli MS, Lebaschi AH, Hajirostam M, Keremati MR. Marjolin's Ulcer: Clinical and pathologic features of 83 cases and review of literature. *Med J Islam Repub Iran*. 2013;27(4):215-24.
5. Lourenço EA, Almeida CIR, Tucori JN, Menuzzi MA, Marcondes LGC. Utilização do "punch" em biópsias da mucosa oral. *Braz J Otorhinolaryngol*. 1984;50(2):17-20.
6. Werner B. Biópsia de pele e seu estudo histológico. Por quê? Para quê? Como? Parte II. *An Bras Dermatol*. 2009;84(5):507-13.
7. Limmer BL. Elliptical donor stereoscopically assisted micrografting as an approach to further refinement in hair transplantation. *Dermatol Surg*. 1994;20(12):789-93 apud Avram M, Rogers N, Contemporary hair transplantation. *Dermatol Surg*. 2009;35(11):1705-19.
8. Marsh JL, Perlyn CA. Decision Making in Plastic Surgery. St. Louis, Missouri: Quality Medical Publishing, 2010.
9. Tilkorn H, Drepper H, Hundeiker M. Problems in surgery of the sole of the foot. *Z Hautkr*. 1990;65(6):550-2, 555.
10. Converse JM. Reconstructive Plastic Surgery: Principles and Procedures in Correction, Reconstruction and Transplantation. 2ª ed. Philadelphia: W.B. Saunders Company; 1977.
11. Hochberg J. Manual de Retalhos Miocutâneos: Axiais, Osteomiocutâneos, Fasciocutâneos e Livres. Porto Alegre: AMRIGS, 1984.
12. Klebuc M, Menn Z. Muscle flaps and their role in limb salvage. *Methodist DeBakey Cardiovasc J*. 2013;9(2):95-9.
13. Gusmão LCB, Lima JSB, Duarte FHG, Souto AGF, Couto BMV. Bases anatômicas para utilização do músculo fibular terceiro em retalhos miocutâneos. *Rev Bras Cir Plást*. 2013;28(2):191-5.
14. Wilmink JM, van den Boom R, van Weeren PR, Barneveld A. The modified Meek technique as a

novel method for skin grafting in horses: evaluation of acceptance, wound contraction and closure in chronic wounds. *Equine Vet J.* 2006;38(4):324-9.

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