Autologous fat graft: an additional or alternative treatment in the ulcer healing

Cavigioli F², Forcellini D¹, Giaccone M¹, Comegliani G¹, Baserga C¹, Klinger M¹

¹ Università degli Studi di Milano, Istituto Clinico Humanitas, U.O.C. Chirurgia Plastica 2, Rozzano (MI), Italy
² Università degli Studi di Milano, MultiMedica Holding SpA, U.O.C. Chirurgia Plastica, Sesto San Giovanni (MI), Italy

Submitted 15 March 2012; Accepted 16 April 2012

INTRODUCTION

Ulcera is a lesion of the skin characterized by a slow or difficult healing. The ulcer may involve the dermis, the dermis and underlying ligaments. The causes can be manifold. Considering the etiopathogenetic aspects, we can classify: mechanical ulcers (pressure), vascular (arterial, venous, lymphatic, and autoimmune) and neuropathic ulcers. The subjective symptoms are characterized by pain, refer to shock, accompanied by functional impotence and intermittent claudication. In diabetic neuropathy, pain may be reduced or absent. The skin around it is dry, shiny, thin, atrophic, hairless with thick and sclerotic nails. Venous ulcers are characterized by thickened margins and have usually an elliptical shape. They are usually located on the medial face of the middle third of lower leg, just above the internal malleolus. The color of the skin around the lesion is dark due to ferric oxidized pigment, and often shows presence of edema, fovea and hyperthermia. The arterial pulses are usually present. The most frequent causes of venous leg ulcers are chronic venous insufficienty, venous hypertension or persistent impairment of microcirculation.

There are also autoimmune ulcers, caused by the presence of circulating immune complexes that can be found at the level of endothelium of blood vessels resulting in an impairment of the local microcirculation and consequently altering the trophism of the skin. They occur more frequently in patients with rheumatoid arthritis. We have also to consider post-traumatic ulcers, where there is discontinuity of the skin that often exposes the dermis and the subcutaneous fat. They are caused by trauma and can turn into chronic ulcers, due to unfavorable conditions, such as the need for numerous surgeries, infections or inadequate treatments. From September 2009 to November 2011 13 patients (11 suffering from post-traumatic ulcers and 2 patients suffering from vascular ulcers) were treated with autologous fat graft. Follow-up was performed at 2 weeks, 3 months and 6 months postoperatively. In all the patients treated obvious signs of clinical improvement with a clear reduction of the ulcerated area appeared. In 9 patients, we had a complete wound healing. The remaining 4 patients were subjected to further surgical procedures (skin graft). We have never had any complication, neither minor nor major. The adipose tissue promotes the healing process by repairing and replacing the lost tissue. These findings suggest that this treatment can significantly improve the functional features of patients with ulcerative diseases if compared to standard medications and surgery. Particularly, lipoinjection of patients with burn scars showed encouraging results concerning texture, softness and thickness of the skin. In conclusion, ulcers are a serious problem for patients causing a marked deterioration in their quality of life. We think that the treatment of post-traumatic and chronic ulcers by fat grafting is yielding encouraging results and could become suitable in many types of ulcers (post-traumatic, vascular, pressure ulcers), as an additional or alternative procedure with low morbidity.

Key words: Post-traumatic ulcer, Vascular ulcer, Fat graft, Lipoinjection.
These assumptions led us to test the potential of this technique in the treatment of ulcerated areas.

MATERIALS AND METHODS

From September 2009 to November 2011 13 patients (11 suffering from post-traumatic ulcers and 2 patients suffering from vascular ulcers) were treated with autologous fat graft. All patients underwent only one intervention under continuous intravenous fentanyl infusion associated with local anesthesia. After tumescent infiltration of 100 ml of saline solution, 75 mg of levobupivacaine, 40 mg of mepivacaine, and 0.5 ml of epinephrine 1:10000, liposuction of the subumbilical area by means of a 10-ml syringe was performed. An adipose tissue sample of approximately 10 cc was obtained and processed following Coleman’s technique (i.e., centrifuged at 3000 rpm for 3 minutes). A volume of 5 to 7 cc, depending on the size of the area to be treated, was injected using an 18-gauge angiographic needle with a snap-on wing (Cordis, a Johnson & Johnson Company, Roden, The Netherlands) into the central portion and around the ulcer at the level of the dermo-epidermal junction. Follow-up was performed at 2 weeks, 3 months and 6 months postoperatively.

RESULTS

In all the patients treated obvious signs of clinical improvement with a clear reduction of the ulcerated area appeared. In 9 patients, we had a complete wound healing (Figures 1, 2). The remaining 4 patients were subjected to further surgical procedures (skin graft). Concerning these patients, we had complete resolution of the ulcer. Only one patient, affected by a vascular ulcer, showed only a partial resolution of the lesion. At 6 months in 12 patients ulcers were completely healed. Only the patient affected by vascular ulcer did not present complete wound healing. We have never had any complication, neither minor nor major.

DISCUSSION

The adipose tissue promotes the healing process by repairing and replacing the lost tissue 16, 17, 20. These findings suggest that this treatment can significantly improve the functional features of patients with ulcerative diseases if compared to standard medica-
tions and surgery. Lipostructure is a safe, rapid and effective procedure. This technique is becoming very popular and the applications are increasing. Particularly, lipostructure of patients with burn scars showed encouraging results concerning texture, softness and thickness of the skin. Coleman’s technique ensures minimal trauma to the adipose tissue. In addition, the centrifugation may allow to increase the concentration of fat cells if compared to the simple sedimentation proposed by other authors. Patients are discharged the same day of surgery, they can then quickly return to their normal activities.

**CONCLUSION**

In conclusion, ulcers are a serious problem for patients causing a marked deterioration in their quality of life. The resolution of vascular ulcers is highly dependent on the patient’s general medical conditions. Nevertheless, we think that the treatment of post-traumatic and chronic ulcers by fat grafting is yielding encouraging results and could become suitable in many types of ulcers (post-traumatic, vascular, pressure ulcers), as an additional or alternative procedure with low morbidity.

**Conflict of interest:**

All Authors disclose any commercial associations or other arrangements that may pose a conflict of interest in connection with the article.

**REFERENCES**