Abstract

Intralesional corticosteroid administration is a procedure involving the injection of a steroid solution into abnormal skin, especially with scars and/or keloids. After the application of topical corticosteroids, atrophy may rarely develop in the skin and subcutaneous tissue. When the developed atrophy of the skin becomes permanent, aesthetic problems that lead to psychological problems negatively affect the daily life of the patients. In this study, pathogenesis of rarely developing linear skin atrophy induced by intralesional corticosteroid administration during scar treatment, clinical and treatment outcomes were presented in the light of the literature.

Keywords: Keloids, hypertrophic scar, atrophy, corticosteroid, fat grafting

INTRODUCTION

Intralesional corticosteroid injections are frequently used in many fields of medicine, especially in dermatology, rheumatology, physiotherapy, neurology, ophthalmology, and otorhinolaryngology. In dermocosmetics, these injections are used for the treatment of acne scars, alopecia, keloids, and hypertrophic scars.1,2

Local side effects can occur after the intralesional administration of corticosteroids. These side effects can include pain, ulceration, hypopigmentation, local calcification, secondary infections, granuloma formation, allergic reactions, and, very rarely, skin atrophy.3

This study presents the clinical findings and treatment outcomes in a case of linear cutaneous atrophy following intralesional corticosteroid application during the treatment of a hypertrophic scar, together with current information from the literature.

CASE PRESENTATION

A 19-year-old female patient applied to our clinic with a complaint of discoloration and severe thinning of the skin in her left forearm. Anamnesis revealed that a simple cut wound that had occurred on the patient’s distal forearm in August 2012 as a result of a glass cut was not sutured but was left to heal by secondary intention. When a hypertrophic scar and keloid developed along the incision line during the follow-up phase, a local triamcinolone injection was planned in another center and was administered in five sessions as of January 2013. The patient and her kin explained that the scar stopped growing as of May 2013; however, cutaneous and subcutaneous atrophy formed in the portion extending from the distal forearm along the cephalic vein to the antecubital fossa. The surgeon in-charge of her treatment decided to discontinue the local corticosteroid injection and monitor the development. The patient applied to our clinic when the atrophy showed no improvement at the end of six months. During the physical examination, severe thinning of the skin and subcutaneous atrophy were observed in the 18x3 cm portion of the left forearm extending from the distal along the cephalic vein to the antecubital fossa (Figure 1). In the distal forearm, a hyperemic, slightly elevated scar line sized 4x0.2 cm was observed longitudinally on the atrophic...
portion adjacent to the radial styloid process. A fat grafting procedure was planned.

**SURGICAL TECHNIQUE**

The patient underwent the operation in a supine position under Midazolam (5 mg/mL: Dormikum®, Roche, Germany)-induced local anesthesia. Before the procedure, her left lateral thigh area was marked and planned for fat grafting. The recipient site was marked in a similar manner. Tumescent fluid (120 cc physiological saline, 0.25% lidocaine, 1:200,000 adrenaline) was prepared and dispersed to the donor site through a 3-mm liposuction cannula. Using a 4-mm liposuction cannula, 60 cc lipoaspirate was harvested and centrifuged. A 30 cc fat graft was prepared and passed into the recipient site gradually and slowly in a controlled manner through a thin, obtuse Coleman cannula (Figure 2). Because the skin was severely thin, utmost care was taken to administer the injection with minimal trauma. A light massage was applied to enable homogeneous dispersion of the fat graft on the recipient site. In this course, because the skin was as fine as parchment, light hyperemia and punctual bleeding areas developed (Figure 3). Considering the possibility of local circulatory disorder, the massage was continued using an antibiotic ointment. The antibiotic ointment was generously applied onto the area where the fat graft was administered and covered with Bactigras® dressing without applying pressure. Oral antibiotics, analgesics, and elevation of the extremity were recommended, and the patient was discharged. Two days later, during redressing of the wound, the local punctual bleeding areas and hyperemia were seen to have cleared to a great extent. In a routine follow-up, the atrophic areas were seen to recover in the early postoperative phase. No problems were encountered in the donor site. The fat grafting procedure was repeated six months later. The result was found to be satisfactory in the 12-month follow-up period.

**DISCUSSION**

Dermatological changes that occur on the skin after local corticosteroid application are dermal atrophy, hypo- or hyperpigmentation, and alopecia. Skin atrophy, however, is rarely encountered after intralesional corticosteroid application. Surgical treatment options for such skin atrophy include fat grafting, fat injection, or reconstruction with temporal fascia.

The first reported case of autologous fat grafting was described in 1893 by Neuber. Fat grafting was uncommon until the 1980s, after which it became especially popular in the reconstruction of breast deformities. In the 2000s, autologous fat graft techniques were first used by Coleman and once more found wide usage around the world, especially in procedures other than those involving breast tissue. Coleman indicates that using proper technique in fat grafting procedures increases the viability of the graft. He briefly states the following particulars:

1. Fat should be harvested with proper grafting technique; because high pressure can degrade the viability of cells, an atmospheric pressure of about 0.6 is close to ideal; fat harvested at this pressure level maintains viability at about 95%;
2. Harvested fat cells should have minimal air contact;
3. When transferring the fat to the recipient site, lipoaspirate should be passed slowly and gradually and not as bolus.

Regarding the pathogenesis of the atrophy associated with intralesional corticosteroids, corticosteroids are reported to possibly develop on fibroblasts and keratinocytes in relation to antiproliferative effects. Corticosteroid-induced local vasoconstriction and subsequent thrombosis and thromboembolism can lead to tissue hypoxia in microcirculation, especially at the capillary level, and can thereby lead to local atrophy in the tissues. In some cases, progressive tissue hypoxia can even lead to tissue necrosis. Kikuchi and Horikawa suggest that skin atrophy caused by intralesional corticosteroid application develops as a result of changes in the lymphatic vessels. Some studies report cutaneous and subcutaneous atrophies to be dose dependent, and that atrophy develops...
sooner and faster in higher doses. In our case, atrophy was observed to extend outside of the area where the corticosteroid was administered and to spread linearly from the distal to the proximal wrist. The presence of linear atrophy aligned with the lymphaticovenous passage suggests that the medicine had possibly seeped outside of the targeted area, leading to undesired outcomes.

Hyperpigmentations and atrophies that develop after corticosteroid application can clear within several months without any additional treatment. However, in cases where atrophy is left to heal itself, this can raise aesthetic problems at a psychological level in patients if the atrophy does not clear. In our case, a fat grafting procedure was planned and performed when the atrophy had not cleared six months after the intralesional steroid treatment. In the routine follow-up, the atrophic areas were seen to recover even in the early stages following the fat grafting procedure; the cosmetic outcome was found to be satisfactory and was observed to have favorably affected the patient's psychology. The lipofilling procedure was found to be effective in scar modulation.

CONCLUSION

High doses and uncontrolled administration should be particularly avoided in local steroid applications. However, it should be borne in mind that the outcome can be reversed in cases in which skin atrophy still occurs. Usually, patients that develop atrophy can be expected to recover within six months. In cases in which the atrophy does not clear within six months, as was the case in our patient, autologous fat grafting constitutes a good surgical option, and a second stage procedure can be performed to perfect the outcome.

Informed Consent: Written informed consent was obtained patient who participated in this case.

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REFERENCES