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Case Report

Facial Chemical Burn Following Self-Administration of 80% Trichloroacetic Acid Solution: A Case Report and Its Management

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BRIEF TEXT

Background

Acne vulgaris is a chronic inflammatory disease of the pilosebaceous unit that commonly begins during adolescence and may persist into adulthood. It is one of the most prevalent dermatologic disorders worldwide and can manifest with both inflammatory and non-inflammatory lesions, primarily affecting the face, trunk, and upper extremities [1-3]. Delayed treatment of acne significantly increases the risk of permanent scarring and its associated psychosocial burden [4-6]. Various therapeutic approaches have been developed for the management of acne scars, including topical agents, surgical procedures, laser resurfacing, and chemical peeling techniques [7-9]….[9-12]. … [11].

Chemical peeling has been used for centuries to improve skin appearance and quality, with historical descriptions dating back to ancient Egyptian medicine [13]. … [14]. Among available peeling agents, trichloroacetic acid (TCA) occupies a prominent role because of its efficacy, predictability, and overall safety profile when administered by trained professionals [15].

Case Presentation

A 20-year-old woman with Fitzpatrick skin phototype IV presented to a specialized dermatology center with signs and symptoms of facial chemical burn. She had a history of atrophic acne scars, predominantly ice-pick scars, and had initially been considered a suitable candidate for physician-performed TCA CROSS therapy. The planned treatment consisted of four to six sessions of focal application of 80% TCA at four- to six-week intervals.

However, in pursuit of more rapid and dramatic improvement, the patient independently applied an 80% TCA solution at home using a cotton applicator directly over the affected areas. Immediately after application, she developed extensive frosting and severe burning sensations. Approximately 20 hours later, after washing her face with water, she sought dermatologic consultation.

Physical examination revealed a chemical burn involving the left malar and submalar regions, accompanied by erythema, brownish discoloration, and a persistent burning sensation. The lesion measured approximately 5 Ч 6 cm. No discharge, secondary infection, or systemic manifestations were observed (Figure 1).

Initial management focused on controlling acute inflammation and preventing further tissue injury. The patient received oral prednisolone (5 mg daily for five days), topical betamethasone lotion twice daily for three days, alpha ointment containing henna and turmeric extracts, and zinc oxide ointment. Strict photoprotection, including regular sunscreen use and sun avoidance measures, was recommended from the beginning of treatment (Figure 2).

After one week, once the acute inflammatory phase subsided, nightly Kligman's formula consisting of hydroquinone, tretinoin, and a topical corticosteroid was initiated to prevent and treat post-inflammatory hyperpigmentation. Regenerative therapy was subsequently introduced. Platelet-rich plasma (PRP) injections were administered weekly for four consecutive weeks (Figure 3,4). Following completion of PRP treatment, platelet-rich fibrin (PRF) therapy was performed sequentially, including PRF dressing during week six, PRF injection during week seven, and a second PRF dressing during week eight. The overall treatment course lasted eight weeks and resulted in progressive clinical improvement characterized by reduction of erythema, improvement of pigmentation abnormalities, enhanced skin texture, and satisfactory tissue restoration (Figure 5)

Discussion

Chemical peeling remains an established therapeutic modality for acne and acne scars. Common peeling agents include salicylic acid, glycolic acid, pyruvic acid, lactic acid, mandelic acid, Jessner's solution, TCA, and phenol [16,17]. Medium-depth chemical peels produce controlled epidermal and papillary dermal injury, leading to regeneration of epidermal and dermal structures. TCA concentrations approximately 30% have demonstrated efficacy and safety in treating mild-to-moderate acne scarring [18-21].

For deeper atrophic scars, particularly ice-pick and boxcar scars, the TCA CROSS technique has emerged as an effective treatment option by stimulating neocollagenesis and tissue remodeling [22, 23]. Nevertheless, as illustrated in the present case, the use of highly concentrated TCA outside professional settings may produce devastating consequences. Previous reports have documented severe chemical burns, permanent scarring, and pigmentary alterations following inappropriate application of concentrated TCA preparations [15, 24]. These observations underscore the importance of patient education and professional supervision in cosmetic dermatologic procedures.

An important aspect of this case was the implementation of a staged multimodal treatment protocol. Early administration of anti-inflammatory therapy likely helped limit tissue damage and facilitate wound stabilization. In addition, proactive management of post-inflammatory hyperpigmentation with Kligman's formula was particularly relevant because darker skin phototypes are more susceptible to pigmentary complications following cutaneous injury.

The most innovative component of the therapeutic strategy was the sequential use of platelet-derived regenerative products. PRP contains multiple bioactive growth factors, including platelet-derived growth factor, transforming growth factor-beta, and vascular endothelial growth factor, which promote angiogenesis, fibroblast proliferation, collagen synthesis, and tissue repair [25, 26]. PRF further enhances regenerative potential by providing a three-dimensional fibrin scaffold that allows sustained release of growth factors over time. The favorable clinical response observed in this patient suggests that combined PRP and PRF therapy may serve as a valuable adjunctive treatment for selected cases of chemical burn injury.

Furthermore, previous studies on chemical burn management have emphasized the importance of early intervention, appropriate wound care, and immediate irrigation following chemical exposure to minimize tissue damage and reduce long-term sequelae [27, 28]. The present case supports these recommendations and highlights the potential benefits of integrating regenerative medicine into conventional burn management.

Conclusion

This case report highlights the potentially severe and occasionally irreversible consequences of unsupervised application of high-concentration TCA for acne scar treatment. The findings emphasize the necessity of physician supervision, public education regarding the risks of self-administered chemical peels, and prompt medical evaluation following chemical injuries. Successful management of this complex facial chemical burn was achieved through a multimodal protocol involving acute inflammatory control, prevention of complications, targeted treatment of post-inflammatory hyperpigmentation, and sequential application of platelet-based regenerative therapies. The favorable clinical outcomes observed in this case suggest that PRP and PRF may represent promising adjunctive modalities for the reconstruction and restoration of chemically injured skin.

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Extended Abstract

Figure 1. Clinical Appearance Immediately After the Trichloroacetic Acid (TCA)-Induced Chemical Burn

Figure 5. Clinical Outcome at the End of Treatment

Figure 4. Clinical Appearance After Four Sessions of Platelet-Rich Plasma (PRP) Therapy

Figure 3. Clinical Appearance After Two Sessions of Platelet-Rich Plasma (PRP) Therapy

Figure 2. Week 2 Before Initiation of Platelet-Rich Plasma (PRP) Therapy