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ASSESSING THE OUTCOME OF 90% TRICHLOROACETIC ACID BY CHEMICAL RECONSTRUCTION OF SKIN SCARS TECHNIQUE IN THE PATIENTS WITH ICE PICK ACNE SCARS

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ABSTRACT

Background: The technique of chemical reconstruction of skin scars uses a high concentration of trichloroacetic acid applied locally on the acne scars to ultimately attain collagenization by initiating the process of inflammation. This in turn can reduce the appearance of scars which is the desired cosmetic result for the patient. **Material and Methods:** 20 patients with predominantly atrophic ice pick post acne scars were treated with chemical reconstruction of skin scars technique, using 90% trichloroacetic acid, which was applied with a wooden toothpick, at 2 weekly settings for four sittings. The outcome was assessed on the basis of clinical assessment, Goodman and Baron Scale, patient's feedback after the fourth treatment of treatment; clinical photographs at each sitting and at the three months follow up after the last treatment. **Results:** About 70% improvement was seen in 16 out of 20 patients and around 50% improvement was observed in the remaining 4 patients. No cosmetic disfigurement or significant side effects were noted. 3 months after the last treatment 2 patients noted a decrease in improvement. **Conclusion:** Chemical reconstruction of skin scars technique, using 90% trichloroacetic acid, is an effective modality for management of ice pick acne scars.

Keywords: Acne scars, Ice pick scars, Trichloroacetic acid, Chemical reconstruction

INTRODUCTION

Acne vulgaris, a chronic inflammatory dermatosis of the pilosebaceous unit, commonly leads to persistent scarring, particularly atrophic ice pick scars, which present a significant cosmetic concern for affected individuals. Treatment options such as laser therapy, including ultrapulse CO_2 laser and fractional CO_2 laser, have shown promise in improving the appearance of atrophic scars, significantly increasing overall treatment efficacy rates [1,2]. However, the chemical reconstruction of skin scars technique, specifically utilizing high concentrations of trichloroacetic acid, offers a targeted and cost-effective alternative for deep, narrow ice pick scars that may not fully respond to broader resurfacing modalities like lasers [3].

These treatment modalities often involve distinct mechanisms of action; while lasers induce collagen remodelling through thermal injury, chemical modalities like trichloroacetic acid CROSS exploit controlled chemical cautery to stimulate localized dermal regeneration. Furthermore, despite the effectiveness of laser therapies for various scar types, their clinical efficacy for acne scars often necessitates further rigorous evidence and meta-analyses to substantiate their widespread application [4]. However, the direct comparative effectiveness of TCA CROSS against advanced laser treatments for deep ice pick scars, particularly concerning long-term collagen synthesis and scar morphology, remains an area requiring further in-depth investigation. Laser therapy, dermabrasion, and surgical excision, have conventionally been employed for acne scar revision [5]. However, these methods often present limitations in treating ice pick scars due to their narrow, deep morphology, thereby necessitating precise, localized interventions such as the CROSS technique. Moreover, the efficacy of laser treatments for extensive scarring often requires multiple modes of application, further complicating their use and increasing patient burden [6].

While various treatments exist for acne scarring, including retinoids, microdermabrasion, dermal fillers, and surgical techniques like subcision, the optimal approach often depends on scar morphology and patient skin type [7,8]. Furthermore, recent advancements in optical technologies, particularly various laser systems, have significantly expanded the therapeutic repertoire for scar revision, enabling clinicians to optimize the appearance of scars through targeted light and thermal energy delivery [9]. These advanced laser applications, encompassing a range of wavelengths and pulse durations, offer precise control over tissue interaction, thereby minimizing collateral damage while maximizing collagen remodelling and scar contracture [9,10].

Further, emerging regenerative therapies, such as the application of platelet-rich plasma and adipose-derived stem cells, are being explored for their potential to enhance scar remodelling and tissue regeneration, often in

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conjunction with existing laser and microneedling techniques [11].

However, despite these advances, the selection of the most efficacious laser treatment for specific acne scar types, such as ice pick scars, still lacks comprehensive comparative clinical studies to provide an evidence-based selection strategy for clinicians [12]. Additionally, while laser therapy has become a gold standard for various scar types, its application for the unique characteristics of ice pick scars, which extend deeply into the dermis, may present challenges that necessitate combined or alternative treatment strategies [13]. Lasers and light therapies, while effective for various scar types, might not adequately address the deep, narrow morphology of ice pick scars, thereby necessitating adjunctive treatments for optimal cosmetic outcomes [14].

Laser therapy, fat grafting, and platelet-rich plasma have also emerged as beneficial adjuncts in scar revision by promoting tissue remodelling and reducing recovery times [15,16]. Moreover, the high cost and potential for adverse effects, such as post-inflammatory hyperpigmentation, associated with laser treatments, particularly in darker skin types, highlight the need for more accessible and safer alternatives. Dermabrasion and surgical excision are additional treatment modalities for acne scarring, though they also have certain limitations for deep ice pick scars [17]. The current study aimed to assess the outcome of chemical reconstruction of skin scars technique, using 90% trichloroacetic acid, for atrophic ice pick acne scars. To study any side effects of chemical reconstruction of skin scars technique, using 90% trichloroacetic acid, for atrophic ice pick acne scars.

MATERIALS AND METHODS

This research was designed as a prospective, longitudinal follow-up study. Each participant acted as their own control, which enabled minimizing interindividual variability by tracking every scar's progression over time. The entire duration of the study was 6 months, which consisted of a 2-month active treatment phase [four bi-weekly sessions] and 4-month observation period that ended with the final evaluation at month six. Sample size and recruitment a consecutive sample of 20 patients with clinically diagnosed ice-pick acne scars was enrolled from the dermatology outpatient clinic. Inclusion was restricted to adults with predominantly ice-pick type scars and no treatment in the six months prior to enrolment. Exclusion criteria were active acne, a tendency to form keloids, pregnancy, lactation, active skin infections, or the use of systemic retinoid in the previous year.

The intervention: The target area was disinfected with a mild antiseptic. The skin around the area was completely dried to prevent any TCA from spreading.

Cross Application: The operator uses a wooden toothpick to fill the base of each ice-pick scar with freshly prepared 90% trichloroacetic acid while the nondominant hand stretches the perilesional skin to facilitate fuller exposure to the scar. The TCA is applied until the scar region turns distinctly 'frosted,' which takes a few seconds.

Session Schedule: TCA applications were conducted biweekly. Patients were scheduled to attend four sessions on weeks 0, 2, 4, and 6.

Post-procedure Care: The patients were instructed to follow a routine which includes the application of a bland emollient, the proper use of broad-spectrum sunscreen, and a rest period. This rest period requires at least seven days of no picking, vigorous rubbing, and exfoliation as a means of recovery.

Follow-up and Assessment -Time-points: The baseline, which is the pretreatment stage, incorporates clinical evaluations as well as digital photographs which were taken during each treatment visit [week 0, week 2, week 4, and week 6], and three months after in week 18. The last visit of these patients after the six months of study was optional so it was considered a long-term assessment visit.

Secondary outcomes

Patient-reported satisfaction on a 5-point Likert scale collected after the fourth sitting and at the three-month visit. Adverse events [erythema duration, PIH, infection, scarring] recorded at each contact.

RESULTS

After four sessions of the 90% trichloroacetic acid [TCA] CROSS technique, clinical evaluation and patient feedback indicated substantial improvement in the appearance of ice pick acne scars. The main findings are summarized in the table below:

Table 1: Substantial improvement in the appearance of ice pick acne scars

Improvement level	N=20	% of patients
~70% improvement	16	80%
~50% improvement	4	20%
Cosmetic disfigurement	0	0%
Significant side effects	0	0%
Regression at 3 months	2	10%

After 4 sittings, 70% improvement was seen in 16 out of 20 patients and around 50% improvement was observed in the remaining 4 patients. No cosmetic disfigurement or significant side effects were noted. 3 months after the last treatment, 2 patients noted a decrease in improvement [Table 1].

The study involved of 20 patients with predominantly atrophic ice pick post-acne scars, who underwent treatment with the chemical reconstruction of skin scars technique using 90% trichloroacetic acid. This acid was precisely applied with a wooden toothpick at two-week intervals over four sittings to induce localized dermal injury and subsequent collagen remodelling. The outcome was evaluated through clinical assessment, patient feedback after the fourth session, and analysis of clinical photographs taken at each visit, with a final follow-up at three months posttreatment to ascertain sustained improvement. The results indicated a significant cosmetic enhancement, with 70% improvement noted in 16 out of 20 patients, and approximately 50% improvement observed in the

remaining four individuals. Notably, no cosmetic disfigurement or significant adverse effects were reported, underscoring the technique's safety profile and reaffirming its utility as a localized treatment option. Despite the initial success, two patients reported a decrease in the observed improvement three months after their final treatment session, suggesting a potential for regression that warrants further investigation into long-term maintenance strategies. This observed partial regression highlights the importance of sustained collagen induction or the potential benefit of adjunctive therapies to maintain the clinical improvements achieved.

The assessment of outcomes involved rigorous clinical evaluation, patient feedback, and photographic documentation, providing a multifaceted view of treatment efficacy and patient satisfaction. Goodman and Baron scar grading system was employed for a standardized and objective evaluation of scar severity and improvement, further enhancing the robustness of the findings.

The integration of quantitative measures like the Goodman and Baron scale, alongside qualitative assessments, provided a comprehensive evaluation of the therapeutic benefits.

Fig 1:

DISCUSSION

The findings from this study corroborate previous research demonstrating the efficacy of high-concentration trichloroacetic acid for treating atrophic acne scars, particularly the recalcitrant ice pick type. This method leverages controlled chemical burns to stimulate neocollagenesis and elastin production, thereby reducing scar depth and improving skin texture. This mechanism of action is crucial for addressing ice pick scars, which are characterized by their narrow, deep, punctiform tracts extending into the reticular dermis or even subcutaneous tissue, making them particularly challenging to treat with superficial modalities. Furthermore, the precision of topical application, as employed in the chemical reconstruction of skin scars technique, allows for targeted treatment within the deep, narrow confines of these scars, minimizing damage to surrounding healthy tissue.

This localized approach ensures that the inflammatory response is confined, optimizing the repair process and mitigating the risk of hypertrophic scarring or dyspigmentation. Lasers, such as fractional CO2 laser therapy, have also shown promise in improving scar appearance and patient-reported outcomes for various types of scars, including burn scars, by promoting collagen remodelling and dermal regeneration [18–20]. While laser treatments offer significant benefits, their mechanosensitivity on isolated fibroblasts and overall effectiveness can be further enhanced when combined with manual scar therapy techniques, which adapt dosages based on tissue physiology and wound healing phases to improve mobility and reduce inflammatory relapses [21, 22]. Conversely, combining techniques such as fat grafts mixed with platelet-rich plasma and non-ablative laser resurfacing has shown superior outcomes in scar treatment, yielding significant improvements in wound healing compared to monotherapies [15].

CONCLUSIONS

Ninety-percent TCA CROSS emerges as a straightforward, low-cost and widely accessible option for ice-pick acne scars. Our six-month follow-up showed consistent scar softening and narrowing with only transient erythema or hyperpigmentation, highlighting a favourable risk-benefit profile. To consolidate its place in everyday practice, future work should clarify optimum session numbers, maintenance schedules and patient selection, and should test combinations with energy-based or topical modulators to prolong collagen remodelling and limit relapse. Parallel mechanistic studies delineating TCA-triggered signalling pathways may inspire adjunctive agents that amplify and stabilize outcomes. Rigorous head-to-head trials will ultimately define its comparative value in contemporary scar management.

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