International Journal Dental and Medical Sciences Research
Volume 4, Issue 1, Jan-Feb 2022 pp 843-845 www.ijdmsrjournal.com ISSN: 2582-6018

Treatment of Acne Scar Using TCA Cross: A Review

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Submitted: 15-02-2022 Revised: 25-02-2022 Accepted: 28-02-2022

ABSTRACT
This research paper is about a widely used technique in which a high strength of trichloroacetic acid is used to treat scars .It is called as chemical reconstruction of skin scars". It is a relatively simple, well tolerated and cost effective procedure which offers both cosmetic and therapeutic benefits in scars treatment. TCA CROSS technique is highly efficacious in treating variety of scars like ice pick acne scars, chicken pox scars which are resistant to treatment with other modalities for scar reconstruction. This review also describes various indications, histologic effects and efficacy of trichloroacetic acid in dermatology.

I. INTRODUCTION

Many chemical agents have been used for scar treatment, including some that are less well known today, such as sour milk, cantharides, urine, mustard, and sulphur, among others[i] . Today the workhorses of the chemical peel domain are the a-hydroxy acids (AHAs), phenol, and TCA.

TCA was tested as early as 1882 by P. G. Unna in Germany, and has been the prototype of chemical peel agents since it was described by Roberts in 1926 and used for acne scarring by Monash in 1945[1] (1). Ayres first delineated its use as therapy for aging skin in 1960[ii].

With a protein dissociation constant (pKa) of 0.52, TCA is relatively stronger than the AHAs (the lower the pKa, the stronger the acid). 3.13[iii] . TCA likewise has a greater potential for causing injury to the skin at a medium or deep level than AHAs, depending upon the concentration and how it is applied.

A milestone in the study of chemical peels was achieved with the objective measurement of injury depth for each chemical agent used[iv]

Superficial peels are defined as those causing injury to the dermis and dermal-epidermal interface, and peels using 10–35% TCA as a sole agent generally fit into this category.

Medium-depth peels are defined as those that penetrate to the papillary or upper reticular dermis, and peels using 35–50% TCA as a sole agent or the TCA "combination peels" generally fit into this category.

Deep chemical peels are those that cause destruction into the reticular dermis, and TCA as a sole agent is generally not recommended here because of potential complications. Complications of TCA peels include dyspigmentation, telangiectasia's, sensitivity, uneven texture, and scarring, among others.

Unlike phenol peels, occlusion of TCA does not result in an enhanced depth of necrosis. Rather, at all concentrations, occlusion decreases the depth of necrosis, likely due to increased "interstitial humidification"[v].

MECHANISM OF ACTION AND HISTOLOGIC EFFECTS

Application of TCA to the skin causes precipitation of proteins and coagulative necrosis of cells in the epidermis and necrosis of collagen in the papillary to upper reticular dermis[1].Over several days the necrotic layers slough and the skin re-epithelializes from the adnexal structures that were spared from chemical damage[3].Dermal collagen remodelling after chemical peel may continue for several months[vi].

Many investigators have observed that the clinical effects of TCA were due to both a re-organization in dermal structural elements and an increase in dermal volume as a result of an increase in collagen content, glycosaminoglycan, and elastin[viiviii].

Stegman's(6) study in 1982 demonstrated that 40–60% TCA produced epidermal necrosis, papillary dermal edema, and homogenization to the mid-reticular dermis . Brodland et al. (7) showed in a porcine model that a minimum of 30% (w/v) TCA is required for complete epidermal necrosis with a single application, as would be indicated for full treatment of actinic keratoses.

INDICATIONS FOR TCA PEELS

1. Photo aging and rhytides,

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2. Moderately deep perioral wrinkles
3. Actinic keratoses,
4. Lentigines, and
5. Other pigmentarydyschromias
6. Acne scars
7. Post inflammatory hyperpigmentation,
8. Melasma,
9. Dilated pores,
10. Vitiligo,
11. Rosacea,
12. Seborrheic dermatitis.

CHEMICAL RECONSTRUCTION OF SKIN SCARS

Higher TCA concentrations produces increased dermal thickening and collagen volume (8).So, in order to maximize the effects of TCA and to overcome complications such as scarring, hyperpigmentation and hypopigmentation, CROSS technique is suggested which consisting of the focal application of higher TCA concentrations by pressing hard on the entire depressed area of atrophic acne scars using a sharpened wooden applicator[ix].

Lee et al, reported that 27 of 33 patients (82% of the 65% TCA group) and 30 of 32 patients (94% of the 100% TCA group) experienced a good clinical response. A better and faster response was seen in the 100% TCA group (9).

Histologic analysis by Yug et al.[x] of scars treated using focal TCA peeling revealed greater collagen production and fragmentation of elastin fibres in the papillary dermis that was more prominent in the CROSS method–treated areas than simple full-face TCA application at lower concentrations.

In another study by N.khunger and bhardwaj - Thirty patients with ice pick acne scars were treated with using high strength 100% TCA is found to be a safe, minimally invasive, efficacious, and cost-effective technique[xi]

Fabbrociniet al.[xii] used focal application of 50% TCA application in the treatment of 5 patients with atrophic acne or chicken pox scars. Clinical examination revealed cosmetic improvements in both depth and appearance of skin scars.

Few previous studies report the usefulness of this therapy in varicella scars -

Barikbin et al. [xiii]used 70% TCA at 3 weekly intervals for a maximum of 6 sessions in a series of 100 patients with varicella scars and reported marked improvement in 41%, moderate improvement in 42% and mild improvement in 12% cases at the end of 12 weeks of follow- up. Post-treatment side effects were mild and transient, resolving gradually within the study period. In their study increasing improvement rate between the 6- and 12-week follow-up visits suggested continuation of the healing process even after cessation of treatment.

Similar improvement reported by Whang[xiv] and colleagues, who found that excellent or good results were achieved in 69% of patients who received focal chemical peeling only once.

Agarwal et al studied a total of 16 patients with atrophic facial post varicella scars treated by focal application of 100% TCA solution, total 4 sittings were given at 2 weekly intervals and the results evaluated after 3 months of follow- up.13 patients completed the study showed good clinical improvement, with 69% patients grading the response as excellent (>75%) improvement, whereas the rest 31% patients reporting good (51- 75%) improvement. No significant complications were seen in any patient.

II. CONCLUSION

Scar treatment with TCA CROSS is an effective and affordable modality. It is a simple technique which can be easily learned and do not use too much of resources. It has least side effects if used in expert hands and with proper patient counseling. This is why it is widely practised .

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