High concentration trichloroacetic acid Versus dermaroller in treatment of acne Scars

Thesis
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Abstract

Background: Acne scarring is a common dermatologic condition that causes problems cosmetically and psychologically. Dermaroller is an effective method for treating acne scars. It is presumed to promote removal of damaged collagen growth and induce more collagen immediately under the epidermis. Chemical Reconstruction of Skin Scars (CROSS) method is focal application of full concentration trichloroacetic acid (TCA) to atrophic acne scars, used to maximize its effects and overcome its complications. It has the advantage of reconstructing acne scars by increasing dermal thickening and collagen production.

Objective: The purpose of this study was to compare the safety and efficacy of Dermaroller and high concentration TCA CROSS method as different therapeutic modalities for the treatment of atrophic acne scars.

Patients and Methods: The study was conducted on 30 patients; only 27 of them completed the course of treatment. Patients were randomly equally divided into 2 groups; patients in group 1 were subjected to 4 sessions (with 6 weeks apart) of Dermaroller, and patients in group 2 were subjected to 4 sessions (with 6 weeks apart) of full strength TCA CROSS technique.

Results: Acne scarring improved in 100% of patients. Scar severity scores improved by a mean of 68.28 % (P value<0.001) in group 1 and a mean of 75.30 % (P value <0.001) in group 2. The degree of improvement was not statistically significant when comparing both groups (P value 0.47).

Conclusion: Both Dermaroller and high concenteration TCA CROSS technique are effective in treatment of atrophic acne scars and gave comparably close results.

Key words: Acne scars, CROSS technique, Dermaroller, TCA.

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LIST OF ABBREVIATION

CIT: *COLLAGEN INDUCTION THERAPY.*

CROSS: *CHEMICAL RECONSTRUCTION OF SKIN SCARS.*

OCs: *ORAL CONTRACPTIVES.*

PCI: *PERCUTANEOUS COLLAGEN INDUCTION*

P. ACNE: *PROPIONOBACTERIUM ACNE.*

TCA: *TRICHLOROACETIC ACID.*

TLRs: *TOLL LIKE RECEPTRORS.*

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Introduction

Acne is a common disorder experienced by up to 80% of people between 11-30 years of age. For most patients acne remains a nuisance. The severe inflammatory response to propionibacterium acne bacteria results in permanent disfiguring scars, which may lead to social ostracism, withdrawal from society, and severe psychological depression ***(Jacob et al., 2001).***

Acne scarring involves the destruction or loss of connective tissue, with dermal atrophy and fibrosis. During maturation phase, the scars contracts and pulls the surface layers, causing indentation of the skin **(Choi et al., 2006).**

There are several classifications of acne scars. A comprehensive scheme was proposed, whereby scars are classified as rolling, ice-pick, shallow box-car, and deep box-car. Rolling scars are gently undulating, appearing like hills and valleys without sharp borders. Ice-pick scars, also kwon as pitted scars, appear as round, deep depressions. Box-car scars have a flat base. They are round, polygonal, or linear at the skin surface **(Alam and Dover, 2006).**

Among the therapeutic tools for treatment of acne scarring are resurfacing method, filler, chemical peeling and other dermal remodeling techniques. These methods can be adapted to treat specific scar types **(Tanzi and Alster, 2002).**

Treatment of atrophic scars by trichloroacetic acid (TCA) activates fibroblast in the dermis, and increasing the amount of collagen, with histological changes showing epidermal and dermal rejuvenation and decrease in the depth of acne scars **(Cho et al., 2006).** The focal application of TCA in a higher concentration (95-100%) has been histologically shown to increase collagen fibers and appeared to produce marked clinical improvement. This is called chemical reconstruction of skin scars (CROSS) method, which is reported as a safer and more effective method than simple application of TCA in activating fibroblasts

in the dermis and increasing the amount of collagen **(Lee et al., 2002; Cho et al., 2006 and Yug et al., 2006)**

Dermaroller offers a new and effective method to treat acne scars in a soft and non invasive way. The fine but extremely sharp surgical needles perforate the scar bed and scar edges. This takes off tissue tension and softens it. This procedure breaks down the fibrotic fibers that often connect the scar base with the fascia. Soon after scar perforation new capillaries and fibroblast can migrate through the scars walls into the scar crater. This results in a revascularization and normalization of the previously hypopigmented surrounding tissue. Percutaneous collagen induction was started in 1997 and has proved to be simple and fast method for safely treating scars. As opposed to ablative laser treatment, the epidermis remains intact and is not damaged. For this reason, the procedure can be repeated safely and also suited to regions where laser treatment and deep peels cannot be performed **(Aust et al., 2008).**

Aim of work:

To compare the efficacy of high concentrated TCA CROSS method and dermaroller as different therapeutic modalities for treatment of atrophic acne scars.

Incidence

Acne is an extremely common disease with a prevalence of 80-85% among adolescents. It persists throughout adulthood in 12% of women older than 25 years and in 3% of persons aged 35-44 years (***White, 1998***).

Pathogenesis

Acne is a multifactorial disease affecting pilosebaceous follicles. The initial event in development of an acne lesion is abnormal desquamation of keratinocytes that line the sebaceous follicle, which creates microplug or microcomedone ***(Knor, 2005).***

An increase in the circulating androgen at the onset of puberty stimulates production of sebum into the pilosebaceous unit. These events combine to create an environment within the pilosebaceous unit that is favorable for colonization of the commensal bacteria, propionobacterium acne. (P. acne) secrets various inflammatory molecules such as lipases, proteases, hyalurodinases and chemotactic factors; that initiate and perpetuate local inflammatory response. Immune response to P. acne includes humoral and cell mediated immunity and complement activation ***(Knor, 2005).***

Previous studies indicate that keratinocytes and sebocytes, as major components of pilosebaceous unit might act as immune cells and might be activated by P. acne via toll like receptors (TLRs) and CD14, and through CD1 molecules, they might recognize altered lipid content in sebum, followed by production of inflammatory cytokines ***(Webester, 2005).***

Diet and acne

Role of diet in acne causation and prevention is complex and controversial. On one hand, there is no evidence that acne is exacerbated by chocolate, nuts, candy, soft drinks, etc, and on the other hand , there is compelling epidemiological data that implicates glycemic diet and exess consumption of dairy products in acne ***(Kubba et al ., 2009)*** for example skim milk intake was associated with prevelance of acne in adolescent boys. This may be a result of ingested milk's effect on acnegenic androgen level, possibly in part because of the raised testosterone resulting from a hyperinsulinemic and IGF-1-mediated stimulus and in part caused by the dihydrotestosterone precursor present in milk ***(Webster, 2008).***

Clinical picture:

Non inflammatory acne is characterized by both open comedones (black heads) and closed comedones formation (whiteheads), while inflammatory acne originate with comedo formation but then expand to form, papules, pustules, nodules and cysts of varying severity ***(Zaenglein and Thiboutot, 2008).***

Differential diagnosis of inflammatory acne:

- Rosacea.
- Acne keloidalis nuchae ,pseudofolliculitis barbae.
- Acneform eruption.
- Folliculitis.
- Perioral dermatitis.
- Fruncle, carbuncle.
- Lupus miliaris disseminatus faciei

- Neutrophilic dermatosis.
- Keratosis pilaris.
- Follicular mycosis fungoid. ***(Zaenglein and Thiboutot, 2008)***

Treatment

The main aim of treatment is to prevent physical or psychological scarring ***(Stern, 2004).***

Medical treatment

Topical treatment

1-Topical retinoids

Topical retinoids have been used in acne therapy since 1962, and the first substance to be studied was tretinoin ***(kang, 2005).***

Retinoids include tretinoin (all-trans retinoic acid), isotretinoin (13-cis-retinoic acid), adapalene (derived from naphthoic acid), tazarotene (acetylenic retionoid) ***(Chivot, 2005),*** Retinoyl B-glucoronide , retinaldehyde, motritinide ***(Gollonick and Krautheim, 2003).***

Tretinoin is available as a gel or cream in a 0.025%, 0.05% and 0.1% solution. In USA, tretinoin is available in 0.1% tretinoin gel microsphere. It is shown to be less irritant than the standard commercial 0.025% tretinoin cream, adapalene is available as 0.1% gel, tazarotene is available as a 0.05% and 1% gel, isotretinoin is available as 0.05%gel ***(Chivot, 2005).***

Although different topical retinoids have different chemical structure, they are comedo suppressive and target microcomedo. However, there are differences in efficacy and tolerability [table 1 and 2] ***(Gollnick et al., 2003).***