Efficacy of diamond microdermabrasion with topical vitamin C in treatment of acne scars

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Abstract

Introduction: Acne scars are largely preventable complications of acne. 95% of the scars occur on the face thus impacting the quality of life. Correction of scars is the priority for acne patients. There is no single treatment modality that has been shown to be universally effective. Microdermabrasion (MDA) with infusion: A recent advances in MDA technology combine exfoliation with dermal infusion. During this process, topical products are delivered into the skin at the time of or immediately after exfoliation.

Aim of the work: Evaluation of efficacy of diamond microdermabrasion with topical vitamin C in treatment of acne scars.

Patients and Methods: Ten patients with post acne atrophic facial scars attending the outpatient clinic of Dermatology in Sohag University Hospitals between April 2018 to September 2018 were offered six diamond microdermabrasion sessions plus topical vitamin C (during the session of diamond microdermabrasion and daily topical application in between sessions) diamond microdermabrasion sessions were two weeks apart. They were evaluated at each session and one month after completion of sessions for both efficacy and safety of the procedure.

Results: The mean ± SD of the patients’ age in the study population was 26.00 ± 5.81 years old nine females and one male with mean acne scars duration ± SD 7.45 ± 4.73 years, 80% of patients had psychological distress from their acne scars. At the end of study duration none of the patients achieved grade reduction in their Goodman and Baron qualitative grading score and 100% of patients had poor (< 25%) satisfaction.

Conclusion: Multiple diamond microdermabrasion sessions with topical vitamin C during sessions and daily application is an ineffective treatment for post-acne atrophic scars.

Key words: diamond microdermabrasion sessions, Vitamen C, acne scar.

Introduction

Acne vulgaris is a very common dermatological disease, it has a prevalence of over 90% among adolescents and persists into adulthood in approximately 12%–14% of cases with psychological and social implications of high gravity (1). Inflammatory acne lesions can result in permanent scars (2). The prevalence and severity of acne scarring in the population has not been well studied, although in the available literature is usually correlated to the severity of acne (3) nearly 1% of people had acne scar (4).

There are two basic types of acne scar depending on whether there is a net loss or gain of collagen (atrophic and hypertrophic scars).

Eighty to ninety percent of people with acne scars have scars associated with a loss of collagen (atrophic scars) compared to a minority who show hypertrophic scars and keloids (5).

Severe scarring caused by acne is associated with substantial physical and psychological distress, particularly in adolescents (2).

Despite high prevalence of acne scars, there is no single treatment modality that has been shown to be universally effective, posing a significant challenge for the treating physician. However, there are multiple methods for the treatment of acne scars available, each with both pros and cons (6).
Microdermabrasion (MDA) with infusion; A recent advances in MDA technology combine exfoliation with dermal infusion. During this process, topical products are delivered into the skin at the time of or immediately after exfoliation.

These systems take advantage of the transient disruption to the epidermal barrier to better deliver medications into the deeper dermal layers (7,8).

The exfoliation effects of MDA are based on the principles of wound healing. By wounding and removing the uppermost layers of the skin in a controlled manner, cell renewal is stimulated with regeneration of a healthier epidermis and dermis (9).

So that, several authors have illustrated that microdermabrasion play a role in the improvement of skin contour irregularities, including rhytides and acne scar (10).

Vitamin C, the most plentiful antioxidant in human skin that is newly introduced as a topical agent for stimulation of collagen synthesis (11). It was found to increases the mRNA levels of collagens I and III, and their processing enzymes in humans and tissue inhibitor of matrix metalloproteinase 1 in the human dermis (12), also to improve the clinical appearance of photoaged skin and to reduce facial wrinkles (12).

The topical application of vitamin C partially restores the anatomical structure of the epidermal-dermal junction and increases the number of nutritive capillary loops in the papillary dermis close to the epidermal tissue in the aged skin (13).

The numerous adverse effects and prolonged downtime associate energy based techniques make non energy based techniques like microdermabrasion and topical agents are more suitable to wide range of acne scars sufferers (6).

**Aim of the work:**
Evaluation of efficacy of diamond microdermabrasion with topical vitamin C in treatment of acne scars.

**Patients and Methods:**
**Design:** Cross sectional clinical study.

**Patients:**
Ten patients with post acne atrophic facial scars attending the outpatient clinic of Dermatology in Sohag University Hospitals between April 2018 to September 2018 were offered six diamond microdermabrasion sessions plus topical vit. C (during the session and daily topical application in between sessions) diamond microdermabrasion sessions were two weeks apart. The study will be conducted according to the ethical guidelines to conduct research on human.

All the patients were informed verbally about the entire procedure, medication, possible complication and outcomes. An informed consent was signed from each participant. Patients were evaluated after each session and one month after completion of sessions for both efficacy and safety of the procedure. All patients were subjected to Medical history and Clinical examination including patients evaluation by Goodman and Baron grading system for qualitative description of post acne scar (14) This evaluation is repeated at each session.

Patient self-assessment of scar improvement will be obtained by recording the % of subjective improvement in the acne scars after treatment as compared with prior to treatment. Secondary response parameters such as effects on seborrhoea, pore size and skin texture as reported by patients were also recorded. These parameters were assessed by direct questioning of the patients after each treatment and one.
month after last session in the form of structured questionnaire in which patients will be asked to rate each parameter as being worse, no change, or improved after the treatment as compared with prior.

Goodman and Baron qualitative description of post acne scars grade acne scars to four grades macular, mild, moderate and sever.

- **The procedure:**

  The diamond microdermabrasion device used was

  The area to be treated was sterilized with topical alcohol for degreasing and disinfection effect. A sterilized diamond probe was used for the treatment. The instrument was passed in horizontal, vertical, and oblique directions for 10-20 minutes on the treatment area. After treatments the face was cleaned with sterile normal saline.

  After each session immediate application of topical vit.C serum was done and also once daily application in between sessions.

  The used vitamin C product was in the form of 17% concentration of L-Ascorbic Acid serum that was encapsulated in gelatinous capsules each contain 1 mg of the serum. This capsule form for topical application help to insure stability of the product and also insure use of equal dose in each application.

**Outcome assessments:**

At each session and one month after completion of sessions all patients are assessed clinically by Goodman and Baron qualitative grading system and Photographic documentation using identical camera setting, lighting and patient. Patient satisfaction: was evaluated at the end of study and was graded as one of four categories represents the % of subjective improvement in the acne scars after treatment as compared with prior to treatment. [Excellent (100% - 76%), Very Good (51% - 75%), good (26% - 50%) and poor (0% - 25%)].

Safety assessment: adverse effects and recovery times were recorded at each treatment visits and follow up visit (erythema, oedema, scaling and crusting, dyschromia and aggravation of inflammatory acne) before starting session, after each session and one month after the last session.

**Inclusion criteria:**

Facial acne scars and age greater than 18 years.

**Exclusion criteria:**

Active inflammatory acne, active infection in the treatment area (e.g., herpes simplex and verrucae), melanoma or lesions suspected of malignancy, isotretinoin use in the past year, dermatoses (e.g., eczema and psoriasis), sunburn, anticoagulant therapy and systemic disease (diabetes, hypertension, collagen disease or bleeding tendency).

**Results**

The mean ± SD of the patients’ age in the study population were 26.00 ± 5.81 years old nine females and one males with mean acne scars duration ± SD 7.45 ± 4.73 years, 80% of patients had psychological distress from their acne scars. Before starting sessions 50%, 40% and 10% of patients were grade 2, 3 and 4 Goodman and Baron grading system respectively.

One month after completion of sessions there was no improvement in the Goodman and Baron grading system.

As regard patient self-assessment, 100% of them report < 25% improvement (poor response) while 60% record improvement in their seborrhea and 50% report improvement in their skin texture.
Discussion

Although a lot of studies done to evaluate efficacy of microdermabrasion either alone or in conjunction with other modalities of acne scar therapy, the challenge to compare our results to previous was due to heterogeneity in their sample size, study design and patient demographics. In addition, different scar grading scales have been used by different studies.

Our study population size was nearly equal to that conducted by Leheta et al. (15), Sharad. (16), El-Domyati et al. (17), Gadkari and Nayak. (18), Leheta et al. (19) to evaluate efficacy of minimaly invasive procedures in treatments of acne scars.

Number of sessions was six sessions one every two weeks near to the average study durations and sessions intervals done by Coimbra et al. (20), Shim et al. (9), and Karimipour et al. (21). For patients evaluation our study combins subjective Goodman and Baron qualitative grading system as used by Majid. (22), Chawla. (23), Nofal et al. (25) and patient satisfaction that used by Leheta et al. (19), Nofal et al. (24).

This study is the first study that uses vit. C daily with microdermabrasion session to treat acne scars in a form of L-ascorbic acid serum as recommended by studies done by Pinnell et al. (25) and in concentration 17% that recommended by study of Matsuda et al. (26) to affect dermal collagen and daily application in between sessions to insure continuous dermal collagenesis.

The only other study that used vit. C 15% with microneedling was Chawla. (23) that used vit. C only during sessions without daily application and compared this with microneedling with PRP.

Although it was found by Coimbra et al. (20) that MDA had a filling effect on fine wrinkles due to enhancement of new collagen production in dermis. The same finding was supported on histological and molecular based studies done by Shim et al. (9) and Karimipour et al. (22) respectively.

In our study clinical evaluation of patients by Goodman and Baron grading system shows no improvement in their scars after combining MDA and topical vitamin C.

This can be explained by the need for get rid of fibrous bands responsible for atrophic scars to be replaced by new collagen formation enhanced by MDA and topical vitamin C.

Conclusion

Multiple minimally invasive sessions of skin microdermabrasion with topical vitamin C during sessions and daily application are an ineffective treatment for post-acne atrophic scars.

References

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