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Comparative analysis of Subcision with Derma roller and Subcision with TCA 50% cross in management of atrophic acne scars

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Abstract

Background: Scarring is a dreaded outcome of acne vulgaris and can occur in all levels of acne severity with negative effects on quality of life of the patients suffering from it. Numerous options for treating post acne scars have been explored over time with variable success. As the demand for effective treatment options with minimal morbidity and down time is increasing, our study may encourage cost effective, minimally invasive combination approaches involving Subcision, derma roller and TCA 50% CROSS.

Aims and objectives: To compare the efficacy between Subcision with derma roller and Subcision with TCA 50% CROSS in management of atrophic acne scars.

Materials and methods: Hospital-based the rapeutic study conducted at Department of DVL, Guntur Medical College. 30 patients with atrophic acne scars were randomly divided into two groups with 15 patients each. Group1 underwent three sessions of Subcision followed by micro needling and Group2 underwent three sessions of Subcision followed by TCA 50% CROSS. Successive sessions were done at 4-week intervals in two groups.

Results: All patients in both the groups had improvement in scars at least by one grade. There was statistically significant decrease in proportion of patients with grade 4 and grade 3 scars and increase in patients with grade 1 and grade 2 scars. Difference in final

improvement between both the groups was not statistically significant.

Conclusion: Both the combination approaches were proved to be safe and cost effective in management of atrophic acne scars.

Keywords: Acne scars, Subcision, Micro needling, TCA CROSS.

Introduction

Acne is a chronic, self-limiting, inflammatory disease of pilosebaceous unit manifesting generally in adolescence with pleomorphic lesions like come dones, papules, pustules, nodules and cysts and may lead to scarring. It is a common skin condition affecting approximately 9.4% of the world's population with highest prevalence in adolescents. Post-acne scarring may affect up to 95% of patients with acne vulgaris and is related to severity and duration of acne vulgaris before treatment [1].It causes significant psychological distress and is even identified as a risk factor for suicide[2].

Acne scarring is classified clinically as Atrophic, Hypertrophic or Keloidal of which atrophic type is the commonest. Atrophic scars are further classified into: Ice-pick, Boxcar, Rolling [3]. The European acne group (ECCA) has renamed atrophic acne scars as V-shaped (icepick), U-shaped (boxcar), and W-shaped (rolling) [4]. Remodeling of collagen, the last step in tissue repair, is modulated by MMPs, which cause the damage and tissue inhibitors of metalloproteases (TIMPS), which contain the damage. When the ratio of MMPs/TIMPs is low, atrophic scars occur and when the ratio is high, hypertrophic scars occur [5]. Various effective modalities including tissue undermining, skin resurfacing, lasers and surgical techniques have been developed to treat post acne scars with each procedure being more efficacious in certain scar types. Most of the patients have more than one type of scar. Treatment of acne scarring must be individually directed for each patient depending on type of scars present [6]. It may require a combination approach with each type of scar needing different treatment.

Subcision or subcutaneous incision-less surgery involves subcutaneous sectioning of dermal adhesions with a 18 to 27 gauge hypodermic needle or NOKOR needle thereby causing elevation of the depressed scar [7,16]. Derma roller is a drum shaped device with needles arranged in circular arrays that aid in inducing controlled skin injury without damaging the epidermis through a process called micro needling [8]. This helps in initiating a complex cascade of growth factors ultimately resulting in collagen induction. TCA CROSS involves focal application of 50- 100% TCA with wooden applicator to the base of an atrophic scar to produce necrosis of floor which further heals with dermal thickening and collagen production [9].

The aim of this study is to combine Subcision with other scar revision techniques (derma roller/TCA) in management of atrophic acne scars. Subcision breaks the dermal tethering of scars while TCA/derma roller help in collagen remodeling thereby aiming at the basic pathology of scar formation.

Materials and methods

This is a hospital based therapeutic study to compare efficacy of Subcision with derma roller and Subcision with TCA 50% CROSS in patients attending dermatology department in government hospital, Guntur. Study was conducted over a period of 20 months from January 2021 to August 2022.

30 patients of age group 18-45 years diagnosed with atrophic acne scars attending DVL OPD were included in the study. Exclusion criteria were presence of active

acne or infection, history of bleeding diathesis, recurrent Herpes simplex, keloidal tendency, surgical procedure for scarring with in previous 3 months, use of Isotretinoin in past 6 months, sensitivity to peeling agents.

Patients were randomly allocated to two groups – 1 and 2

- Group 1 – patients were treated with Subcision followed immediately by micro needling.
- Group 2 – patients were treated with Subcision followed by application of TCA CROSS 50%.

Procedures were repeated for 3 sessions every 4 weeks in both groups.

Prior to the procedure, topical an aesthetic cream was applied and left under occlusion for 40 minutes.

Methods

Subcision

After proper disinfection, scars were marked using a surgical pen. A 21-gauge needle mounted on a 5cc syringe was inserted at the periphery of the scar with bevel facing upwards. Needle was advanced parallel to the skin surface in dermo-subcutaneous plane until the tip of needle comes to lie beneath the scar. Needle was then moved to and fro initially to break the fibrous bands. Snapping sound was heard indicating the release of tethering. An additional fanning movement was done by swiping the needle side to side beneath the scar, while withdrawing the needle. Skin was squeezed circumferentially to prevent formation of hematoma and adequate pressure was applied with saline soaked gauze for 5 minutes.

Derma roller

Micro needling using derma roller was done immediately after Subcision in group 1 patients. While stretching the skin with one hand, derma roller was held like a pen with dominant hand and rolled over skin 5 times in three directions- horizontally, vertically and diagonally until. This results in 250 holes/cm^2. End point observed was uniform pin point bleeding. Treated area was cleaned with saline soaked gauze.

TCA 50% cross

Subcision was followed by TCA 50% CROSS application in group 2 patients. After cleaning the area with normal saline, 50% TCA was applied with pointed end of wooden toothpick by pressing on the base of depressed scars. Frosting was taken as the end point..

Patients were advised photoprotection with broad spectrum sunscreen with SPF >30 for at least 1 week following procedure.

Follow up and assessment

After completion of 3 sessions of the procedure in both groups, patients were followed up till 3 months and final grading of scars was done at the end of 3 months.

Photographs of affected areas were taken at each visit along with clinical assessment of grades.

Patients were asked to rate their improvement on a scale of 1 – 10 at final follow up.

Rating on 1-10 scale	Patient satisfaction
> 7	EXCELLENT
5, 6, 7	GOOD
3 or 4	FAIR
< 3	POOR

Final results were labelled as

- EXCELLENT (>70%) –two-grade improvement observed by both photographs and grading system, and patient rates his improvement as >7.
- GOOD (50-70%) - one-grade improvement observed by both photographs and grading system, and patient rates his improvement as 5,6,7.

- FAIR (30-50%) - improvement in scars observed only by photographs, and patient rates his improvement as 3 or 4.
- POOR (<30%) - no improvement observed either by photographs or grading system, and patient rates improvement as<3.

Statistical analysis

SPSS (Statistical package for the social sciences) was used to tabulate and analyse data.

- Quantitative data expressed as mean ± standard deviation
- Qualitative data expressed in counts or percentage
- Chi-square test was done to determine *p* value which when <0.05 suggestive of statistical significance.

Results

Overall male predominance was noted in our study with 76.7% of the participants being males. Majority of patients were in the age group 21-30 years with mean age of 25.03 years (SD ±4.65, Range: 18-40).

Predominant scar type in majority of patients was found to be of Boxcar type (50% cases) followed by rolling scars in 33.3% patients and ice pick scars in 16.7% patients.

According to goodman and baron qualitative grading, 10 patients (13.3%) had grade 4 acne scars, 13 patients (43.3%) had grade 3 scars, 7 patients (23.3%) had grade 2 scars. There was no significant difference in baseline scar grade between the two groups.

Variables such as scar morphology and baseline scar grade which were likely to influence the final outcome were equally distributed between the two study groups thus, confirming that the two groups were comparable to begin with.

Table 1: shows baseline characteristics of both study groups.

	Group 1	Group 2
Mean age	25.06 ± 4.65	25 ± 5.11
Sex		
Males	12	11
Females	3	4
Predominant scar type		
Rolling	6	4
Ice pick	2	3
Boxcar	7	8
Baseline scar grade		
Severe	5	5
Moderate	7	6
Mild	3	4

In Group 1, three months post treatment, proportion of patients with grade 4 and grade 3 scars was reduced to zero percent and 13 percent respectively. Proportion of patients with grade 2 was increased to 53.3% and patients with grade 1 acne scars was increased from zero percent to 33.3%. Hence after treatment, number of patients with grade 4 and grade 3 acne scars reduced significantly while patients with grade 2 and grade 1 scars were significantly increased (p = 0.0001).

In Group 2, three months post treatment, proportion of patients with grade 4 and grade 3 was reduced to zero percent and 26.6 percent respectively. Proportion of patients with grade 2 was increased to 40% and grade 1 acne scars was increased from zero percent to 33.3%. Hence after treatment, number of patients with grade 4 and grade 3 acne scars reduced significantly while patients with grade 2 and grade 1 scars were significantly increased (p = 0.01).

Table 2: shows scar grades before and after treatment in both groups.

	Group 1				Group 2			
Grade	Before treatment		After treatment		Before treatment		After treatment	
1	0	0%	5	33.3%	0	0%	5	33.3%
2	3	20%	8	53.3%	4	26.7%	6	40%
3	7	46.7%	2	13.3%	6	40%	4	26.7%
4	5	33.3%	0	0%	5	33.3%	0	0%
Total	15		15		15		15	
	Chi square test= 15.05, p=0.0001*, statistically significant				Chi square test= 10.80, p=0.01*, statistically significant			

Improvement in terms of appearance of scar along with patient satisfaction was graded as Excellent (>70%), Good (50-70%), Fair (30-50%), Poor (<30%).

- Excellent improvement was seen in 5 patients (33.3%) in group 1 and 2 patients (13.3%) in group 2.
- Good improvement was noted in 7 patients (46.6%) in group 1 and 5 patients (33.3%) in group2.
- Fair improvement was seen in 3 patients (20%) in group 1 and 8 patients (53.3%) in group 2.
- 100 percentage patients showed minimum one grade improvement in scar and response was >30% in all patients in both groups.
- There was clinically significant difference in improvement between the two groups but it was not statistically significant.

Table 3: shows final improvement in both groups.

	Group 1 (Subcision + derma roller)	Group 2 (Subcision + TCA)	Total
Excellent	5	2	7 (23.3%)
Good	7	5	12 (40%)
Fair	3	8	11 (36.7%)
Total	15	15	30 (100%)
Chi square test= 3.89, p=0.14, Not statistically significant			

Most of the patients rated their response as Good (40%) patients. 100 percentage patients rated their response >3. There was no statistically significant difference in patient satisfaction rating between the two groups.

Majority of patients had no adverse effects except for transient post procedure erythema and edema. Acne flare was observed in 2 cases in group 1 but none in group 2. Hematoma was observed in 1 patient each in both groups. PIH was noticed in 1 patient in group 1 and 2 patients in group 2.

Figure 1: Subcision with derma roller

A) Before treatment

B) 3 months post treatment

Figure 2: Subcision with TCA 50% CROSS

A) Before treatment

B) 3 months post treatment

Table 4: shows comparison of our study groups with other studies.

	Our study		Dhamale et al			Dhollan N et al	
Method	**S + M**	**S + T**	**S + M**	**S + T**	**S**	**M**	**T**
Excellent (>70%)	33.3%	13.3%	25%	0%	0%	26.7	14.3
Good (50-70%)	46.6%	33.3%	50%	38.1%	4.8%	46.7	35.7
Total (Above 50% improvement)	80%	46.6%	75%	38.1%	4.8%	73%	50%

Discussion

According to Adityan et al, high incidence (39.5%) of acne scarring was observed in India. This encourages us to study efficacy of cost-effective modalities like Subcision, micro needling and TCA 50% CROSS.

30 patients who were willing and fulfilled the inclusion criteria were included in the study. They were randomly divided into 2 groups (group 1 and group 2) with 15 patients in each group.

Group 1 – Subcision followed by micro needling with derma roller for 3 sessions.

Group 2 – Subcision followed by TCA 50% CROSS application for 3 sessions.

In group 1, out of all the patients who underwent Subcision with derma roller, Excellent (>70%) improvement was seen in 5 patients (33.3%).

- In a study comparing micro needling and TCA 100% CROSS by Priyanka Sharma et al [10], 24% patients showed excellent improvement in micro needling group.
- In a study by Dogra et al [11], approximately 13% of patients showed excellent response with micro needling. In Dham ale et al [12] study on evaluation of various upcoming therapies for acne scars, zero cases showed excellent improvement with Subcision. In the same study, 25% cases showed excellent response with Subcision plus micro needling which is comparable to results in our study.
- In Shashank Bhargava et al [13] study combining Subcision and micro needling, post treatment improvement of 2 grades was noticed in 24.4% cases.

Proportion of patients with excellent improvement in our study are almost similar to other studies by Dham ale et al and Shashank Bhargava et al study which combined Subcision with micro needling. But results in our study were superior to Priyanka Sharma et al study and Dogra et al study involving micro needling alone and this superiority in results may be accounted for the use of Subcision along with micro needling in our study.

In group 2, only 2 patients (13.3%) showed excellent improvement.

- In a study by Priyanka Sharma et al, 24% patients showed excellent improvement with 100% TCA CROSS.
- Excellent improvement was noticed in 60% of cases in a study by Jasleen Kaur et al[14] on Subcision with 50% TCA CROSS in management of atrophic acne scars.
- In a study by Dhollan N et al [15] comparing micro needling and TCA 100%CROSS, 14.8% patients showed improvement >75% (equivalent to excellent response in our study

Proportion of patients with excellent improvement in group 2 of our study is comparable with that in Dhollan et al study which involved use of 100%TCA. The equivalence in the results my be attributed to TCA being used in combination therapy in our study and higher concentration of TCA peel used in Dhollan et al study.

In group 1, 46.6% of patients showed GOOD improvement in scar grade.

- In Priyanka Sharma et al study, 60% cases showed moderate response (50-75%).
- In Dham ale et al study, 50% cases in Subcision with micro needling group showed 51-75% improvement.
- In Shashank Bhargava et al study combining Subcision and micro needling single grade improvement was noticed in 71% cases.
- In Dhollan N et al study, 50-74% improvement was seen in 46.7% patients who underwent micro needling alone.

In group 2 of our study, 33.3% patients showed GOOD improvement.

- In Jasleen Kaur et al study, 30% cases showed good response, which is similar to response observed in group 2 of our study.
- Similarily in Dham ale et al study, 38% of patients of Subcision plus TCA group showed 51-75% improvement.
- 35.7% of patients in Dhollan N et al study using 100% TCA showed 50-74% improvement.

Hence, percentage of patients showing good improvement in all 3 studies mentioned above are comparable to the results in group 2.

In our study, 100% cases showed at least single grade improvement in scar grade similar to Dham ale et al study which also showed overall improvement at least by one grade in 100% cases with both Subcision plus micro needling and Subcision plus TCA. Comparable results were also seen in Shashank Bhargava et al study in which 95.6% cases showed at least single grade improvement.

Patient satisfaction rating

- In group1, 5 patients (33.3%) graded their response to treatment as >70%, 7 patients (46.6%) reported their response as 50-70% while 3 patients (20%) reported as 30-50%.

In Shashank Bhargava et al study, 17.8% patients rated their improvement as >75%; 24% patients and 55% patients reported their response as 50-74% and 25-49% respectively. In Priyanka Sharma et al study, 24% patients in micro needling group graded their improvement as marked (> 75%).

- In group 2, 2 patients (13.3%) graded their response to treatment as >70%, 5 patients (33.3%) reported their response as 50-70% while 8 patients (53.3%) reported as 30-50%. In Priyanka Sharma et al study, 16% of patients

who underwent TCA 100% CROSS graded their improvement as >75%.

Adverse effects

Immediate side effects like erythema, edema and pain was seen in all patients which subsided within 1-2 days. Other adverse effects observed were hematoma, acne flare and PIH. All adverse effects were minimal and transient in both groups.

Conclusion

Both the groups in our study involving combination approach showed increased improvement when compared to other studies using single method alone. Irrespective of scar grade and morphology, statistically significant improvement was noticed with both derma roller and TCA CROSS done in combination with Subcision. There was no statistically significant difference observed between the two groups in terms of scar improvement. Patient satisfaction was high in both groups with minimal and transient side effects.

However, further studies with larger sample size along with focus on response of individual morphological scar types may be needed to get conclusive evidence regarding the efficacy of various modalities.

Ethical approval

Approval for the study was obtained from Institutional Ethics Committee, Guntur Medical College, Guntur, AP, India.

Consent

Written and informed consent was obtained from all participants of the study.

List of abbreviations

TCA- Trichloroacetic acid, CROSS- Chemical Reconstruction Of Skin Scars, PIH- Post inflammatory hyperpigmentation

Data availability

Data related to the study is available upon request from the corresponding author.

Authors' contributions

MU collected, interpreted and prepared manuscript. MR supervised and guided at all stages. VS helped with methodology and final manuscript. All authors read and approved of the final manuscript.

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