E-ISSN 2250-0944
ISSN 2250-1150
doi: 10.31838/ijprt/15.01.126

Research Article

Efficacy and Safety of Subcision and Microneedling in Treatment of Atrophic Acne Scar

Dr Ayushi Tyagi[1], Dr Navneet Randhawa[2], Dr Khushboo Gupta[3], Dr Rajendra Devanda[4], Dr Sanjay Kumar Kanodia[5*], Dr. U.S Agarwal[6]

[1]Junior resident, Department of Dermatology, Venereology, Leprology, NIMS Medical College, Jaipur, Rajasthan.
[2]Assistant Professor, Department of Dermatology, Venereology, Leprology, NIMS Medical College, Jaipur, Rajasthan.
[3]Associate Professor, Department of Dermatology, Venereology, Leprology, NIMS Medical College, Jaipur, Rajasthan.
[4]Assistant Professor, Department of Dermatology, Venereology, Leprology, NIMS Medical College, Jaipur, Rajasthan
[5]Professor, Department of Dermatology, Venereology, Leprology, NIMS Medical College, Jaipur, Rajasthan.
[6]Professor and Head of Department, Department of Dermatology, Venereology, Leprology, NIMS Medical College, Jaipur, Rajasthan.

Corresponding author
Name: Dr Sanjay Kumar Kanodia
Address: B 75, near Satellite Hospital Sethi Colony, in front of Pink Square Mall, Jaipur, Rajasthan.
Email: skinstudy@gmail.com
Received: 04.03.25, Revised: 23.04.25, Accepted: 21.05.25

ABSTRACT

Background: Acne vulgaris is a common skin disorder, with atrophic scars being a frequent sequela. Various treatments exist, but combination therapies like subcision and microneedling have shown promise in addressing different scar types effectively.

Objective: To evaluate the efficacy and safety of combining subcision and microneedling in treating atrophic acne scars.

Methods: A prospective study was conducted on 160 patients (aged 18–40 years) with atrophic acne scars. Participants underwent four sessions of combined subcision and microneedling at monthly intervals. Scar improvement was assessed using the Goodman and Baron qualitative grading scale, and patient-reported outcomes were recorded.

Results: Grade 4 scars (60% of patients at baseline): 32% improved by 2 grades, 68% by 1 grade; none remained at Grade 4 post-treatment. Grade 3 scars (26%): 31% improved by 2 grades, 64% by 1 grade; 5% showed no improvement. Grade 2 scars (14%): 86% improved by 1 grade; 14% had no improvement. Patient satisfaction: 31% reported 75–100% improvement, 31% reported 50–74% improvement, and 35% reported 25–49% improvement. Transient erythema, edema, and pain (resolved within 2–3 days); occasional bruising and hyperpigmentation.

Conclusion: The combination of subcision and microneedling is a safe, cost-effective, and efficacious treatment for atrophic acne scars, particularly for rolling and boxcar types. It demonstrated significant improvement in severe scars (Grades 3 and 4) with minimal downtime and high patient satisfaction. Further comparative studies are needed to optimize treatment protocols.

Keywords: Atrophic acne scars, Subcision, Microneedling.

INTRODUCTION

Acne vulgaris is a prevalent skin disorder that affects more than 90% of teenagers. About 95% of individuals with acne vulgaris experience acne scars, which are the most frequent after effect of the inflammatory process. This is because abnormal perifollicular inflammation and extracellular matrix (ECM) remodelling mechanisms cause acne to arise. Atrophic acne scars are categorised as rolling, ice pick and boxcar scars which are more common than hypertrophic or keloid scars.[1] Both medical and surgical approaches can be used to treat atrophic scars- topical, oral retinoids and anti-biotics are a part of the medical approach. A variety of procedures are included in surgical techniques including dermabrasion, chemical peels, microneedling, ablative and nonablative lasers, soft-tissue augmentation, light energies and subcision.[2]

Combination therapies work better than solo treatments because patients typically have a range of scar types that need volume restoration, tightness or tissue mobility (e.g., surgical modalities) in addition to resurfacing.[3] From the aforementioned modalities, the course of treatment should be tailored to the patient's needs, tolerance and goals in addition to the doctor's assessment, skills, and expectations.[4] A more contemporary approach to treating acne scars is subcutaneous incisionless surgery. Subcision is a technique where a needle is inserted percutaneously near to the scar to manipulate and release fibrous tissue, resulting in the scar shrinking.[5]

Bleeding is necessary for the production of clots during this process and for filling the resulting space, which permits skin elevation secondary to dissociation from the underlying scar tissue. Subcision works better on rolling and boxcar scars and has a little effect on the icepick scars.[6]

Percutaneous collagen induction (PCI) therapy is the basis for how microneedling, which involves rolling a dermaroller tool back and forth and applying pressure in different directions on the cutaneous areas impacted by acne scars, functions.

In addition to subcision, other modalities such as fractional lasers, platelet-rich plasma, dermabrasion, and microneedling can be coupled to decrease the number of sessions required and improve the desired results. When subcision and microneedling are combined, they work in concert to treat atrophic scars in a cost-effective and efficient manner.

Aim

To study the efficacy and safety of subcision and microneedling combination in treatment of atrophic acne scar.

Objectives:

1) To determine the efficacy and adverse effects of subcision and microneedling combination in treatment of atrophic acne scar.

MATERIAL AND METHODS

The study was conducted in the Department of Dermatology, Venereology and Leprosy at the National Institute of Medical Sciences and Research, Jaipur with approval from the Scientific and Ethical committee of this institution and based on inclusion and exclusion criteria from 1st May 2023 to 31st October 2024

Inclusion Criteria

1. Patients of atrophic acne scars, aged between 18-40 years, both male and female attending the Dermatology, venereology & leprosy OPD at National Institute Of Medical Sciences & Research, Jaipur.
2. Have given their consent for the participation in study.

Exclusion Criteria

1. Patients with active acne.
2. Patients undergoing any other surgical procedure.
3. Age <18 years and >40 years
4. Patients having keloidal tendencies or hypertrophic scars.
5. Patients with bleeding tendencies.
6. Patients having active herpes simplex virus infection, warts or other localized infection in the treatment area.
7. Immunosuppressed patients

METHODOLOGY

Prospective research including 160 participants was conducted. Digital photos of the study participants were taken, and they were clinically evaluated to determine the morphology of their scarring and their grades on the Goodman and Baron scale, which is shown in [Table 1].

Patients got guidance about the benefits and drawbacks of the two types of therapy. There were four microneedling with subcision sessions done at monthly interval and the patient was followed up for a period of six months.

Subcision is an intervention used to raise the atrophic acne scars. To break the fibrotic strands and create new connective tissue, an intradermal needle (number 18 or 20 gauge) is inserted under the scar and pushed back and forth in a fan-shaped motion parallel to the skin's surface. This is a safe and cost-effective strategy.

Microneedling is a well-known minimally invasive method that includes making many, repeating punctures in the stratum corneum with a sterile microneedle to treat atrophic acne scars. This leads to growth factor regeneration and percutaneous collagen induction, which in turn promote collagen and elastin synthesis.

TABLE 1. Goodman and Baron qualitative grading of acne scars[11]

GRADE	SEVERITY	CLINICAL FEATURES
1	Macular	These scars can be erythematous, hyper- or hypopigmented flat marks
2	Mild	Mild atrophy or hypertrophy scars that might not be obvious at social distances of 50cm or greater and can be covered adequately by makeup
3	Moderate	Moderate atrophic or hypertrophic scarring that is obvious at social distances of 50cm or greater and which is not covered easily by makeup, but is still able to be flattened by manual stretching of the skin
4	Severe	Severe atrophic or hypertrophic scarring that is evident at social distances greater than 50cm and is not covered easily by makeup, nor able to be flattened by manual stretching of the skin

RESULT

All 160 patients completed 4 sessions with an interval of 4 weeks. There were 90 male and 60 female patients, 18-40 years of age in this study. Before starting the treatment 96 patients had grade 4 acne scars, 42 patients had grade 3 acne scars and 22 patients had grade 2 acne scars. Grading of acne scars was done using Goodman and Baron qualitative grading of acne scars.

At the end of 6 months, the final score was calculated, the proportion of patients with grade 4 scars was reduced to 0 % as (32%) i.e 30 patients improved by 2 grade and (68%) 66 patients improved by 1grade.

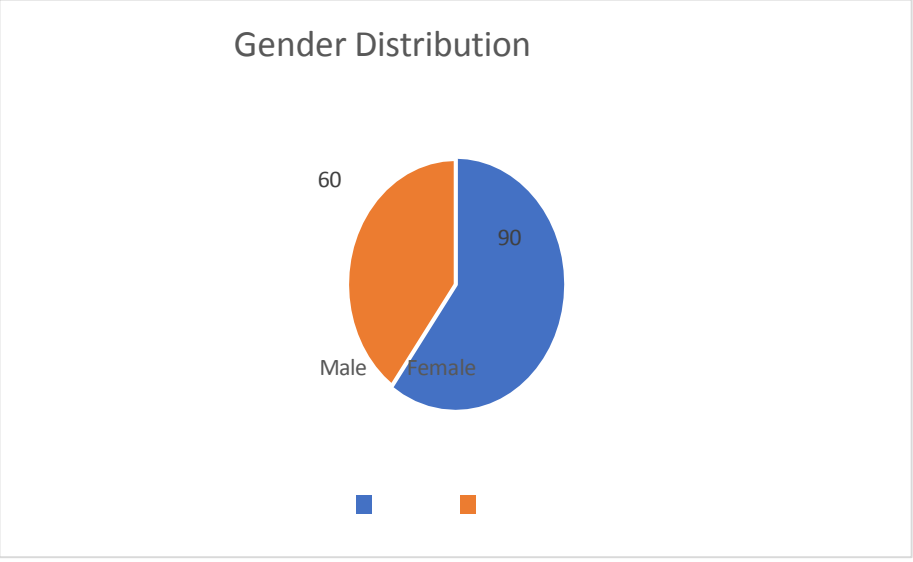
In 42 patients with grade 3 scars (31%) 13 patients showed improvement by 2 grade and 27 patients showed improvement by 1 grade, while 2 patients had no improvement.

In 22 patients with grade 2 scars, 19 patients improved by 1 grade and 3 patients resulted in no improvement.

The rolling and boxcar scar types showed good response to treatment, while little improvement was observed for icepick scars. Side effects were mild and transient.

Post-treatment transient erythema, edema and pain were the commonly seen side effects. These lasted for 2 to 3 days, with no interference in the daily routines of our patients.

While in few patients bruising and post inflammatory hyperpigmentation was observed.



A patient with (a)Grade 4 acne scar pre-treatment.
(b)Grade 2 acne scar post-treatment.

A Patient with (A) Grade 3 acne scar pre- treatment.
(b) Grade 2 acne scar post-treatment

Table 1: TOTAL NUMBER OF PATIENTS PRE AND POST TREATMENT

	No. of patients pre-treatment	**No. of patients post treatment**
GRADE 1 (MACULAR)	0 (0%)	32 (20%)
GRADE 2 (MILD)	22 (14%)	60 (36%)
GRADE 3 (MODERATE)	42 (26%)	68 (41%)

GRADE 4 (SEVERE)	96 (60%)	0 (0%)
TOTAL	160	160

TABLE 2: IMPROVEMENT OF SCAR GRADING AFTER COMPLETE TREATMENT

Pre-Treatment Grade	Number Of Patients	Post-Treatment Improvement By 2 Grades	Post-Treatment Improvement By 1 Grade	No Improvement
GRADE 2	22	__	19 (86%)	3 (14%)
GRADE 3	42	13 (31%)	27 (64%)	2 (5%)
GRADE 4	96	30 (32%)	66 (68%)	__
TOTAL	160	43 (27%)	112(70%)	5 (3%)

TABLE 3: PATIENT-REPORTED RATING OF TREATMENT OUTCOME

Pretreatment Grade	No. of Patients	Excellent (75–100% Improvement)	Very Good (50–74% Improvement)	Good (25–49% Improvement)	Poor (0–24% Improvement)
4	96	21(22%)	30 (31%)	45 (47%)	-
3	42	18 (42%)	14 (33%)	8 (20%)	2 (5%)
2	22	10 (45%)	5 (23%)	4 (18%)	3 (14%)
Total	160	49 (31%)	49 (31%)	57(35%)	5 (3%)

DISCUSSION

Scar treatment is challenging but a number of therapeutic options exist for the practicing dermatologist.[7]

Fernandes was the first to describe percutaneous collagen induction, also known simply as microneedling, as a viable treatment for skin rejuvenation. .[6] The original purpose of microneedling with a dermaroller was to cure loose skin, fine wrinkles, and skin rejuvenation. More than 90% of participants in earlier studies saw improvements of at least one grade,

demonstrating its effectiveness in treating acne scars.

According to one theory, needles carry an inherent electrical charge that causes fibroblasts to proliferate. The stratum corneum and other layers of the epidermis are unaffected by skin needling.

Subcision is a method that causes scar elevation by releasing the fibrous tissue. It is carried out parallel to the layers of skin and beneath the skin.

Lobo et al reviewed subcision on a total of 417 patients from 17 articles which included; 155 patients underwent sharp subcision, 235 patients underwent blunt subcision, and 27 patients underwent energy-assisted subcision. Subcision using sharp, blunt, and energy-assisted instruments were all effective in treating atrophic acne scars.[8]

MK Yadav et al compared the efficacy of microneedling with platelet-rich plasma (PRP) against subcision with PRP in treating atrophic post-acne scars in a split-face study design. In which both modalities showed statistically significant results individually, there was no significant difference in qualitative improvement of acne scars between the two groups. Over the left side of the face that was managed with microneedling with PRP, 36% had grade 1 scars and 64% had grade 2 scars at the completion of the study. A statistically significant improvement was noted on the left side of the face (P-value = 0.04).Over the right side of the face that was managed with subscision, 48% had grade 1 scars, 48% had grade 2 scars, and 4% had grade 3 scars at the completion of the study. A highly significant improvement was noted on the right side of the face (P-value = 0.001) which was statistically even more than the left side. .[9]

Dhamale et al analysed the efficacy of subcision alone as well as combination of subcision with other therapeutic modalities. In this study subcision alone group showed the least improvement while subcision plus microneedling group showed the best response. At the end of 9 months, (S + M) group showed maximum (64.00% ± 12.354%) and subcision alone group showed the least response (36.62% ± 9.437%). [10]

Shen et al reviewed 12 studies, totaling 414 patients for acne scars which concluded microneedling without radiofrequency achieved superior results in terms of scar improvement. For objective scar improvement, the pooled estimate analysis of the first group, treated with microneedling without radiofrequency, yielded a mean difference of 0.42 (95% CI—0.12–0.73%) with a significant difference at the 5% significance level. The second group, treated with fractional radiofrequency microneedling, exhibited no significance at the 5% significance level. No form of microneedling caused post inflammatory hyperpigmentation an advantage in acne scar treatment. Thus, microneedling is a favorable choice for the treatment of acne scarring. .[11]

Scar elevation is further enhanced by neocollagenesis and clot formation brought on by the caused dermal trauma, which then fills the empty space.

In microneedling the trauma in the dermis initiates wound healing and growth factor release, leading to collagen production and deposition in the upper dermis. Skin needling renders facial skin smoother and improves rolling acne scars.[12]

In Scars that were initially small or shallow show less improvement following subcision, but rolling scars that are deeper, wider, and more apparent show more improvement. Boxcar scars also show less improvement than rolling scars.[12]

Good outcomes were obtained in individuals with severe Grades 4 and 3 acne scars by our study 95.6 percent of patients had overall improvement (improvement of at least one grade), with minor erythema, edoema and discomfort that persisted for one to two days. Overall, 31% of patients showed excellent improvement and 66 % of patients responded well to the treatment. The improvement was connected with the patient's judgements of how much their scars had improved: 31% of patients claimed that their acne scars had improved 75–100%, and 31% reported that their scars had improved 50–74 percent. A significant proportion of patients 35% reported an improvement ranging from 25 to 49 percent. Every patient tolerated the surgery nicely.[13]

CONCLUSION

Subcision and microneedling are two easy, low-cost office procedures that have shown promising results in treating boxcar and rolling type atrophic scars more effectively than ice pick scars.

The current acne scar treatment regimen has demonstrated effectiveness not just for Grade 2 acne scars but also for more severe Grades 3 and 4 scars. There was very little downtime and a high degree of patient satisfaction.

There are several alternatives for treating face acne scarring, but there is little evidence in the

literature about the safety and effectiveness of combining these treatments and devices, according to the review of the research. The authors have found that combining acne scar therapy methods can be done safely, effectively and with the best results for patients.

LIMITATIONS

There are several promising therapies for the treatment of atrophic scarring, but robust clinical guidelines cannot be formulated without first developing standardized operating protocols for each treatment modality. Additionally, treatment modalities are often combined based on a physician's personal preference, and an individual may be treated with one or more of the options mentioned in this section. Therefore, more controlled, comparative split-face studies with rigorous statistical measurements are necessary to ascertain which combinations are optimal for patients of different scarring severities and scar types.

REFERENCE

1. Durai PC, Nair DG. Acne vulgaris and quality of life among young adults in South India. Indian J Dermatol. 2015;60(1):33-40.
2. Gozali MV, Zhou B. Effective treatments of atrophic acne scars. J Clin Aesthet Dermatol. 2015;8(5):33-40.
3. Bhargava S, Kumar U, Varma K. Subcision and Microneedling as an Inexpensive and Safe Combination to Treat Atrophic Acne Scars in Dark Skin: A Prospective Study of 45 Patients at a Tertiary Care Center. J Clin Aesthet Dermatol. 2019;12(8):18-22.
4. Hyland SJ, Wetshtein AM, Grable SJ, Jackson MP. Acute Pain Management Pearls: A Focused Review for the Hospital Clinician. Healthcare (Basel). 2022;11(1):34.
5. Chandrashekar B, Nandini A. Acne scar subcision. J Cutan Aesthet Surg. 2010;3(2):125-6.
6. Vempati A, Zhou C, Tam C, Khong J, Rubanowitz A, Tam K, Hazany S, Vasilev R, Hazany S. Subcision for Atrophic Acne Scarring: A Comprehensive Review of Surgical Instruments and Combinatorial Treatments. Clin Cosmet Investig Dermatol. 2023;16:125-134.
7. Chilicka K, Rusztowicz M, Szyguła R, Nowicka D. Methods for the Improvement of Acne Scars Used in Dermatology and Cosmetology: A Review. J Clin Med. 2022;11(10):2744.
8. Lobo, Yolanka BPhysio, MBBS*; Lim, Davin S. MBBS, FAC. Surgical subcision in acne scars: A review of instrumentation.
9. Manoj Kumar Yadav, Prasoon Soni, Bhikam Chand Ghiya, Rajesh Datt Mehta, Aakanksha Arora, Vishnu Kumae Jangir, Rajesh Khokhar, Sumiti Pareek. Efficacy of autologous platelet rich plasma with subcision vs platelet rich plasma with microneedling in atrophic acne scars
10. Dhamale, Suyog S; Sutaria, Amita H[1,]; Shah, Bela J. A Study to Evaluate Various Upcoming Therapies for Acne Scars
11. Yu-Chun-Shen, Wen Chiu, Yi-No-Kang, Chiehfeng Chen: Microneedling Monotherapy for \Acne Scar: Systematic Review and Meta-Analysis of Randomized Controlled Trials
12. Connolly D, Vu HL, Mariwalla K, Saedi N. Acne Scarring-Pathogenesis, Evaluation, and Treatment Options. J Clin Aesthet Dermatol. 2017;10(9):12-23.
13. Kravvas G, Al-Niaimi F. A systematic review of treatments for acne scarring. Part 1: Non-energy-based techniques. Scars Burn Heal. 2017;3:2059513117695312.