

EFFICACY OF INTRALESIONAL NORMAL SALINE FOR THE TREATMENT OF ATROPHIC ACNE SCARS

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Abstract

Background: Atrophic acne scarring is a common sequel of acne vulgaris and has a marked negative impact on quality of life of patients. Conventional treatment modalities are often costly, invasive, and associated with adverse effects. Intralesional normal saline has emerged as a simple, minimally invasive, and cost-effective alternative.

Objective: To determine the efficacy of intralesional normal saline in the treatment of atrophic acne scars.

Methodology: This descriptive case series was conducted in the Department of Dermatology, Sir Ganga Ram Hospital, Lahore, from August 2025 to November 2025. A total of 70 patients with moderate to severe atrophic acne scars were enrolled. Intralesional normal saline (0.1–0.3 mL) was injected into each scar weekly for six sessions. Efficacy was assessed using the Goodman and Baron qualitative score at baseline and one month after completion of last session.

Results: Mean age of the participants was 27.8 ± 6.4 , among them 38 (54.3) were females and 32 (45.7) were males. One grade reduction was considered good response and two-grade reduction, a very good response. Both good and very good response was considered efficacious. Efficacy was achieved in 62.9% of the patients, with 41.4% demonstrating a good response and 21.5% a very good response. Rolling and boxcar scars showed significantly better response compared to ice-pick scars ($p < 0.05$). Adverse effects were limited to only transient erythema (17%) and pain (14%).

Conclusion: Intralesional normal saline is an effective and safe treatment option for the treatment of atrophic acne scars, demonstrating better outcomes in rolling and boxcar scars.

Keywords: Intralesional normal saline, Atrophic acne scars, Goodman and Baron score.

INTRODUCTION

Acne vulgaris is an inflammatory disease affecting the pilosebaceous unit, typically following a prolonged course. It is characterised by closed and open comedones, inflammatory papules, pustules and nodules. It is one of the most common skin diseases affecting adolescents and teenagers. A study conducted in 2021, reported the incidence of acne among undergraduate medical students of Lahore, Pakistan to be 73.2%.¹

Upto 90 percent of acne patients may develop scarring, which is usually due to inflammation and tissue destruction. Most of these scars are atrophic in nature and are attributed to the loss of collagen in the dermis. There are three major types of atrophic acne scars: rolling scars, boxcar scars and ice-pick scars.² Availability of effective and evidence based treatment options for acne scarring holds considerable importance for both patients and clinicians, as it has a significant impact on body image, self esteem and quality of life³. Treatment modalities currently in use include laser resurfacing, radiofrequency, chemical peels, chemical reconstruction of scars (CROSS), dermabrasion, microneedling

,subcision, fat grafting and other types of tissue augmentation. However, each of these has its own limitations and side effects such as pain, post-inflammatory hyper pigmentation, subsequent infections and reactivation of herpes simplex infection. In addition, high cost of treatment and requirement of specialized equipments limits their application in low resource settings.⁴⁵

Intralesional Normal Saline (NS) has shown to be effective in various dermatological conditions and was found to have excellent therapeutic effects. It has been used in the management of corticosteroid induced cutaneous atrophy, granuloma annulare and cutaneous leishmaniasis.⁶

The proposed mechanism of action of Intralesional NS in acne scarring is multifactorial. It promotes collagen production, leads to dehiscence of fibrous bands that attach the scar base to underlying dermal tissue and focal clotting, which elevates the scar tissue³. It is reported to have low risk of allergic reactions, infection and bleeding . Intralesional normal saline can therefore be a safe, cheap, less invasive and readily available treatment option for atrophic scars of acne.⁷

A study conducted at Karachi conducted including 49 patients found that intralesional 0.9% normal saline significantly improved atrophic acne scars, with mild cases increasing from 6.1% to 71.4% after treatment⁸. Another split-face study by Gandhi et al.⁹ reported similar efficacy between PRP and intralesional normal saline, suggesting that the mechanical effect of injection is more important than the injected solution itself.

Acne scars remain challenging to treat as they require multiple modalities to achieve desired results and ultimately bringing a positive impact on patient's quality of life¹⁰. With the existing treatment options, new modalities need to be explored to deliver effective treatment with minimum adverse effects. Limitations of current treatments include low efficacy, high cost, multiple side effects and dissatisfaction among both patients and physicians. So we planned our study to determine the efficacy of intralesional normal saline for the treatment of atrophic acne scarring.

METHODOLOGY

It is a descriptive case series that was conducted at the Department of Dermatology, Sir Ganga Ram Hospital, Lahore from August 2025 to November 2025. After obtaining informed consent, 70 patients aged 18–45 years having any gender, with clinically diagnosed moderate to severe atrophic acne scars, based on the Goodman and Baron classification criteria were enrolled in the study. Participants with all forms of atrophic acne scars including rolling, ice-pick, and boxcar scars for more than 6 months to less than 5 years duration were included. Patients who had received any treatment for acne or acne scars during last 6 months, including oral retinoids were excluded. Pregnant or lactating women, patients with severe comorbidities and those with a known hypersensitivity to lidocaine were also not eligible for inclusion. Additionally, individuals receiving anticoagulant therapy, those with active cutaneous infections (e.g., herpes simplex), inflammatory dermatoses or a predisposition to keloid formation were also excluded from the study. A detailed history was obtained and clinical examination was performed. Intralesional normal saline was given under aseptic conditions and topical lignocaine was used for local anesthesia. At each session, 0.1-0.3 ml of 0.9% normal saline was administered in each lesion. Blanching of scar and elevation was taken as endpoint. The procedure was performed once weekly for six weeks. Following the procedure, all patients were advised to apply topical fusidic acid and sunscreen. Efficacy was assessed one month after the last session, with the help of Goodman and Baron qualitative grading system (Figure 1). One grade reduction was considered good response and two-grade reduction, a very good response. Both good and very good responses were considered efficacious. Pre and post procedure photographs were taken at each visit.

DATA ANALYSIS

SPSS version 22.0 (IBM Corp., Armonk, NY, USA) was used for data entry and statistical analysis. Quantitative variables (age and duration of scars) were expressed as mean $\pm$ standard deviation (SD), while qualitative variables (gender, type of acne scars, grading, and treatment efficacy) were presented as frequencies and percentages. Effect modifiers, including age, gender, duration of scars, and type of acne scars, were controlled through stratification. Post-stratification, the chi-square test was applied to assess associations between variables. A p-value of ≤ 0.05 was considered statistically significant. Subgroup analysis was performed to evaluate treatment response across different types of atrophic acne scars, with emphasis on rolling, boxcar, and ice-pick scars.

RESULTS

Total 70 patients with atrophic acne scars were enrolled in the study. The mean age of the participants was 27.8 ± 6.4 years. There were 38 (54.3%) female patients and 32 (45.7%) were male. According to scar morphology, rolling scars were observed in 32 patients (45.0%), boxcar scars in 25 (35.0%) and ice-pick scars in 13 (20.0%). In terms of baseline severity, moderate scars were present in 42 patients (60.0%), while 28 patients (40.0%) had severe scars (Table 1). 29 patients (41.4%) achieved a good response with one-grade improvement, while 15 patients (21.5%)

showed a very good response with two-grade improvement (Table 2). Overall, treatment efficacy was achieved in 44 patients (62.9%). Pretreatment and post treatment pictures are shown. Comparison of treatment efficacy according to scar type demonstrated that rolling and box scars achieved the greatest clinical improvement and this difference was statistically significant (Table 3). Stratification of treatment efficacy according to age group, gender and duration of disease did not show any statistical differences (Table 4). Adverse effects seen in our study were mild erythema observed in 12 (17.1%) patients and transient pain in 10 (4.3%) patients (Table 5).

Table 1: Baseline Characteristics of Patients with Atrophic Acne Scars (n = 70)

Variable	Category	n (%) / Mean ± SD
Age (years)	Mean ± SD	27.8 ± 6.4
Gender	Female	38 (54.3)
	Male	32 (45.7)
Scar type	Rolling	32 (45.0)
	Boxcar	25 (35.0)
	Ice-pick	13 (20.0)
Baseline severity	Moderate	42 (60.0)
	Severe	28 (40.0)

Table 2: Treatment Response After Intralesional Normal Saline Therapy (n = 70)

Outcome	n (%)
Good response (1-grade improvement)	29 (41.4)
Very good response (2-grade improvement)	15 (21.5)
No response	26 (37.1)
Overall efficacy (good + very good response)	44 (62.9)

Table 3: Comparison of Treatment Efficacy by Scar Type (n = 70)

Scar Type	Efficacy Present n (%)	Efficacy Absent n (%)	Total n (%)	p-value
Rolling	24 (75.0)	8 (25.0)	32 (100)	
Boxcar	15 (60.0)	10 (40.0)	25 (100)	
Ice-pick	5 (38.5)	8 (61.5)	13 (100)	
Total	44 (62.9)	26 (37.1)	70 (100)	0.01

Table 4: Stratification of Treatment Efficacy by Age and Gender (n = 70)

Variable	Category	Efficacy Present n (%)	Efficacy Absent n (%)	Total n (%)	p-value
Age group	18–25 years	16 (66.7)	8 (33.3)	24 (100)	
	26–35 years	20 (64.5)	11 (35.5)	31 (100)	
	36–45 years	8 (53.3)	7 (46.7)	15 (100)	0.68
Gender	Female	25 (65.8)	13 (34.2)	38 (100)	
	Male	19 (59.4)	13 (40.6)	32 (100)	0.58
Duration of disease	6 months ≤ 1 year	18 (72.0)	7 (28.0)	25 (100)	
	>1–3 years	17 (60.7)	11 (39.3)	28 (100)	
	>3–5 years	9 (52.9)	8 (47.1)	17 (100)	0.39

Table 5: Adverse Effects of Intralesional Normal Saline Therapy (n = 70)

Adverse Effect	n (%)
Mild erythema	12 (17.1)
Transient pain	10 (14.3)
Infection	0 (0.0)
Worsening of scarring	0 (0.0)

Figure 1: Goodman and Baron qualitative grading score¹¹

GRADE	LEVEL OF DISEASE	CLINICAL FEATURES
1	Macular	These scars can be erythematous, hyper- or hypopigmented flat marks. They do not represent a problem of contour like other scar grades but of color.
2	Mild	Mild atrophic or hypertrophic scars that may not be obvious at social distances of 50cm or greater and may be covered adequately by makeup or the normal shadow of shaved beard hair in men or normal body hair if extra facial.
3	Moderate	Moderate atrophic or hypertrophic scarring that is obvious at social distances of 50cm or greater and is not covered easily by makeup or the normal shadow of shaved beard hair in men or body hair if extra facial, but is still able to be flattened by manual stretching of the skin (if atrophic)
4	Severe	Severe atrophic or hypertrophic scarring that is evident at social distances greater than 50 cm and is not covered easily by makeup or the normal shadow of shaved beard hair in men or body hair if extra facial and is not able to be flattened by manual stretching of the skin.

DISCUSSION

Acne scars are a distressing sequelae of acne vulgaris, persisting long after active lesions have resolved. These are formed due to collagen destruction, impaired wound healing and tissue remodeling due to inflammation. It affects the patient physically as well as psychologically and leads to low confidence, anxiety, depression and social withdrawal. It also leaves a negative impact on interpersonal relationships and quality of life.

Intralesional injection of normal saline is a safe, simple, inexpensive, and well-tolerated procedure with a low risk of adverse effects owing to its non-allergenic nature. Several mechanisms have been proposed to explain its beneficial effects on acne scars. The injection mechanically disrupts the fibrotic bands tethering the scar base to the underlying dermis, resulting in elevation of depressed scars in a manner similar to subcision. Additionally, the microtrauma induced by needle insertion stimulates fibroblast activity, promoting collagen and elastin synthesis and extracellular matrix remodeling, thereby improving the appearance of atrophic acne scars, as observed in the present study.

Acne scars are refractory to treatment and a single treatment modality usually does not yield satisfactory results, therefore multiple modalities like chemical peels, microneedling, subcision, dermal fillers, laser resurfacing and surgical technique are used in combination. All of these are expensive, require specialized equipment and can have a number of side effects including pain, post inflammatory hyperpigmentation, erythema and infection. Thus, there is a need to develop safer, more effective and innovative therapies for atrophic acne scarring.

In our study, a total of 70 patients were included, with a mean age of 27.8 ± 6.4 years, which is comparable to the study conducted by Khan et al. (24.69 ± 4.35 years) in their study evaluating the efficacy of intralesional normal saline for atrophic acne scars and mean age of their study was 24.69. This similarity reflects the high prevalence of acne and its sequelae among young adults. Of the 70 participants included in our study, 32 (45.7%) were males and 38 (54.3%) were females, demonstrating a slight female predominance. This finding is consistent with the study by Khan et al.,¹² which also reported a higher proportion of female participants. Furthermore, according to the Goodman and Baron classification, 60.0% of patients in our study had moderate acne scarring, which is comparable to the findings of Asghar et al.,¹³ who reported 69.4% of patients with moderate-grade scars.

The overall efficacy of intralesional normal saline in the present study was 62.9%, with 29 (41.4%) patients achieving a good response and 15 (21.5%) demonstrating a very good response. These findings are comparable to those reported in previous studies evaluating intralesional normal saline for atrophic acne scars. Usman et al.¹⁴ in a randomized controlled trial comparing intradermal normal saline with 100% TCA CROSS, reported that 88.9% of patients in the normal saline group achieved at least 50% clinical improvement. Similarly, Asghar et al.¹³ reported an overall efficacy of 46%, based on a statistically significant improvement in Visual Satisfaction (VS) scores. Khan et al.⁸ also demonstrated a significant clinical improvement in atrophic acne scars following treatment with intralesional normal saline. Overall, the findings of the present study are comparable with those of previous studies, all of which demonstrated significant clinical improvement in atrophic acne scars following treatment with intralesional normal saline.

In the present study, rolling scars showed the most favorable response, with improvement in 24 of 32 patients (75%), followed by boxcar scars, which improved in 15 of 25 patients (60%) followed by statistically significant. Similar

patterns were noted by Bagherani and Smoler¹⁵, who reported the highest improvement in rolling scars, with comparatively lesser responses in boxcar and ice-pick scars.

One of the key observations in present study was the favorable safety profile of intralesional normal saline therapy. Only mild transient side effects such as erythema and pain were observed. No patient developed infection, worsening of scars or hyper pigmentation. Khan et al.⁸ also reported adverse effects limited to mild and transient pain and erythema only, with no serious complications. Compared to procedures such as laser resurfacing, radiofrequency microneedling, and chemical reconstruction techniques, intralesional saline is comparatively cheaper, easily available, technically simple, and associated with minimal downtime. These advantages make it particularly useful in healthcare settings with limited resources.

LIMITATIONS

It is a descriptive case series, conducted at a single center, on a small scale, without a control or comparison group, so the efficacy of Intralesional Normal Saline cannot be directly compared with other established treatment modalities.

STRENGTH:

This study evaluates a simple, low cost and minimally invasive intervention that requires no specialized equipment. This study will contribute to the limited local data available on this topic and may serve as basis for future large scale comparative studies and expand the therapeutic options available to the patients.

CONCLUSION

Intralesional normal saline is an effective treatment option for treatment of atrophic acne scars with a very good safety profile and is particularly effective for rolling and box scars. It is cost effective and can be performed without any advanced equipment making it particularly useful in low resource setting.

Conflict of interest

There is no conflict of interest.

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