HSPI The Open Access Publisher

ANNALS OF DERMATOLOGICAL RESEARCH
ISSN 2994-1180

Research Article

Efficacy and Safety of Punch Elevation Combined with Dermapen in Treating Boxcar Post-acne Scars: A Paired Comparison Study in Syria

Sajeda Alnabelsi* and Suzan Qattini

Department of Dermatology and Venereology, Faculty of Medicine, Damascus University, Damascus, Syria

Abstract

Background: Atrophic scars following acne vulgaris are considered an aesthetic, psychological, and social problem for patients, and despite the existence of many treatment options, finding modern treatments is a necessity to reduce side effects associated with current therapies and reduce the financial burden on patients.

Objectives: to evaluate the efficacy of punch elevation combined with dermapen in treating atrophic scars following acne vulgaris on the cheeks, and to evaluate patients' satisfaction with this procedure.

Methods: This clinical trial involved 19 patients to evaluate the efficacy of punch elevation combined with dermapen in treating post-acne scars.

Results: According to the Goodman and Baroon scale for acne scars, and after 6 months, the percentage of grade 4 decreased from 26.3% to 10.5%, grade 3 decreased from 73.7% to 31.6%, grade 2 increased from 0% to 52.6%, and grade 1 increased from 0% to 5.3%. *p* - value was less than 0.005, indicating a relationship between the degrees of atrophic scars on the Goodman-Baron qualitative scale after 6 months of treatment. According to the improvement scale, good improvement was 10.5%, acceptable improvement was 57.9% and no improvement was 31.6%. Patients were satisfied with the procedure after 3-6 months according to the modified Global Aesthetic Improvement Scale for Patient Evaluation.

More Information

***Address for correspondence:**
Sajeda Alnabelsi, MD, Department of Dermatology and Venereology, Faculty of Medicine, Damascus University, Damascus, Syria, Email: mp79.sajeda@gmail.com; Sajeda3.na@damascusuniversity.edu.sy

Submitted: September 25, 2025
Approved: October 03, 2025
Published: October 06, 2025

How to cite this article: Alnabelsi S, Qattini S. Efficacy and Safety of Punch Elevation Combined with Dermapen in Treating Boxcar Post-acne Scars: A Paired Comparison Study in Syria. Ann Dermatol Res. 2025; 9(1): 008-012. Available from: https://dx.doi.org/10.29328/journal.adr.1001037

Introduction

Acne vulgaris is a chronic inflammatory disorder of the pilosebaceous units characterized by the presence of a spectrum of cutaneous lesions, including inflammatory papules, pustules, nodules, and non-inflammatory open and closed comedones. It is one of the most common skin diseases worldwide, affecting an estimated 85% of adolescents and young adults, with varying severity and persistence into adulthood. A frequent and challenging sequela of acne vulgaris is the development of atrophic scars, which are characterized by a loss of collagen and dermal tissue, leading to depressions on the skin surface. These atrophic scars significantly affect patients not only aesthetically but also psychologically and socially, often leading to reduced self-esteem and diminished quality of life. The three main morphologic types of atrophic acne scars include rolling, boxcar, and icepick scars, with atrophic scars constituting approximately 80% - 90% of all post-acne scarring cases [1].

The pathogenesis of acne scarring involves an interplay of inflammation, abnormal wound healing, and matrix remodeling. Deep inflammatory lesions destroy the dermal matrix and induce localized tissue loss. This disruption causes fibrosis and retraction of the skin surface, culminating in scar formation. Risk factors for severe acne scarring include delayed treatment, severity of acne lesions, delayed resolution of inflammation, and individual genetic predisposition. Due to the permanent nature of these scars, their management represents a major therapeutic challenge for dermatologists.

Currently, treatment modalities for acne scars are diverse and include both surgical and non-surgical approaches such as topical and systemic medications, laser therapies, chemical

peels, radiation therapy, and autologous regrowth stimulants like platelet-rich plasma (PRP) [2,3]. Among the surgical techniques, punch elevation stands out as an efficacious, economical, and relatively safe method, especially suited for deep boxcar and icepick scars [4]. This technique involves excising the fibrotic base of the scar using a punch instrument and elevating the scar tissue to the level of the surrounding skin, restoring surface contour. Compared to other modalities like laser therapy and PRP, punch elevation has a favorable safety profile with fewer risks of burns, post-inflammatory pigment changes, and infections [5-7].

Microneedling, also referred to as collagen induction therapy, is a minimally invasive method employing fine needles to create controlled microinjuries on the skin surface. This stimulates the natural wound healing cascade, promoting collagen and elastin synthesis and improving skin texture and elasticity. Microneedling has gained wide acceptance given its efficacy, ease of use, low cost, and minimal downtime, with reported benefits in various dermatologic conditions, including atrophic acne scars [8-10]. Dermapen is a motorized microneedling device that enables precise depth control and multi-directional needle movement, enhancing the stimulation of dermal remodeling.

Given the complementary mechanisms—structural release from punch elevation and biological stimulation from microneedling—the combined use of these modalities can potentially yield synergistic improvements in atrophic acne scarring. Recent evidence supports multimodal approaches for acne scar treatment, as combining different techniques often achieves superior outcomes by addressing diverse pathophysiological components of scarring [11-14]. However, clinical data specifically evaluating the combination of punch elevation and microneedling, especially using Dermapen, remain limited.

This study aims to evaluate the efficacy, safety, and patient satisfaction of punch elevation combined with Dermapen microneedling for the treatment of boxcar atrophic acne scars on the cheeks in a prospective, self-controlled clinical trial. The findings may provide valuable insights into an effective and accessible treatment protocol for acne scarring, with particular relevance for patients in resource-limited settings.

Materials and methods

Study design and population

A prospective, non-controlled clinical trial was conducted at the Dermatology and Venereology Hospital, Damascus University, between January 2023 and December 2024. The institutional review board approved the study, and informed consent was obtained from all participants.

Inclusion criteria: • Adults aged 18–45 years • Goodman–Baron grade 3–4 boxcar scars on both cheeks • Stable acne (no active lesions) for ≥6 months.

Exclusion criteria: • Pregnancy or lactation • History of keloid formation, bleeding disorders, or uncontrolled diabetes • Isotretinoin use within 6 months • Other scar treatments within 1 month • Active infection in the treatment area.

Intervention protocol

Session 1: Punch elevation of each target scar using a 1.5 - 3.5 mm disposable punch, elevating the scar tissue flush with the surrounding skin. Closure was achieved with Steri-Strips.

Session 2 (after 1 week): First microneedling session using a Dermapen device with 1.5 mm sterile needles, performing three passes in horizontal, vertical, and diagonal directions until pinpoint bleeding occurred.

Session 3 (after 1 month): Second microneedling session using the same parameters.

All patients were instructed to avoid sun exposure and use broad-spectrum sunscreen post-procedure.

Statistical analysis

To perform statistical analysis using a paired sample T-test, with JASP v 8.5.1, we followed these steps:

1. State the hypothesis:

- Null hypothesis (H0): The mean difference between paired samples is zero (no effect).

- Alternative hypothesis (H1): The mean difference is not zero (effect exists).

2. Collect data:

- Obtain paired measurements before and after treatment.

3. Calculate differences:

- Compute difference scores for each pair of post - pre values.

4. Check assumptions:

- Verify that the differences are approximately normally distributed.

5. Compute test statistic:

- Calculate the mean difference and its standard error.

- Calculate the T-statistic as the mean difference divided by the standard error.

6. Obtain *p* - value:

The *p* - value <0.05 was considered statistically significant.

Results

The study included 19 patients, with 63.2% being male (12

patients) and 36.8% female (7 patients). Most participants were aged between 18 and 27 years (52.6%), followed by 28 to 36 years (31.6%), and 37 to 45 years (15.8%). Regarding skin phototypes, the majority were type IV (52.6%), followed by type III (36.8%), and type V (10.5%). At baseline, scar severity assessed by the Goodman-Baron Qualitative Scale showed that 73.7% of patients had grade 3 scars, while 26.3% had grade 4 scars. No patients presented with grades 1 or 2 scars initially. After six months of treatment, there was a significant improvement in scar severity. Statistical analysis using the Wilcoxon test revealed a highly significant change (w 153, p (1-tail) = 0.0002, p (2-tail) = 0.0003), with many patients' scars improving from severe grades 3 and 4 to milder grades 1 and 2 (Table 1).

Patient self-evaluation using the Global Improvement Scale confirmed this positive outcome, with 89.7% reporting at least an acceptable level of improvement. Only 10.5% noted no change, and none experienced worsening of scars (Table 2).

Illustrative examples of three patients' scars before and after treatment are shown in Figures 1-3, demonstrating visible improvement over the six months. Overall, the results indicate that the treatment was effective in significantly reducing the severity of acne scars, leading to a meaningful clinical and patient-perceived improvement within six months.

Discussion principal findings

This study demonstrates that punch elevation followed by microneedling via Dermapen is effective in improving Goodman–Baron grade 3–4 atrophic acne scars of the boxcar type localized to the cheeks. Over a six-month follow-up, there was a statistically significant shift toward lower scar grades (p = 0.001), with more than two-thirds of patients achieving at least "acceptable" improvement and over half reporting high procedural satisfaction. No major adverse events were observed.

Table 1: Scar Grades Before and 6 Months After Treatment.

Scar Grade	Number at Baseline	Percentage at Baseline (%)	Number at 6 Months	Percentage at 6 Months (%)
Grade 1	0	0%	1	5.3%
Grade 2	0	0%	10	52.6%
Grade 3	14	73.7%	6	31.6%
Grade 4	5	26.3%	2	10.5%
Total	19	100%	19	100%
Wilcoxon test = 153; p (1-tail) = 0.0002, p (2-tail) = 0.0003, z = 3.61.				

Table 2: Global Improvement Scale for Patient Evaluation After 6 Months.

Improvement Level	Number	Percentage (%)
Expected Improvement	1	5.3%
Good Improvement	6	31.6%
Acceptable Improvement	10	52.6%
No Change	2	10.5%
Worse	0	0%
Total	19	100%

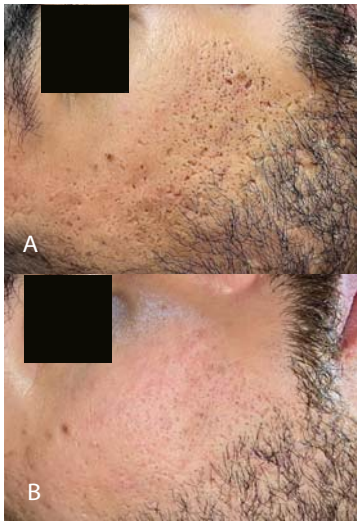

Figure 1: A) Scar grade 4 (before treatment). B) Scar grade 2 (after treatment).

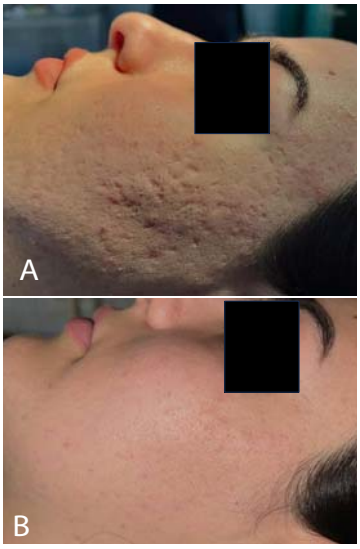

Figure 2: A) Scar grade 3 (before treatment). B) Scar grade 2 (after treatment).

Figure 3: A) Scar grade 4 (before treatment). B) Scar grade 3 (after treatment).

Rationale for the combination approach

Punch elevation is a focal surgical technique specifically designed to release the fibrotic base and elevate sharply demarcated scars, particularly deep boxcar and narrow icepick variants [6-8]. While effective in restoring contour, punch elevation alone does not address the surrounding dermal atrophy or texture irregularities. Microneedling via Dermapen complements this by producing controlled dermal microinjury, which stimulates neocollagenesis, neoelastogenesis, and dermal matrix remodeling [9-12]. The sequential use of these modalities leverages their complementary mechanisms: structural release through punch elevation and biologic regeneration through microneedling.

Comparison with previous studies

Our results are consistent with the literature demonstrating the benefits of multimodal scar treatment. Fabbrocini, et al. reported enhanced outcomes when subcision was followed by fractional CO_2 laser therapy [13,14]. Nofal, et al. found that microneedling combined with platelet-rich plasma outperformed microneedling alone [15,16]. While the literature on punch elevation combined specifically with microneedling is sparse, a similar rationale has been applied in combining other focal release techniques with collagen-induction modalities, showing improved efficacy over monotherapy [9,17,18].

Advantages of the protocol

The current protocol achieved meaningful clinical improvement with one punch elevation session followed by two Dermapen sessions, offering a time- and cost-efficient option, particularly in resource-limited settings. The approach also avoided prolonged downtime, with no significant pigmentary alteration, hypertrophic scarring, or secondary infection. The minimal invasiveness and favorable safety profile make it a viable alternative to energy-based resurfacing in patients with darker skin types, who are at higher risk for post-inflammatory hyperpigmentation [10,18,19].

Limitations

The study was a prospective, non-controlled clinical trial without a control or comparison group, limiting the ability to attribute improvements solely to the intervention. The sample size was relatively small (19 patients), reducing the statistical power, which increases the sensitivity to single-patient changes and limits the generalizability of the findings. Follow-up duration was limited to 6 months, which may not capture the full extent of collagen remodeling and scar improvement, known to continue up to 12 months post-treatment. The patient population comprised mostly phototypes III to V, which may limit applicability in lighter or darker skin phototypes. Objective assessment tools, such as high-resolution imaging, optical profilometry, or ultrasound-based skin thickness measurement, were not employed, potentially introducing subjective bias in outcome assessment [19,20]. Additionally, follow-up was limited to six months, whereas collagen remodeling may continue for up to 12 months post-treatment [12].

These limitations acknowledge the constraints on study design, population, assessment methods, and follow-up duration that may impact the interpretation and generalizability of the efficacy and safety results.

Clinical implications and future directions

This combination protocol addresses two key components of atrophic acne scarring— structural depression and dermal atrophy—within a single treatment plan. The favorable balance of efficacy, safety, cost, and downtime supports its use as part of a stepwise scar management algorithm, particularly for patients with deep boxcar scars. Future randomized controlled trials with larger cohorts, longer follow-up, and head-to-head comparisons against established treatments such as fractional CO_2 laser, subcision, or punch techniques alone are warranted to further define its role in scar management.

Conclusion

Combining dermapen with punch elevation enhances scar remodeling by promoting cellular regeneration and improving overall skin quality. Clinically, this combined approach has been shown to yield significant improvement in the appearance of deep boxcar scars. Patients frequently report high levels of satisfaction due to the noticeable aesthetic benefits alongside minimal adverse effects, such as transient redness or mild swelling. The safety profile is favorable as both procedures are minimally invasive, with low risks of infection or scarring if performed correctly. Economically, this combination is cost-effective compared to more invasive and expensive treatments like laser resurfacing or surgical excision.

Ethical considerations

This prospective, non-controlled clinical trial was conducted at the Dermatology and Venereology Hospital, Damascus University, between January 2023 and December 2024. The study protocol received approval from Damascus University, and written informed consent was obtained from all participants prior to enrollment.

References

1. Rocha MA, Costa CS, Bagatin E. Acne vulgaris: an inflammatory disease even before the onset of clinical lesions. Inflamm Allergy Drug Targets. 2014;13(3):162–7. Available from: https://doi.org/10.2174/1871528113666140606110024
2. Jacob CI, Dover JS, Kaminer MS. Acne scarring: a classification system and review of treatment options. J Am Acad Dermatol. 2001;45(1):109–17. Available from: https://doi.org/10.1067/mjd.2001.113451
3. Yang Z, Lv Y, Yue F, Cao D. Early intervention of fractional carbon dioxide laser on fresh traumatic scar. Lasers Med Sci. 2019;34(7):1317–24. Available from: https://doi.org/10.1007/s10103-019-02716-5

4. AlGhamdi KM, AlEnazi MM. Versatile punch surgery. J Cutan Med Surg. 2011;15(2):87–96. Available from: https://doi.org/10.2310/7750.2011.10002
5. Goodman GJ, Baron JA. The management of postacne scarring. Dermatol Surg. 2007;33(10):1175–88. Available from: https://doi.org/10.1111/j.1524-4725.2007.33252.x
6. Gozali MV, Zhou B. Effective treatments of atrophic acne scars. J Clin Aesthet Dermatol. 2015;8(5):33–9. Available from: https://pubmed.ncbi.nlm.nih.gov/26029333/
7. Eubanks SW, Solomon JA. Safety and efficacy of fractional radiofrequency for the treatment and reduction of acne scarring: a prospective study. Lasers Surg Med. 2022;54(1):74–81. Available from: https://doi.org/10.1002/lsm.23453
8. Keyes EL. The cutaneous punch. Arch Dermatol. 1982;118(11):940–2.
9. Sharquie KE, Noaimi AA, Al-Janabi EA. Treatment of active acne vulgaris by chemical peeling using TCA 35%. J Cosmet Dermatol Sci Appl. 2013;3(3):32–5. Available from: https://www.scirp.org/journal/paperinformation?paperid=39965
10. Ali B, ElMahdy N, Elfar NN. Microneedling (Dermapen) and Jessner's solution peeling in treatment of atrophic acne scars: a comparative randomized clinical study. J Cosmet Laser Ther. 2019;21(6):357–63. Available from: https://doi.org/10.1080/14764172.2019.1661490
11. Jaiswal S, Jawade S. Microneedling in dermatology: a comprehensive review of applications, techniques, and outcomes. Cureus. 2024;16(9). Available from: https://doi.org/10.7759/cureus.70033
12. Serrano G, Almudéver P, Serrano JM, Cortijo J, Faus C, Reyes M, et al. Microneedling dilates the follicular infundibulum and increases transfollicular absorption of liposomal sepia melanin. Clin Cosmet Investig Dermatol. 2015;8:313–8. Available from: https://doi.org/10.2147/ccid.s77228
13. Doddaballapur S. Microneedling with dermaroller. J Cutan Aesthet Surg. 2009;2(2):110–1. Available from: https://doi.org/10.4103/0974-2077.58529
14. Asilian A, Faghihi G, Asemi Esfahani A, Mokhtari F, Nilforoushzadeh M, Mozafarpoor S. Comparison of two methods of subcision, Nokor and blunt blade, in acne scar treatment. J Cosmet Dermatol. 2019;18(6):1788–93. Available from: https://doi.org/10.1111/jocd.12981
15. O'Daniel TG. Multimodal management of atrophic acne scarring in the aging face. Aesthet Plast Surg. 2011;35(6):1143–50. Available from: https://doi.org/10.1007/s00266-011-9715-y
16. Chawla S. Split face comparative study of microneedling with PRP versus microneedling with vitamin C in treating atrophic post-acne scars. J Cutan Aesthet Surg. 2014;7(4):209–12. Available from: https://doi.org/10.4103/0974-2077.150742
17. Goodman GJ, Baron JA. The management of postacne scarring. Dermatol Surg. 2007;33(10):1175–88. Available from: https://doi.org/10.1111/j.1524-4725.2007.33252.x
18. Garg VK, Sinha S, Sarkar R. Glycolic acid peels versus salicylic–mandelic acid peels in active acne vulgaris and post-acne scarring and hyperpigmentation: a comparative study. Dermatol Surg. 2009;35(1):59–65. Available from: https://doi.org/10.1111/j.1524-4725.2008.34383.x
19. Park SY, Park MY, Suh DH, Kwon HH, Min S, Lee SJ, et al. Cross-sectional survey of awareness and behavioral patterns regarding acne and acne scars based on a smartphone application. Int J Dermatol. 2016;55(6):645–52. Available from: https://doi.org/10.1111/ijd.12853
20. Heng AH, Say YH, Sio YY, Ng YT, Chew FT. Epidemiological risk factors associated with acne vulgaris presentation, severity, and scarring in a Singapore Chinese population: a cross-sectional study. Dermatology. 2022;238(2):226–35. Available from: https://doi.org/10.1159/000516232