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# Effect of Subcision and Microneedling in the Treatment of Atrophic Acne Scars in Patients: A Case Series

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## Abstract

**Background:** Acne vulgaris is a common condition with a prevalence of over 90% among adolescents and post-acne scarring is a well known sequelae. Different types of scars (ice pick, boxcar, and rolling scars) warrant a customized approach of treatment for each type. We propose a novel treatment of atrophic acne scars using combination of subcision and microneedling.

**Materials and Methods:** Ten consecutive patients of skin types III - IV with moderate and severe facial acne scarring received three sequential subcision and micro-needling treatments after informed consent over a period of three months with an interval of 4 weeks between each session. Goodman and Baron's qualitative and quantitative acne scar grading systems along with side by side comparison of pre-operative and post-operative photographs were used for assessment at the end of three sessions of the combination procedure.

**Results:** Estimation of improvement with Goodman and Baron's Global qualitative acne scarring system, we found good results in patients with Grades 3 and 4 acne scars. Out of 7 patients with grade 4 scars, 29% showed improvement by 2 grades and 71% showed improvement by 1 grade and all the 3 patients with grade 3 scars showed improvement by 1 grade. Quantitative assessment showed 30% patients had minimal improvement, 50% had moderate improvement and 20% had good improvement in scars. Adverse effects were transient pain, erythema and oedema.

**Conclusion:** Subcision and microneedling are simple and inexpensive office procedures which in combination are well tolerated and are efficacious in treatment of moderate and severe acne scars.

**Key words:** Acne Vulgaris; Cicatrix; Needles

## Introduction

Acne vulgaris is a common condition with a prevalence of over 90% among adolescents,<sup>1</sup> and often causes an unfortunate and permanent complication of scarring that results from an altered wound healing response to cutaneous inflammation. Post-acne scarring has a significant negative impact on quality of life of young patients and is a challenging condition for dermatologists with no easy and definitive solution. For choosing the appropriate intervention, assessment of the severity of scarring is necessary. The severity assessment is done by classification of the scars. They have been broadly classified into three different types: atrophic, hypertrophic, or keloidal. Hypertrophic and keloid scars are the result of net

gain of collagen during the healing process, while scars characterized by destruction of collagen in the dermis are atrophic.

Atrophic acne scars are the most common type and are further classified as ice -pick (V-shaped), rolling (W-shaped) and boxcar (U-shaped).<sup>2,3</sup> The exact prevalence of each scar type is hard to calculate but some estimations report that within atrophic scars, the ice pick type represents 60–70%, boxcar 20–30%, and

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rolling scars 15–25%. It is common for patients to have more than one type of scar.

For the treatment of atrophic acne scars over face, several approaches have been developed. Medical management includes the use of topical and oral retinoids, while surgical methods include punch elevation, punch excision, subcision and elliptical excision. Different procedures include chemical peels, percutaneous collagen induction by dermabrasion and microneedling, dermal grafting, focal treatment with trichloroacetic acid, fillers, fat transfer, various ablative and nonablative lasers, and light energies.<sup>4</sup> Microneedling is a technique that is a part of percutaneous collagen induction (PCI) therapy and involves puncturing the skin multiple times using needles.<sup>5</sup> It is thought that needles break collagen bundles in the superficial layer of the dermis that are responsible for scars with subsequent induction of more collagen immediately under the epidermis.<sup>6</sup> Microneedling primarily targets superficial boxcar scars. Subcision (subcutaneous incisionless surgery) is another safe technique in which a needle is inserted percutaneously adjacent to the scar to manipulate and release fibrous tissue, which pulls the scar down.<sup>7</sup> It primarily targets rolling type of atrophic scars. The efficacy and safety of combination of subcision and microneedling procedures in moderate to severe atrophic acne scars was evaluated.

## Materials and Methods

A retrospective photographic analysis of 10 consecutive patients with Global Acne Scarring Classification grades 2 to 4 treated with a combination of subcision and microneedling after informed consent for moderate to severe facial atrophic acne scarring was done at the Department of Dermatology and Venereology in a tertiary care teaching hospital between January 2019 and March 2019. The age of the patients ranged from 16 to 32 years with a mean age of 22 years and had Fitzpatrick skin type III - IV. Patients were excluded if they were pregnant, lactating, had active acne, any active infection, keloidal tendency, undergone any surgery or procedure for acne scars in previous three months. Ten consecutive patients (5 males and 5 females) met the inclusion criteria.

Patients had undergone three sessions of subcision and microneedling with an interval of 4 weeks in between each session, since the time for collagen remodelling lasts around 4-6 weeks. The procedure area was thoroughly cleaned with saline and povidone iodine and anaesthetised with thick coating of topical anaesthetic cream (lidocaine 2.5% and prilocaine 2.5%)

left for 60 minutes under occlusion. Subcision was performed using 18-gauge, tribeveled, hypodermic needle in which the needle was inserted into the deep dermis, parallel to the skin surface with bevel upwards and then moved back and forth under the scars. Microneedling was performed using dermaroller with 192 needles and 1.5 mm needle size. It was rolled on the scarred skin in eight directions (horizontal, to the right, to the left, vertical, up, down, and in both diagonal directions) applying minimal pressure and at the same time affected area was stretched in a perpendicular direction to the dermaroller movement so that the base of the scars could also be reached. The presence of uniform bleeding points over the scarred area was the end point for any treatment session. All the patients were instructed to apply topical antibiotic (fusidic acid) for 24 hours and were advised oral antibiotic for 7 days to guard against secondary infection and oral non steroidal anti-inflammatory drugs (NSAIDs) for 2 to 5 days for pain relief. Patients were also advised to apply sunscreen over the entire face every morning and avoid sun exposure. Adverse effects that occurred post-treatment including erythema, swelling, post inflammatory hyper pigmentation, and any interference with daily activities were noted.

The response was evaluated clinically by before and after photographs and pre-treatment grading of scars was compared with final grading using the global acne scarring classification of Goodman and Baron [Tables 1 and 2a and b]<sup>8,9</sup>

## Results

Out of 10 patients, 5 (50%) were women and 5 (50%) were men, with an age range of 16 to 32 years and mean age of 22 years. Acne scar duration varied from less than 1 year to more than 10 years. Most patients had mixed types of atrophic acne scars, including ice pick, boxcar and rolling scars. According to Goodman and Baron acne scar grading scale, 7 patients presented with grade 4 scars and 3 patients presented with grade 3 scars on both sides of the face. At the end of 1 month after last session, qualitative assessment by Goodman and Baron's Global acne scarring system showed that out of 7 patients with grade 4 acne scars, 2 patients (29%) showed reduction by 2 grades (Figures 1 and 2) and 5 patients (71%) by 1 grade (Figure 3). All the 3 patients with grade 3 acne scars showed reduction by 1 grade (Figure 4) (Tables 3 and 4). Estimation of improvement with Goodman and Baron's Global quantitative acne scarring system showed that 3 patients (30%) had minimal improvement ( $p=0.22$ ), 5 patients (50%) had moderate improvement ( $p=0.005$ ) and 2 patients (20%) had good improvement ( $p=$

0.016). The improvement in patients with Grade 4 scars at baseline was found to be statistically significant. The study showed good response to treatment for rolling and boxcar scar types with no failure rate (Table 5). The

combination treatment was well tolerated. All patients had reported mild erythema and oedema for 1 to 2 days, with no interference in daily routines. None of the patients had complaints of post-inflammatory hyperpigmentation.

**Table 1:** Goodman and Baron’s qualitative acne scar grading system<sup>8</sup>

Grade	Level of disease	Characteristics	Examples
1	Macular disease	Erythematous, hyper- or hypo pigmented flat marks visible to patient or observer irrespective of distance	Erythematous, hyper- or hypo pigmented flat marks
2	Mild disease	Mild atrophy or hypertrophy that may not be obvious at social distances of 50 cm or greater and may be covered adequately by make-up or the normal shadow of shaved beard hair in males or normal body hair if extrafacial	Mild rolling, small soft papular
3	Moderate disease	Moderate atrophic or hypertrophic scarring that is obvious at social distances of 50 cm or greater and is not covered adequately by make-up or the normal shadow of shaved beard hair but is still able to be flattened by manual stretching of the skin	More significant rolling, shallow “boxcar,” mild to moderate hypertrophic or opular scars
4	Severe disease	Severe atrophic or hypertrophic scarring that is obvious at social distances of 50 cm or greater and is not covered adequately by make-up or the normal shadow of shaved beard hair in males or body hair (if extrafacial) and is not able to be flattened by manual stretching of the skin	Punched out aerophic (deep “boxcar”), “ice pick,” bridges and tunnels, gross atrophy, dystrophic scars, significant hypertrophy or keloid

**Table 2:** (a) Goodman and Baron’s quantitative acne scar grading system 9

Grade or Type	No of lesions (1-10)	No of lesions (11-20)	No of lesions (>20)
Milder scarring (1 point each)	1 point	2 points	3 points
Macular erythematous pigmented			
Mildly atrophic, dish-like			
Moderate scarring (2 points each)	2 points	4 points	6 points
Moderately atrophic, dish-like			
Punched out with shallow bases, small scars (<5 mm)			
Shallow but broad atrophic areas			
Severe scarring (3 points each)	3 points	6 points	9 points
Punched out with deep but normal bases, small scars (<5 mm)			
Punched out with deep but abnormal bases, small scars (<5 mm)			
Linear or troughed dermal scarring			
Deep, broad atrophic areas			
Hyperplastic	2 points	4 points	6 points
Papular scars	Area <5mm	Area 5-20mm <sup>2</sup>	Area >20 mm <sup>2</sup>
Keloidal/ Hypertrophic scars	6 points	12 points	18 points

**Table 2:** (b) Assessment of improvement using Goodman and Baron’s quantitative acne scar grading system

Grades	Improvement status
0-5	Minimal reduction in GSGS scores
5-10	Moderate reduction in GSGS scores
10-15	Good reduction in GSGS scores
>15	Very good reduction in GSGS scores

**Table 3:** Goodman and Baron's qualitative and quantitative global acne scar scores of 10 patients at baseline and 1 month after the last session of treatment

Patient	QUALITATIVE SCORE		QUANTITATIVE SCORE	
	BASELINE	4 MONTHS	BASELINE	4 MONTHS
1	4	2	18	7
2	4	3	15	9
3	4	2	20	9
4	4	3	20	14
5	4	3	15	9
6	3	2	14	11
7	3	2	12	9
8	4	3	15	9
9	3	2	9	5
10	4	3	19	13

**Table 4:** Improvement in Goodman and Baron's qualitative scar grading post treatment in patients with Grade 3 and Grade 4 scars

Previous to treatment grade of acne scar	No of patients	Post-treatment reduction of scars by 3 grades(%)	Post-treatment reduction of scars by 2 grades(%)	Post-treatment reduction of scars by 1 grade(%)	No post-treatment reduction of scars(%)
Grade 3	3	0(0)	0(0)	3(100%)	0(0)
Grade 4	7	0(0)	2(29%)	5(71%)	0(0)

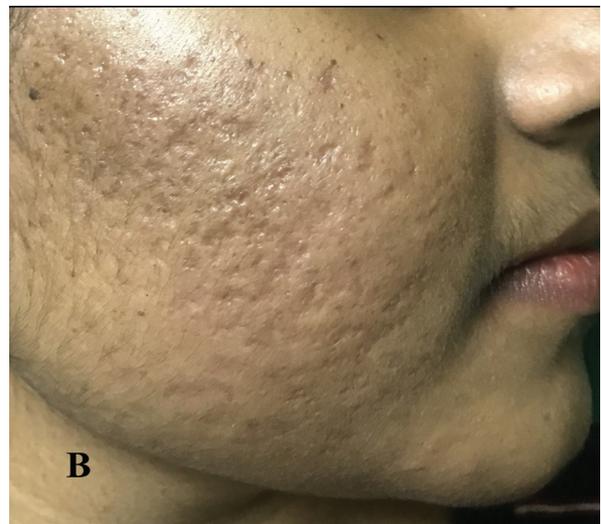
**Table 5:** Improvement in Goodman and Baron's quantitative scar grading after complete treatment

Improvement status in GSCS scores	No of patients (%)
Minimal reduction	3 (30%)
Moderate reduction	5 (50%)
Good reduction	2 (20%)
Very good reduction	0 (0)

**Figure 1:** A patient with skin type IV with Grade 4 rolling and boxcar scars- A) before treatment; B) improvement to Grade 2 after 3 sessions of subcision and microneedling



**Figure 2:** A patient with a mix of rolling, boxcar and ice-pick scars (Grade 4)- A) before treatment B) improvement to Grade 2 after treatment



**Figure 3:** A patient with skin type IV with Grade 4 rolling and boxcar scars- A) before treatment; B) improvement to Grade 3 after 3 sessions of subcision and microneedling



**Figure 4:** A patient with Grade 3 (ice pick and boxcar scars)- A) before treatment; B) improvement to Grade 2 after treatment

## Discussion

Microneedling (collagen induction therapy) utilizes tiny needles to puncture the skin multiple times, creating micro-clefts that penetrate into the dermis. The trauma in the dermis initiates wound healing and growth factor release, leading to collagen production and deposition in the upper dermis.<sup>10</sup> Skin needling renders facial skin smoother and improves rolling acne scars.<sup>10</sup> Different studies have emphasized the efficacy of micro needling monotherapy in the treatment of acne scars and have shown improvement of at least 1 grade in more than 90 percent of subjects.<sup>11-13</sup> Melanocyte number is not altered, which justifies the use of microneedling in Fitzpatrick Skin Types III to V.<sup>14</sup> A combination of microneedling with platelet-rich plasma has been found to be more effective than microneedling alone in treating acne scars.<sup>15-17</sup> Significant improvement in acne scars and skin texture has been shown with a combined sequential treatment of microneedling and glycol acid peel.<sup>14, 18</sup>

Subcision (subcutaneous incisionless surgery) is a non-operative technique that involves a needle being inserted percutaneously to release fibrotic scar bands in the dermis and subcutaneous tissue, similar to a “mini-scalpel”. This approach results in a tethered scar being “released” and allows neocollagenesis to take place beneath the scar, helping to lift and smooth the surface contour.<sup>19</sup> Deeper, wider, and more noticeable rolling scars improve more dramatically after subcision than do scars that were initially small or shallow, and

boxcar scars improve much less than rolling scars.<sup>20</sup> Subcision has been found to be effective alone as well as in combination with fractional carbon dioxide laser, micro needling, platelet rich plasma and fractionated micro needling radio frequency in various studies.<sup>19-25</sup>

On estimation of improvement with Goodman and Baron’s Global qualitative acne scarring system, we found good results in patients with Grades 3 and 4 acne scars. Out of 7 patients with grade 4 scars, 29% showed improvement by 2 grades and 71% showed improvement by 1 grade. All the 3 patients with grade 3 scars showed improvement by 1 grade. Boxcar and rolling scars showed better improvement than ice pick scars. On estimation of improvement with Goodman and Baron’s Global quantitative acne scarring system, all 10 patients (100%) showed improvement in their scars with no failure rate. 30% patients had minimal improvement, 50% had moderate improvement and 20% had good improvement with transient side effects such as mild erythema, pain and oedema.

## Conclusion

Subcision and microneedling are simple and inexpensive office procedures which in combination were well tolerated and showed more improvement in boxcar and rolling type atrophic scars as compared to ice pick scars. This minimally invasive multimodality therapy has an added advantage of minimal downtime and can be considered as an effective modality of treatment for moderate to severe acne scars.

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