

The Combination Therapy of Microneedling and Subcision with Platelet Rich Plasma (PRP) versus Platelet Rich Fibrin Matrix (PRFM) on Rolling and Boxscar Type Acne Scar: Case Series

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Keywords: Boxscar, Platelet Rich Plasma, Rolling Scar, Scar Acne.

Abstract: **Background:** Scarring is an unfortunate and frequent complication of acne vulgaris, resulting in significant psychological distress for patients. They have been subclassified into ice pick, boxcar, and rolling scars. Subcision and microneedling are some of therapeutic modalities in the form of acne scar. Platelet-rich plasma (PRP) has been evaluated for its potential benefits in the treatment of acne scars. In addition to platelets and their products, the presence of a fibrin matrix (PRFM) can enhance the delivery of growth factors. **Objectives:** investigate the efficacy of combination therapy using subcision, microneedling with application of PRP and PRFM in rolling and box acne scars. **Methods:** To observe the case reports from patients admitted to the hospital until patient returns. **Case:** 2 male patients, 28 and 30 years old, having acne scars in their faces since 5 years ago. They had no previous treatment until they came to Dr. Moewardi general hospital a few months ago. After physical examination, we diagnosed them with box and rolling scars. We applied PRFM in their scars, followed by microneedling and subcision. Then, we injected PRP in that region. **Conclusions:** Giving injury to the dermis by microneedling acts in synergy with act of PRP and PRFM, which will modify healing response by releasing cytokines and growth factors, thus will induce remodeling of acne scars.

1 INTRODUCTION

Acne scars can be classified into three different types: atrophic, hypertrophic, or keloidal. (1) Atrophic acne scars are the most common type. The most basic and practical system divides atrophic acne scars into three main types: ice pick, rolling, and boxcar scars. A number of treatments are available to reduce the appearance of scars. (Gozali MV et al, 2015) There are no methods of completely removing acne scarring, hence everything is a compromise, and often multiple techniques are combined. Many newer treatments offering the twin hopes of efficacy and safety. (Goodman GJ, 2011)

Subcision is a procedure in which a needle is inserted under the skin and passed in multiple directions. Subcision is best utilized for rolling acne scars. (Gozali MV et al, 2015) Although subcision is adequate as a stand-alone treatment, improved results are achieved when it is combined with other modalities. (Hession MT et al, 2015) Microneedling

with dermaroller is a simple and cheap procedure for atrophic scar remodulation. However, there is little published data about its efficacy and safety when used in patients with dark color Asian skin type. (Dogra S et al, 2014)

Platelet-rich plasma (PRP) has been evaluated for its potential benefits in the treatment of acne scars. (Leo MS et al, 2015) In addition to platelets and their products, the natural wound response requires the presence of a fibrin matrix, which enhances the delivery of growth factors. Fibrin mediates the adhesion of fibroblasts and other cells to the injured site. Animal studies have also suggested improved wound healing when Platelet Rich Fibrin Matrix (PRFM) is used. (Sclafani AP et al, 2012)

This case series aimed to investigate the efficacy of combination therapy using subcision, microneedling with application of PRP and PRFM in rolling and box acne scars.

2 CASE

We reported 2 male patients, 28 and 30 years old, having acne scars in their faces since 5 years ago. They had no previous treatment until they came to dr.Moewardi general hospital a few months ago. After physical examination, we diagnosed them with box and rolling scars. We applied PRFM in their scars, followed by microneedling and subcision. After that, we injected PRP in that region.

To make PRP and PRFM, Peripheral blood was drawn from the patient into two vacuum collection tubes, the first tubes contained anti coagulants CAPD to be processed into PRP and the other tube was without anticoagulants for making PRFM.

The first tube was prepared by double-spin method for each session. Seventeen milliliters of blood was withdrawn in a 20-mL syringe prefilled with 3 mL of acid-citrate-dextrose anticoagulant. First centrifugation was performed at 293.88 g for 5 min (soft spin). Both buffy coat and plasma layer were taken for further centrifugation and red cell sediments were discarded. Second centrifugation was performed at 690.94 g for 17 min (hard spin) resulting in the formation of platelet-poor plasma above and platelet-rich zone at the bottom. Platelet-poor plasma (PPP) was removed and discarded leaving behind a solution of 2 mL PRP.

The second tube is centrifuged for 6 minutes at 1100 rpm, which yields a supernatant plasma/platelet suspension and the cellular components (erythrocytes and leukocytes) below the separator gel. The plasma/platelet suspension is transferred to a second vacuum tube containing calcium chloride and was ready for use.

First we cleaned patients' face with milk cleanser and toner, then we applied topical anesthesia with EMLA ® for one hour. We applied PRFM topically, then we did microneedling 1.0 mm in acne scar region. After that, we did subcision in their rolling scars and injected them with autologous PRP, 0.1-0.2 ml per lesion. We applied antioxidant gel after procedure and patient were not allowed to wash their face for a while. They should apply antioxidant gel in their faces twice daily. We did this treatment once in 4-6 weeks, and re applied this treatment twice.

Clinical improvement in these two patients was assessed with photography and Global Acne Scarring (GAS) Grading System. There were improvements in their acne scars. The first patients who previously had moderate score became mild. The second patient who had severe classification and after procedure, he had moderate score.

Table 1. Global Acne Scarring Grading System assessment in our patients. There is improvement in their score before and after procedure.

	GAS	
Patient 1	Before	Moderate
	After	Mild
Patient 2	Before	Severe
	after	Moderate

3 DISCUSSION

Procedures such as dermal and subcutaneous autologous and non-autologous fillers and subcision carry no further risk and are independent of photoreactive skin type. Some procedures, such as light skin peels, microdermabrasion, skin rolling, and fractional resurfacing, carry minimally more risk.(Goodman GJ, 2011) This is usually required when scars occur on the forehead, chin, and lower jaw line and is due to excessive muscle activity on a scarred, atrophic, compliant area of skin.(Goodman GJ, 2011) This case series included two patients with atrophic scars, mostly rolling and box scars, predominantly in malar region.

A qualitative global acne scarring system is presented by Goodman and Baron in 2006 facilitate the relatively simple grading of a patient with postacne scarring and allow the rational description of that patient.(Goodman GJ et al, 2006) This description may allow better communication of disease severity between practitioners and give a lead to the most appropriate treatments for patients.(Goodman GJ et al, 2006)

Table 2. Grades and examples of post acne scarring

Grade	Level of disease	Characteristics	Example of scars
1	Macular disease	Erythematous, hyper- or hypopigmented flat marks visible to patient or observer irrespective of distance.	Erythematous, hyper- or hypopigmented flat marks
2	Mild disease	Mild atrophy or hypertrophy that may not be obvious at social distances	Mild rolling, small soft

		of 50 cm or greater and may be covered adequately by makeup or the normal shadow of shaved beard hair in males or normal body hair if extrafacial.	papular
3	Moderate disease	Moderate atrophic or hypertrophic scarring that is obvious at social distances of 50 cm or greater and is not covered easily by makeup or the normal shadow of shaved beard hair in males or body hair if extrafacial, but is still able to be flattened by manual stretching of the skin.	More significant rolling, shallow "box car," mild to moderate hypertrophic or papular scars
4	Severe disease	Severe atrophic or hypertrophic scarring that is obvious at social distances of 50 cm or greater and is not covered easily by makeup 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 atrophic (deep "box car"), "ice pick", bridges and tunnels, gross atrophy, dystrophic scars significant hypertrophy or keloid

Subcutaneous incisionless surgery (subcision) was first introduced in 1995 as an effective treatment for rolling scars. In this procedure, a

hypodermic, tribevelled, or filter needle is introduced into the subdermal plane to undermine the scar through a series of backward and forward motions, followed by horizontally rotating the needle in a fanning motion. These motions loosen the fibrotic adhesions that cause the bound-down appearance of rolling scars and create a wound environment amenable to collagen deposition. The bleeding and subsequent clot formation that result from the procedure aid in elevating the skin from the underlying scar tissue, generating a potential space for neocollagenesis. (Hession et al, 2015)

"Scar needling" as a means of new collagen deposition was first introduced by Orentreich and Orentreich in 1995 in the form of subcision. Fernandes described percutaneous collagen induction (PCI) therapy performed with a self-designed microneedling device, as an alternative to lasers for skin rejuvenation. Multiple skin punctures were made with a drum-shaped device which had multiple fine protruding needles. Basic contention behind this technique was that the epidermis need not be damaged to make the skin smoother. He popularized this technique for combating photoaging, laxity and for skin rejuvenation. Later PCI technique has been used for the treatment of scars of varied etiology like acne, postburn, postvaricella etc. With this technique, the rolling is usually continued until bruising occurs, which initiates the complex cascade of growth factors that finally results in collagen production. (Gozali et al, 2015)

We combined microneedling and subcision technique in our patients, so percutaneous collagen will be induced so that atrophic scar in these patients can be elevated. To enhance this elevation effect, we also used autologous PRP and PRFM that contains high concentrations of platelet growth factors such as platelet-derived growth factors (PDGF), transforming growth factors (TGF), vascular endothelial growth factor (VEGF), insulin-like growth factor (IGF), epidermal growth factor (EGF), and interleukin (IL)-1.

The optimal PRP platelet concentration should be more than 10 lakhs platelets/IL having 300–700% enrichment. PDGF in PRP improves dermal regeneration and acts locally to promote protein and collagen synthesis, causes endothelial migration or angiogenesis, and induces the expression of TGF-beta. TGF-beta activates fibroblasts causing it to undergo cell division and produce collagen. This collagen deposition is responsible for reducing the scars. (Asif et al, 2016)

Sclafani et al described in their study that the action of PRFM is more steady and sustained, yielding increased and sustained concentrations of growth factors during the crucial wound healing period after the initial acute inflammatory phase.(Sclafani et al, 2012)

4 CONCLUSION

Scarring is an unfortunate and frequent complication of acne, resulting in significant psychosocial distress for many patients. In this report, we suggested that injury to the dermis by microneedling acts in synergy with act of PRP and PRFM, will modify the natural healing response from the beginning of inflammation to the initiation of collagen induction by releasing cytokines and growth factors, thus will induce remodeling of acne scars.

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