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COMBINATION OF SUBCISION, MICRONEEDLING, AND PLATELET-RICH PLASMA THERAPY IN PATIENT WITH GRADE FOUR ATROPHIC ACNE SCARS

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ABSTRACT
Atrophic acne scars affect up to 75% of patients with a history of acne and are often associated with significant psychosocial distress. These scars are classified into three main types: ice pick, rolling, and boxcar. A multimodal therapeutic approach is often required for effective management, particularly in severe cases. This report presents a case of a 40-year-old married woman with a 10-year history of inflammatory acne lesions that progressed into grade 4 atrophic scars. The acne was suspected to be triggered by injectable contraceptive use, which contains progestins with androgenic activity. The patient frequently picked at her acne, leading to deep scarring predominantly on both cheeks. Based on clinical evaluation, dermoscopy, and skin analyzer assessment, the patient underwent a series of treatments combining subcision, microneedling, and platelet-rich plasma (PRP) therapy. Following treatment, the Self-Assessment of Clinical Acne-Related Scars (SCARS) score improved from 22 to 14, while the Facial Acne Scar Quality of Life (FASQoL) score improved from 32 to 16. This case highlights the effectiveness of a combination approach in remodeling scar tissue and improving quality of life in patients with severe atrophic acne scars. A tailored, comprehensive treatment plan is essential for optimal outcomes.

Keywords: atrophic acne scars; microneedling; platelet-rich plasma; scar treatment modalities; subcision

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INTRODUCTION

Acne vulgaris is a common disorder of the pilosebaceous unit. It frequently leads to permanent scarring on the face, which can have significant physical, psychological, and social impacts on an individual's life. Atrophic acne scars affect up to 75% of acne patients. (Deshmukh & Belgaumkar, 2019; Rahmayani et al., 2019; Schoenberg et al., 2020)Acne scarring is complex and can present with multiple scar types in a single individual. Atrophic acne scars are classified into three main types: icepick, rolling, and boxcar scars.(Bhargava et al., 2019; Goh et al., n.d.; Kamel et al., 2021)Therapies aimed at improving the function, texture, contour, and pigmentation of the skin have been practiced since the 16th century. Treatment of acne scars requires careful consideration of several factors, including the severity of the scarring, efficacy and cost of procedures, the clinician's objectives, patient expectations, potential side effects, and the psychological and emotional burden on the patient. A wide range of modalities are available for improving scars, such as subcision, microneedling, silicone gel, dermabrasion, microdermabrasion, chemical peels, punch excision, intralesional steroid injections, lasers, and surgical techniques.(Deshmukh & Belgaumkar, 2019; Ward et al., 2019)

Despite the variety of available interventions, many patients remain dissatisfied with their treatment outcomes. Therefore, combination therapies are often necessary to achieve optimal results. Combination approaches may be more effective than monotherapies, as they can target multiple types of scarring in a single session.(Bhargava et al., 2019) Subcision, or subcutaneous incisionless surgery, was first introduced in 1995 by Orentreich. It is a

minimally invasive and effective procedure for conditions such as atrophic acne scars, depressed scars, cellulite, and wrinkles. Subcision is most effective for treating rolling acne scars. The controlled injury beneath the scar stimulates neocollagenesis, which helps to fill the void beneath the scar without damaging the skin's surface.(Dadkhahfar et al., 2020; Ward et al., 2019)Microneedling, also known as percutaneous collagen induction therapy, has been widely used in dermatology for scar remodeling. It is considered safe for patients with darker skin types (Fitzpatrick skin types IV to VI).(Juhasz & Cohen, 2020) Microneedling creates micro-injuries (microwounds) that release growth factors and stimulate collagen production as part of the skin's response to injury.(Bhargava et al., 2019; Ward et al., 2019)

Platelet-rich plasma (PRP) is a therapeutic modality used for the treatment of acne scars and can serve as an adjuvant therapy when applied topically after microneedling. Platelet-rich plasma has become one of the modalities supporting scar remodeling.(Rohanda & Jusuf, 2022) It possesses angiogenic properties and promotes tissue remodeling. Due to its angiogenic nature, PRP application can also accelerate wound healing.(Deshmukh & Belgaumkar, 2019; Schoenberg et al., 2020)

METHOD

This article is a case report that presents the diagnosis, clinical management, and follow-up care of a patient. Data for this case were obtained through anamnesis, physical examination, and relevant supporting investigations. The collected data were analyzed qualitatively and are presented in a narrative format. This report presents a case of a 40-year-old woman diagnosed with grade 4 (severe) atrophic acne scars. It highlights contributing risk factors, outlines the clinical progression, and aims to provide insights for clinical practice—particularly in evaluating treatment outcomes using a combination of subcision, microneedling, and PRP therapy.

CASE REPORT

A 40-year-old married woman, a housewife of Indian descent, with a chief complaint of facial acne scars (pitted scars) on both cheeks that had persisted for approximately 10 years. Around ten years ago, the patient began using injectable contraceptives as part of a family planning program. Following this, she developed skin-colored and red papules on her face accompanied by itching and occasional pain. The patient admitted to frequently squeezing and picking at the lesions. Over time, the lesions increased in number, with some becoming larger and filled with pus.The patient had never sought medical treatment for her condition and had only used over-the-counter acne spot treatments purchased from a pharmacy. The complaints persisted throughout the period she was receiving injectable contraception. After two years of use, the patient stopped using the contraceptive injections. The red papules gradually diminished but left scarring in the form of pitting on her face. A similar complaint was also reported by the patient's brother. She began to feel self-conscious about her appearance, prompting her to seek medical attention.

The patient reported infrequent use of sunscreen and had never reapplied it. She denied any history of herpes, hypertension, diabetes mellitus, or bleeding disorders, and she was not taking any anticoagulant medications. She also had no history of smoking. The patient's nutritional status was classified as overweight, with a weight of 75 kg and a height of 170 cm. Her skin was categorized as Fitzpatrick type IV. Dermatological examination of the right and left buccal regions revealed multiple atrophic acne scars, including icepick, rolling, and boxcar types.

Figure 1. The patient's clinical presentation at the first visit.

Based on the patient's characteristic medical history, a working diagnosis of acne scars was made. The scars were visibly prominent from a distance of over 50 cm and could not be flattened by manually stretching the skin. According to the Goodman and Baron classification, the patient's acne scars were classified as grade 4. The Self-Assessment of Clinical Acne-Related Scars (SCARS) score was 22, and the Facial Acne Scar Quality of Life (FASQoL) score was 32. The planned treatment consisted of a combination of subcision and microneedling with PRP. The patient was thoroughly informed about the procedure, potential side effects, and necessary post-treatment care. After understanding the explanation, the patient signed an informed consent form. Prior to the procedure, the patient underwent a priming phase for four weeks using 0.025% tretinoin cream (applied at night) and a non-comedogenic sunscreen with SPF 30. Priming was discontinued three days before the scheduled procedure. Blood tests were also performed to assess hemostasis, with all lab results within normal limits.

The instruments required for the procedure included an 18G needle, headband, towel, instrument tray, stainless-steel bowl for 0.9% sodium chloride solution, and a Dermapen®. Materials used included sterile gloves, mask, sterile gauze, moistened cotton, tissues, cotton buds, 0.9% NaCl solution, antiseptic solution, topical antibiotic, and topical anesthetic (10% lidocaine). Before the procedure, the patient was asked to wash her face. The patient lay down, a headband was placed around her head, and a towel was draped over her neck and chest. Topical 10% lidocaine cream was applied over the entire face and left on for 45–60 minutes until numbness was achieved. A venous blood draw was then performed; the tube used contained citrate buffer. The collected blood was centrifuged at 5,600 rpm for 10 minutes. The red layer was discarded, and the tube was centrifuged again at 2,400 rpm for 10 minutes. The clear layer was removed, leaving the PRP solution ready for use. The topical anesthetic was then cleaned off using sterile gauze.The subcision procedure began with antiseptic solution applied to the treatment area. Subcision was performed using an 18G needle with the bevel facing up, targeting the acne scars. The needle was inserted to the dermal level, and fibrous bands between the dermis and epidermis were released using a fanning motion. Bleeding was controlled using sterile gauze.

Next, microneedling was performed using a Dermapen®, fitted with a disposable tip containing 12 to 36 needles with adjustable depths (0.25 mm to 3.0 mm). For acne scars, a needle depth of 1.5 to 2.0 mm was used. The device was applied vertically with gentle

traction on the skin. Topical PRP was used as a serum to aid gliding of the device and to prevent unwanted epidermal damage. The Dermapen® was moved over the treatment area in multidirectional or cross-hatching patterns, and needling was continued until pinpoint bleeding appeared. Any significant bleeding was managed by applying pressure with sterile gauze. After the procedure, a cold compress was applied using sterile gauze soaked in 0.9% NaCl solution for 10–15 minutes. The patient reported mild pain following the procedure, which improved after compress application. Topical antibiotic (fusidic acid cream) was applied after the compress. The face was then cleansed again, followed by a final application of the antibiotic cream.The patient was instructed not to use night cream for three days. She was also advised to avoid direct sunlight exposure by using protective items such as a hat or umbrella when outdoors, and to refrain from rubbing her face.

Further education included maintaining facial hygiene, avoiding scrubbing during face washing, and being strictly prohibited from picking or peeling the skin or scabs. The patient was instructed to apply topical antibiotic (fusidic acid) twice daily until the skin dried and the scabs naturally peeled off. Once no more peeling or scabbing was observed, the patient was instructed to resume the use of SPF 30 sunscreen, reapplied every two hours, and 0.025% tretinoin night cream.The patient was scheduled to return for a follow-up in 4 weeks for the second treatment session.At the 4-week follow-up visit, the patient reported that the acne scars appeared slightly improved and reduced in size (Figure 2). The scars remained clearly visible at a distance of more than 50 cm and could not be flattened with manual skin stretching. According to the Goodman and Baron classification, the patient's acne scars were still classified as grade 4 (severe). The patient then underwent a second session of combined subcision and microneedling with PRP.

Figure 2. The patient's clinical presentation at the second visit

Figure 3. The patient's clinical presentation at the third visit.

At the third visit, which took place four weeks after the second procedure, the patient reported improvements in skin texture (Figure 3). The scars were still clearly visible from a distance greater than 50 cm and could not be flattened by manual skin stretching. According

to the Goodman and Baron classification, the patient's acne scars remained grade 4 (severe). The patient then underwent a third session of combined subcision and microneedling with PRP. After the third treatment, the patient was instructed to continue using sunscreen and night cream (tretinoin 0.025%) daily for the next three months. Three months after the third procedure, the patient returned for follow-up. Based on the anamnesis, the patient felt an improvement in skin texture, particularly on the left side of her face (Figure 4). The scars were still visible from a distance greater than 50 cm, but could now be flattened by manual skin stretching. According to the Goodman and Baron classification, the patient's acne scars had improved to grade 3 (moderate).

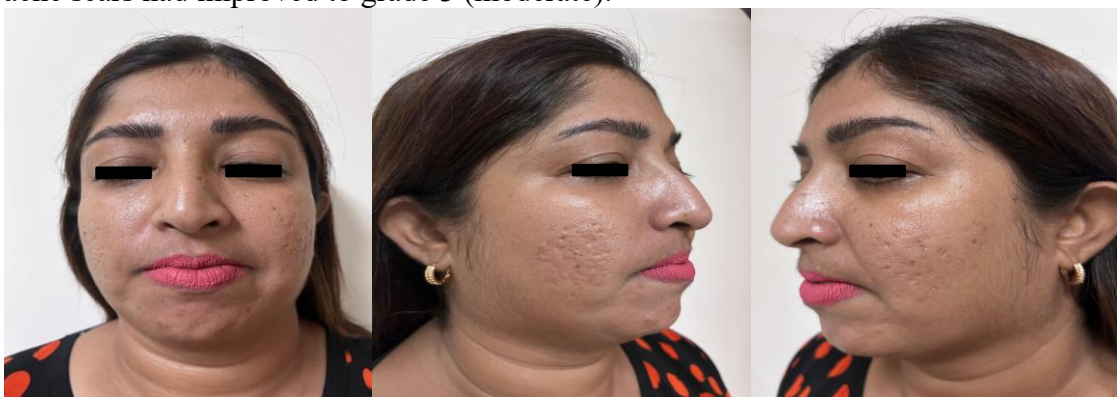

Figure 4. The patient's clinical presentation three months after the final treatment.

After treatment, the SCARS (Self-Assessment of Clinical Acne-Related Scars) score was 14, and the FASQoL (Facial Acne Scar Quality of Life) score was 16 (Figure 5). The prognosis for this patient was good in terms of life expectancy (quo ad vitam), function (quo ad functionam), and recovery (quo ad sanationam).

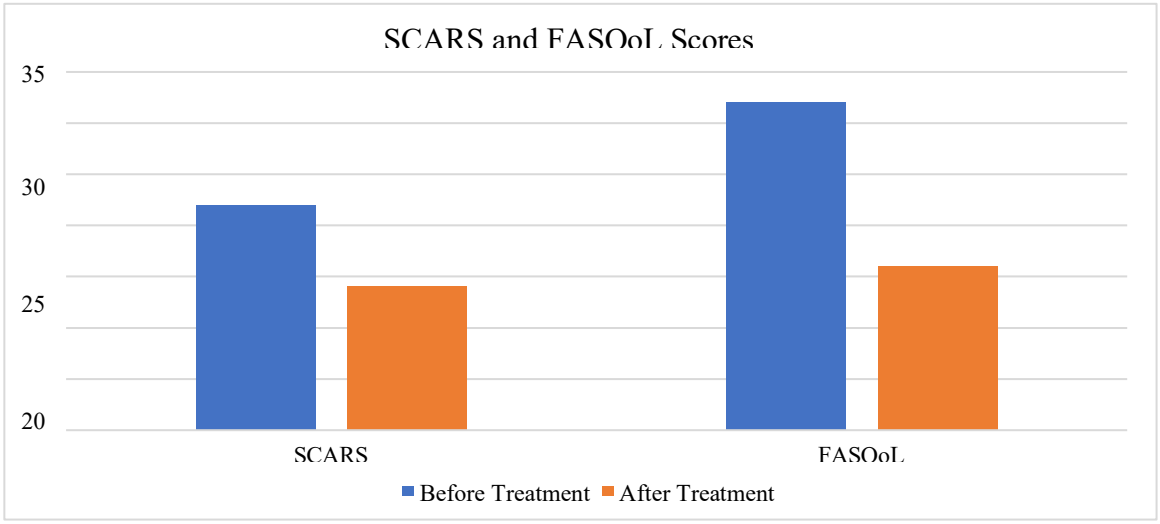

Figure 5. The decrease in SCARS and FASQoL score graphs indicates improvement.

DISCUSSION

A 40-year-old married woman of Indian ethnicity, a housewife, presented with complaints of acne scars on her face that had been present for approximately 10 years. Acne scarring commonly affects women and is often associated with persistent or late-onset acne.(Skroza N et al., 2018)The patient had a history of using injectable contraceptives 10 years ago. According to the patient, after receiving the injections, she began developing large, red, and painful acne lesions on her face. She frequently picked at these lesions, which later led to the formation of depressed scars. She discontinued the use of injectable contraceptives after two years. Injectable contraceptives are used by 40 million women worldwide for pregnancy

prevention and contain progestin as the main component.(Khafagy et al., 2021)Acne is a complex inflammatory disease with a multifactorial nature. At least four contributing factors have been identified: hyperproliferation of follicular epithelium, increased sebum production, Cutibacterium acnes, and immune-inflammatory responses. These factors are interrelated and influenced by hormonal and immune regulation.(Goh et al., n.d.) Excess sebum production is induced by androgens, with testosterone and dihydrotestosterone being the most dominant androgens involved in acne development. Increased androgen levels and heightened receptor sensitivity in target organs contribute to increased sebum secretion.(Bosanac et al., 2018)

Progestins are known to have intrinsic androgenic activity, particularly first-generation progestins. All progestins bind to progesterone receptors but may also interact with other steroid receptors, including estrogen, androgen, glucocorticoid, and mineralocorticoid receptors. First-generation progestins were initially developed for their anti-gonadotropic effects, which can result in side effects such as acne.(Davtyan, 2012)The patient's sibling experienced similar complaints. A study by Wei et al. found that acne was observed in 78% of siblings. Acne can occur earlier and be more severe in individuals with a family history of the condition.(Bhate & Williams, 2013; Wei et al., 2010)On physical examination of the right and left buccal regions, multiple types of acne scars were found, including icepick, rolling, and boxcar scars. The majority (80–90%) of acne scars represent a loss of collagen following inflammation from acne (atrophic scars), while a smaller proportion involve excessive collagen (keloids or hypertrophic scars). Atrophic scars form due to depressions caused by secondary fibrotic contraction. These atrophic scars are classified into three types: boxcar, icepick, and rolling.(Bhargava et al., 2018; Ibrahim et al., 2017)

Based on history-taking, physical examination, and supporting assessments, the patient was diagnosed with acne scars. The severity of the acne scars was classified as grade 4 (severe) according to Goodman and Baron Acne Scar Qualitative Grading System. Determining the severity is essential for selecting the appropriate treatment modality.(Bhargava et al., 2018; Deshmukh & Belgaumkar, 2019)After local anesthesia was administered, the first procedure performed on the patient was subcision. Subcision is a minor surgical technique used to manage depressed scars and is most effective for rolling-type acne scars. It is less effective for boxcar and icepick scars. The selected area was prepared with a topical antiseptic such as 2% chlorhexidine or povidone-iodine, and anesthesia was achieved using topical or injected 2% lidocaine with 1:1,000,000 epinephrine. After waiting for maximum vasoconstriction, a small (18–20G) hypodermic needle with a sharp tip was inserted at a 30-degree angle into the periphery of the scar. The needle was then moved in a fanning motion beneath the defect to release fibrotic adhesions, using a back-and-forth piston-like motion.(Ahramiyanpour et al., 2023; Deshmukh & Belgaumkar, 2019; Kamel et al., 2021; Nilforoushzadeh et al., 2020; Ward et al., 2019)

This motion produces a characteristic sound indicating the dermal base has detached from its subcutaneous adhesions. The other hand of the operator was used to stretch, pinch, or stabilize the treated area. Simultaneously, fibrous tissue was released through an incision effect, with the needle acting as a scalpel. This detachment of the scar from the underlying subcutaneous tissue stimulates collagen formation during the wound healing process. Controlled injury to the connective tissue under the scar promotes clot formation and neocollagenesis, which fills the gap beneath the scar without damaging the skin surface.Subcision can be performed at various skin depths but is generally done at the deep dermis and dermo-subcutaneous junction. After removing the needle, manual pressure was applied for 5–10 minutes to achieve hemostasis. Subcision is generally well tolerated, inexpensive, and easy to perform in an outpatient setting.The drawbacks of this procedure include variable responses to treatment and the risk of the scar re-depressing within 10 days post-procedure. Common side effects of

subcision include bruising, hematoma, scarring, nodule formation, and post-inflammatory hyperpigmentation or hypopigmentation. According to Ahramiyanpour et al., subcision has a reported success rate of 50% for rolling-type acne scars. The procedure often needs to be repeated in areas with deep scarring.(Ahramiyanpour et al., 2023)

After the subcision procedure was completed, it was followed by microneedling using Dermapen® and the application of PRP on the patient. Skin needling, also known as percutaneous collagen induction, using an automated microneedling device like Dermapen®, is a method used to improve scars, particularly atrophic acne scars.(Ali et al., 2019; Sitohang et al., 2021)Microneedling is a minimally invasive procedure that uses tiny needles to puncture the epidermis until pinpoint bleeding occurs. Dermapen® is a pen-shaped microneedling device that uses disposable needle tips. The needle depth can vary depending on the area of the skin being treated. For the forehead, a depth of 1–1.5 mm is recommended; for the periorbital area: 0.5–1 mm; for the face: 1.5–2 mm; for the nasal skin, especially on the upper dorsum: 0.5–1 mm; and for the neck and décolleté: 0.5–1.5 mm.(Amer et al., 2021; Peng, 2019)The small wounds (microwounds) formed during the procedure stimulate the release of growth factors and induce collagen production. Additionally, this procedure stimulates the production of tumor growth factor (TGF)-β3, which has anti-inflammatory effects, and TGF-β1, which inhibits melanin production by downregulating tyrosinase. The formation of microscopic channels from the epidermis to the dermis after microneedling increases skin remodeling activity. In response to cutaneous injury and collagen breakdown, the growth factor cascade stimulates the migration and proliferation of fibroblasts, leading to the formation of new collagen.(Bhargava et al., 2019; Ibrahim et al., 2017)

Neocollagenesis induced by microneedling can continue for several months after the procedure. Gene expression studies before and after microneedling have shown increased expression of type I collagen, glycosaminoglycans, vascular endothelial growth factor (VEGF), fibroblast growth factor (FGF)-7, epidermal growth factor (EGF), and TGF-β. Histological examination shows thickening of the epidermis and increased collagen and elastin deposition. After several weeks to months, the newly formed type III collagen matures into type I collagen, resulting in tighter skin and visibly reduced scars. Juhasz & Cohen, 2020; Peng, 2019)During microneedling, the epidermis remains relatively intact, allowing for faster healing and minimal side effects. A study by Ibrahim et al. found that microneedling is safe for the treatment of acne scars in patients with darker skin tones (Fitzpatrick IV–VI) compared to conventional resurfacing modalities. This is because the number of melanocytes remains unchanged due to the lack of epidermal damage. Side effects include mild pain during the procedure, which resolves afterward. Post-procedural redness is typically experienced for 1–2 days.(Ibrahim et al., 2017)The application of PRP was carried out simultaneously with the microneedling procedure. Platelet-rich plasma is autologous blood plasma with a higher-than-average concentration of platelets. Normal platelet concentration in blood is 150,000 to 400,000 per microliter. In PRP, the platelet concentration reaches 4–7 times the physiological concentration. Currently, there is no standardized protocol for obtaining PRP. PRP contains potent regenerative and angiogenic components that promote rapid healing, increase collagen production, and assist in tissue remodeling at treated scar sites.(Ibrahim et al., 2017; Peng, 2019; Vempati et al., 2023)

The growth factors found in PRP include platelet-derived growth factor, keratinocyte growth factor, insulin-like growth factor 1, TGF, VEGF, FGF, EGF, as well as cytokines and chemokines. PRP also stimulates the production of hyaluronic acid, which draws water into the hyaluronic matrix, leading to swelling that increases skin volume and turgor and lubricates the tissue. Hyaluronic acid supports cell proliferation and extracellular matrix synthesis and modulates collagen diameter, thereby improving atrophic scars.(Ibrahim et al., 2017)This

patient underwent a combination of three procedures: subcision, microneedling, and PRP application. Combination therapy is often necessary because patients typically present with multiple scar types requiring volume restoration, tightening or tissue mobilization, along with resurfacing.(Bhargava et al., 2019) A study by Vempati et al. showed that PRP is one of the most commonly combined therapies with subcision. PRP combined with subcision produced better outcomes than subcision alone or subcision combined with microneedling.(Ahramiyanpour et al., 2023; Vempati et al., 2023) Topical PRP applied immediately after subcision and microneedling has shown positive effects, especially for rolling scars and shallow boxcar scars. However, for icepick and deep boxcar scars, multiple sessions and more invasive interventions are needed for optimal results.(Vempati et al., 2023) A study by Bhargava et al. involving the combination of subcision, microneedling, and PRP application showed good results in patients with Grade 4 acne scars. A study by Amer et al. also demonstrated that a combination of Dermapen® and PRP was more effective than monotherapy, without the risk of dyspigmentation or complications. Subcision combined with PRP yielded good outcomes in patients with rolling and boxcar scars. Microneedling in combination with other therapies such as PRP, vitamin C, and glycolic acid can also improve atrophic acne scars. Additionally, needling enhances the absorption of PRP.(Amer et al., 2021; Bhargava et al., 2019)

After the procedure, the treated area was compressed with 0.9% NaCl for 10 minutes, followed by the application of fusidic acid ointment. Fusidic acid works by inhibiting bacterial protein synthesis through preventing the elongation factor's translocation from the ribosome. It has a steroid-like structure but without the same side effects. Fusidic acid can penetrate normal, damaged, and avascular skin. Topical application of fusidic acid yields higher concentrations compared to systemic administration, with antimicrobial activity present in both the epidermis and dermis. It is mainly effective against gram-positive bacteria such as Staphylococcus and Corynebacterium species. Topical antibacterial agents are preferred for therapy and infection prevention in minor wounds due to advantages over systemic agents.(Bandyopadhyay, 2021)The patient was advised to use sunscreen daily and avoid direct sun exposure for at least two weeks post-procedure, while consistently using sun protection.(Peng, 2019) As priming and treatment during the healing period, the patient was prescribed 0.025% tretinoin cream to be applied to the entire face. Topical tretinoin has the ability to modify abnormal follicular keratinization, thereby promoting comedolysis, modulating epidermal cell proliferation and differentiation, stimulating fibroblasts, preventing collagen loss, and inhibiting UV-induced skin metalloproteinase induction (collagenase, 92-kd gelatinase, and stromelysin, all of which degrade collagen). Tretinoin also reduces epidermal melanin and pigmentation through increased keratinocyte turnover and tyrosinase inhibition. It decreases stratum corneum thickness and abnormal keratinocyte desquamation.(Baldwin et al., 2013)

The side effect observed in the patient was mild post-procedural pain. Possible side effects of subcision for acne scars include procedural pain, bruising, transient dyspigmentation, keloid formation, edema, nodules, transient paresthesia, and hemorrhagic papules and pustules. These are typically mild and resolve within days. A similar protocol reported by Bhargava et al. noted only mild and transient erythema and edema, without post-inflammatory hyperpigmentation.(Bhargava et al., 2019; Dadkhahfar et al., 2020)Before and after the procedures, the patient was asked to complete the SCARS and FASQoL questionnaires. The Self-Assessment of Clinical Acne-Related Scars (SCARS) is an instrument for assessing the severity of acne scars in front of a mirror with five questions. The Facial Acne Scar Quality of Life (FASQoL) is used to assess the emotional, social, and occupational/educational impact of acne scars through ten questions.(Woong-Suk CHAE; Jun-Young SEONG; Ha-Na JUNG; Sook-Hyun KONG; Ho-Seok SUH; Yu-Sung CHOI., 2015)The prognosis for this patient is

quo ad vitam bonam, quo ad functionam bonam, and quo ad sanationam bonam. The combination therapy of subcision, needling, and PRP can be an effective treatment for severe acne scars. This multimodal therapy does not require many sessions and has been reported to provide good patient satisfaction with minimal downtime.(Bhargava et al., 2019; Schoenberg et al., 2020)

CONCLUSION

This case demonstrates that combining subcision, microneedling, and PRP is effective in treating severe atrophic acne scars. Significant improvements were observed both clinically and in the patient's quality of life. A personalized, multimodal approach is essential for optimal outcomes in acne scar management.

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