Role of Dermaroller and Prp In Post-Traumatic Facial Scar Treatments

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ABSTRACT
In the present study follow up kept on immediate post-operative day and at one week to evaluate pain, bleeding and inflammation. Final follow up at two months for assessment of aesthetic score by three independent personnel. Pain and inflammation were more associated with Group B compared to Group A, but there are no statistical significance differences among this groups (P value- 0.074 and 0.136 for pain and inflammation respectively on immediate post-operative day. Chi-square test). Final follow up assessment of aesthetic scores at two months calculated by Chi-square test and comparisons of two groups for aesthetic scores done by Independent t-Test. All three personnel gave higher aesthetic score to Group B but statistically this was not significant (P-value 0.287, 0.129 and 0.400 by Observer 1, 2 and patients respectively. Chi-square test). The mean aesthetic score given by Observer 1, 2 and patient was higher associated to Group B but statistically this was not significant (P=0.526, 0.055 and 0.232 independent t-Test).

INTRODUCTION
The face is especially susceptible to injuries, as the most visible portion of the body. Wounds to the skin, teeth and sensitive face tissues trigger pain in the face area. As a maxillofacial surgeon we are more conscious about the skeleton components and dentitions rather than soft tissue, but it leaves facial scar and it will give psychological trauma to patient (Levine et al., 2005). The facial scar may have significant psycho-social implications. Patients have extreme emotional stress, especially where they arise in noticeable regions of the face, due to maxillofacial painful injuries, surgical operations, and serious acne. Aesthetically speaking, the standard of the life of patients may be impaired and in men and women, while traumas and elective processes also trigger minimal scarring, substantial distress and self-awareness is reported (Fernandes, 2005a; Harris et al., 2015).

Maxillofacial accidents that cause scar tissue growth are fairly normal and contribute to aesthetic or functional enhancement care for patients. Maxillofacial surgeons must understand that increased scar functional efficiency may be mirrored in the enhancement of patients’ psychological well-being and behaviour (Levine et al., 2005). Revising facial cells provides the maxillofacial surgeons with a significant diagnosis and technological task. Facial cavities are also more painful than wounds on certain parts of the body, as they are not easy to hide. Suitable preparation and technological expertise are important if the outcome is to be both clinically and cosmetically useful for the user. The wound healing cycle ends in development of scars affected by various factors accompanying maxillofacial trauma including basic repair (Moetaz et al, 2015). Many scar attenuation procedures available in secondary maxillofacial dermatology include scar revision surgery, chemical peeling, laser treatment,
fractionated laser, pulsed dye and laser, Percutaneous Collagen Induction (PCI) with dermaroller and selective derma-abrasion with dermapen (Fernandes, 2005a).

Dermarollers have recently become common as an easy way to treat scars, primarily acne scars. The specialist or dermatologist with limited training will comfortably use it. Combined use of micro-needling platelet rich plasma (PRP) infusion method is well known as the latest approach for managing post-wound and acne rash (Chawla, 2014). Rich plasma platelets (PRP) include several active growth factors that release neurotransmitters from nearby areas that promote development inducing enhanced immune responses (Asif et al., 2016). PRP includes many triggered growth factors. This research project intends to carry out a PCI combined with PRP for management of post-traumatic scars.

Research Objectives

This study intends to study dermaroller alone and in combination with Platelet Rich Plasma (PRP) for management of post-traumatic facial scar. This research seeks to assess the successful utilization of combination of microneedling as well as PRP in post-traumatic scar treatments.

Literature Review

Fernandes (Fernandes, 2005b) outlines concepts, rules, contraindications, procedures including post-operative surface mark treatment utilizing dermaroller in his distinguished paper. PCI is an easy process that will effectively that rapidly perforate every skin with the proper device. While the smoothing observed in laser remodelling might not come from a single operation, the cornea is relatively natural. Treatment could be replicated if the outcome is not enough. The method is appropriate in places not ideal for scratching or resurfacing with lasers. Percutaneous injection of collagen with dermaroller was carried out with Liebel (Aust et al., 2008) using multiple 1.5 mm needles to treat atrophic acne marks. Dermaroller was found to be efficient and healthy in the care of the atrophic acne scars for PIC. Majid (Liebl and Kloth, 2012) and Asif et al. (Majid, 2009) performed related experiments. Both observed that micro-needling treatment is a safe and convenient way of coping with atrophic face bruises from various etiologies.
### Table 1: Age distribution among individual groups

| Group  | Count | Min Age | Max Age | Mean   | SD     |
|--------|-------|---------|---------|--------|--------|
| Group A | 10    | 19      | 41      | 29.60  | 7.777  |
| Group B | 10    | 19      | 40      | 28.60  | 6.851  |

### Table 2: Frequency Distribution of Gender among the study

| Gender | Frequency | %     | Valid % | Cumulative % |
|--------|-----------|-------|---------|--------------|
| Male   | 15        | 60.0  | 60.0    | 60.0         |
| Female | 5         | 40.0  | 40.0    | 100.0        |

### Table 3: Frequency Distribution of etiology of injury among the study

| Etiology               | Frequency | %     | Cumulative % | Valid % |
|------------------------|-----------|-------|--------------|---------|
| RTA                    | 14        | 70.0  | 70.0         | 70.0    |
| Assault                | 4         | 20.0  | 90.0         | 20.0    |
| Sports Related         | 2         | 10.0  | 100.0        | 10.0    |
| Total                  | 20        | 100.0 | 100.0        | 100.0   |

### Table 4: Frequency Distribution of the area involve among study for various injuries

| Area                             | Frequency | %     | Valid % | Cumulative % |
|----------------------------------|-----------|-------|---------|--------------|
| Forehead                         | 4         | 20.0  | 20.0    | 20.0         |
| Angle of Mandible                | 1         | 5.0   | 5.0     | 25.0         |
| Fronto-zygomatic Region          | 6         | 30.0  | 30.0    | 55.0         |
| Chin                             | 4         | 20.0  | 20.0    | 75.0         |
| Midface                          | 4         | 20.0  | 20.0    | 95.0         |
| Cheek                            | 1         | 5.0   | 5.0     | 100.0        |
| Total                            | 20        | 100.0 | 100.0   | 100.0        |

### Table 5: Comparing two groups for pain frequency after immediately post-operative day by Chi-square Test

|                          | Pain | Absent | Present | Total | P Value |
|--------------------------|------|--------|---------|-------|---------|
|                          |      |        |         |       |         |
| Group A                  | Count| 7      | 3       | 10    | 0.074   |
| % Within Group           | 70.0%| 30.0%  | 100.0%  |       |         |
| % Within Pain            | 70.0%| 30.0%  | 50.0%   |       |         |
| % of Total               | 35.0%| 15.0%  | 50.0%   |       |         |
| Group B                  | Count| 3      | 7       | 10    |         |
| % Within Group           | 30.0%| 70.0%  | 100.0%  |       |         |
| % Within Pain            | 30.0%| 70.0%  | 50.0%   |       |         |
| % of Total               | 15.0%| 35.0%  | 50.0%   |       |         |
| Total                    | Count| 10     | 10      | 20    |         |
| % Within Group           | 50.0%| 50.0%  | 100.0%  |       |         |
| % Within Pain            | 100.0%| 100.0% | 100.0%  |       |         |
| % of Total               | 50.0%| 50.0%  | 100.0%  |       |         |
Table 6: Comparing Two groups for inflammation frequency (present or absent) after immediately post-operated day by Chi-square Test

|       | Inflammation |     |     |     |
|-------|--------------|-----|-----|-----|
|       | Absent | Present | Total | P Value |
| Group A | Count |  |  |  |
| % Within Group | 2 |  |  |  |
| % Inflammation | 20.0% | 80.0% | 100.0% |
| % of Total | 10.0% | 40.0% | 50.0% |
| Group B | Count |  |  |  |
| % Within Group | 0 |  |  |  |
| % Inflammation | 0.0% | 100.0% | 100.0% |
| % of Total | 0.0% | 50.0% | 50.0% |
| Total | Count | 2 | 18 | 20 |
| % Within Group | 10.0% | 90.0% | 100.0% |
| % Inflammation | 100.0% | 100.0% | 100.0% |
| % of Total | 10.0% | 90.0% | 100.0% |

Needling discussing progress and expanding perspectives, suggested that micro-needle is a very simple and effective clinical method which is efficient and minimally invasive. It was first implemented as skin rejuvenation, but has now been included in a broad spectrum of signs such as hypertrophic scars, acne, post-traumatic / burning scars, male pattern baldness, skin peels, drug supply, seborrheic dermatitis, stretchmarks, etc. Microneedling by the derma roller tool for the treatment of atrophic acne scars was found to be efficient yet secure for activation of percutaneous collagen.

MATERIALS AND METHODS

This research was carried out after approval by the Ethics Committee in the Ministry of Oral and Maxillofacial Surgery, Dental Science School; KIMSDU, Karad. A total of 20 patients were involved in this research (including males and females both). All patients were randomly divided into two groups; Group A: PCI with dermaroller alone and Group B: PCI with dermaroller and in combination with PRP.

Inclusion Criteria
1) Patients with post traumatic scar (> 21 days)
2) Patients willing to participate in the study and for the follow-up visits.
3) Patients in the age group of 20 - 50 years.

Exclusion Criteria
1) Patients having history of keloid scarring or keloidal tendency
Figure 6: Frequency Distribution of shape of scar among two groups

- 2) Patients with uncontrolled diabetes mellitus
- 3) Patients with bleeding disorder
- 4) Patients on long term oral steroid therapy
- 5) Patients on anti-coagulant therapy
- 6) Patients with active skin infections, like herpes infection and bacterial infection.

**Preoperative Evaluation**

Assessment of all the cases was done pre-operatively on the basis of the following factors:

1) Case history
2) Clinical examination
3) Laboratory investigations

A thorough history and clinical evaluation was performed and recorded based on the case history pro-forma. The method, its risks as well as the observation time included in the research process were clarified to the patients. Those patients willing to undergo the procedure and the follow-up visits were enrolled in the study and an informed written permission was taken. A. Tourniquet, B. Syringes (10 ml), C. Flashback blood collection needle, D. Vacutainer without Anti-coagulant, E. Vacutainer with C.P.D.A. Anti-coagulant, F. 10% CaCl₂, G. 12 ml borosilicate glass tube, H. Clean sterile stainless steel bowl.

**PRP Preparation**

Tourniquet was placed on the arm and the patient was instructed to clench the fist so as to make the vein prominent. Tapping over the vein with finger was also performed if required to make the vein more prominent. Under aseptic techniques, 10 ml of blood was drawn intravenously from the anti-cubital region of patients. Vacutainer tube was placed and counter balanced in centrifuge machine. The blood vacutainer was centrifuged for 10 minutes at 2400 rpm. The effect is a breakdown of the entire blood into the bottom of Red Blood Cell (RBC). This plasma contains platelets which is collected and centrifuged to yield platelet rich plasma (PRP). PRP has been placed into sterile stainless-steel tubes, then PRP has been applied to 0.5–1 ml of 10% calcium chloride to develop PRP gel (Figure 2).

**Derma roller Technique**

Before the treatment, the scar area of patients were digitally photographed and filled in a database. The area over the skin to be treated was cleaned with medical spirit followed by painting of the respective area by 10% betadine solution. Sterile drape was applied to the face to expose only the treatment area. Topical anaesthetic cream (prilocaine 25mg and lidocaine 25mg) was applied for 60 minutes. Using a derma roller tool, (Figures 1 and 3) the micro-needling was achieved. The microneedles were carried out consecutively in the regions affected for a minimum of 10-14 runs in four directions: vertically, horizontally, diagonally right-hand as well as diagonally left-handed.

**RESULTS AND DISCUSSION**

Number of total males and females enrolled for the study were 15(60%) and 5(40%) respectively. The total male and female among group A and B was 8(80%), 2(20%) and 6(60%), 4(40%) respectively (Table 1). Etiology of facial trauma in the study.
included Road Traffic Accident (RTA) 14(70%), assaults in 4(20%), and sports related injury in 2(20%) of patients (Table 2). Figures 4 and 5 represent before and after treatment images. In group A and group B, RTA 7(70%), assaults in 2(20%), and sports related injury in 1(10%) of patients respectively (Table 3). Site of distribution of post traumatic facial scar in the study was; forehead 4(20%), angle of mandible 1(5%), fronto-zygomatic region 6(30%), chin 4(20%), and cheek 1(5%) patients (Table 4). In group A frequency of distribution of area involved was forehead 2(20%), angle of mandible 1(10%), fronto-zygomatic region 3(30%), chin 2(20%), and midface 2(20%). In group B frequency of distribution of area involved was forehead 2(20%), fronto-zygomatic region 3(30%), chin 2(20%), and midface 2(20%) and cheek 1(10%) (Figure 6). The Frequency of distribution of shape of scar among the study was linear in 10(50%), oval in 6(30%), and irregular in 4(20%) patients (Table 5). The Frequency of distribution of shape of scar in both the group A and group B was linear in 5(50%), oval in 3(30%), and irregular in 2(20%) patients respectively (Table 6).

CONCLUSIONS

PCI was introduced by Fernandez in South Africa for first time. Since then it became a popular method for skin tightening, acne scar revision and skin wrinkle removal but in the field of maxillofacial dermatology and for post traumatic facial scar attenuation this method is new and better in comparison to other available options in recent days. This study was carried out with an aim of comparing and evaluating precautious collagen induction with dermaroller device alone and in combination with PRP for post traumatic facial scar attenuation. Total 20 patients were enrolled in this assessment which were arbitrarily separated into 2 groups (Group A and group B) The parameters evaluated were pain, bleeding and inflammation on immediate post-operative day and 1 week follow-up,and modified standard six point aesthetic scale was used to determine a side-by-side assessment of the accepted standards for clinical progression photographs and which were compared by Chi-square test, and independent t-test.

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Conflict of Interest

I hereby declare that there is no conflict of interest related to this manuscript.

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