

*Research Article***Carboxy therapy versus PRP in striae distensae**

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Abstract

Striae distensae (SD), are a form of scarring of the skin associated mainly with rapid weight changes and pregnancy. various treatment are available for improving stretch marks. Of them, carboxy therapy and platelet rich plasma (PRP). Comparison between them was discussed here, the study included 30 patients with striae distensae divided into two groups, carboxy group (15 patients) received 6 sessions 2 weeks interval and PRP group (15 patients) received 3 sessions one month interval. histological evaluation was performed before and after treatment, as epidermal thickness was measured in all cases before and after treatment. No significant difference between 2 groups. conclusion, the two modalities proved their efficacy in treatment of SD with no significant difference.

Keywords: striae distensae, carboxytherapy, PRP.

Abbreviation: SD: striae distensae, and PRP: platelet rich plasma.

Introduction

Striae distensae is tearing of dermis which over time may diminish but will not disappear completely (suh et al., 2012).

Striae distensae is a challenging cosmetic problem; although various treatment modalities have been applied like radiofrequency, ultrasound, topical retinoid, platelet rich plasma (PRP) and carboxy therapy, it remains an important target of research for an optimum treatment (suh et al., 2012).

Carboxy therapy refers to cutaneous and subcutaneous administration of carbon dioxide gas by 30G or 32G needle which is delivered by programmable apparatus (sabine, 2012).

Platelet rich plasma (PRP) is an autologous concentration of human platelets contained in small volume of plasma. PRP increased the length of dermoepidermal junction, the amount of collagen, and number of fibroblasts (shin et al., 2012).

Two modalities of treatment were compared with their efficacy in treatment of striae distensae: first carboxytherapy and the second PRP.

Patients and methods

We performed a clinical study on thirty female patients, whose ages ranged between 15 - 50 years old. Patients were selected from outpatient clinic of Minia University hospital.

The patients were divided randomly into two groups: Group (I) included fifteen patients with SD and were treated by carboxy therapy and Group (II) included also fifteen patients with SD and were treated by PRP. All patients were subjected to complete history taking, through general examination to exclude any systemic diseases, and full dermatological examination. group (I) carboxytherapy, the gas was applied by intra-dermal injections with an angle of 15°, with bevel border up,

directly into the striae using carboxy gun (Concerto Carboxy and Meso gun, 602-

0845, Lyon Cosmo Trade, France). The clinical endpoint of injection is the occurrence of an erythema and distension of the injected tissue, each patient had 6 sessions 2 weeks interval. Group II (PRP therapy). Treatment was performed through intradermal injection of PRP. Each patient had 3 sessions with one month interval.

To prepare PRP, ten cc of venous blood was collected from the antecubital vein under complete aseptic conditions into tubes containing acid citrate dextrose (ACD) (10:1) as an anticoagulant.

The citrated whole blood was subjected to two centrifugation steps; the initial centrifugation (soft spin) at 1500 g for 10 min to separate the plasma and platelets from red and white blood cells. Low centrifugation speed are recommended to avoid fragmentation of platelets. When the anticoagulated blood is centrifuged, 3 layers with different densities separate out: The lower layer, composed of red blood cells, the middle layer, composed of white blood cells and platelets, the upper layer composed of plasma. The plasma phase, in turn, can be subdivided into 3 fractions according to the number of platelets present. These fractions are, from most to least abundant: the platelet-poor fraction, the intermediate fraction with a medium concentration of platelets, and the platelet-rich fraction. The resulting plasma supernatant was harvested to second centrifugation step (hard step) at 4000g for 4 minutes. typically the lower 2 cc of plasma are the rich one. Then, PRP was activated by adding calcium chloride (0.1 cm of CaCl₂ to each 1cm of PRP) immediately before the injection.

In group II, PRP was injected using insulin syringe intra-dermally in the striae distensae with a space of 2 cm between different

points of injections. Quartile grading score (Score from 0 to 4) was used for assessment of clinical improvement. No improvement (0%), mild improvement (<25%), moderate improvement (25%-50%), v. good improvement (51%-75%), excellent improvement (>75%). Patient satisfaction (Score from 0 to 2), no satisfaction (0), slightly satisfied (1), and satisfied (2). Histo-pathological Assessment Skin biopsies had been taken from the center of striae distensae (4mm punch), before and after 2 weeks of treatment then stained with Haematoxylin and Eosin (H&E). Histometry, the epidermal thickness of all skin biopsies, were measured by a computer assisted program (analySIS® Five by Olympus Soft Imaging Solutions GmbH, Johann-Krane-Weg 39, D-48149 Münster, Germany) at the dermatopathology unit of the Dermatology, STD's and Andrology Department, Minia University Hospital. Epidermal thickness measurement was done before and after treatment. Special histochemical stains: Orcein stain was used for demonstration of elastic fibers changes and Masson trichrome stain was used to evaluate dermal collagen.

Result

Regarding clinical improvement, there was no significant difference between 2 groups (P value = 0.673), as in carboxytherapy excellent improvement (40%), marked improvement (20%), moderate improvement (26,7%), mild improvement (6,7) and no improvement (6,7). In PRP, excellent improvement (20%), marked improvement (26,7%), moderate improvement (40%), mild improvement (13,3%) .

Biopsies stained by (H&E) in both groups showed before treatment, thin and flat epidermis with attenuation of rete ridges and separation of collagen fibers with increased interfibrillary spaces. After treatment by the two modalities, epidermis increased in thickness and the dermis showed increase deposition of collagen fibers. There is highly

significant increase in the mean of the epidermal thickness in carboxytherapy group I from $40.9 \pm 8.9 \mu$ before treatment to $60.7 \pm 15.2 \mu$ after the end of treatment period ($P < 0.001^*$). Also, There is highly significant increase in the mean of the epidermal thickness in PRP group from $38 \pm 6.9 \mu$ before treatment to $50.8 \pm 9.7 \mu$ after 2 weeks after end of treatment sessions ($P < 0.001^*$). Before treatment in both groups, mason trichrome stained sections from SD showed disorganized collagen fibers, 2 weeks after end of sessions of both groups. increased deposition of collagen fibers which became more dense, compact and organized was reported .

Discussion

Striae distensae is a very common cosmetic problem which develops during either puberty or pregnancy (Tabaie et al., 2018). Various modalities of treatment have been used to treat striae including topical retinoid therapy, chemical peels, ultrasound therapy, microdermabrasion, IPL, near infrared lasers, platelet rich plasma and carboxytherapy (El Taieb and Ibrahim, 2016). PRP is blood plasma with concentrated platelets. The concentrated platelets found in PRP contain large reservoirs of bioactive proteins, including growth factors that are vital to initiate and accelerate tissue repair and regeneration (Picard et al., 2015). Carboxy therapy is the use of CO₂ subcutaneously. The effect of such administration is effective not only in improving circulation and perfusion parameters of injection site but also inducing an increase in tissue oxygen partial pressure 2-10 (Eliana et al., 2013). The study aimed to compare carboxytherapy versus PRP in treatment of striae distensae, thirty patients were divided randomly into two groups: patients treated by carboxy therapy (group I: 15 volunteers) and

patients treated by PRP (group II: 15 volunteers). Regarding clinical improvement, there was no significant difference between 2 groups ($P = 0.673$).

Histologically, in the early stage of striae distensae, there are dermal edema and perivascular lymphocytic cuffing, and, in the later stage, atrophy and loss of rete ridges occur. There is loss of the normal random collagen distribution to the level of the mid dermis or deeper. Elastin stains reveal scarce or absent elastin fibers and reduced fibrillin in the papillary and reticular dermis within affected areas (Watson al., 1998), In our study regarding histological evaluation of SD, before treatment showed thin and flat epidermis with attenuation of rete ridges and separation of collagen fibers with increased interfibrillary spaces with marked decrease of dermal elastic fibers was observed in all cases. Elastic fibers also appeared fragmented in most biopsies. Mason trichrome stained sections from SD showed disorganized collagen fibers.

After treatment in carboxy group, there is highly significant increase in the mean of the epidermal thickness from $40.9 \pm 8.9\mu$ before treatment to $60.7 \pm 15.2\mu$ after the end of treatment period ($P < 0.001$), In PRP group, Post-treatment biopsies demonstrated increased thickness of epidermis with thick, compact collagen fibers and organized elastic fibers. The increase of epidermal thickness was from $38 \pm 6.9\mu$ before treatment to $50.8 \pm 9.7\mu$ after 2 weeks after end of treatment sessions ($P > 0.001$), elastic fibers in both groups after treatment, were markedly increased in number with regular distribution throughout the reticular dermis and became more

uniformly. In mason trichrome stained sections from SD in both groups showed increased deposition of collagen fibers which became more dense, compact and organized, so that the skin appears healthier as the improvement in the color of striae indicates better improvement in pigmentation and vascularization after therapy.

Mason trichrome stained 2 weeks after end of sessions showed increased deposition of collagen fibers which became more dense, compact and organized was reported with elastic fibers markedly increased and became more regular in distribution

Conclusion

The tow modalities of treatment proved to be effective clinically and histopathologically in treating of SD, well tolerated by patients with minimal side effects.

Acknowledgment

We thank all staff members of dermatology department and all participants in this study.

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