



## Erbium and Fractional CO<sub>2</sub> Lasers in Acne Scars

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### Abstract

Acne scars are difficult to treat. Of these boxcar and rolling scars present a considerable therapeutic challenge. The depth of the craters varies in size and the standard of therapy has been the fractional CO<sub>2</sub> laser resurfacing. Partial improvement of the scars occurs with a moderate reduction in the depth of the scars. Further reduction is possible with the use of erbium laser and sodium hyaluronate.

**Keywords:** Boxcar scars; Rolling scars; Sodium hyaluronate; Fractional CO<sub>2</sub> laser; Erbium laser

### Introduction

Nodular acne, grade III and grade IV acne predisposes to icepick, boxcar scar and rolling scars. Even patients on oral tetracyclines, oral retinoids and topical antiacne therapy exhibit early signs of scarring culminating in pronounced scarring with passage of time. Neglected cases of acne exhibit deep scarring much earlier.

When fractional ablative resurfacing lasers are used, acne scars show significant improvement. Fractional carbon dioxide laser is most commonly used for the treatment of acne scars [1]. Fractional photothermolysis ablates tissue, stimulates neocollagenesis and collagen remodeling leaving surrounding rings of viable tissue [2,3]. Boxcar scars & rolling scars show improvement after the laser.

Sodium hyaluronate is a naturally occurring, viscous high molecular weight polysaccharide, composed of sodium glucuronate and N-acetyl-glucosamine. It forms a repeating unit by linking alternately beta 1-3 and beta 1-4 glycosidic bonds. A biologic polymer, it is found in various vertebrate connective tissues including aqueous and vitreous humor of the eye, synovial fluid, skin and umbilical cord. Due to its high viscoelastic properties it is used to maintain the depth of anterior chamber in cataract surgeries [4].

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### Case Presentation

In our clinic, eleven patients with boxcar and rolling scars were treated with fractional carbon dioxide laser (Ultrapulse laser). About 5% densities and 35 mj of energy were used on the base of the scar. While low density (5%) with higher energy (35%) stimulates neocollagenesis, 10% density with 20 mj of energy was used on the rest of the field to fractionally ablate scar tissue (Figure 1 and 2). After the initial collagen remodelling interval of three months, the scars showed a significant yet incomplete reduction of the crater. After three months, the scars were again treated individually with erbium laser. The scar crater was filled with sodium hyaluronate (Provisc) (Figure 3) and then eight passes of 800 mj of short pulse 2940 nm erbium laser (Alma Harmony Pro XL) was applied over the scar. The scars were reviewed after an interval of four weeks (Figure 4). There was significant improvement in the depth of the scar as well as the texture of the scars. The shoulder of the scars also showed sufficient reduction of the height.

### Discussion

Acne is an invariable accompaniment of early adulthood. Timely and regular treatment during the lengthy course of the disease greatly reduces extent of scarring. Those with neglected acne, nodular acne as well as a familial predisposition to scarring develop extensive scarring over the years.

Once the acne has been controlled, laser reduction of acne scars can be attempted. The first step would be to subsize the scars by inserting a nokorneedle and using fan shaped lateral movement to snap the fibrous bands.

Laser resurfacing of the scar area is completed using the fractional carbon dioxide as outlined earlier. Wound healing occurs in one week and topical 2% Mupirocin ointment is used to aid the



Figure 1: Scars at presentation.



Figure 2: Post fractional CO<sub>2</sub> laser.



Figure 3: Instilling gel.

healing process. Use of sunscreens is mandatory and topical whitening creams can be used for post inflammatory hyper pigmentation.

After 12 weeks of collagen remodeling the Erb.Yag laser is used with aperture of 4 mm to target the residual boxcar scars filled with viscous sodium hyaluronate. Healing occurs in one week.

Sodium hyaluronate has the unique property of high viscosity and vertical instead of horizontal expansion under pressure. Sodium



Figure 4: Final result.

hyaluronate protects the base of the scar from being ablated during the procedure and prevents further increase in crater depth. It does not spatter when the laser beam comes in contact with the surface. Healing occurs within one week.

Therefore the sequential combination of fractional CO<sub>2</sub> laser to stimulate neocollagenesis followed by 4 mm erbium YAG laser with sodium hyaluronate gel can lead to optimal results in patients with boxcar scars.

### Conclusion

As a first step fractional CO<sub>2</sub> laser is used to stimulate neocollagenesis in the entire acne scar area including the craters. In 12 weeks time, healing and remodeling of scar takes place with noticeable reduction of depth of boxcar scars and rolling scars. After instilling drops of sodium hyaluronate gel in the craters to protect the base of the scar a 4 mm erbium hand piece is used to target the shoulders of the scars to flatten them to the level of the base of the scars. Optimum therapeutic results can thus be obtained in patients with boxcar scars.

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