Peertechz

CLINICAL GROUP

INTERNATIONAL JOURNAL OF Dermatology and Clinical Research OPEN ACCESS JOURNAL

ISSN: 2455-8605 DOI: https://dx.doi.org/10.17352/ijdcr

Research Article

The efficacy of single treatment of fractionated CO2 laser to improve scars in rhinoplasty

Anil R Shah[1,2]* and Sarah Van Meter[2,3]

[1]University of Chicago, Division of Facial Plastic Surgery, Chicago, IL, USA

[2]Aesthetic Skin, Chicago, IL 60654, USA

[3]Indiana University Bloomington, College of Arts and Sciences, USA

Received: 01 December, 2023
Accepted: 20 December, 2023
Published: 21 December, 2023

***Corresponding author:** Anil R Shah, University of Chicago, Division of Facial Plastic Surgery, Chicago, IL, Aesthetic Skin, Chicago, IL 60654, USA, Tel: +13129440117; E-mail: shah@shahfacialplastics.com

https://www.peertechzpublications.org

Check for updates

Abstract

Background: The formation of scars is fairly inevitable after open rhinoplasty and alar base procedures. Oftentimes, patients exhibit insecurities or discomfort at the appearance of these scars. CO2 laser resurfacing has been proposed as an effective treatment to minimize the appearance of surgical scars.

Objective: To demonstrate the effectiveness of fractionated CO2 laser in the minimization of the appearance of surgical scars.

Methods: Retrospective analysis of a rhinoplasty surgeon's database as well as blinded grading of 54 consecutive alar wedge scars using Vancouver Scar Scales.

Results: No complications were seen with the use of fractionated CO2 lasers as a treatment on rhinoplasty scars. No difference was seen in scar appearance, including scar height, vascularity, pliability, and scar height after one treatment of CO2 laser.

Conclusion: A single treatment of fractionated CO2 laser does not improve scars. Multiple sessions of fractionated CO2 laser could be a more effective treatment for the appearance of surgical scars.

Introduction

External incisions are made in rhinoplasty to both access the nose in open rhinoplasty as well as remove excessive soft tissue and reduce the alar base. While these incisions can help influence the shape of the nose, incision visibility after rhinoplasty can be a potential source of patient dissatisfaction. Incisions are typically subsequent to any surgical operation with the potential of scarring. Scaring severity depends on the aftercare and the patient's particular skin.

The use of the alar wedge scar has been described by several authors. Kridel and associates have described its use for reducing alar flare and narrowing the nasal base. They noted twenty scar revisions [1]. Other authors have noted different results with scars being more noticeable. A study by Gilbert evaluated forty patients one year post-rhinoplasty and compared alar wedge scars between patients who had cutaneous-only resection versus cutaneous and vestibular resection. The results demonstrated a statistically significant difference between the two approaches with cutaneous only reduction having better scar aesthetics [2].

Scar visibility can be more apparent in darker and thicker skin as well. A study by Ince and others demonstrated darker skin types have an increased likelihood of scar visibility and vascularity. It found that those with Fitzpatrick type IV skin, which has the highest incidence of hyperpigmentation, are more prone to showcasing visible scars following surgery [3]. It also demonstrated that increasing dermal thickness is a risk factor for the development of alar wedge scars. Of practical concern is that most patients seeking alar base reduction typically have darker Fitzpatrick skin types [4].

Citation: Shah AR, Meter SV (2023) The efficacy of single treatment of fractionated CO2 laser to improve scars in rhinoplasty. Int J Dermatol Clin Res 9(1): 011-013. DOI: https://dx.doi.org/10.17352/2455-8605.000049

While rhinoplasty remains a popular surgery, dealing with facial scars can be a potential source of dissatisfaction. In this study, we aim to see if a single dose therapy of fractionated CO2 therapy is effective in improving scar appearance. We examined one author's experience with alar wedge excisions in combination with fractionated CO2 laser resurfacing postoperatively to determine the impact and scar visibility.

Materials and methods

A retrospective review of Dr. Anil Shah's patient database revealed in the last fifteen years revealed seven-thousand rhinoplasty patients. The patients that were included in the study were patients with documentation of alarbase scars around the nostrils from an open rhinoplasty that were treated with CO2 lasers at least one of their follow-up appointments. Fifty-four patients were found with a combination of alar wedge excision with fractionated CO2 laser resurfacing. The patients' ages range from 18 to 65 years old with a gender distribution of 92% female, 50 female patients, and 8% male, 4 male patients. Patients were excluded from the study if they were not available for follow-up appointments. All scars were resurfaced with the same settings using an Ellman Cortex Fractionated CO2 laser. The settings of the CO2 laser have three parameters, which are power, spacing, and dwell. The power, which is set at 3.0 (0-30.0) indicates the amount of energy the laser is emitting per unit of time and the higher the power correlates to a more aggressive treatment because it vaporizes the tissue to a greater degree. The spacing, which is set at 600 um (0 um - 2000 um), is how far apart the individual laser beams are from each other within the handpiece. For darker skin types you want more spacing in between the laser beams so the spacing has been increased to 800 um on darker complected patients to reduce burning, hypopigmentation, and hyperpigmentation. The dwell setting is set to 0 (0-2000) for rhinoplasty scars is how deep the CO2 vaporizes the tissues. These particular settings were used because they are easily tolerable and can be personalized if changes need to be made. The settings used Occlusive ointment was immediately applied to the scars and for the next several days. Charts were examined to determine any complications or side effects as well as if any revision wedge procedures were performed.

Scars were graded using the Vancouver Scar Scales by two blinded observers [5]. The Vancouver Scar Scale grades scars on 4 parameters: vascularity, pigmentation, pliability, and height. An individual score is assigned to each parameter: Vascularity 0-3, Pigmentation 0-2, Pliability 0-5, and Height 0-3 for a total score out of 13. Each score in each parameter represents a different appearance as demonstrated in the table below (Table 1). An advantage of this scale is it is used vastly across literature while downfalls include not considering the patient's perception as well as excluding pain and pruritus.

In addition, the authors classified patients based on skin type Fitzpatrick to determine if fractionated CO2 lasers had an impact on darker skin types.

Scars were resurfaced typically between 4-8 weeks based on the optimal timing of dermabrasion scar resurfacing according to a study on scar revision [6]. The theory on the reason for optimal benefit is due to maximal fibroblast activity at this time.

Table 1: Vancouver Scar Scale.

Scar Characteristic	Score
Vascularity	
Normal	0
Pink	1
Red	2
Purple	3
Pigmentation	
Normal	0
Hypopigmentation	1
Hyperpigmentation	2
Pliability	
Normal	0
Supple	1
Yielding	2
Firm	3
Ropes	4
Contracture	5
Height (mm)	
Flat	0
< 2	1
2 ~ 5	2
> 5	3
Total Score	13

Results

Overall, no complications arose as a result of fractionated CO2 laser resurfacing on the scar, meaning zero cases of hypopigmentation, prolonged hyperpigmentation, increased scarring, or skin necrosis. Additionally, the settings worked for patients with skin types across the board, as patients with Fitzpatrick V and VI seemed to tolerate fractionated CO2 lasers well with similar results.

Based on our blinded observer analysis, no difference was found in Vancouver Scar Analysis. A t-test was used to compare vascularity, pigmentation, pliability, and scar height and no statistical difference was found.

Discussion

Alar wedge excisions are used in rhinoplasty for a variety of purposes including narrowing the alar base and removing thickness along the alar base. Many patients who require this type of narrowing have thicker skin and subsequently are at risk for increased scar visibility.

As with other incisions, the technical aspects of the scar will play a major role in the scar's appearance. The authors of this paper prefer slightly favorable bevel, subcutaneous sutures, and the use of vertical mattress sutures. However, even with technical execution, some patients will have variations in scar formation.

Citation: Shah AR, Meter SV (2023) The efficacy of single treatment of fractionated CO2 laser to improve scars in rhinoplasty. Int J Dermatol Clin Res 9(1): 011-013. DOI: https://dx.doi.org/10.17352/2455-8605.000049

Currently, there are no studies examining rhinoplasty scars and lasers. The current literature demonstrates limited studies examining scars and lasers are limited as well. One study by Jung, Jeong, MD, et al. demonstrated improvement in thyroid scars improvement using Vancouver Scar Scale Scores [7]. This study examined scars two weeks after surgery and is limited by the timing of resurfacing at two to three weeks.

Treatments with fractionated CO2 for rhinoplasty scars post-operatively are theorized to improve the appearance both in the scar and the color of the patient's skin, thus melanocytes are also believed to play a role in the process [8]. It is believed that fractionated CO2 lasers disrupt the melanocytes present and as a result recruit healthy melanocytes from the surrounding healthy dermis during the collagen remodeling process [9,10]. This recruitment is thought to contribute to a more natural appearing coloration to the newly remodeled scar.

A concern with fractionated CO2 laser therapy in darker skin types is the risk of hyperpigmentation and hypopigmentation. Our study did not demonstrate either of these phenomena.

Since scaring is inevitable after surgery, learning more about how to minimize their appearance is an advancement in the field of medicine. All of Dr. Anil R. Shah's patients receive CO2 laser treatments during their follow-up appointments after surgery in efforts to erase their scars. The degree, coloration, and texture of the patient's scar or scars varies person to person, therefore, what was learned through this study is applied to future patients with similar scars. With the knowledge and techniques acquired from this study, patients are able to be treated more efficiently and effectively.

The study used the Vancouver Scar Scale before and after the CO2 fractionated laser treatment to quantify the improvement of the treatment being tested.

While our study showed no improvement with the Vancouver Scar Scale, there are some considerations. First of all, Dr. Anil R. Shah uses smaller sutures to minimize scar formation and it is possible that the scars were not severe enough to warrant a significant enough improvement. There are also limitations in the Vancouver Scar Scale as well as in photography as it is limited by the two-dimensional nature of photography. Finally, a single treatment of fractionated CO2 laser therapy may not be enough, and additional treatments may be necessary.

There are several limitations to this study. One, in particular, is that the retrospective study creates selection bias since we are choosing patients from a sample. This bias could skew the data in favor of better outcomes with the CO2 laser, but since there were not any significant results, this bias did not have a significant effect.

Conclusion

Based on the data of this study, it was found that a fractionated CO2 laser is safe for resurfacing skin types for alar wedge scars. Although based on our Vancouver Scar Analysis, no demonstrable difference was seen before and after treatment on the scars. Based on these results, rhinoplasty surgeons can consider the use of fractionated CO2 lasers after rhinoplasty as a safe treatment but it may not be effective as a single treatment therapy. In order to diminish scars, providers should consider using multiple treatments of the CO2 laser in four to six-week intervals.

Ethical considerations

While conducting this research, the confidentiality of all of the patients was handled with the utmost importance. Since the personal information, besides age, gender, and skin type, of the patients is not needed, such as their names or other information in their medical notes, it was quite simple to keep confidentiality intact. With that being said, the anonymity of the participants was guaranteed as well. Along with before pictures before the study, informed consent was obtained from each patient before each laser treatment along with before pictures with the potential risks and side effects of the CO2 laser. This way, all of the patients are confidently participating voluntarily in the study. Additionally, the degree of triangularity was high in this study with two researchers involved in collecting and analyzing the data allowing for a balanced analysis.

References

1. Kridel RWH, Starr N. Reducing the Alar Base While Minimizing Visible Sequalae: A Review of Three Alar Base Reduction Techniques over 35 Years. Facial Plast Surg Aesthet Med. 2023 Sep-Oct;25(5):384-390. doi: 10.1089/fpsam.2022.0215. Epub 2022 Nov 14. PMID: 36374240.

2. Gilbert SE. Alar reductions in rhinoplasty. Arch Otolaryngol Head Neck Surg. 1996 Jul;122(7):781-4. doi: 10.1001/archotol.1996.01890190077017. PMID: 8663954.

3. Ince B, Dadaci M, Oltulu P, Altuntas Z, Bilgen F. Effect of Dermal Thickness on Scars in Women with Type III-IV Fitzpatrick Skin. Aesthetic Plast Surg. 2015 Jun;39(3):318-24. doi: 10.1007/s00266-015-0466-z. Epub 2015 Mar 19. PMID: 25787787.

4. Harris MO. Rhinoplasty in the patient of African descent. Facial Plast Surg Clin North Am. 2010 Feb;18(1):189-99. doi: 10.1016/j.fsc.2009.11.012. PMID: 20206100.

5. Baryza MJ, Baryza GA. The Vancouver Scar Scale: an administration tool and its interrater reliability. J Burn Care Rehabil. 1995 Sep-Oct;16(5):535-8. doi: 10.1097/00004630-199509000-00013. PMID: 8537427.

6. Sharma M, Wakure A. Scar revision. Indian J Plast Surg. 2013 May;46(2):408-18. doi: 10.4103/0970-0358.118621. PMID: 24516292; PMCID: PMC3901922.

7. Jung JY, Jeong JJ, Roh HJ, Cho SH, Chung KY, Lee WJ, Nam KH, Chung WY, Lee JH. Early postoperative treatment of thyroidectomy scars using a fractional carbon dioxide laser. Dermatol Surg. 2011 Feb;37(2):217-23. doi: 10.1111/j.1524-4725.2010.01853.x. Epub 2011 Jan 27. PMID: 21272120.

8. Wyss N, Graf N, Hafner J, Imhof L. Fractional CO_2 laser to improve noticeable scars after skin cancer surgery: An appraisal by the patients, laypersons, and experts. Dermatol Ther. 2021 Jul;34(4):e14999. doi: 10.1111/dth.14999. Epub 2021 May 31. PMID: 34022110; PMCID: PMC8459294.

9. Carniol PJ, Meshkov L, Grunebaum LD. Laser treatment of facial scars. Curr Opin Otolaryngol Head Neck Surg. 2011 Aug;19(4):283-8. doi: 10.1097/MOO.0b013e32834896b9. PMID: 21659876.

10. Cervelli V, Gentile P, Spallone D, Nicoli F, Verardi S, Petrocelli M, Balzani A. Ultrapulsed fractional CO2 laser for the treatment of post-traumatic and pathological scars. J Drugs Dermatol. 2010 Nov;9(11):1328-31. PMID: 21061753.

Citation: Shah AR, Meter SV (2023) The efficacy of single treatment of fractionated CO2 laser to improve scars in rhinoplasty. Int J Dermatol Clin Res 9(1): 011-013. DOI: https://dx.doi.org/10.17352/2455-8605.000049