

Postoperative Treatment of Linear Thyroidectomy Scars with the Pinhole Method Using a 10600-nm Carbon Dioxide Laser

Jimyung Seo, Jae Won Lee, and Do Young Kim

Department of Dermatology, Severance Hospital, Cutaneous Biology Research Institute, Yonsei University College of Medicine, Seoul, Korea.

The formation of linear hypertrophic scars along suture lines is a frequent and undesired event after the conventional thyroidectomy.¹ Previous reports have described good therapeutic results in minimizing the scars with fractional lasers and intralesional steroid injections.¹⁻⁴ However, in the cases of narrow linear scars, the fractional laser can damage the surrounding tissue despite using the smallest spot size. Intralesional steroid injections can also worsen scar appearance, causing atrophy and telangiectasia of the surrounding skin (Fig. 1A). Here, we describe the use of a pinhole method using a 10600-nm carbon dioxide (CO₂) laser to treat linear thyroidectomy scars.

Five female Korean patients, who developed linear hypertrophic scars during the postoperative treatment of thyroidectomy scars, were included. All five patients had a linear thyroidectomy scar on the anterior neck with a length of 6 cm to 8 cm. The mean patient age was 44.6±6.9 years (range, 39–52 years). We performed two to three CO₂ laser (Spectra SP; Lutronic, Goyang, Korea) treatments using the pinhole method in 4- to 8-week intervals for each patient. Final treatment outcomes were evaluated after 8 weeks from the last CO₂ laser treatment. All the participants provided written informed consent. Thirty minutes after applying topical anaesthesia (EMLA; AstraZeneca AB, Södertälje, Sweden), the treatment was performed using 300-mJ pulse energy and a 100-Hz frequency with a 1-mm spot diameter. The CO₂ laser penetrated the skin de-

pending on the scar thickness, creating multiple small holes 1- to 2-mm apart (Fig. 1B). Clinical photographs were taken, and the Vancouver Scar Scale (VSS) was graded at every visit to evaluate the treatment efficacy. The VSS includes grades for pigmentation (0=normal, 1=hypopigmented, 2=mixed pigmentation, 3=hyperpigmented), pliability (0=normal, 1=supple, 2=yielding, 3=firm, 4=ropes, 5=contracture), height (0=flat, 1≤2 mm, 2=2–5 mm, 3≥5 mm), and vascularity (0=normal, 1=pink, 2=red, 3=purple).¹ Two blinded physicians also evaluated the final outcomes using a four-point grading scale (grade 1, <25% improvement; grade 2, 26–50%; grade 3, 51–75%; grade 4, >75%).

All five patients showed posttreatment improvement (Fig. 1C-F). Four of the five patients showed clinical improvement greater than grade 3 (three patients showed grade 4 improvement, one patient showed grade 3 improvement, and one patient showed grade 2 improvement). The mean total VSS scores decreased significantly: 10.2±1.3 pretreatment and 4.6±1.1 posttreatment. One patient developed persistent erythema after the first session; this complication continued for 3 weeks but spontaneously resolved.

Ablative fractional lasers have been widely used to effectively minimize the appearance of thyroidectomy scars.^{2,5} However, this laser has some limitations regarding the penetration depth and size of the focused beam. Fixed spot sizes and shapes in the commercially available lasers often interfere with the fine manipulation during lasering. The pinhole method using a CO₂ laser creates multiple tiny holes penetrating from the epidermis to the deeper dermis.^{6,7} This improves the scar texture by inducing collagen bundle regeneration and realignment following the physical breakage and thermal damage.^{6,8} The biggest benefit of this method is that the small holes can be adjusted for the various scar types. By controlling the hole depth and distance, we can effectively treat the narrow hypertrophic scars while preventing the damage to the surrounding tissue. Moreover, the pinhole method is very safe; none of the patients experienced significant adverse effects, such as postoperative

Received: July 1, 2015 **Revised:** September 12, 2015

Accepted: September 12, 2015

Corresponding author: Dr. Do Young Kim, Department of Dermatology, Severance Hospital, Cutaneous Biology Research Institute, Yonsei University College of Medicine, 50-1 Yonsei-ro, Seodaemun-gu, Seoul 03722, Korea.
Tel: 82-2-2228-2090, Fax: 82-2-393-9157, E-mail: dykim@yuhs.ac

•The authors have no financial conflicts of interest.

© Copyright: Yonsei University College of Medicine 2016

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/3.0>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

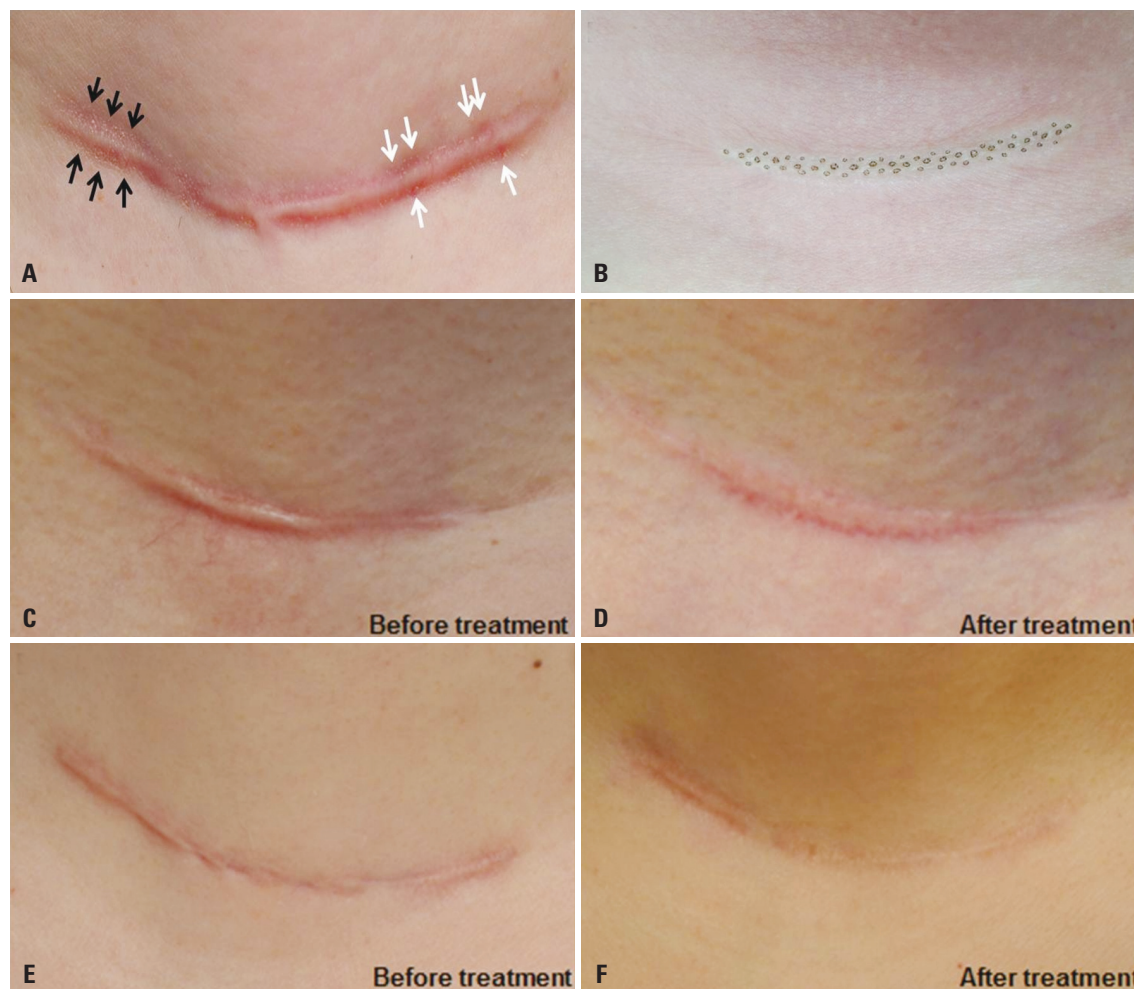


Fig. 1. (A) Treatment of narrow linear scars after thyroidectomy can be challenging. Treatment with a fractional laser damages the surrounding tissue due to the larger spot size (black arrows). Intralesional steroid injections cause surrounding atrophy and telangiectasia (white arrows). (B) With the pinhole method, tiny holes with adequate penetration depth were created in the area of the scar. Clinical photographs of 46-year-old (C and D) and 39-year-old (E and F) female Korean patients. Marked improvement was observed after the treatment with the pinhole method. The pinhole method ensures scar flattening and successfully blurs the scar margins.

bleeding and oozing.

In conclusion, the pinhole method with the CO₂ lasers should be strongly considered to safely and easily reduce the appearance of linear, narrow, hypertrophic scars.

REFERENCES

1. Jung JY, Jeong JJ, Roh HJ, Cho SH, Chung KY, Lee WJ, et al. Early postoperative treatment of thyroidectomy scars using a fractional carbon dioxide laser. *Dermatol Surg* 2011;37:217-23.
2. Ha JM, Kim HS, Cho EB, Park GH, Park EJ, Kim KH, et al. Comparison of the effectiveness of nonablative fractional laser versus pulsed-dye laser in thyroidectomy scar prevention. *Ann Dermatol* 2014;26:615-20.
3. Ryu HW, Cho JH, Lee KS, Cho JW. Prevention of thyroidectomy scars in Korean patients using a new combination of intralesional injection of low-dose steroid and pulsed dye laser starting within 4 weeks of suture removal. *Dermatol Surg* 2014;40:562-8.
4. Tang YW. Intra- and postoperative steroid injections for keloids and hypertrophic scars. *Br J Plast Surg* 1992;45:371-3.
5. Kim HS, Lee JH, Park YM, Lee JY. Comparison of the effectiveness of nonablative fractional laser versus ablative fractional laser in thyroidectomy scar prevention: a pilot study. *J Cosmet Laser Ther* 2012;14:89-93.
6. Lee SJ, Cho S, Kim YK, Cho SB. Scar revision by the pinhole method using a 10,600-nm carbon dioxide laser. *J Cosmet Laser Ther* 2013; 15:37-8.
7. Chang IK, Lee Y, Seo YJ, Kim CD, Lee JH, Im M. Treatment of multiple trichilemmomas with the pinhole method using a carbon dioxide laser in a patient with Cowden syndrome. *Dermatol Ther* 2015; 28:71-3.
8. Cho SB, Lee SH, Lee SJ, Lee JE, Kim DH. Syringoma treated with pinhole method. *J Eur Acad Dermatol Venereol* 2009;23:852-3.