




# Treatment of horizontal neck wrinkles by Endolift laser: Biometric measurement

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## Abstract

**Background:** One of the common esthetic complaints of patients is horizontal neck wrinkles that have limited treatment modality.

**Aim:** In the present study, we evaluated the efficacy of the Endolift laser on the horizontal neck wrinkles.

**Methods:** Totally, 10 healthy female and male patients suffering horizontal neck wrinkles were joined in this study. All patients are treated with Endolift laser. The effect of the Endolift methods on the horizontal neck wrinkles was evaluated by biometric parameter changed results with Cutometer, Visioface, and the Skin Ultrasound Imaging system. Also, three blinded dermatologists and patients' satisfaction were evaluated.

**Results:** The Visioface results showed that the Endolift laser treatment significantly decline the depth and area of horizontal neck wrinkle. The skin ultrasonography results reported the epidermis and dermis density and thickness were significantly increased. Also, the cutometer outcomes displayed that the Endolift laser treatment can increase skin elasticity. Also, significantly a greater number of patients were well satisfied with the technique.

**Conclusion:** In conclusion, Endolift laser is a safe and effective method for decreasing the horizontal neck wrinkles and improving the appearance of the neck. This procedure does not require general anesthesia and recovery time.

## KEYWORDS

Endolift laser, horizontal neck wrinkle, laser therapy, treatment

## 1 | INTRODUCTION

A large number of patients are looking for new treatment methods for neck rejuvenation. Common signs of neck aging include rough texture, horizontal neck wrinkles, sagging skin with droopy folds, dark spots, rhytidosis and midneck hollowing, platysmal bands, and double chins caused by excessive adipose tissue.<sup>1,2</sup> Horizontal neck wrinkles

appear as furrows or linear depressions occupying the anterior half of the neck.<sup>3</sup> The cause of their formation is different from other wrinkles that are caused by aging in the skin of the face.<sup>4,5</sup> The reasons affecting the development of neck wrinkles are expanded and complex. Lack of moisture causes skin dryness and subsequent loss of collagen and the connective tissue atrophy. These changes in the neck skin are more obvious.<sup>6</sup> Various factors such as genetic, smoking,

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alcohol, and environmental factors are related to the neck aging.<sup>3,7</sup> These horizontal neck wrinkles are often seen in young adults and children as well.<sup>8,9</sup> Frequent bending of the neck is related to work on computers, mobile, and can be a reason for horizontal neck wrinkles in the young people.<sup>9,10</sup> Therefore, neck wrinkles are not exclusive to the elderly and can occur at any age. The researchers and clinicians have paid more attention to neck esthetic changes. Recently, laser techniques have received much attention for cosmetic disorders.<sup>11,12</sup> Several treatment methods are suggested for neck rejuvenation such as Botulinum toxin type A injections, fractional CO<sub>2</sub> laser, diode laser, radiofrequency, and plasma resurfacing that can reduce platysmal bands, tighten the skin, and improve the neck laxity,<sup>13–16</sup> but have limited effects on horizontal wrinkles of the neck. However, effective treatment for horizontal neck wrinkles is limited.<sup>9,17</sup> In the present research, we evaluated the efficacy of Endolift laser method as a novel technique in the treatment of horizontal neck wrinkles. Some previous studies showed that Endolift laser is an effective method for treating skin laxity of the lower third of the face and improve the forehead wrinkles and frown line.<sup>18,19</sup> So in this study, we assessed the efficacy of the Endolift laser technique on treatment of horizontal neck wrinkles.

## 2 | METHODS

### 2.1 | Subjects and patients selection

Totally 10 healthy female and male patients suffering from horizontal neck wrinkles were joined in this study. The age range was from 25 to 58. Written informed consent forms were gained from all individuals for all investigations and all the positive and possible side effects of the procedure were explained to the patients. Patients with any medical therapy, any procedure that he/she did within at last 6 months, any topical or systemic treatment for rejuvenation, thyroid disease, coagulopathy, immunocompromised status, active infection, cancer, and autoimmune disease, were excluded. Pregnant and breastfeeding patients were also excluded.

### 2.2 | Study design and technique

Endolift™ (LASEMAR1500™ machine, Eufoton s.r.l.) was used in this study. A sterile set was prepared for each patient. A sterile set includes betadine galipot, injectable serum galipot, syringe containing injectable lidocaine for anesthesia, sterile gauze, sterile gloves, and new sterile fibers for Endolift. The intervention area (neck area) was cleaned using betadine and the target area was cleaned of betadine using injected serum. Injectable lidocaine (2% lidocaine) was used in the neck area containing the horizontal wrinkles so that the site of Endolift fiber insertion and the into the skin and the fiber movement area are numbed. After local anesthesia, the new sterile fiber was inserted into the skin and reciprocating movements were used in the intervention area and the laser diode (1470 nm) was induced at the same time. In

this treatment method, the 400 μ fiber was used. The intensity and the power of the device include Power: 3–3.5 W, Pulse: T ON–T OFF: 25–75, Shot Number: 200–250 J on each side of the neck except thyroid area, total shots for the whole of the neck area: 400–500 J. The neck was divided into two parts from the area under the chin and the number of shots on both sides of the neck and the intensity and power of the device were the same in all areas of the neck. The thyroid area did not receive treatment. The patients received the treatment one time. The necessary care after treatment was explained to the patients. For the patients with the history of herpes, acyclovir tablets are prescribed and the antibiotic is prescribed to prevent possible infections after the procedure for 5 days. The possible side effects like infection, and swelling were noted and managed after treatment. This treatment method does not have a recovery period or down time. The patients were follow up 3 months after the procedure and the patients underwent biometry and skin analysis.

## 3 | OUTCOMES EVALUATION

### 3.1 | Biometric measurement: Cutometer, Visioface, and Mexameter assessment

For all patients, biometric parameters were measured before and 3 months after the treatment, Cutometer, Visioface, and the Skin Ultrasound Imaging system (Germany) were used for evaluation of the results. The Cutometer evaluates skin biomechanical properties. The skin elasticity was measured by Cutometer with an analysis of three factors R2, R5, and R7. The skin aging and elasticity were evaluated by R2 and R7 that are the key parameters of Cutometer. R2 reported skin viscoelasticity, containing viscous deformation and R7 reported the biological elasticity. R5 reported net elasticity. The changes in the volume, depth, and area of the skin wrinkle were appraised by Visioface (multi-probe adapter). The skin ultrasound imaging system is related to the dermis and epidermis diameter and density. The increase in the dermis density is associated with the increase in the collagen amount of dermis. The erythema was evaluated by Mexameter MX 18 probe.

### 3.2 | Patients' and physician assessment and digital photographs

The effect of the Endolift methods on the horizontal neck wrinkles was evaluated by three blinded dermatologists and patients' satisfaction. The results were evaluated as follows: no satisfaction, slightly satisfied, moderately satisfied, and well satisfied. Before and 3 months after the treatment digital photographs were taken.

### 3.3 | Statistical analysis

Statistical analysis was done by SPSS 15.0 statistical software (SPSS) in this study. A *p*-value of <0.05 was noted statistically significant.

**TABLE 1** Comparing biometric characteristics of the skin before and 3 months after treatment. The biometric characteristics were significantly changed after treatment.

	Measured values		Percent change	<i>p</i> -value
	Before	After		
Visioface				
Wrinkle				
Volume (px3)	119.39 ± 30.17	55.66 ± 20.27	53.78 ± 9.46	<0.05
Depth (px2)	10.0 ± 0.17	7.0 ± 0.16	30.16 ± 6.46	<0.05
Area (px)	13.35 ± 5.17	8.33 ± 3.19	38.45 ± 8.73	<0.05
Skin Ultrasonography				
Skin density	10.30 ± 3.12	14.81 ± 9.16	40.11 ± 10.21	<0.05
Skin thickness	906.12 ± 190.62	1216.25 ± 216.07	34.02 ± 13.13	<0.05
Epidermis density	35.14 ± 13.16	45.55 ± 18.12	28.99 ± 11.21	<0.05
Epidermis thickness	66.41 ± 19.11	87.21 ± 20.15	31.25 ± 12.42	<0.05
Dermis density	8.65 ± 4.79	11.93 ± 7.71	48.75 ± 13.29	<0.05
Dermis thickness	828.71 ± 161.07	1134.34 ± 176.12	36.9 ± 10.22	<0.05
Density <sup>a</sup>				
R2	0.60 ± 0.11	0.78 ± 0.13	30.3 ± 7.18	<0.05
R5	0.51 ± 0.04	0.75 ± 0.16	47.03 ± 10.18	<0.05
R7	0.40 ± 0.05	0.61 ± 0.04	48.41 ± 11.26	<0.05

<sup>a</sup>Density of the skin measured by Cutometer.

## 4 | RESULTS

### 4.1 | Biometric parameters results

The biometric measurement results of all patients are shown in Table 1 as mean ± SD.

### 4.2 | Visioface results

According to the Visioface results, the Endolift laser treatment significantly declined the depth and area of horizontal neck wrinkle, and the percentages of change for volume, depth and area were 53.78 ± 9.46, 30.16 ± 6.46, and 38.45 ± 8.73, respectively ( $p < 0.05$ ; Table 1). The results of visioface for the cases A and B are shown in Figures 1 and 2.

### 4.3 | Skin ultrasonography results

The skin ultrasonography results reported the epidermis and dermis density and thickness were significantly increased (Table 1) and the percentages of change in epidermis thickness and density were 31.25 ± 12.42 and 28.99 ± 11.21 and for dermis thickness and density the percentages of change were 36.9 ± 10.22 and 48.75 ± 13.29 ( $p < 0.05$ ). The case A and case B skin ultrasound results are shown in Figures 3 and 4.

### 4.4 | Cutometer results

The Cutometer results showed similar results and the cutometer outcomes displayed that the Endolift laser treatment can increase skin elasticity ( $p < 0.05$ ) (Table 1). The percentages of change in R2, R5, and R7 were 30.3 ± 7.18, 47.03 ± 10.18, and 48.41 ± 11.26, respectively.

### 4.5 | The mexameter results and side effect evaluation

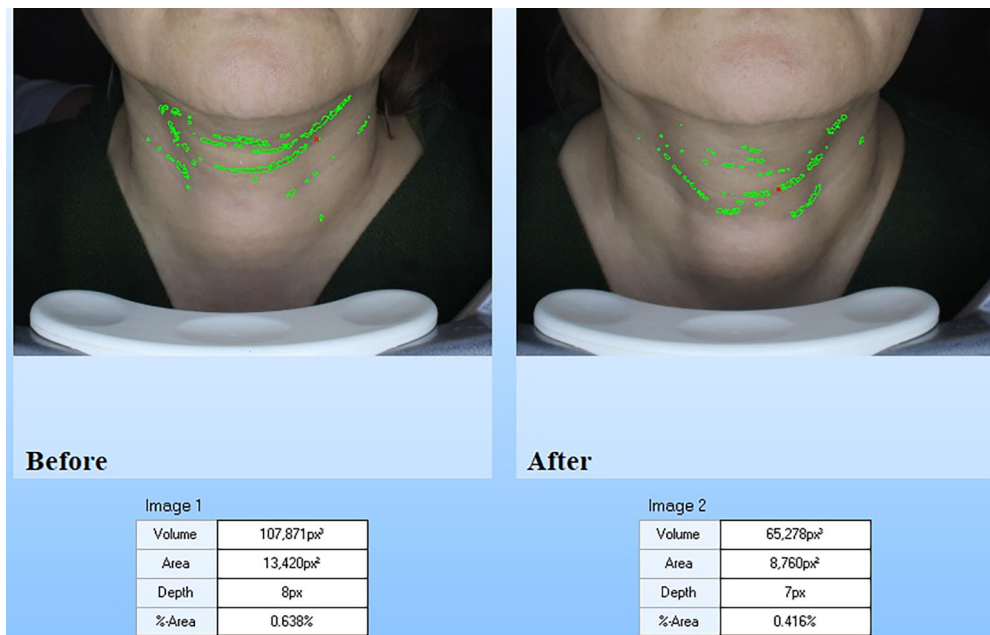
The patients showed mild edema and erythema, after the treatment which was completely resolved after 1 or 2 days. The mexameter data showed no significant difference between the erythema before and after the procedure (data not shown). The patients were monitored 3 months, and no side effect was informed throughout the study.

### 4.6 | Patients' satisfaction and physicians' assessment results

According to the patients' satisfaction, a significantly greater number of patients were well satisfied  $N = 8$  after treatment (Table 2) ( $p < 0.05$ ). The physician satisfaction is revealed in Table 3. The physician reported a significant satisfaction after Endolift laser treatment ( $p < 0.05$ ).



**FIGURE 1** Visioface wrinkle analysis for Case A: the volume, area, and depth of the horizontal neck wrinkle significantly decrease after treatment.

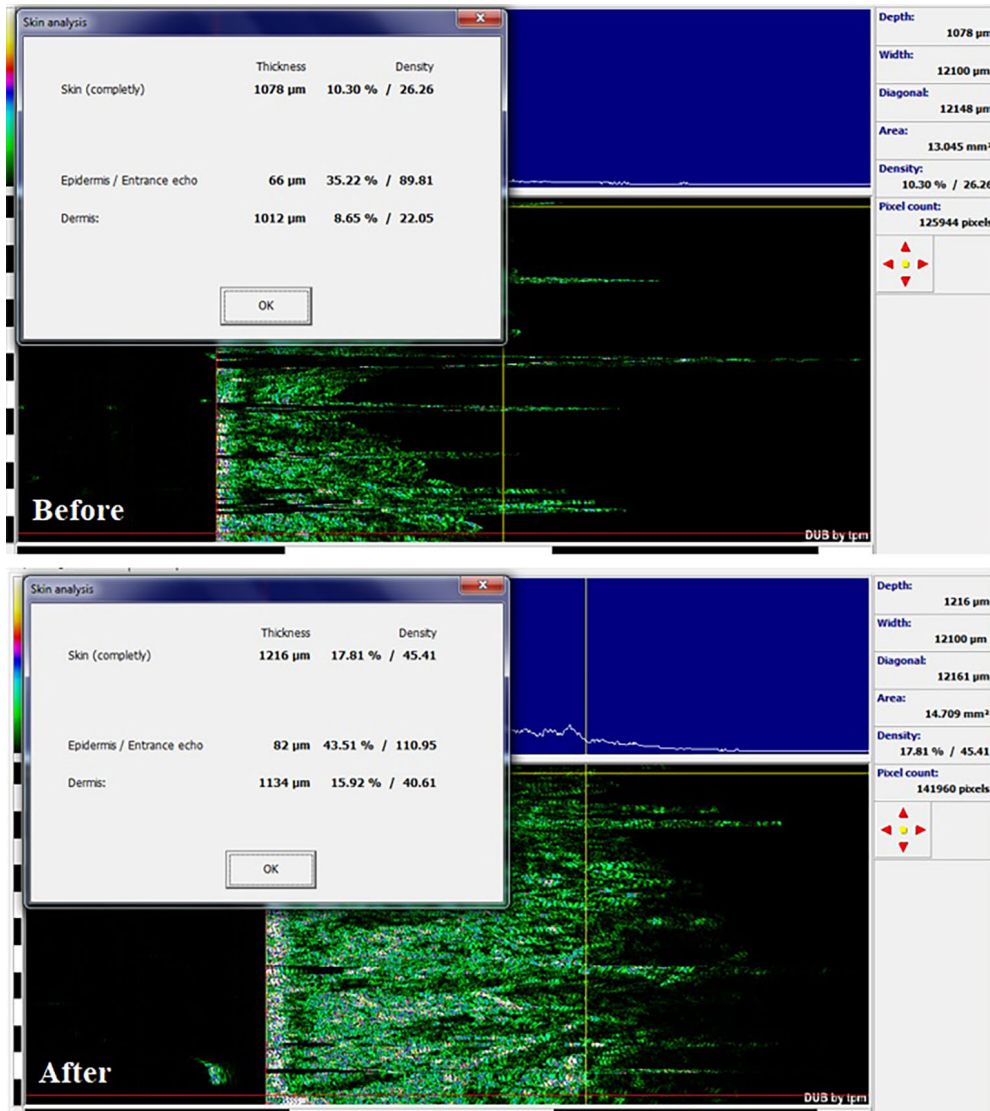


**FIGURE 2** Visioface wrinkle analysis for Case B: the volume, area, and depth of the horizontal neck wrinkle significantly decrease after treatment.

## 5 | DISCUSSION

Contrasting facial wrinkles, horizontal neck wrinkles are not related to aging and they are detected in young adults and children as well.<sup>9</sup> There are various surgical and nonsurgical procedures that are used alone or in combination for neck rejuvenation, and for horizontal neck wrinkles

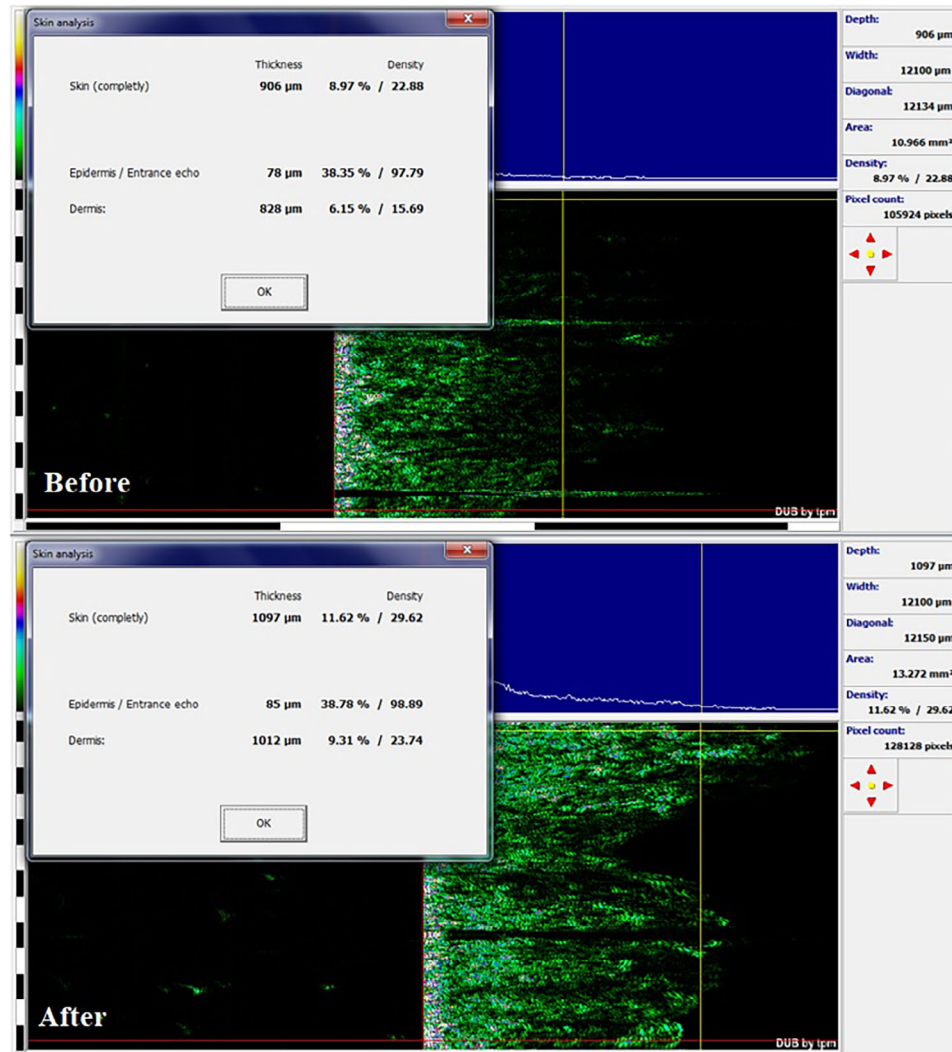
treatment; however, they are not very successful.<sup>3</sup> Some of these treatments include thread lifting, local skin tissue fillers, radiofrequency, lasers, or injection of intradermal neuromodulator. Topical drugs are utilized as well.<sup>20</sup> Soft tissue fillers like poly lactic acid, hyaluronic acid, calcium hydroxyapatite, or adipose tissue are also used as moderate effective methods,<sup>10,17,21,22</sup> to physically fill the neck tissue volume



**FIGURE 3** Skin analysis with ultrasonography for Case A. The epidermis and dermis density and thickness were significantly increased.

loss or induce skin tissue regeneration. Also, some studies reported that botulinum toxin can be useful for the reduction of wrinkles of the neck.<sup>23,24</sup> Most patients prefer minimally invasive treatment to conventional surgery because this treatment is fast and rapid with no recovery time and more natural recovery effect. In several studies, the effect of laser was evaluated on neck wrinkles. Intradermal radiofrequency, and lasers, stimulate the local skin tissue to reform collagen and tighten the skin.<sup>25–28</sup> Gold et al. evaluated the effect of microneedle fractional RF on the improvement of neck wrinkle in 49 patients. They reported 65% of patients showed a significant improvement.<sup>29</sup> In the study of Bencini et al., the effect of nonablative fractional 1540 erbium glass laser was evaluated on neck wrinkles and they showed that this technique is effective for the treatment of dyschromia and wrinkles, but not effective for the neck skin laxity.<sup>30</sup> Serdar and colleagues reported that fractional Er:YAG laser and Fractional RF modalities are both effective for the neck wrinkles and aging skin treatment.<sup>27</sup> Ablative fractionated CO<sub>2</sub>, for the neck wrinkles

treatment was evaluated by Tierney et al.<sup>31</sup> In the present study, we evaluated the effect of Endolift laser as a new noninvasive technique on horizontal wrinkle of neck. In this research study, the results were evaluated by biometric changes and patients' satisfaction. Also, three blind dermatologists assessed the results. Our Visioface results showed that the Endolift laser treatment significantly decline the depth and area of horizontal neck wrinkle. The skin ultrasonography results reported the epidermis and dermis density and thickness were significantly increased. Also, the cutometer outcomes displayed that the Endolift laser treatment can increase skin elasticity. In some other studies, the effect of Endolift laser for treatment of forehead wrinkles, acne scars, upper eyelid and eyebrow ptosis, arm and under abdomen fat, lower eye bag, skin laxity, jowl fat, nasolabial folds, and marionette lines was evaluated previously.<sup>18,19,32–39</sup> Our results were similar to these studies' results. According to these previous studies, Endolift laser can decrease the skin laxity and can tighten the skin and also can decrease the facial wrinkles. To our knowledge, this is the first report of



**FIGURE 4** Skin analysis with ultrasonography for Case B. The epidermis and dermis density and thickness were significantly increased.

**TABLE 2** Patient satisfaction for horizontal neck wrinkles treatment 3 months after Endolift laser treatment. The  $p < 0.05$  was considered as statistically significant. According to the patient's satisfaction, a significantly greater number of patients were well satisfied  $N = 8$  after treatment.

	Valid	Frequency	Percent	$p$ -value
After 3 months	No satisfaction	0	0	$p \leq 0.05$
	Moderately satisfied	2	20	
	Well satisfied	8	80	
	Total	10	100	

**TABLE 3** Physician assessment after treatment. The physician reported a significant satisfaction after Endolift laser treatment. The data were shown as mean  $\pm$  SD.

Dermatologists	Physician satisfaction (%) (Mean $\pm$ SD)	$p$ -value
Physician 1	85 $\pm$ 5.2	$p < 0.05$
Physician 2	83 $\pm$ 4.3	
Physician 3	81 $\pm$ 6.1	

Endolift laser that shows it is a safe and effective method to decrease the horizontal neck wrinkles and improve the appearance of the neck. This procedure does not require general anesthesia and recovery time.

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## CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

## ETHICAL APPROVAL

Informed consent was obtained from all the patients. All patients were provided with a complete description of the study design, purpose, and probable outcomes. All the patients were checked before and 6 months after the last session of treatment.

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