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**Articles**

**The Multimodal Laser Treatment of Rhinophyma: clinical and psychological implications**

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**Abstract**

*Background:* Rhinophyma is a benign condition of the nose, characterized by its enlargement in the lower 2/3, with a bulbous appearance, purple-red tint, dilated pores and a rough surface. The treatment of choice for this pathology was based on the use of the multimodal laser, which contributed to the improvement of the patients' quality of life.

*Methods:* the present study was conducted on a number of 6 male patients, with different levels of severity and with Fitzpatrick II and III type skin. For their treatment the following were used: Cutera Xeo vascular NdYag laser, Cutero Xeo LimeLight laser, program A (vascular), Cutera Pearl Fractional laser.

*Results:* We found that methods such as drugs, radiofrequency or dermabrasion didn't give optimal results. Therefore, after a classification of patients with mild, moderate and severe forms, we have applied the treatment according to these 3 forms of rhinophyma, based on the principle of the "subunit method". Our treatment has been reduced to two methods: multimodal laser treatment and surgical treatment.

*Conclusions:* In mild and medium forms we considered sufficient multimodal laser treatment, a combination of NdYag, ErYag and intensely pulsed light, while in severe forms only surgical treatment brings optimal results. All patients were satisfied with the treatment, with responses ranging from increased self-esteem and social comfort to a better quality of life.

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## 1. Introduction

Rhinophyma is a benign condition, without spontaneous remission, characterized by a large nose in the lower 2/3, bulbous, with prominent pores, a red-purple tint, painless, with a rough surface, resulting from the enlargement of the sebaceous glands and the subcutaneous tissue. Characteristically, the nose is nodular, telangiectatic, and filled with sebaceous secretion. Pathologic examination reveals a loss of fluid in the dermal interstitium and matrix, which is postulated to initiate inflammation and fibrosis (Fisher, 1970; Marks, 1968). Occasionally it can cause breathing difficulties by narrowing the nostrils and prolonged bleeding during surgery in the nasal region, such as carcinomas or rhinocorrections (Tambe et al., 2019). This pathology was first described in 1845 by Ferdinand von Hebra as a final stage of rosacea but it can also occur de novo, without previous inflammatory changes (Cravo et al., 2009; Serowka et al., 2014). In the past, it was also considered a clinical sign of alcoholism, the so-called "whiskey nose" but this relationship has never been proven (Al Hamzawi & Al Baaj, 2019; Curnier & Choudhary, 2004).

Rhinophyma occurs almost exclusively in men between the ages of 50 and 70, with a male / female ratio between 5: 1 and 30: 1 (Rohrich et al., 2002; Sadick et al., 2008; Wiemer, 1987).

The etiology remains uncertain and multifactorial but the primary etiology appears to be superficial untreated vasodilation in rosacea (Popa et al., 2012). Several hypotheses include in the list of etiological factors and environmental factors, as well as microorganisms such as *Demodex folliculorum* and *Helicobacter pylori* (Crawford et al., 2004). A common and early feature in the etiology of rosacea is a recurrent vasodilation of the face which, according to Marsili et al. (1993), would cause nasal hypertrophy of the soft tissues, gradually giving rise to rhinophyma.

For a better understanding of its origin, it is necessary to analyze its evolution and the different types of rosacea, of which there are four main subtypes: erythemotelangectic, papulo-pustular, ocular and phytomatic. The erythemotelangectic type is characterized by wear, erythema, and

prominent blood vessels and is aggravated by triggers, including alcohol, heat, and emotions. The papulo-pustular type is characterized by erythema in the central region of the face accompanied by erythematous papules with or without associated pustules. The ocular type is characterized by irritation and itching (Comeau et al., 2019). Finally, phytomatic type rosacea, the one most frequently associated with rhinophyma, is characterized by hypertrophy of the sebaceous glands, edema and denaturation of the tissue contour (Powell & Raghallaigh, 2012). Based on the position of the face, it is possible to distinguish: rhinophyma (involving the nose), metophyma (involving the forehead), blepharophyma (involving the eyes), otophyma (involving the ears) and gnathophyma (involving the chin) (Carlson et al., 2008). In turn, rhinophyma can be classified into three clinical entities: glandular (nasal enlargement due to sebaceous gland hyperplasia), fibrous (increased density of the nasal connective tissue with variable sebaceous hyperplasia) and fibroangiomatic (enlargement of the nose due to the connective) (Thiagarajan, 2012).

The diagnosis of rhinophyma is usually based on the clinical appearance of the nose and the history of rosacea. For differential diagnosis, histopathological examination may be useful to rule out conditions mimicking rhinophyma, such as squamous cell carcinoma and angiomatous tumors. The histopathological features of rhinophyma include hyperplasia of the sebaceous glands, hyperplasia of the connective tissue and signs of chronic inflammation (Thiagarajan, 2012) while the peculiar morphological characteristics concern telangiectasy, hypervascularity, a thick nasal cutaneous layer, nodularity covered by atrophic skin with expanded pores (Bogetti et al., 2002; Hallock, 1988; Har-El et al., 1993).

Surgical treatment represents the treatment of choice for rhinophyma. Over time, a variety of excisional and ablative treatment options, such as scalpel excision, cryosurgery, electrosurgery, dermabrasion, CO2 laser surgery, and argon laser surgery, have been established (Gupta & Chaudhry, 2005; Moreira et al., 2010). In particular, through the use of the laser it is possible to eliminate the injured areas of the nose by vaporising the glandular structures, while the thermal damage of the laser itself is able to reduce the number and severity of relapses.

These results can have significant consequences on the patient's living conditions: it has been found that in terms of psychosocial impact, rosacea, and even more so in the case of rhinophyma, could cause a negative quality of life similar to that caused by psoriasis, diabetes, arthritis, epilepsy and coronary heart disease (Aksoy et al., 2010; Bewley et al., 2016; Moustafa et al., 2014; Tomas-Aragones & Marron, 2016; Van Der Linden et al., 2015).

In particular, subjects characterized by disfigurements that alter the color, texture or appearance of the skin, describe strong feelings of stigmatization, associated with behaviors of isolation and exclusion. Facial imperfections also cause greater psychological disturbances than other areas of

the body as the face is more exposed and difficult to camouflage (Barankin, 2003; Koo et al., 2000; Militi et al., 2020; Orion & Wolf, 2014).

Patients with rhinophyma have a characteristic redness of the nose, with thickened skin and rough surface, which cause embarrassment, low self-esteem and relationship difficulties that can lead to real social phobias (Blount & Pelletier, 2002; Böhm et al., 2014; Halioua et al., 2017; Su & Drummond, 2012).

It also appears that patients with more severe symptoms experience higher levels of anxiety and distress and that there is a direct relationship between the severity of rhinophyma and the rate of depression, particularly among men who are most affected by the disease (Gupta et al., 2005; Heisig & Reich, 2018; Wu et al., 2018).

Yet, subjective perceptions of disease severity, not clinical measures, seem to be the better predictor of self-reported psychological sequelae (Abram et al., 2009). Studies of other dermatoses have found a similar complexity of connections, whereby symptoms and outcomes are mediated by symptom perceptions, quality of life, age and gender (Böhm et al., 2013).

The perception of body image also seems to play a key role in the quality of life of patients suffering from "disfiguring" pathologies or injuries. In general, it seems that subjects with deformations focus more on their own appearance than others, with negative effects not only at the psychosocial level but also at the work level (Ben-Tovim & Walker, 1995; Benrud-Larson et al., 2003; Ennis et al., 2013; Heinberg et al., 2007; McDermott et al., 2015; Thombs et al., 2008). Attractive people are in fact perceived as healthier, more competent and more likely to be successful (Weeden & Sabini, 2005). In an international study by Dirschka et al. (2015), in which the impact of facial erythema and rosacea on subjects' subconscious perception was assessed, it was found that patients with these lesions evoked a negative first impression in others and were considered less reliable and self-confident on a personal and professional level. People with visible disfigurement, on the other hand, report being confronted with frequent staring, audible comments about their appearance, unsolicited questions about the cause of their disfigurement and other stigmatizing behaviors (Lawrence et al., 2006; Rumsey & Harcourt, 2004). Such a condition can favor the onset of defensive structures (Merlo et al., 2020; Settineri et al., 2018, 2019c) which translate not only into avoidance behaviors and difficulties in adapting, but also into sexual problems (Fobair et al., 2006; Hagedoorn & Molleman, 2006; Newell & Marks, 2000). Clinicians and health professionals should be aware of this disadactive issues, as such for others psychological dynamics depending on psychological dynamics (Caputo et al., 2020; Felaco & Parola, 2020; Merlo et al., 2020b, 2020c; Parola, 2020).

The impact of rhinophyma on the quality of life of those affected by it highlights the salience of the topic in the clinical setting and the need to introduce adequate treatment that guarantees

an improvement in their conditions. Currently there is no cure for rhinophyma, the ideal solution is surgical or laser treatment, which by improving the aesthetics of the nose, contribute significantly to improving the quality of life of these patients.

## 2. Material and method

The present study was performed on a number of 6 patients, of which 3 with mild rhinophyma, 2 with moderate rhinophyma and 1 with severe rhinophyma. All patients were male, with the age between 52 and 68 years and with Fitzpatrick II and III type skin. For their treatment we used the following treatment methods: Cutera Xeo vascular NdYag laser, Cutera Xeo LimeLight laser, program A (vascular), Cutera Pearl Fractional laser.

Our experience in the treatment of rhinophyma has shown us that there is another component worth considering, namely hypervascularization with the presence of telangiectasias. In the context in which the radiofrequency did not give notable results and starting from the pathophysiological determinism of rhinophyma, we use the following treatment scheme:

**Table 1.** Therapeutic scheme used

Rhinophyma type	Histopathological changes	Therapeutic scheme
Mild rhinophyma	Telangiectasia, pappular follicles and slight changes in texture	Stage 1: vascular laser, 2-4 sessions, 2-3 weeks apart Stage 2: fractional laser, 1 session
Moderate rhinophyma	Telangiectasias, pappular follicles and slight changes in texture + nose thickening and contour changes	Stage 1: vascular laser, 2-4 sessions, 2-3 weeks apart Stage 2: fractional laser, 2-3 sessions, 6 months apart Stage 3: surgical excision in case of suboptimal results
Severe rhinophyma	Telangiectasias, pappular follicles and slight changes in texture + nose thickening and contour changes + nodules	Stage 1: vascular laser, 2-4 sessions, 2-3 weeks apart Stage 2: surgical excision with skin graft

Patients were classified into three clinical degrees of severity, mild, moderate, or severe rhinophyma according to the references of Orenstein et al. (2001) thus, mild rhinophyma was found in patients with telangiectasias, papillary follicles, and slight changes in texture. Moderate rhinophyma added to the changes in the initial stage the thickening of the nose and contour changes; severe rhinophyma added nodules to the pre-existing changes of the moderate rhinophyma (see table 1).

The vascular laser treatment in stage 1 of the treatment was performed using a Cutera Xeo laser, by two methods: NdYag for telangiectasias and LimeLight for diffuse redness in order to reduce the vascular bed. It took 1-2 Nd-Yag sessions performed at 2-3 weeks apart, and 2-4 LimeLight sessions (program A, vascular), performed at 2-3 weeks apart. For the 1064 nm NdYag laser, the working parameters used were: 3 mm spot, 110-130 J energy and 15-20 ms spot length. For the LimeLight laser the energy used was 14-18 J / cm<sup>2</sup>.

The second stage of the treatment fractional laser was used with a Cutera Xeo Pearl Fractional laser. There were performed 1 or 2 sessions every 6 months, with the following working parameters: fluence 160-200 J/cm<sup>2</sup>, ∞, pass 1-2 and density level 2-3.

Regarding the surgical treatment, in the past I used the excise the skin in all its thickness and used the free graft of skin harvested retroauricularly. There were no recurrences but the aesthetic result was mediocre, with differences in color, texture and even thickness. However, patients were satisfied.

Postprocedure, for vascular laser treatments, a cream with a 50% protection factor was applied for 14 days and for Er: Yag ablative laser treatments, a semi-exclusive, polyurethane adhesive dressing was applied for 24 hours, followed by daily application of petrolatum until re-epithelialization of the treated area 8-13 days after treatment. Patients were evaluated on days 2, 5, 7, 14 and 30 after the procedure was done to assess treatment responses; and in these cases the cream with 50% protection factor was later recommended.

### **3. Results**

After the first phase of the treatment, the vascular laser, there was an improvement in the overall appearance, both in color and texture. In almost all patients a decrease in the volume of the nose was observed, much more evident in mild rhinophyma than in severe rhinophyma. Following the treatment in the second stage with the fractional laser, a visible improvement of the texture and a decrease of the nose volume was observed, most of the times the results being satisfactory for the patients. We tried the fractional laser in severe rhinophyma but the results obtained and the feedback from patients were not encouraging, which is why in bulky rhinophymas, with nodules and severe fibrosis, we prefer surgical treatment, vascular is only preparatory, in order to reduce bleeding during surgery. Also, due to the use of the initial vascular laser, the healing time was much reduced. Regarding the surgical treatment, on the present group, only one of the 6 patients presented an indication for surgical treatment, but after the treatments performed (2 vascular NdYag sessions, 4 LimeLight sessions and 2 Fractional Pearl) he was satisfied with result and refused surgery. In fact, more and more patients have been refusing surgical treatment lately.

#### 4. Discussion

Regarding the treatment of rhinophyma, multiple methods have been described but without a clear and standardized protocol that has proven to be the most effective. The first stage of treatment for rhinophyma, in its early stage, is drug treatment. Medical therapies include oral isotretinoin and antibiotics such as tetracycline, erythromycin and topical metronidazole. In the more advanced stages of the disease, drugs have not been effective (Al Hamzawi & Al Baaj, 2019). Radiation therapy was also used in the early stages of rhinophyma, but due to the increased risk of malignancy, this method was abandoned relatively quickly (Comeau et al., 2019). In recent decades, attempts have been made to use cryosurgery. This method of treatment is inexpensive and produces minimal bleeding, but it also has some major disadvantages, such as the inability to control the depth of thermal damage and unsightly post-treatment hypopigmentation (Redett et al., 2001). Thus, the current treatment methods used are: surgical excision, electrosurgery, dermabrasion and laser ablation.

Surgical excision with primary or secondary closure has been used since 1845, and skin grafting was first used in 1912 (Apikian et al., 2007). This type of excision with full skin thickness, however, can lead from the formation of vicious or unsightly scars to the difference in texture and color of the grafted skin, all with suboptimal aesthetic results. Thus, over time, the excision of the skin in its entire thickness was replaced by excisions of the skin of partial thickness, obtaining clearly superior aesthetic results (Fincher & Gladstone, 2004). Applying a dermal replacement to create a neoderm covered by the partial thickness autologous skin graft can serve as a suitable functional and aesthetic model, without the need for full thickness skin grafts or local flaps (Selig et al., 2013).

Recently, a new therapeutic approach to rhinophyma called the "subunit method" has been introduced, which addresses three fundamental problems of the rhinophyma nose: hypertrophic sebaceous glands, excess skin (from the "tissue expansion" effect) and destruction of tissue support; the results being promising (Hassanein et al., 2016). Thus began the sequential approach in the treatment of rhinophyma using different therapeutic procedures that address differently in each case of the three pathophysiological problems.

Ablative laser therapy has been used to treat rhinophyma since the 1980s, with the discovery of the first carbon dioxide (CO<sub>2</sub>) and argon lasers (Apikian et al., 2007). Ablative lasers are particularly useful for treating rhinophyma, due to their ability to vaporize excess tissue in a controlled manner. Moreover, ablative lasers cause the remodeling of collagen, which is beneficial due to the dermal degradation present in rhinophyma (Fincher & Gladstone, 2004).

Initially, the CO<sub>2</sub> laser was considered one of the best therapies to treat rhinophyma and is still considered an effective treatment option. Because water is the main target chromophore, there is a non-selective ablation of tissues, so that thermal energy non-selectively destroys everything it finds near the chromophore (water): hair, sebaceous glands, cartilage, bone, etc. The relatively deep penetration also limits the ability to obtain a precise tissue contouring (el-Azhari et al., 1991; Fincher & Gladstone, 2004).

The Er: YAG laser (2940 nm), compared to the CO<sub>2</sub> laser, has a better water absorption coefficient and a lower tissue ablation depth. This allows more precise tissue contouring than CO<sub>2</sub> lasers and makes it easier to control. The Er: YAG laser also produces much less collateral thermal damage, thus reducing collateral tissue damage, which reduces the risk of vicious scarring and shortens recovery time. It also reduces the risk of depigmentation (Rostan et al., 2001). In addition to CO<sub>2</sub> laser reepithelialization is faster, starting from the 3<sup>rd</sup>-4<sup>th</sup> day post-procedure (Cravo et al., 2009; Serowka et al., 2014). The most recent studies, performed on groups of patients with rhinophyma treated with ablative laser Er: Yag reported excellent results, without scars and with very good aesthetic results (Orenstein et al., 2001). Double-mode Er: YAG lasers, more recently, combine standard short-pulse with higher-width ablative energy, which provides increased thermal energy for improved coagulation (Fincher & Gladstone, 2004); thus eliminating the disadvantage of hemostasis that Er: YAG lasers have had in the past compared to CO<sub>2</sub> lasers (Mathis & Ibrahim, 2019).

Side effects after fractional laser are, however, rare and include pain during the procedure, hypopigmentation and scarring, which can occur up to 6 months after the procedure (Madan et al., 2009). Post-treatment depigmentation after complete ablation should be considered, especially when treating Fitzpatrick III-VI skin types, as the risk of depigmentation is substantially higher (Sadick et al., 2008; Meesters et al., 2015).

Our results indicate that multimodal laser treatment is sufficient and with optimal results for patients with mild forms, it is acceptable and often satisfactory for patients with moderate forms but is ineffective in severe forms, in which only surgical treatment remains the final option. Er: YAG laser treatment is an effective option due to the high accuracy of the ablation, the low risk of complications, the reduced pain and the shorter recovery time compared to a CO<sub>2</sub> laser.

Adverse results are rare. In our experience we had no scars or post-procedure depigmentation. Er: YAG therapy was well tolerated, without prolonged edema or erythema and with improved texture, skin surface and nose volume. All patients were satisfied with the treatment outcomes, with responses ranging from increased self-esteem and social comfort to improved life change. All patients tolerated postoperative recovery well.



For mild and moderate forms of rhinophyma we consider it the best therapeutic option at this time.

The treatment of rhinophyma is also of great importance in the clinical setting as it can have repercussions on the quality of life of patients and on the perception of body image (Benrud-Larson, 2003), especially among younger patients who give great importance to their appearance than the older population (Altabe & Thompson, 1993; Cash & Henry, 1995; Fauerbach et al., 1995; Militi et al., 2020; Settineri et al., 2019a, 2019b).

Research on patients characterized by physical lesions and disfigurements, particularly localized in the face, has highlighted the presence of depressive and anxious symptoms, adaptation difficulties and social avoidance (Rumsey & Harcourt, 2004; Sivakumar et al., 2010; Van Lankveld et al., 2007).

Among patients with acquired or congenital deformations, the location of the disfigurement is believed to play a role in how an individual adjusts to changes in appearance. Pruzinsky (2004) notes that it is probably more difficult for patients with visible (i.e., facial) deformations to adapt to changes in appearance than for those with deformations that are more easily camouflaged (i.e., bodily scars). Therefore it can be understood that patients with facial problems experience greater distress than the second group.

However, there is no direct correlation between the extent of the disfigurement and the degree of suffering of the body image, due to the subjective nature of the latter. Consequently, it is possible that patients with minimal or mild disfigurement report greater distress and impairment than patients with objectively severe disfigurements (Pruzinsky, 2002).

In a study by Bohm et al. (2014), it was highlighted instead that persons with especially pronounced symptoms of inflammatory papulopustular eruption or rhinophyma were more likely to report having been rejected by others. That rhinophyma is more common in males may explain why men reported greater impairment of life quality and more severe depression symptoms. The visibility of symptoms is certainly a factor explaining stigmatization, as demonstrated for vitiligo patients (Schmid-Ott et al., 2007). Depression and anxiety varied with somatic symptom severity, discomfort, lower life quality, and stigmatization. This suggests that patients who have experienced stigma or who report a low quality of life are at higher risk. Therefore, doctors treating patients with rosacea and rhinophyma should be sensitive to symptoms of mental distress, considering psychological treatment as part of a holistic treatment.

Further research should also focus on specific psychotherapeutic interventions that reduce the effect of psychological distress and improve the quality of life of patients with similar diseases.

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**Appendix A**



**Figure 1.** before the treatment

**Figure 2.** After the treatment

(4 session limelight laser, 1 session fractional laser)