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Case report

Treating rhinophyma: A case report illustrating decortication/vaporization with an 808-nm diode laser

Anwendung eines 808 nm-Diodenlasers zur Entfernung/Vaporisation eines Rhinophyms – Eine Fallstudie

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Abstract

Rhinophyma is a skin disease that is not only disfiguring but can also have a negative impact on respiratory function by causing nasal obstruction. There is a wide range of techniques used in the surgical management of rhinophyma, including laser treatment, all of which involve tissue ablation. With regard to the laser therapy, there is no consensus as to which laser is most effective. The authors present a case report to illustrate their method of treating rhinophyma with an 808-nm diode laser, which included the use of exogenous pigment to define the target area and the application of human fibrin glue to obtain good hemostasis and wound healing and prevent infection.

Keywords: rhinophyma; laser; ablation.

Zusammenfassung

Das Rhinophym ist eine Hauterkrankung, die nicht nur entstellenden Charakter hat sondern durch die Verengung der Nase auch die Atmung erheblich beeinträchtigen kann. Zu den verschiedenen ablativen chirurgischen Behandlungsmethoden gehört auch die Lasertherapie, wobei es derzeit keinen Konsens darüber gibt, welcher Laser am effektivsten ist. In der vorliegenden Fallstudie wird die Anwendung eines 808 nm-Diodenlasers dokumentiert. Die Operationsgrenzen wurden dabei vor der Laserbehandlung mit "Carbon black" markiert. Zur Blutungsstillung, Verbesserung der Wundheilung und Vermeidung von Infektionen wurde im Anschluss an die Laserbehandlung Fibrinkleber verabreicht.

Schlüsselwörter: Rhinophym; Laser; Ablation.

1. Introduction

Rhinophyma is a benign and rare disease of unknown etiology that is thought to be a complication of end-stage acne rosacea [1]. It affects the soft tissues of the nose, especially in Caucasian men between 50 and 80 years old [2, 3], causing progressive deformity. The cartilaginous parts of the nasal pyramid, as well as the tip and the alae of the nose, are more commonly involved than the area just below the nasal septum and the free margins of the nares [4]. Rhinophyma is associated with extrinsic (diet, climate, infection) and intrinsic risk factors (heredity, gastrointestinal disease, stress) [3]. There are cases reported in the literature in which an association with basal or squamous cell carcinoma, B-cell lymphoma, and amelanotic melanoma has been observed [5–10]. The negative esthetic impact of the disease can cause considerable psychological suffering, and functional disturbances related to nasal obstruction are frequent [2, 6, 11, 12]. Numerous surgical techniques have been used to treat rhinophyma, all of which involve tissue ablation. Besides providing good cosmetic results, surgery must permit histological examination of the tissue removed because of the relationship between altered sebaceous glands and carcinoma. The surgical techniques that are currently most commonly used are excision and repair with flaps or grafts [13–16], superficial or deep decortication with traditional scalpels, electric scalpels, or dermoabrasive agents, cryotherapy, or radiotherapy [4, 13–16], and decortication/vaporization with lasers [4, 13–23]. Water scalpels [24, 25], ultrasonic scalpels [26, 27], or radiofrequency scalpels [28, 29] are also used. Often, some of the methods cited above are combined, especially because of the need to ensure good hemostasis and skin remodeling [4, 13, 14, 18–20]. Some authors recommend applying biological hemostatic agents like Tissucol® (Baxter) and FloSeal® (Baxter) [15, 17]. The 808-nm diode laser used within this case study, with its specific ability to target exogenous and endogenous chromophores, provides a distinct advantage over other water-absorptive 1450-nm diode lasers, which have been recently shown to be helpful in the management of refractory acne vulgaris by provision of precise ablation and hemostasis [22, 23, 30, 31].

2. Case report

A 70-year-old man presented with a pronounced multilobular nasal tumefaction that extended beyond the anatomical

Figure 1 Preoperative images.

boundaries of his nose (Figure 1). On clinical examination, it was found to be a glandular (sebaceous) form of rhinophyma with severe diffuse hypertrophy and focal nodularity, causing a severe reduction in nasal airspace. The patient had a history of various risk factors mentioned above including dietary (alcohol), heredity (an affected family member), and social factors (stress with a history of psychological problems).

The patient underwent day surgery. One hour before the procedure, he was given short-term antibiotic prophylaxis with ceftriaxone (2 g i.v.). Surgery was performed under local anesthesia 1% mepivacaine with a moderate quantity (0.01%) of adrenaline, which is our standard for operations on the face.

Excision/vaporization was performed using the LASEmaR 800™ (Eufoton SRL, Trieste, Italy), an 808-nm (near infrared) arsenium-gallium (ArGII) semiconductor laser. Because of the laser's affinity for dark chromophores, the areas to be vaporized or excised for histological examination were marked repeatedly with black pigment (carbon black) (Figure 2A,B) in such a way as to spare the largest amount possible of healthy tissue as well as provide tissue for histological analysis. The laser system settings were as follows: spot of 1 mm, 18 W, 10 consecutive impulses at a time, 50 ms on and 30 ms off, with pauses of 500 ms. During the procedure, the area was repeatedly cooled with ice to keep thermal injury to a minimum. The immediate result was decortication without bleeding (Figure 3A). After decortication, 2 ml of human fibrin glue (Tissucol®; Baxter) was applied to the area (Figure 3B,C).

The surgical specimen was sent for histological examination (Figure 4). The patient was given gauze dressings and local antibiotics (mupirocin cream) and discharged with a prescription for outpatient wound care and antibiotic therapy (ceftriaxone, 1 g i.m.). In the early postoperative period, the patient was seen three times a week, and after 10 days, twice a week. A small amount of serosanguineous secretion was observed for the first 72 h after surgery. The application of fibrin glue was repeated on the fifth postoperative day. Outpatient wound care consisted of the application of mupirocin cream and a covering of solid silicone gel containing vitamin E (Sifravit®; Sifra SPA). After the second week of outpatient wound care, the patient came for a weekly follow-up visit for a further 3 weeks and in the intervals managed on his own. Within 40

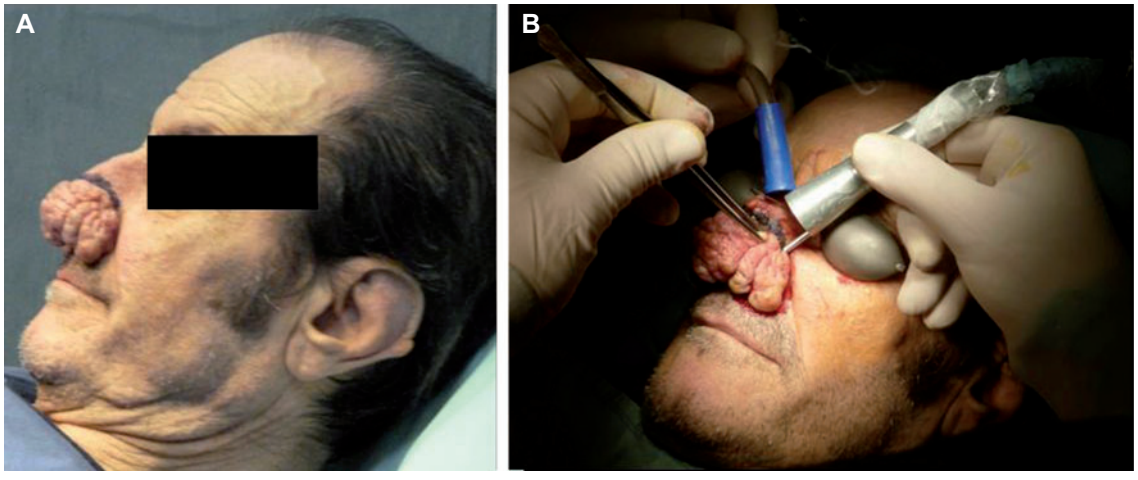

Figure 2 (A) Area marked with carbon black. (B) Same area during laser excision.

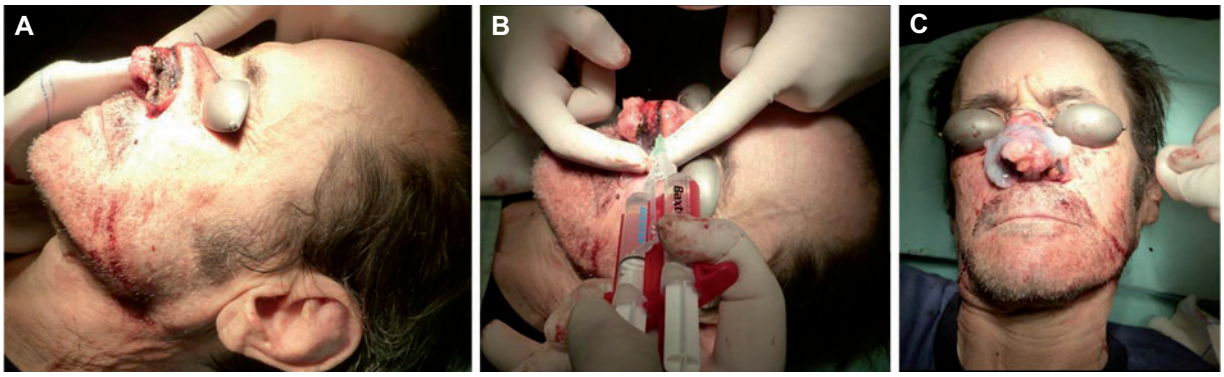

Figure 3 (A) Intraoperative view, (B) after excision, and (C) after fibrin glue was applied.

days, a partial reepithelialization of the surgical wounds was observed. At 60 days, the final esthetic results and functional results had practically been achieved (Figure 5). The patient was entirely satisfied with the result. According to our treatment plan, any excessive fibrosis/scarring would be treated 6–7 months postoperatively using an erbium laser.

3. Discussion

There is no particular difficulty in arriving at a clinical diagnosis of rhinophyma, but possible associations with malignant tumors must be borne in mind [5–10]. The various types of surgical treatment mentioned above are effective in most patients and can be performed in an outpatient setting, which is clearly an advantage, although recovery times are relatively long (approx. 3–4 weeks) and postoperative wound care can be difficult. State-of-the-art ablation technologies (lasers, radiofrequency, ultrasound, water scalpels) [4, 13–23] do not have the limitations of first-generation ablation techniques (electric scalpels, dermoabrasive agents, cryotherapy, and radiotherapy). Some authors consider the newer ablation techniques the gold standard for the treatment of rhinophyma from both an esthetic and a functional point of view [13, 14, 17, 20, 21, 32]. In the case described, we decided to use an 808-nm diode laser (ArGII) instead of a classic water-absorbed ablative laser (2940-nm erbium or 10,600-nm CO_2 laser) because of the known ability of the 808-nm laser to selectively target dark chromophores (both natural endogenous and artificial exogenous chromophores) and because of our experience using this laser. The laser beam targets darkly colored areas for photothermolysis, making it possible to spare healthy tissue by applying black pigment (carbon black) to the areas to be excised or vaporized. It has been demonstrated [30, 31] that in areas colored with carbon black ink, ablation is initially superficial but extends deeper after the first two to three pulses. When the laser penetrates the skin to an area that is not dark enough to be selectively targeted, carbon black should be reapplied. The amount of carbon black required depends on the type of tissue involved. The laser also recognizes the dark pigment of hemoglobin and therefore permits photothermolysis of the small vessels present in the area treated, resulting in perfect simultaneous hemostasis. The 808-nm

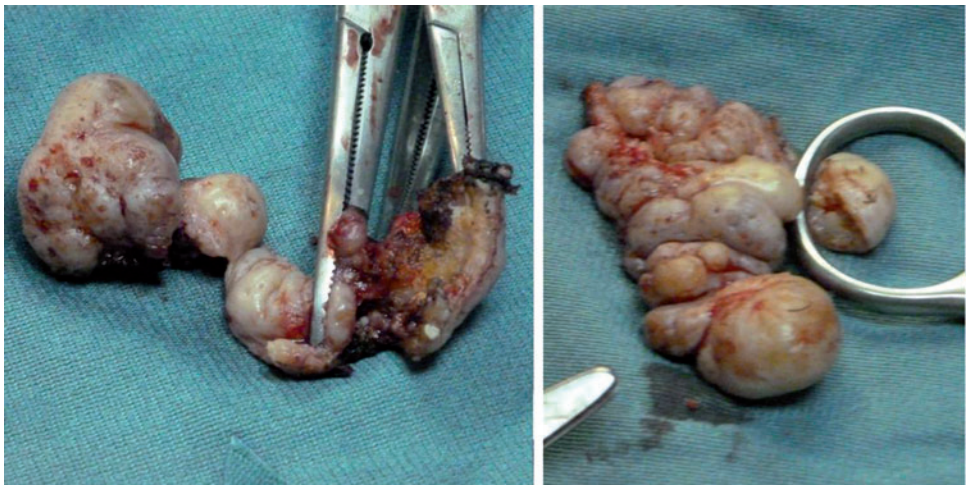

Figure 4 Surgical specimen, which was sent for histological examination.

Figure 5 Results 2 months after surgery.

laser can have a nonablative thermal effect (selectively direct on melanin and hemoglobin targets) or become an effective vaporizing laser tool using exogenous artificial chromophores such as carbon black type. Moreover, using sequences of very short impulses (10 consecutive impulses, 50 ms on and 30 ms off, with 500-ms pauses) and a 1-mm spot size permit to limit thermal injury to the surrounding tissue. We chose to use a sequence of 10 impulses of short duration (50 ms) so that the laser beam was able to penetrate sufficiently deeply without collateral thermal damage. The first few impulses vaporized the tissue marked with the chromophore. Tissue dyed by a chromophore lying slightly deeper, underneath the area carbonized by these impulses, is vaporized by the rest of the impulses. A longer sequence of impulses (for instance, 20) would cause excessive thermal injury to the surrounding tissue, and a shorter sequence of impulses (for instance, 5) would not result in effective tissue ablation, leading to a necessary pulse balance régime. This balance provides effective tissue ablation without excessive scarring caused by deep tissue ablation and excision. In some patients with less extensive rhinophyma, a more precise laser might be more useful.

Concerning the application of biological hemostatic agents once decortication is completed, in our experience, human fibrin glue (Tissucol®) is more useful for slight bleeding, such as that occurring after decortication, than FloSeal® (bovine thrombin in a bovine-derived gelatin matrix), which is useful in cases of more severe bleeding. Fibrin glue mimics the later phases of the coagulation cascade, stimulating chemotaxis and the proliferation of fibroblasts with the release of growth factors, and resulting in more rapid reepithelialization, assisting in the prevention of postoperative infection by filling concomitant dead space [33–36].

The role played by excessive fibrosis in the pathogenesis of rhinophyma (i.e., increased expression or dysregulation of the fibrogenic proteins transforming growth factor (TGF)-β, TGF-β1, TGF-β2, and TGF-β rec II in phymatous tissues along with greater expression of the antiscarring properties of TGF-β3) has been discussed by some authors [37, 38]. It is our opinion, based on results reported in the literature [15] and our own personal experience [33–36], that the application of fibrin glue to the bleeding surface does not lead to unesthetic scarring and therefore avoids a negative effect locally. Moreover, there are almost no reports in the international literature of complications or undesirable results following this use of fibrin glue.

4. Conclusions

Our limited experience using an 808-nm diode laser followed by the application of Tissucol® to treat rhinophyma suggests that this technique provides rapid and effective decortication and remodeling for extensive rhinophyma lesions. Moreover, there was a high degree of patient satisfaction with the technique. We used the 808-nm diode laser for precise tissue ablation and hemostasis, which is a variant on other water-absorbed diode lasers and which targets chromophores for the specific advantage of this wavelength by intraoperative application of carbon black. We await longer-term results. Our future work will compare this new technique with treatment results using the CO_2 laser.

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