Case Report

Laser Epilation as a Treatment for Recurrent Infections around Bone Conduction Implant Abutment

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Abstract

Introduction: One of the most frequent complications of percutaneous bone conduction hearing implant (BCHI) surgery is dermatitis around the titanium skin-penetrating abutment.

Objective: To describe the laser epilation of hair around a BCHI abutment using the long-pulsed, 800-nm Light Sheer™ diode laser (Lumenis, Inc.) as a treatment for recurrent soft tissue reactions secondary to the in growth of hairs around the implant site.

Results: Laser therapy resulted in prevention of recurrent infections as a sequel of an effective hair follicle reduction in our case. The patient was very satisfied with the outcome and no side effects could be observed.

Recommendation: Diode laser therapy appears to be a successful therapeutic option for patients suffering from recurrent infections around their BCHI abutment due to the in growth of hair. This treatment can be proposed as a new alternative for current standard therapies.

INTRODUCTION

One of the most frequent complications of percutaneous BCHI involves a soft tissue reaction around the titanium skin-penetrating implant or peri-abutment dermatitis.

The most commonly used classification for this soft tissue reaction is the Holgers’ classification [1]. Grade 0 means no irritation; whereas a grade 1 stands for reddish discoloration of the skin around the implant; a grade 2 stands for a reddish skin with moist surface of the skin around the implant; a grade 3 reaction results in the formation of granulation tissue around the implant and a Holgers’ grade 4 shows extensive soft tissue reactions post-BCHI surgery [2,3]. Also in growth of hair around the abutment may cause problems of recurrent infections around the BCHI implant.

Hair can be removed by many techniques; however, laser treatment has emerged as the criterion standard in hair depilation. There are many kinds of epilation laser systems, including the long-pulsed alexandrite laser, the neodymium-doped yttrium aluminium garnet (Nd: YAG) laser and the diode laser. Diode lasers use the principle of selective photothermolysis (SPTL) or photoepilation to target the melanin in the hair shaft. Hereby, the laser damages the melanin by selectively heating it while leaving surrounding tissue unharmed. This results in the disruption of hair growth and regeneration, thus providing hair loss. A diode laser can be complemented by cooling technology, or other pain reducing methods which improve treatment efficacy and patient comfort [4].

There are already many reports that detail the clinical importance of those systems. However, to date, laser epilation in reconstructive surgery of auricular malformations is the only found indication in otology [5,6]. We want to add recurrent peri-abutment dermatitis as a result of in growth of hair as a new indication for laser hair removal in otology.

CASE REPORT

The patient was a 68 years old female with a medical history of Ramsay Hunt in December 2009, complicated with a vestibulocochlear dysfunction on the right side. Because of a progressive increase in sensorineural hearing loss on the right side with perceptive thresholds of 85 – 90 dB in April 2010, the decision was made to place a BCHI on the right side. A BIA210 was placed using the Nijmegen linear incision technique with soft tissue reduction. There were no complications postoperatively.

During follow-up she complained about recurrent infections
around the BCHI abutment. On clinical examination, a Holgers’
grade I, caused by in growth of hair around the abutment, could be
observed on several occasions. Treatment consisted of excessive
hair removal followed by local treatment with an ointment
containing hydrocortisone and oxytetracycline (Terracortril®
suspension) and instead of opting for a revision surgery to
reduce the amount of hair follicles, the patient was referred to
the colleagues of dermatology to perform a laser epilation in
an ambulant setting. The laser treatment took place after local
control of the infection.

They performed photoepilation with the diode laser Light
Sheer Duet system at a wavelength of 800 nm. The Light Sheer
ET hand piece was used to treat the small area with the following
parameters: spot size 9 x 9 mm, energy density 30 - 40 J/cm²,
pulse duration 15 - 20 ms, cooling with the Light Sheer’s cooled
sapphire device. Laser treatment was carried out 2 cm around
the abutment, as near as possible to the abutment. The area to
be treated was shaved immediately before laser epilation. No
local anesthesia was applied before the laser treatment. After
irradiation, an ointment containing Sulfadiazine (Flammazine®)
was applied routinely for several days. The treatment was well
tolerated and provided a quick and effective hair reduction.
For a satisfying result, 4 sessions during a period of 7 months
were necessary. During the treatment, the patient had mild
to moderate pain and after treatment, there was redness and
mild oedema around the hair follicles. These side-effects can be
considered as normal.

The latest check-up, 11 months after completion of the laser
epilation, showed a Holgers’ grade 0 (Figure 1).

**DISCUSSION**

Local inflammatory skin reactions at the skin/abutment
interface are the most common complications of BCHI. Frequent
and attentive cleaning of the abutment site is necessary in an
attempt to prevent infections. If local infection does occur,
the traditional treatment algorithm may consist of one of the
following treatment options: local wound care (including
general cleaning, topical antibiotics and in-office silver nitrate
cautery of granulation tissue), topical clobetasol cream, localized
triamcinolone injections, and, in the case of more significant local
infections, even oral antibiotics or revision surgery (including
fitting of a longer abutment and/or subcutaneous soft tissue
reduction)[2,7-9]

The mechanisms of the inflammatory reaction around the
skin-penetrating device are not completely understood, but are
supposed to include infections by bacterial and fungal pathogens,
a foreign body reaction and shear stresses from surrounding soft
tissues [10]. We feel that in growth of hair can also be a cause of
recurrent infections around a BCHI abutment.

Titanium has an excellent biocompatibility and integrates
readily with bony structures, but the implant does not
demonstrate sufficient integration with the skin in order that
the skin-implant interface can offer a complete isolation with
the internal environment. It is known that there is epidermal
down growth along the implant surface, which tends to form a
pocket with cellular debris and hair shafts between the implant
and the skin at the epidermal-implant interface. This can permit
pathogens to enter the body, which may cause infections [11].
Whether the new generation coated abutments provide sufficient
barrier and complete skin in growth to prevent peri-abutment
dermatitis still remains to be proven by long-term studies.

In the older techniques with tissue reduction, the problem of
hair in growth may be due to an insufficient removal of the hair
follicles around the abutment implant site. Another explanation
is that the hair shafts get broken off and get pushed down
into the dermis along with the pylon during the implantation
surgery, by which they are placed in a different direction, grow
in and elicit an inflammatory response which can secondary get
infected. In the current techniques, where a new longer abutment
without any need for soft tissue reduction is used, there’s no
more removal of hair follicles. This may give rise to hair growth
around the skin penetrating abutment leading to entangling
of the abutment or in growth. That’s why we introduced the
laser hair removal technique in patients with this problem.
The downside of this technique is a strict patient selection. A
complete and detailed history should be obtained to rule out
associated illness. This should include photo-aggravated skin
diseases and medical illness, e.g., systemic lupus erythematosus;
treatment area with active cutaneous infections, e.g., herpes or
staphylococcal infections; history of any photosensitizing drugs
(minocycline, isotretinoin) and keloid or hypertrophic scars. Also
proper patient selection and tailoring of the fluence used to the
patient’s skin type, remain important factors in efficacious and
well tolerated laser treatment. Individuals with skin photo types
III to V can be effectively and safely treated with the diode laser;
individuals with blond, grey and white hair does not respond well
to this treatment [4,12].

Different laser systems have been used for hair epilation,
in our case the diode laser has been used. Hereby, SPTL leads
to destruction of the pigmented hair follicles and thus ensuring
a long-lasting, however, not permanent hair removal. For
this reason repeated treatments may prove beneficial for the
maintenance of an optimal treatment outcome. Possible side
effects include slight to moderate pain and redness or oedema
around the hair follicle. Pain can be prevented with anesthetic

![Figure 1. Outcome after four diode laser treatments.](image)
gels or creams. We only saw mild adverse reactions in our patient and the epilation result was satisfactory. So, this case report shows the positive effect and the efficacy of the laser epilation in reducing hair growth and preventing recurrent infections around the BCHI abutment. We think that this treatment may decrease the need for invasive postoperative treatment options such as revision surgery in patients with BCHI. In our department, several patients were already treated with success with this treatment.

Laser hair removal with the diode laser led to a complete resolution of recurrent infections in our case. To our knowledge, no cases of laser hair removal for the treatment of recurrent infections around a BCHI abutment due to the in growth of hair have been reported so far.

**RECOMMENDATION**

In conclusion, diode laser treatment appears an effective alternative in the treatment of recurrent infections around a BCHI abutment due to in growth of hair. Laser hair removal for this indication seems a safe and well-tolerated treatment option resulting in sustained symptomatic improvement. Further study is needed. A large randomized controlled trial comparing laser hair removal with other treatment modalities for this indication would be helpful in order to determine the place of this new treatment option in the existing treatment algorithm.

The individual whose case and picture are presented in this article has provided written informed consent to publish her case details.

**SUMMARY**

Sitting of a percutaneous bone conduction hearing implant (BCHI) may give rise to adverse skin reactions.

This paper describes a patient with recurrent infections around her BCHI abutment due to the in growth of hair, which was successfully treated with laser hair removal therapy.

In order to confirm the effectiveness of this treatment mode, long term results need to be documented in a considerable number of patients.

**REFERENCES**