Laser snoring and sleep apnoea reduction

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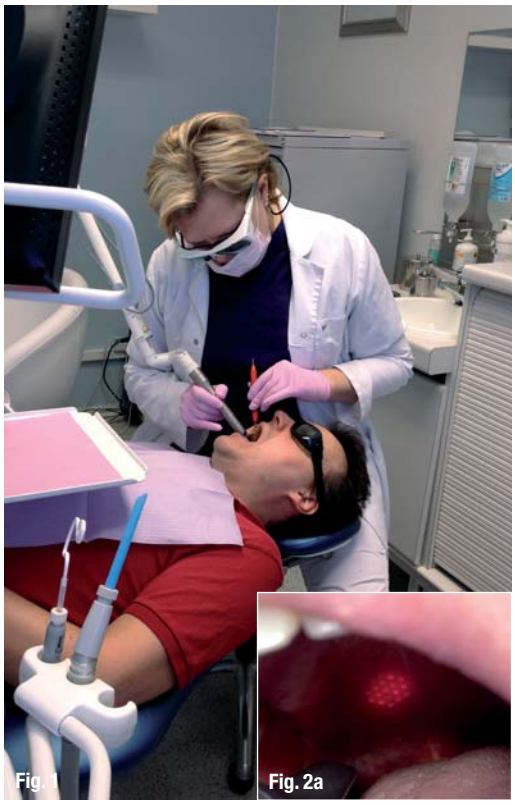
Fig. 1_Mallampati classification.
Figs. 2a & b_NightLase treatment procedure.



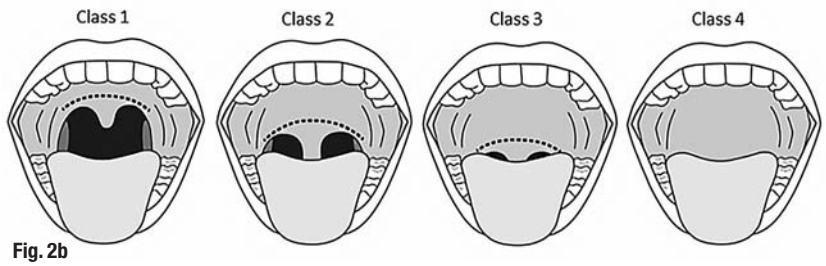


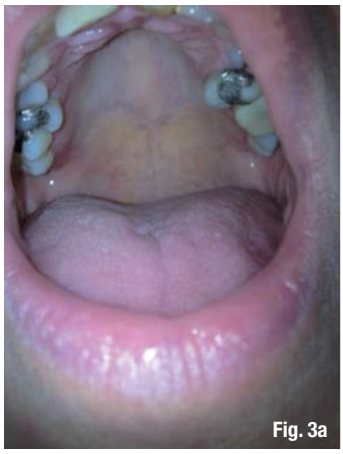
Fig. 2b

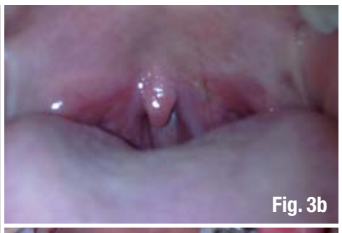
_Introduction

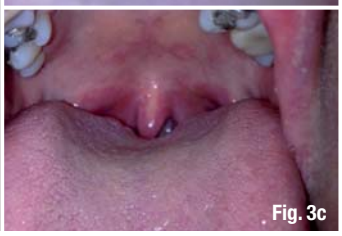
It has been estimated that roughly 30–50 % of the US population snore and almost one-third suffer from sleep apnoea. However, only 5 % have been diagnosed and treated.[1,2] Snoring and sleep apnoea result from obstructed airways. This can be an outcome of many different factors, such as anatomic deviations, tumours, polyps, allergies, large adenoids and tonsils, a large uvula or a long soft palate.[3–6] Heavy snoring is sometimes called "heroic" snoring and may affect bed partners, even causing marital conflict.

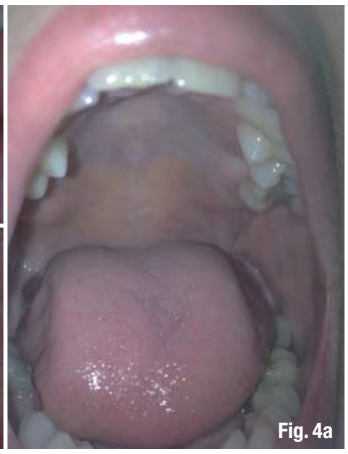
Snoring is not sleep apnoea and sleep apnoea is not snoring. Still, many patients with loud snoring also have obstructive sleep apnoea (OSA). An overnight sleep study known as polysomnography should be conducted on severe snorers to conclude if they have OSA. During the sleep test, the number and length of possible apnoeic periods is recorded, and oxygen levels, heart rhythm (EKG), body position and bruxism are examined. Treatment can be discussed after the sleep study results have been evaluated.

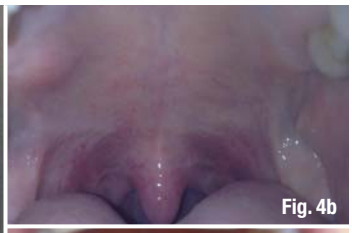
In OSA syndrome, several breathing pauses may cause a significant decrease in blood oxygen level and cardiac arrhythmia. OSA syndrome is life-threatening with long-term effects resulting in lung and heart problems.[7] This may also interact with the brain's restorative REM sleep periods and cause concentration, memory and mood problems. Daytime sleepiness, morning headaches, sexual dysfunction, hallucinations and short-term memory loss are other problems related to OSA.[7–9]

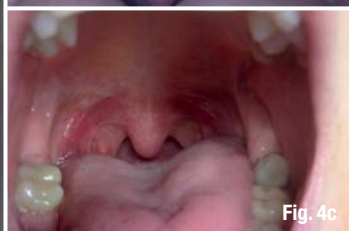












Non-surgical treatment options for patients suffering from OSA include oral appliances, palatal implants, weight loss, alternative medicine and continuous positive airway pressure (CPAP) masks.[10] Surgical methods include laser-assisted uvulopalatoplasty or uvulopalatopharyngoplasty,[11] radiofrequency tissue ablation and palatal implants.[12–14]

_Laser treatment option: NightLase

Among other treatments, a minimally invasive laser treatment is now available. In this method, laser light is used for non-ablative thermal heating of the tissue, which subsequently causes shrinking of the collagen fibres. This phenomenon opens up the airways and reduces snoring and sleep apnoea. There are many benefits of treatment with NightLase (Fotona), such as no need for anaesthetic, no pain and only three short 20-minute sessions with immediate results. This case presentation describes the treatment of patients with OSA using an Er:YAG laser, with a long-term follow-up period of 28–36 months. These clinical cases are part of an uncontrolled study to evaluate the usefulness of the laser in snoring and sleep apnoea treatment.

_Materials and methods

Patients with different OSA levels are included in this case report, all from a general dental practice. Ten patients were randomly selected and five typical cases are presented here visually, in terms of preoper-

Figs. 3a–c_Case #1. Pre-op Class 4 (a). Class 1 after three treatments (b). Class 2 at recall 36 months post-op (c).
Figs. 4a–c_Case #2. Pre-op Class 4 (a). Class 1 after three treatments (b). Class 1 at recall 28 months post-op (c).

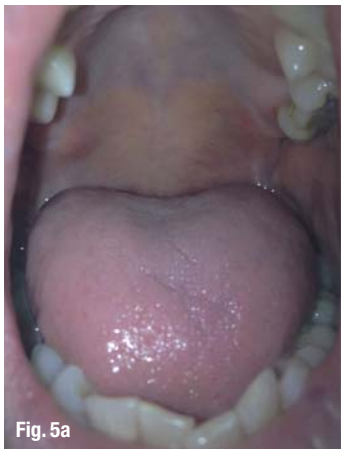


Fig. 5a

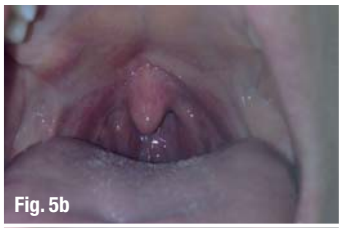


Fig. 5b

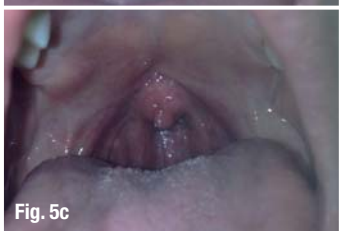


Fig. 5c

Figs. 5a–c_Case #3. Pre-op Class 4 (a). Class 1 after three treatments (b). Class 1 at recall 36 months post-op (c).

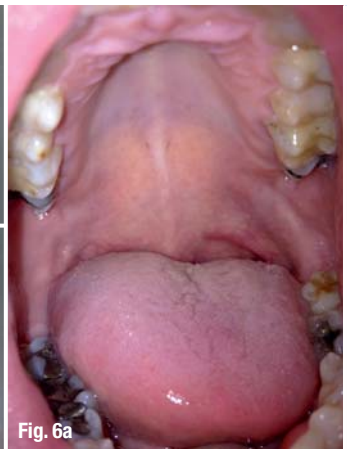


Fig. 6a

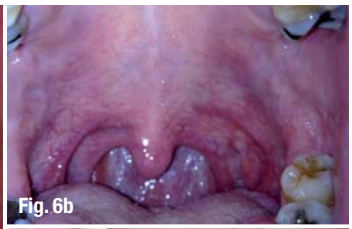


Fig. 6b

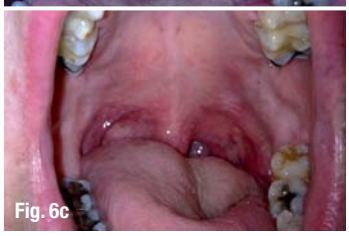


Fig. 6c

Figs. 6a–c_Case #4. Pre-op Class 4 (a). Class 1 after three treatments (b). Class 2 at recall 28 months post-op (c).

ative, postoperative and recall photographs. Three patients used a CPAP mask before treatment. All of the patients gave their consent for the treatment protocol using the Er:YAG laser and for the clinical photographs taken pre- and postoperatively to be used in presentations. All of the treatments were performed from late 2011 to the first quarter of 2012. No anaesthetic was administered. Mallampati classification (Fig. 1) was used before and after the treatments. All of the treatments were performed with a LightWalker AT laser (Fotona)—other Fotona models can be used too. Before each treatment, the effects of the Er:YAG laser treatment were explained to the patient (Fig. 2a). A fractional laser beam (Fig. 2b) was used with a PS04 handpiece at minimally invasive settings according to the manufacturer's protocol:

- The laser beam is fired at soft intra-oral tissue with a repetition rate of 10 Hz in LP mode.
- The laser beam is manually delivered across the target, either vertically or horizontally (depending on the region).
- Several passes are performed across each region (with well-defined overlap).
- The treated tissue is thermally processed and consequently shrinks.
- Sessions are scheduled at appropriate time intervals.
- Total delivered pulses vary per patient from 10,000 to 15,000.

Figs. 7a–c_Case # 5. Pre-op Class 4 (a). Class 1 after three treatments (b). Class 2 at recall 36 months post-op (c).

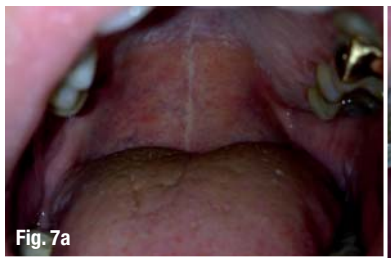


Fig. 7a

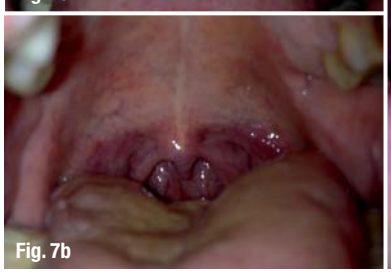


Fig. 7b

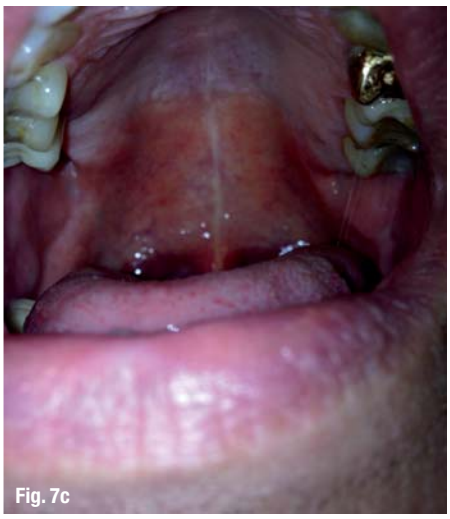


Fig. 7c

Clinical case #1

The patient was a 46-year-old female patient. Medical anamnesis established severe OSA with related headaches and daytime drowsiness. Intra-oral examination showed Mallampati Class 4. The postoperative result showed Class 1 (Figs. 3a–c).

Clinical case #2

The patient was a 42-year-old female. Medical anamnesis included severe OSA and use of a CPAP mask. The greatest concern for the patient was her heavy snoring causing relationship problems. Intra-oral examination showed Mallampati Class 4. The postoperative result was Class 1 (Figs. 4a–c).

Clinical case #3

The patient was a 30-year-old male and former ice-hockey player, lately unable to exercise at all owing to his becoming out of breath immediately owing to severe OSA. He had been using a CPAP mask for two years with discomfort. His Mallampati Class 4 was reduced postoperatively to Class 1 (Figs. 5a–c).

Clinical case #4

The patient was a 45-year-old male with snoring and breathing problems, causing relationship stress. His Mallampati Class 4 was reduced postoperatively to Class 1 (Figs. 6a–c).

Clinical case #5

The patient was a 56-year-old male with moderate OSA, which was causing relationship problems, as well as sleeping problems, a sore throat and morning headaches. His Mallampati Class 4 was reduced postoperatively to Class 1 (Figs. 7a–c).

_Results

All of the patients using a CPAP mask were able to discontinue use of the mask after the first treatment. After the third treatment, patients reported improvement of more than 85 %. Average improvement after one treatment session was 51 % and after the second session, 61 % (Fig. 8).

All of the patients were satisfied and stated that they would recommend NightLase therapy. None reported discomfort or pain during or after the treatment. Only one mentioned dry mouth postoperatively. All of the patients reported that they could breathe much more easily and that motion-related exhaustion had disappeared; quality of life was also better without daily headaches.

_Discussion

Both snoring and sleep apnoea are the cause of several health issues and are potentially life-threatening.[8] Still, most patients are unwilling to undergo treatment owing to multiple side-effects, unsuccessful non-surgical and surgical treatments, and uncomfortable procedures.[15]

In the treatments presented in this article, the success rate was over 85 % (Fig. 8). Even after 28–36 months, the results remained good. NightLase is an easy treatment to perform, with no pain during or after the treatment. Therefore, it can also be repeated with minimum discomfort to the patient. The procedure is safe with no need for anaesthetic or medication. Consequently, it allows a good night's sleep and better quality of life for the patient and his or her partner sharing the same bed. However, patient selection with proper examination and exclusion criteria are important to identify the therapy needed.

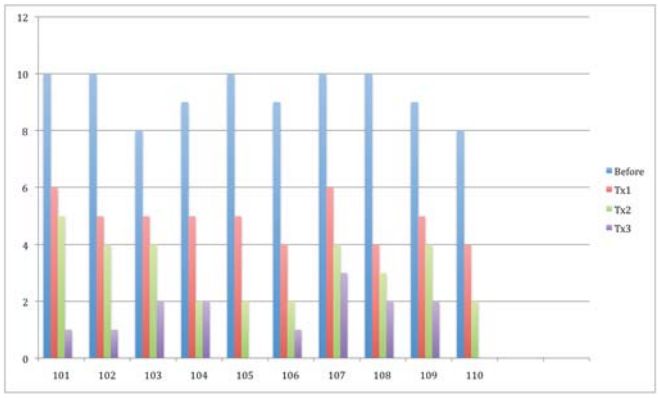


Fig. 8_Total score for snoring reduction after three treatments.

_Conclusion

NightLase is a safe and very successful treatment for reducing snoring and sleep apnoea, and is supported by evidence-based dentistry. It is a minimally invasive treatment with no need for special arrangements, either pre- or postoperatively. Since no anaesthetic is needed, the treatment is well accepted by patients. Long-lasting effects—from 12 to 36 months—allow for high overall satisfaction among patients._

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Kurz & bündig

Konventionelle Behandlungsmethoden von Schnarchsymptomen und Schlafapnoe (Atemstillstand) umfassten bisher alles, von oralen Apparaturen über Uvulaplastik-Operationen, Radiofrequenz-Gewebeablationen, CPAP-Masken (Continuous Positive Airway Pressure) bis hin zu alternativer Medizin.

Eine minimalinvasive Zahnheilkunde mit dem Einsatz eines Lasers ermöglicht die Durchführung einer nicht-ablativen Er:YAG-Straffung des Gaumenzäpfchens, des Gaumensegels sowie des umliegenden Gewebes mit einem partiellen Laser-Handstück. Diese sogenannte „NightLase®"-Behandlung wird von Fotona angeboten.

Dieser Case Report beschreibt nun dazu die Behandlung von Patienten mit Schlafapnoe, die langfristig 28 bis 36 Monate lang mit einem Laser therapiert wurden. Die klinischen Fälle sind Teile einer freien Studie, die den Lasereinsatz bei der Schnarch- und Schlafapnoebehandlung auf Effizienz untersucht. Dazu werden repräsentative Fallbeispiele nach Mallampati-Klassifikationen aufgezeigt und die Vorteile der NightLase®-Therapie gegenüber konventionellen Methoden erläutert. Ergebnis: Bereits nach der dritten Behandlung bekundeten 85 Prozent der Patienten eine Verbesserung. Bereits 51 Prozent hatten bei dem ersten Lasereinsatz eine Verbesserung gespürt. Alle Patienten (insgesamt 100 Prozent) waren am Ende der Behandlung zufrieden und würden die NightLase®-Therapie weiterempfehlen.