Laser Assisted Uvulopalatoplasty for Snoring and Sleep Apnea Syndrome.

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Abstract: With the advantage of less bleeding and our accumulated experience of using the Nd:YAG laser for head and neck surgery, we applied the laser assisted uvulo palatoplasty (LAUP). Between February 1994 and September 1994, 241 patients, 184 male and 57 female, with the problem of snoring or sleep apnea consulted our department. Eighty seven patients were operated by LAUP. Among them, 42 patients were operated by LAUP type 1 method and 45 by LAUP type 2 method. The apnea index and loudness of snoring were significantly diminished after surgery but no serious complications such as significant bleeding or postoperative episode of asphyxia or nasopharyngeal stenosis, nasal regurgitation were observed. This new operation method was effective especially as a day care surgery.

Obstructive sleep apnea is a disorder characterized by a wide range of severity of subjective symptoms including but not limited to daytime hypersomnolence, headache, altered mentation, and snoring. While medical management of the disorder had been unpredictable, Fujita et al (1) developed the uvulo palatopharyngoplasty operation in 1981. With the advantage of less bleeding and our accumulated experience with using the Nd:YAG laser for surgery of head and neck region (2,3), we applied the laser assisted uvulo palatoplasty (LAUP) by the contact Nd:YAG laser system as a day care surgery.

Materials and Methods

Between February 1994 and September 1994, 241 patients, 184 male and 57 female, with the problem of snoring or sleep apnea had consulted at the Department of Otorhinolaryngology, Kagoshima University.

After having the physical and the otolarngological examinations including sinus X-Ray, cephalometric measurements, the patients excluded the central nervous system problems and the
obstructive nasal diseases such as the septal deviation, hypertrophic rhinitis, nasal polyp, and sinusitis were studied. The patients were examined by polysomnograph (PSG) (Chest Apnomonitor 2, Chest Co., Tokyo, Japan). It's able to measure the respiratory interval, frequency, the oxygen saturation of the finger tip. Apnea was defined as any cessation of airflow for at least 10 seconds. With 5 or more episodes per hour, the patient was defined as sleep apnea syndrome. Also less than 5 episodes, the patient was defined as simple snoring. According to their apnea index, they were operated by LAUP methods at the outpatient clinic. To assess the effect of this LAUP method, clinical polysomnography is repeated at one month, 6 month, and 12 month after the operation.

The contact Nd:YAG laser system (CL50, SLT Japan Company, Tokyo) was used for this operation. The patients sit upright and fully awake in a comfortable chair. After local anesthesia (0.5% Lidocaine), the contact Nd:YAG laser system is used to trim the palate or to reshape the uvula. The laser energy for LAUP is between 6 and 9 watts per second. The laser beam was irradiated continuously. This operation takes about 5 minutes, and the full treatment is delayed for 2 weeks until the wound will change to the scar tissue. Type 1 is the method of incising the margin of the uvula. Type 2 is the method of not only incising the margin of the uvula but also cutting out the prolonged uvula in a suitable shape (Fig. 1). But palatal musculature was not violated.

Results

Among 241 patients, 122 patients were evaluated by polysomnograph. By Apnea index, 63 of them were classified as the simple snoring and 59 were classified as sleep apnea syndrome. Up to now, 87 patients were operated at the outpatient clinic. 42 patients were operated by LAUP type 1 method and 45 were operated by type 2 method. 2 patients had not successful results so that they admitted and received further uvulopalatopharyngoplasty. There were no serious
complications associated with LAUP, such as significant bleeding or postoperative episode of asphyxia or nasopharyngeal stenosis, nasal regurgitation.

Fig. 2 shows the change of apnea index of each patient before and one month after the operation. The apnea index of postoperation was significantly lower than that of preoperation. P value was 0.01. The change of oxygen saturation above 95% before and one month after the surgery is shown in Fig. 3. No statistical difference was found. Loudness of snoring of each patient was evaluated by his co-sleeper. Snoring of before surgery was considered as score 10 and compared with it, postoperative snoring was evaluated (Fig. 4). Considered 50% reduction as effective, 13 of 21 (62%) had successful results.

Two cases were presented. The first case was 29-year-old man. His apnea index before operation was 4.1. He was diagnosed as simple snoring. We chose LAUP type 1 as the operation
method. The polysomnographical measurement was performed pre and post operation. Apnea index (AI) was decreased from 4.1 to 3.2 and loudness of snoring was decreased to 2 (Table 1).

The second case was 46-year-old man. His apnea index was 29.2 and LAUP type 2 method was chosen. After the operation, AI was decreased to 7.5, mean apnea duration diminished (Table 2). Loudness of snoring was also decreased to 4.

**Discussion**

Since Fujita et al.\(^1\) described the uvulopalatopharyngoplasty (UPPP) in 1981, UPPP has been shown to be an effective treatment in some but not all obstructive sleep apnea patients and snorers. Although the effectiveness of nasal CPAP has been reported, the patients experienced problems with chronic nasal irritation, nasal bleeding, mask irritation, and inconvenience. That would have resulted in long-term failure of nasal CPAP. Recently, with the advantage of less bleeding, Séquert et al.\(^4\) also reported the effectiveness of CO\(_2\) laser pharyngotomy. Our LAUP methods is performed under local anesthesia and the postoperative pain is moderate. The patients have the advantage of being treated especially at the outpatient clinic, having a day care surgery, and returning to their work the day after the operation. Also there were no major serious complications, such as significant bleeding or postoperative episode of asphyxia or nasopharyngeal stenosis, nasal regurgitation.

Fujita et al. reported a 50% favorable response rate using a 50% or greater reduction in the

<table>
<thead>
<tr>
<th>Apnea index</th>
<th>mean apnea duration</th>
<th>% SaO(_2) &gt;95%</th>
<th>Loudness of snoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>preop.</td>
<td>4.1</td>
<td>29.8sec</td>
<td>83.2%</td>
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<tr>
<td>postop.</td>
<td>3.2</td>
<td>13.3sec</td>
<td>78.2%</td>
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<table>
<thead>
<tr>
<th>Apnea index</th>
<th>mean apnea duration</th>
<th>% SaO(_2) &gt;95%</th>
<th>Loudness of snoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>preop.</td>
<td>29.2</td>
<td>31.3sec</td>
<td>10.1%</td>
</tr>
<tr>
<td>postop.</td>
<td>7.5</td>
<td>16.5sec</td>
<td>14.5%</td>
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AI as their index. Our closer analysis revealed the statistical decrease of AI and the decrease of snoring score. However, the subjective improvement is often better than the PSG data. It is very difficult to predict in which patients the procedure will be beneficial. There were several reports that no single PSG index will adequately assess the degree of severity of OSA or its improvement after the operation.

Laser assisted uvulopalatoplasty was considered to be clinically effective. Half of the patients had successful results. But only the short-term follow up was done. Long-term follow up should be carried out and further discussed.

References