

The effect of laser assisted uvulopalatoplasty on the sense of smell and taste*

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SUMMARY

Aim: To assess the effect, if any, of Laser Assisted Uvulo Palatoplasty (LAUP) on the sense of smell and taste.

Materials and Methods: A prospective study examined 33 patients undergoing LAUP for snoring. Significant sinonasal pathology was excluded in all patients by a complete examination including rigid nasal endoscopy. None of the cases had any systemic illness or drug history that was likely to affect the sense of smell or taste. Twenty-eight patients were male and five female. The mean age was 44 years (range, 25-67). Twelve patients (36%) were regular smokers, and eight patients (24%) were ex-smokers all of whom reported a change in smell and taste after stopping.

Preoperative assessment utilised a visual analogue score of smell and taste perception, the University of Pennsylvania Smell Identification Test (UPSIT) for the assessment of olfaction (maximum score of 40), and whole mouth testing for solutions of NaCl, sucrose, quinine, citric acid and acetic acid. LAUP technique was standardised for each case and reassessment was performed 3 months postoperatively.

Results: Three patients failed to complete the study and were excluded. The mean values for visual analogue score pre and post surgery were 9.1 and 8.9 respectively, which was not significant using Wilcoxon Rank test ($P=0.257$). The mean value of the UPSIT scores before surgery were 32.3 (+4.0), range, 24-39, and after surgery 31.2 (+4.3), range 20-37. There was no significant difference in pre and post UPSIT scores ($p=0.068$). Whole mouth taste testing had a preoperative mean value of 4.1 and a postoperative value of 4.2. The difference was not statistically significant, Wilcoxon Rank test ($p=0.317$).

Conclusion: In this study there was no significant change in the patients' perception of smell and taste or in their objective measurement following a standardised Laser Assisted Uvulopalatoplasty.

Key words: laser assisted uvulopalatoplasty, olfaction, taste.

INTRODUCTION

Laser Assisted Uvulopalatoplasty (LAUP) has been developed as an alternative to traditional uvulopalatopharyngoplasty for the treatment of snoring due to palatal flutter and its use widely published. The technique was developed by Kamami (1990) and was first performed in Paris in 1986. It has now gained popularity in the U.K following widespread use in France and the USA. Kamamis publications (1994a, 1994b, 1994c) report multi-staged treatment under local anaesthesia using CO₂ laser delivered via a specially designed hand piece with the incorporation of a backstop. The subsequent fibrosis combined with the decrease in bulk of the soft palate has been shown to be

effective in reducing the snoring and it is thought to have less long-term complications than the more extensive uvulopalatopharyngoplasty (Kotecha et al., 1998). Kamamis original article, which described the technique and results in 31 patients, reported the occurrence of no complications; but a more recent report by Walker et al. (1996) identified several potential complications which included postoperative haemorrhage (2.12%), local infection (0.53%), temporary palatal incompetence (0.53%), and temporary loss of taste (0.27%). It is our experience that a significant proportion of the LAUP postoperative patients complain of globus sensation and a study by Pinczower (1998) showed that the incidence of globus could be as high as 25%. It is necessary to

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inform LAUP patients of all the possible complications and, as a result of an anecdotal report by one of our patients that he had hyposmia and loss of taste following LAUP, a prospective clinical study was undertaken to evaluate the sense of smell and taste before and three months after LAUP.

MATERIALS

For this study, 33 patients undergoing LAUP for simple snoring were selected. Patients were seen in a specialised Snoring and Sleep Disorders outpatient clinic. A comprehensive history was taken with specific reference to symptoms indicative of possible obstructive sleep apnoea. Direct questioning attempted to elicit a history of nasal obstruction including previous operations and a smoking history. None of the patients had any systemic illness or drug history that was likely to affect the sense of smell or taste. Patients were asked to complete an Epworth Sleepiness Scale (Johns, 1991) questionnaire and the score recorded. Significant sinonasal pathology was excluded in all patients by rigid nasal endoscopy and a complete examination of the oral cavity, pharynx and larynx was performed with the flexible nasoendoscope. The patients height, weight, collar size and blood pressure were also noted. Haematological investigations included a full blood count and thyroid function tests. All patients had a full polysomnographic overnight assessment using the Oxford Instruments SAC system and Obstructive Sleep Apnoea was excluded. They were then further investigated by sleep nasoendoscopy as described by Croft and Pringle (1991) and the palatal snorers were listed for LAUP.

Twenty-eight patients were male and five female. The mean age was 44 years (range, 25-67 years). Twelve patients (36%) were regular smokers, and eight patients (24%) were ex-smokers all of whom reported a change in smell and taste after stopping. None of the smokers gave up the habit postoperatively.

METHOD

Preoperative assessment was by visual analogue score of smell and taste perception. For assessment of smell function, the University of Pennsylvania Smell Identification Test (UPSIT, marketed as The Smell Identification Test™, Sensonics Inc, Haddonfield, NJ, USA) was used with 40 microencapsulated odours (Doty et al., 1984). After scratching and sniffing an impregnated patch, the test subject must make a forced choice, rendering a maximum potential score of 40. As the test has been extensively validated for sex and age in normal populations and the test-retest reliability coefficient is high, a control group is not necessary and there is no comparable clinical group as snorers or patients with obstructive sleep apnoea using a CPAP machine may have rhinitis. Whole mouth testing assessed taste thresholds for solutions of sodium chloride, sucrose, quinine, citric acid and acetic acid and the five correct answers would correspond to salty, sweet, bitter, sour and/or acid.

The Laser Assisted Uvulopalatoplasty technique was standard for each case. All the operations were carried out as day cases under general anaesthesia administered through a laryngeal mask. The patient was placed in the standard tonsillectomy position and the mouth kept open with a Boyle Davis gag. A

CO₂ laser delivered via a micromanipulator was used in continuous mode with an output of 10 watts. Wet surgical swabs were placed in the postnasal space extending down the posterior pharyngeal wall to protect the pharynx from burns. Prior to commencing the procedure and with the swabs already in place we measure the distance between the free edge of the soft palate just lateral to the uvula to the soft and hard palate junction. Bilateral full thickness incisions were fashioned lateral to the uvula that are 25% of the distance between the free edge of the soft palate to the hard palate junction and excision of 50% of uvula (Figure 1). This protocol for palatoplasties gives good results with minimal complications (Kotecha et al., 1998).

Reassessment by a visual analogue score of smell and taste perception, the University of Pennsylvania Smell Identification Test (UPSIT) and whole mouth taste testing was performed three months postoperatively.

Kolmogorov-Smirnov tests were carried out in order to test the normality of distribution. The difference of pre- and post UPSIT score has been analysed in a paired t-test. A nonparametric test, Wilcoxon Signed Rank test, has been used to analyse the difference of the pre- and post visual analogue scale values and of the pre- and post taste values. A p-value <0.05 was regarded as statistically significant.

RESULTS

All the tests were performed as described in all individuals but postoperative data was unavailable in three patients and they

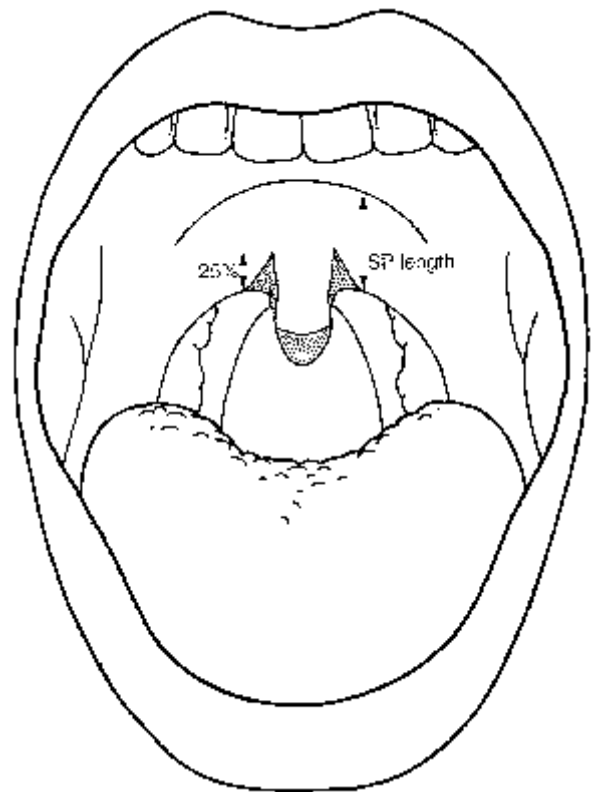


Figure 1. Modified Kamami technique for LAUP. Bilateral incisions that are 25% of the soft palate length and excision of 50% of the uvula.

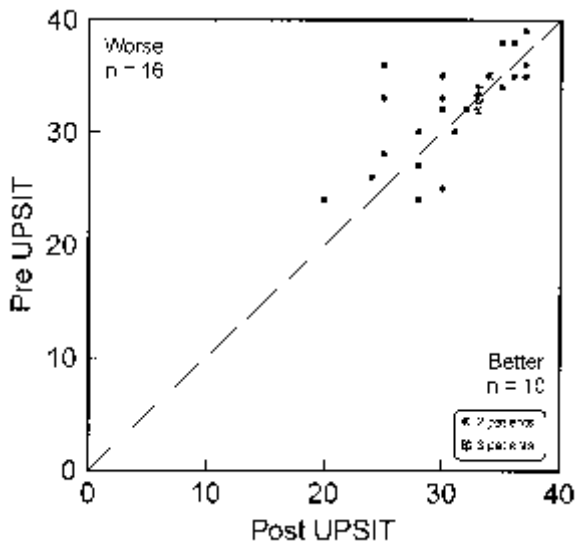


Figure 2. Scattergram showing the change in the UPSIT scores. Each point above the line indicates a patient with deterioration in the sense of smell following surgery.

were excluded. The majority of patients felt their sense of smell and taste was unchanged. Visual analogue scoring for smell and taste was the same in 25 patients, it was better in one patient and worse in four. With the UPSIT ten subjects were improved, four were unchanged and sixteen had a lowered number of correct responses (Figure 2). Whole mouth taste testing was unchanged in 21 patients, six scored better and three worse.

The mean values for visual analogue score pre and post LAUP were 9.1 (± 1.6), range, 5-10 and 8.9 (± 1.6), range, 5-10 respectively; which was not significant using Wilcoxon Rank test ($p=0.257$). The mean value of the UPSIT scores before surgery were 32.3 (± 4.0), range, 24-39, and after surgery 31.2 (± 4.3), range, 20-37. The difference in UPSIT score between pre and post LAUP was not statistically significant according to Student's t-test ($p=0.068$). Whole mouth testing had a preoperative value of 4.1 (± 0.7), range, 3-5 and a postoperative value of 4.2 (± 0.7), range 3-5. The difference was not statistically significant, Wilcoxon Rank test ($p=0.317$).

DISCUSSION

Surgery for snoring has undergone numerous advances and modifications over the past few years. The traditional uvulopalatopharyngoplasty, with its associated risks (Faibanks, 1990), whilst still useful has now very much been superseded by laser techniques. The Kamami technique has gained popularity but it is not without complications (Kotecha et al., 1998; Walker et al., 1996); infection, haemorrhage, regurgitation and the sensation of a lump in the throat are well-documented problems. This study aimed to consider the effect of LAUP on olfaction and taste.

The development of the Smell Identification Test™, also known as the University of Pennsylvania Smell Identification Test (UPSIT) has provided a convenient mean for quantitatively assessing olfaction. The results should be interpreted within the entire context of the individuals age, occupation, general health and psychological state but the test has been validated and per-

centile norm, which contain over 2000 normal individuals of equivalent age and gender, are provided (Doty, 1995). In general, the following has been developed for establishing an adult patient's olfactory diagnosis.

Test score	Olfactory diagnoses
0 - 5	Probably malingering
6 - 18	Total anosmia
19 - 25	Severe microsmia
26 - 30	Moderate microsmia
31 - 34	Mild microsmia
35 - 40	Normosmia

With the exception of boys or girls less than 15 years of age, this classification scheme is independent of subject age. Anosmia is defined as total inability to perceive qualitative odour sensations, whereas microsmia is defined as decreased smell ability. The term microsmia was chosen to specifically relate to the scores on the UPSIT, and does not draw a distinction between partial anosmia and hyposmia, which would be related to concepts in the clinical situation. Both test-retest reliability and internal consistency reliability of the entire 4-booklet Smell Identification Test has been assessed in detail in several studies (Doty et al., 1984; Doty et al., 1989). Test-retest reliability coefficients are high for tests administered six or more months apart and for tests administered two or more weeks apart.

Whole mouth testing of all fields assesses taste thresholds for solutions of NaCl, sucrose, quinine, citric acid and acetic acid. It is useful in determining dysfunction in specific taste stimuli (Goodspeed et al., 1987). Taste buds are the sense organ of taste and are mainly located on the tongue but are also found on the palate, postnasal space, larynx and oesophagus, taste is then transmitted via cranial nerves VII, IX and X to their respective brainstem nuclei and central connections. Surgical procedures in the head and neck risk damaging the taste organ, the cranial nerves or any central neural pathways involved in gestation. Taste disturbance has been reported after tonsillectomy, presumed to be secondary to damage to the lingual branch of the glossopharyngeal nerve (Carrie, 1999).

The olfactory and gustatory systems both contribute to flavour perception and a reduction in the perception of taste, is a common complaint in the presence of olfactory dysfunction. The other qualities making up flavour include texture, temperature and colour.

The subjects in this study had no instrumentation in the nose during anaesthesia or surgery (nasal intubation or nasal suction) and they all underwent general anaesthesia. We do not aim to consider the mechanisms responsible for any olfactory or gustatory change and assume that the use of general anaesthesia has no deleterious effect on the sense of smell. A previous study by Holmstrom and Lund (1996) would suggest that major surgery distant to the nose performed under general anaesthesia may produce temporary olfactory enhancement and this is probably a consequence of increased cortisol release in response to surgical stress.

With the increasing importance of giving adequate informed consent prior to a surgical procedure, we felt it was necessary to establish whether hyposmia and loss of taste were possible complications that should be mentioned to all patients undergoing LAUP. This study has failed to show any change in the quantitative assessment of olfaction or taste following Laser Assisted Uvulopalatoplasty.

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