

Harmonic Scalpel Assisted Uvulopalatopharyngoplasty

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Abstract

Objectives: To investigate the evaluation of the harmonic scalpel-assisted uvulopalatopharyngoplasty (UPPP) surgery with posterior wall of uvula mucosa sutured with anterior wall. **Design:** According to the diagnostic criteria published by Chinese medical association of otolaryngology-head and neck, 21 cases were performed UPPP with the harmonic scalpel. The Regional Ethics Committee of our hospital approved the study protocol. Informed written consent was obtained from all participants. **Setting:** A single specialist hospital. **Participants:** 21 patients with OSAHS. **Participants were not randomized in groups and were performed UPPP with the harmonic scalpel.** **Main Outcome Measures:** Part of the uvula muscle and the anterior wall of the uvula mucosa were removed, and the mucosa of posterior wall was preserved. The mucosa of the posterior wall was sutured with the remaining part of the anterior wall. The AHI and $LSaO_2$ were measured both before and six months after the operation by Polysomnography (PSG). **Results:** This study reported a significant improvement ($p < 0.01$) at six months of follow-up. The effective rate of this surgery was 76.2% at six month. Preoperative AHI ($\bar{x} \pm s$) was 48.6 ± 12.65 , and $LSaO_2$ ($\bar{x} \pm s$) was $67.4\% \pm 9.18\%$; postoperative AHI was 10.9 ± 9.29 , and postoperative $LSaO_2$ was 91.0 ± 1.47 . The mean operation duration was 30.1 minutes. **Conclusion:** The use of HS in UPPP is efficient and shows some advantages over conventional method: its use provided a blood free surgery field, and shorter operation duration.

Keywords

Sleep Apnea-Hyperpnoea Syndrome, Uvulopalatopharyngoplasty (UPPP), Harmonic Scalpel, Bleeding

1. Introduction

Obstructive sleep apnea-hypopnea syndrome (OSAHS) is the periodic reduction or cessation of airflow during

sleep that results from collapse of soft palate and uvula [1]. The syndrome is associated with loud snoring, repeated episodes of hyponeas and apneas. Untreated OSAHS is associated with increased likelihood of hypertension, cardiovascular disease, stroke, daytime sleepiness, motor vehicle accidents, and diminished quality of life [2]. The syndrome affects about 4% males and 2% females in middle age. The surgical treatment of OSAHS includes an increasing variety of procedures. Among these are uvulopalatopharyngoplasty (UPPP) with tonsillectomy, nasal surgery, tracheotomy, and additional pharyngeal or maxillofacial procedures. The most common procedure in adult is Uvulopalatopharyngoplasty, which was first described by Fujita for the treatment of OSAHS in 1981. Since then, the operation was widely used worldwide. This surgical treatment has continued to involve with new techniques and modifications showing improvements in success. However there are complications such as postoperative airway obstruction, intraoperative and postoperative bleeding, cardiac arrhythmia, myocardial infarction and other serious complications [3] [4]. In order to control these complications, many devices such as radiofrequency thermotherapy, laser, electrotome are used in the surgery of UPPP. It is clear that the usage of these devices has reduced the incidence of the implications [5]. In our department, Harmonic scalpel (HS) has been used in UPPP since January 2010. This procedure has achieved good results. The aim of this study has been to test the efficacy and applicability of usage of HS in UPPP.

2. Materials and Methods

The Regional Ethics Committee approved the study protocol. Informed written consent was obtained from all participants. 21 patients, between 25 and 60 years old (18 males and 3 females), affected by OSAHS, were enrolled in this no randomized study. The patients enrolled presented a Friedman tongue position grade I-II, and tonsil size 2 - 3 degree.

All Patients underwent preoperative Polysomnography (PSG) examination, and sleep positioning devices obstruction detection. The patients whose apnea and hypopnea index (AHI) was above 20, and the obstruction site are velopharynx are enrolled into this study. 21 cases were enrolled in this study, including 18 males and 3 females, aged between 25 and 60 years. The average age was 40.2 years old. 20 Patients were followed up for six months, and had the PSG examination.

Before and six month after the surgery, the patients in this study were evaluated with AHI and the lowest oxygen saturation ($LasO_2$) during sleep.

The patients underwent a perioperative evaluation, including the duration of surgical dissection, and the amount of intraoperative blood loss, Intraoperative blood loss was estimated by calculating the cotton weight change before and at the end of surgery.

Equipment used: Johnson Lucky GEN300 type ultrasonic scalpel, frequency 55 KHZ, 14 cm handle, 10 mm shear type blade, and power set to block 3 and 5-speed. PSG for the new 9600 Beijing TEDA. Obstructive sleep apnea diagnosis and positioning system (Apnea Graph AG 200, UK).

All the operations were carried out under general anesthesia with nasotracheal intubation. The oral cavity was opened up with a Boyle-Davis mouth gag. The harmonic scalpel (HS) was used throughout the operation. The generator was set at 3 speed while coagulation and 5 speed while dissection. All the patients were performed the tonsillectomy with HS firstly, and then two incisions, about 0.5 - 1 cm long according to the length of uvula, were made along each side of the uvula (**Figure 1**). The mucosa of the soft palate was dissected, and the adipose tissue was cut off with HS. Then the anterior wall of the uvula was incised and the uvula muscle was cut off. However the posterior wall and the tip was preserved. The mucosa of the posterior wall was sutured with the remaining mucosa of the anterior wall, and a neo-uvula was created. HS was used throughout the whole operation.

Statistical analysis was performed with the statistical software package SPSS for Windows, version 9.0. The Student t test was used, and P values of less than 0.001.

3. Result

The effect of OSAHS standard reference 2002 National Symposium (Hangzhou) to develop the evaluation standard is presented in **Table 1**.

According to AHI and $LSaO_2$, this study reported a significant improvement ($p < 0.01$) at six months of follow-up (**Table 1**). Six month after the surgery, the mucus of the soft palatine recovered, and the neo-uvula functioned well (**Figure 2**). Four of the patients didn't have significant improvement according to the AHI at six

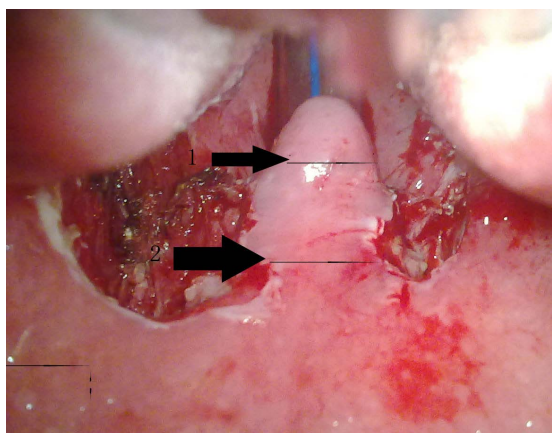


Figure 1. After tonsillectomy, first arrow shows the incision of the anterior wall of uvula, second arrow shows the site of incision of the uvula muscle.

Table 1. Scalpel-assisted uvula reserved UPPP preoperative posterior wall mucosa Data before (t = 1) and six months (t = 2) after surgery.

Case	Sex	Age	Tonsil Grade	Operation Time	Blood Loss	AHI		LaSO ₂	
						t = 1	t = 2	t = 1	t = 2
1	M	31	II	25	5	42.3	5.4	75	90
2	M	27	III	30	6	65.7	10.1	51	89
3	M	26	II	32	7	43.2	4.1	80	92
4	M	55	II	35	3	28	20	81	90
5	F	35	II	36	4	39.4	3.1	63	95
6	M	60	III	20	4	43.6	30	70	85
7	M	52	II	28	3	50.3	6.5	60	90
8	M	43	III	30	5	61.5	10.2	57	89
9	M	50	III	35	7	64.8	7.8	53	90
10	M	42	II	35	8	50.6	6.5	60	91
11	M	32	II	26	2	52.2	4.1	63	91
12	M	46	III	28	3	45.8	2.1	70	92
13	F	25	II	29	4	19.2	15.1	90	92
14	M	31	III	34	3	56.7	12.1	65	90
15	M	34	III	36	5	47.9	10.2	68	92
16	M	37	II	35	3	62.3	40.2	63	89
17	M	38	III	35	4	58.7	9.2	66	92
18	F	56	III	26	2	60.4	12.1	61	90
19	M	49	III	29	3	59.3	10.5	59	92
20	M	27	II	32	4	20.1	3.2	86	95
21	M	49	III	40	2	46.7	5.9	65	90
Mean		40.2		30.1	4.2	48.6	10.9	67.4	91.0
P						p < 0.01		p < 0.01	

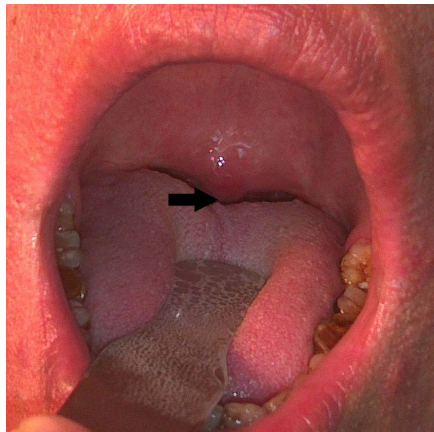


Figure 2. Six months after surgery, the soft palatine and the neo-uvula functions well.

months. However they feel better according to snoring VAS score. One of the patients refused to have the PSG examination, and was lost during follow-up. The effective rate of this study was 76.2% at six month. Preoperative AHI ($\bar{x} \pm s$) was 48.6 ± 12.65 , and $LSaO_2$ ($(\bar{x} \pm s)$) was $67.4 \pm 9.18\%$; postoperative AHI was 10.9 ± 9.29 , and postoperative $LSaO_2$ was 91.0 ± 1.47 . The mean operation duration was 30.1 ± 4.79 (min) (**Table 1**).

Complications: There wasn't primary postoperative bleeding in these patients of this study. However two cases of secondary bleeding occurred 7 days after the operation. The Bleeding volume was between 100 ml and 200 ml. Both cases were treated with bipolar coagulation under local anesthesia. Two patients suffered from transient velopharyngeal insufficiency after surgery and recovered spontaneously after two weeks.

4. Discussions

HS was originally used for laparoscopic surgery. The otolaryngologist has used it in tonsillectomy and thyroidectomy since 20th [6] [7]. We found that HS was useful and efficient in tonsillectomy, and we used it in UPPP since 2009. In our operation, the usage of HS has reduced the operation time and the blood loss. Young, T. *et al.* used HS in UPPP and concluded that, HS is a reliable and safe device in UPPP, providing sufficient hemostasis and cutting precision [7]. While using HS, the operation field is blood free, and this makes an optimal view. The working temperature of HS is generally between 55° and 100°. Unlike other heat-producing devices, it doesn't cause thermal injury [8]-[10]. This can help us to dissect the mucosa of the uvula more precisely. The uvula has the ability to produce and secrete large quantities of thin saliva. And it also plays an important role in phonation and swallowing [11]. However, the uvula would be sacrificed in UPPP and this could cause complications such as velopharyngeal insufficiency and pharyngeal uncomfortable [12]. We preserved the posterior wall of the uvula mucosa, and sutured it with the remaining part of the anterior wall in HS-UPPP. Therefore the function of the uvula has been partly preserved. While lying supine the neo-uvula has the ability of anti-gravity. We use the HS during in every step of the operation, and the HS gives us the blood free operation field. However, this study was not a RCT design and hadn't a long time follow up. To get more information whether HS is safe and effective or not in UPPP, more cases should be performed, and HS should be compared with other devices such as laser, radiofrequency, and electrotome.

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