Quality of Life Measures Following Laser Assisted Uvulopalatopharyngoplasty (LAUP) in Obstructive Sleep Apnoea Syndrome (OSAS)

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Abstract The objective of this study is to assess the efficacy of laser assisted uvulopalatopharyngoplasty in the treatment of Obstructive Sleep Apnoea Syndrome. This study was conducted over a period of 2 years and comprised of a total of 18 patients of both sexes, from a pool of 64 patients who presented with clinical features of OSAS. All the surgeries were done by the same surgeon and standardised criteria for diagnosis was followed. Only those Patients who were diagnosed to have moderate to severe OSAS of the obstructive type with single level retro palatal obstruction were treated surgically with LAUP, and followed up for a period of 6 months. Of the 18 patients 16 reported of improvement in quality of life, as assessed by Functional Outcomes of Sleep Questionnaire (FOSQ), accounting for 88.8%. The results support the surgical treatment for OSAS of moderate to severe single level retro palatal type, as evidenced by the FOSQ scoring. LAUP is a very good surgical option in alleviating the symptoms of moderate to severe single level retro palatal OSAS.

Keywords LAUP · OSAS · Retropalatal · Apnoea · Quality of life

Introduction

OSAS is characterized by recurrent episodes of partial or complete upper airway obstruction during sleep which is terminated by an arousal. Recurrent arousals cause sleep fragmentation resulting in sleep deprivation with detrimental psychosomatic effects [1]. The primary cause for OSAS is a narrow upper airway, which is compensated by the upper airway dilator muscles during wakefulness. During sleep the muscle activity decreases resulting in upper airway collapse [2]. The sites of upper airway obstruction are velopharynx (behind the soft palate), oropharynx (behind the tongue), hypopharynx, or a combination of the three [3]. The level of airway obstruction is assessed by flexible endoscopy and Dynamic MRI [4]. Treatment options include weight loss, positional therapy, oral devices, continuous positive airway pressure (CPAP), and surgery [5]. The selection of surgical procedure is based on the level of airway obstruction. There are usually multiple sites of airway collapse, necessitating multiple surgeries in a staged pattern, which explains why single level surgery is less successful than CPAP in treating OSA. Here we identify single level retropalatal obstruction and study the efficacy of LAUP in treatment of these cases.

Materials and Methods

With the approval of our ethical committee, medical records of 64 patients who presented with symptoms of sleep disordered breathing, in the form of snoring, frequent sleep arousals, excessive day time sleepiness, nasal block apnoeic spells, mood changes and reduced alertness during May 2007 to May 2009 were reviewed and evaluated (Fig. 1). Those patients who were diagnosed as “Habitual

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Fig. 1 Clinical presentation

snorers” were excluded from the study, along with those with obstructions below the level of palate or multiple levels of obstruction.

All the patients had undergone basic lab investigations, cardiology work up, endocrinology consult and endoscopy. The patients were then subjected to Polysomnography. Patients with mild OSAS were treated conservatively. Moderate to severe OSAS patients were advised Dynamic MRI, to evaluate the level of obstruction. Patients, who had single level retro palatal obstruction, were offered LAUP under GA.

Polysomnography report and Dynamic MRI pictures of patient number 12 with Frank Apnoea and dip in saturation of up to 63% associated with Bradycardia and obstruction at the retro palatal level is shown in Figs. 2 and 3.

Steps of LAUP

STEPS OF LAUP:

1. With all necessary safety protocols using 532 KTP laser 10 watts power, 0.6 mm fibre in near contact mode, tonsillectomy was performed.
2. Excision of a strip of soft palate and uvula was done, and a neo-uvula was created; preserving the palatal function.
3. The remnant of the tonsillar pillars were then approximated, as shown in Fig. 4; (a) Neo-uvula. (b) Pillar suturing.

The principle being to stiffen the soft Palate by scarring, and to increase the space behind the soft palate to minimise obstruction.

Postoperatively patients were put on antibiotics, analgesics, steroids and mouth gargles. Patients were allowed a normal diet on POD 1 and discharged on POD 4. Patients were kept on follow up. POD 7, POD 21, followed by monthly follow up for the next 6 months. Figure 4 shows the immediate post-op view.

Results

52 patients underwent sleep studies. The patients were in the age group of 33–55 and had a mean BMI OF 32.50; male:female ratio being 2:1 of which 41 were diagnosed to have OSAS-obstructive type. 13 patients had mild OSAS with an AHI of 5–15; 29 patients had moderate to severe OSAS with AHI of 15–30 and above. 29 patients with moderate to severe OSAS patients underwent Dynamic MRI. 21 of them had single level retro palatal obstruction. 19 patients were operated by LAUP under GA. 18 patients with complete data were included in the study. At the end of 3 months patients were evaluated subjectively by FOSQ, and an FOSQ score of 80 or above was considered a successful surgical correction. Patients were also assessed based on their symptom profile as in Fig. 5. With 12 patients reporting complete absence of snoring and 6 patients showing 50% reduction in snoring, 15 patients reporting complete improvement of day time sleepiness and 3 reporting minimal improvement in day time sleepiness, 10 patients reporting 60% improvement in work

Fig. 2 A prototype 'Apnoeagraph'

Fig. 3 Dynamic MRI showing level of obstruction at retropalatal region

efficiency and 8 patients reporting 40% improvement, 16 patients reporting better mood disposition and 2 showing minimal improvement, 10 patients reported of complete cessation of apnoeic spells and 8 reported more than 75%

reduction in apnoeic spells, and 14 patients reporting nil sleep arousals and 4 reporting less than 2 sleep arousals. 88.88% of patients achieved a successful QOL change based on FOSQ score of 80 and above.

Fig. 4 Immediate post op view of (a) neuvula (b) sutured pillars

Discussion

Surgical options for OSAS are many and needs to be individualized to address the exact anatomical areas of obstruction [6]. Septoplasty and Turbinoplasty for improving nasal airway, Tonsillectomy and UPPP for pharyngeal obstruction, Base of tongue advancement, Maxillo-Mandibular advancement are few options. In our study patients with only single level retro palatal obstruction were chosen for LAUP, and surgical outcome at the end of 3 months was assessed subjectively. 88.88% patients showed improvement in the quality of life as evidenced by FOSQ scores. Steward et al. studied the short (3 months) and long term effects (1 year) of LAUP on

3,071 patients spanning 18 years by questionnaire evaluation and concluded that 73.5% patients had short term benefit and long term benefit was seen in 65% patients; long term recurrence of symptoms was attributed to further weight gain and discontinuation of life style modification measures [7]. Mickelson et al. assessed the surgical outcome by comparing the pre- and post-op AHI and mean oxygen desaturation and concluded that 92.3% patients benefitted from LAUP [8]. The use of laser is superior to the conventional UPPP in terms of better surgical delineation, good haemostasis, less perioperative pain, better wound healing and minimal scarring. The incidence of post-operative complications is also minimal.

FOSQ Test

Note: In this questionnaire, when the words “sleep” or “tired” are used, it describes the feeling that you cannot keep your eyes open, your head is droopy, that you want to nod off or that you feel the urge to nap. These words do not refer to the tired or fatigued feeling you may have after you exercised.

FOSQ questions are answered using numbers from 0 to 4 (see answer key below):

- 0 = I don't do this activity for other reasons
- 1 = Yes, extreme
- 2 = Yes, moderate
- 3 = Yes, a little
- 4 = No

FOSQ Scoring:

- 20–40 Severe OSAS
- 40–70 Moderate OSAS
- Above 70 Mild OSAS

Fig. 5 Subjective assessment scores

Q1) Do you generally have difficulty concentrating on things you do because you are sleepy or tired?

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☒ 4

Q2) Do you generally have difficulty remembering things because you are sleepy or tired?

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Q3) Do you have difficulty finishing a meal because you become sleepy or tired?

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Q4) Do you have difficulty working on a hobby (for example: sewing, collecting, gardening) because you are sleepy or tired?

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Q5) Do you have difficulty doing work around the house (for example: cleaning house, doing laundry, taking out the trash, repair work) because you are sleep or tired?

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Q6) Do you have difficulty operating a motor vehicle for short distances because you become sleepy or tired?

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Q7) Do you have difficulty getting things done because you are too sleepy or tired to drive or take public transportation?

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Q8) Do you have difficulty take care of financial affairs and doing paperwork (for example: writing checks, paying bills, keeping financial records, filling out tax forms, etc.) because you are sleepy or tired?

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Q9) Do you have difficulty performing employed or volunteer work because you are sleepy or tired?

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Q10) Do you have difficulty maintaining a telephone conversation because you become sleepy or tired?

☐ 0 ☒ 1 ☐ 2 ☐ 3 ☐ 4

Q11) Do you have difficulty visiting with you family or friends because you become sleepy or tired?

☐ 0 ☒ 1 ☐ 2 ☐ 3 ☐ 4

Q12) Do you have difficulty doing things for your family or friends because you become sleepy or tired?

☐ 0 ☒ 1 ☐ 2 ☐ 3 ☐ 4

(For Question 13 answer using only 1, 2, 3, or 4.)

Q13) Has your relationship with family, friends or work colleagues been affected because you are sleepy or tired?

☐ 1 ☒ 2 ☐ 3 ☐ 4

Q14) Do you have difficulty exercising or participating in a sporting activity because you are too sleepy or tired?

☐ 0 ☒ 1 ☐ 2 ☐ 3 ☐ 4

Q15) Do you have difficulty watching a movie or videotape because you become sleepy or tired?

☐ 0 ☒ 1 ☐ 2 ☐ 3 ☐ 4

Q16) Do you have difficulty enjoying the theater or a lecture because you become sleepy or tired?

☐ 0 ☒ 1 ☐ 2 ☐ 3 ☐ 4

Q17) Do you have difficulty participating in religious services, meeting or a group club because you are sleepy or tired?

☐ 0 ☒ 1 ☐ 2 ☐ 3 ☐ 4

Q18) Do you have difficulty being as active as you want to be in the evening because you are sleepy or tired?

☐ 0 ☒ 1 ☐ 2 ☐ 3 ☐ 4

Q19) Do you have difficulty being as active as you want to be in the morning because you are sleepy or tired?

☐ 0 ☒ 1 ☐ 2 ☐ 3 ☐ 4

Q20) Do you have difficulty being as active as you want to be in the afternoon because you are sleepy or tired?

☐ 0 ☒ 1 ☐ 2 ☐ 3 ☐ 4

Q21) Do you have difficulty keeping a pace with others your own age because you are sleepy or tired?

☐ 0 ☒ 1 ☐ 2 ☐ 3 ☐ 4

Q22) How would you rate yourself in your general level of activity?

1= Very low; 2= Low; 3= Medium; 4= High

☐ 1 ☒ 2 ☐ 3 ☐ 4

Q23) Has your intimate or sexual relationship been affected because you are sleepy or tired?

☐ 0 ☒ 1 ☐ 2 ☐ 3 ☐ 4

Q24) Has your desire for intimacy or sex been affected because you are sleepy or tired?

☐ 0 ☒ 1 ☐ 2 ☐ 3 ☐ 4

Q25) Has your ability to have an orgasm been affected because you are sleep or tired?

☐ 0 ☒ 1 ☐ 2 ☐ 3 ☐ 4

Analysis

Patient	Pre-op FOSQ score	Polysomnography	Dynamic MRI	Post-op FOSQ score
1	24	AHI-54.9	Severe retropalatal obstruction	97
2	31	AHI-60.1	Severe retropalatal obstruction	91
3	22	AHI-38.8	Moderate retropalatal obstruction	89
4	28	AHI-36.1	Moderate retropalatal obstruction	99

Table a continued

Patient	Pre-op FOSQ score	Polysomnography	Dynamic MRI	Post-op FOSQ score
5	34	AHI-51.1	Severe retropalatal obstruction	84
6	29	AHI-44.8	Severe retropalatal obstruction	98
7	26	AHI-31.5	Moderate retro palatal obstruction	96
8	25	AHI-36	Moderate retropalatal obstruction	90

Table a continued

Patient	Pre-op FOSQ score	Polysomnography	Dynamic MRI	Post-op FOSQ score
9	38	AHI-55	Severe retropalatal obstruction	94
10	49	AHI-59.4	Severe retropalatal obstruction	86
11	48	AHI-60	Severe retropalatal obstruction	88
12	39	AHI-62.7	Severe retropalatal obstruction	78
13	38	AHI-54.2	Severe retropalatal obstruction	89
14	41	AHI-33.9	Moderate retropalatal obstruction	79
15	35	AHI-51.9	Severe retropalatal obstruction	86
16	37	AHI-55.5	Severe retropalatal obstruction	88
17	39	AHI-33.4	Moderate retropalatal obstruction	84
18	44	AHI-40.4	Moderate retropalatal obstruction	91

Conclusion

LAUP is an effective surgical tool in the treatment of moderate to severe single level retro palatal obstruction.

Quality of life improvement in terms of general productivity, vigilance, activity levels, social behaviour and sexual intimacy post LAUP is marked, as evidenced by improvement in FOSQ scores.

All patients reported of complete cessation of snoring following LAUP which not only improves the quality of

life of the patient but also helps restore marital harmony in couples estranged by OSAS.

A thorough pre-operative work up, with careful patient selection, good surgical technique, meticulous post-op follow up, and life style modification is required for good treatment outcomes.

The role of polysomnography in the diagnosis of OSAS cannot be over emphasised.

LAUP is not a substitute for life style modifications, but is an effective adjunct in the management of OSAS.

Although the size of the study sample is small, it is a fair indicator of treatment outcomes following surgical intervention with LAUP in OSAS.

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