

Original Research Article

DOI: <http://dx.doi.org/10.18203/issn.2454-5929.ijohns20193866>

An analysis on evaluation of surgical outcomes in zetaplasty for circumferential collapse of velopharynx: a case series

M. Venugopal, S. Mohamed Siddique*

Department of ENT, Madras Medical College Chennai, Tamil Nadu, India

Received: 11 April 2019

Revised: 19 June 2019

Accepted: 26 June 2019

***Correspondence:**

Dr. S. Mohamed Siddique,

E-mail: drsmidsms@gmail.com

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ABSTRACT

Background: Obstructive sleep apnoea syndrome is a disorder that involves periodic partial or total collapse of the pharyngeal airway during sleep which results in progressive asphyxia. It also leads to more insidious conditions including hypertension, diabetes mellitus, coronary artery disease, stroke, cognitive impairment and daytime somnolence. The aim is to analyse the surgical outcomes of series of 16 patients of OSA having circumferential collapse at velopharynx for which Zetaplasty was done by comparing pre-operative and post-operative symptoms, Epworth Sleepiness Scale, DISE and polysomnography.

Methods: A prospective study in 16 patients was done in our institute during the period from July 2017 to June 2018 and was followed for a period of 6 months. It comprised of 14 male and 2 female. At the patients in our study had complaints of snoring, frequent awakening at night and excessive day time sleepiness.

Results: All the 16 patients showed good improvement in symptoms after the surgery. There was around 50% drop in the post-op AHI. The post-op ESS score was also reduced. Lowest oxygen saturation improved significantly.

Conclusions: Zetaplasty for circumferential airway collapse at velopharynx level is a very safe and effective option as determined by the results of our study which is substantiated by reduction in AHI, ESS score and reduction in snoring.

Keywords: Obstructive sleep apnoea, Asphyxia, Velopharynx, Zetaplasty, DISE, Polysomnography

INTRODUCTION

Obstructive sleep apnoea (OSA) was first described by Guilleminault in 1973 as a syndrome which is characterised by recurrent episodes of sleep apnoea and hypopnoea. This was due to upper airway collapse which results in decreased oxygen levels in blood and arousal from sleep.¹ Obstructive sleep apnoea syndrome (OSAS) may produce excessive day time somnolence, cardiopulmonary and cardiovascular diseases, poor concentration and cognitive impairment, diabetes mellitus and hypertension leading to lower quality of life.

The gold standard for the treatment of OSAS is continuous positive airway pressure (CPAP). However these devices are not very much compatible and patients use these devices insufficiently. Alternative and well-studied options are surgery, oral appliances and weight loss.² The surgery options being zetaplasty and uvulopalatopharyngoplasty.

Zetaplasty is a surgical procedure which aims at removal of excessive and space occupying tissue in the oropharynx with a corresponding increase in the cross-sectional area of the velopharynx.³

Aims and objectives

The aim of our study is to analyse and demonstrate the surgical outcomes of zeta-plasty for a series of 16 cases of obstructive sleep apnoea having circumferential collapse of velopharynx.

METHODS

A prospective study was done in our unit at the institute of otorhinolaryngology in Rajiv Gandhi Govt General Hospital for a total of 16 patients between July 2017 to June 2018. The study included 14 males and 2 females. All the patients included in our study had history of loud snoring, frequent awakening at night and excessive daytime somnolence. The following inclusion criteria for the subjects were followed:

- Age >20 years and <60 years which included both males and females.
- Body mass index (BMI) <40.
- Apnoea hypopnoea index (AHI) >5.
- Refused CPAP therapy.
- Patients willing to undergo surgery.
- Type 1 pharyngeal collapse (circumferential collapse at velopharynx alone) assessed by drug induced sleep endoscopy (DISE).

The following were the exclusion that were followed:

- Age <20 yrs and >60 years.
- Hypothyroidism and other metabolic disorders.
- Cardiothoracic disorders.
- Associated craniofacial abnormalities.

The Friedman tongue palate position (FTP) was also used to assess the obstruction level in the patients and staged them. FTP evaluates the palate with the tongue in the neutral position inside the mouth.

Per-operative and post-operative considerations

The patients in our study were posted for zeta-plasty after obtaining anaesthesia fitness. Candidates eligible were divided into patients with intact tonsils and patients status post tonsillectomy. 14 patients had intact tonsils and 2 patients had previous tonsillectomy done. Tonsillectomy was done for all patients with intact tonsils. The anterior mucosa was removed and the soft palate was split in the midline. The palatoglossus muscle was cut and the posterior palatal mucosa was sewed to the anterior resected margin which retracts the midline anterolaterally and widens the retropharyngeal space.

Special protocols were strictly followed for our post-operative care. All patients had uneventful post-operative period. All the patients received adequate antibiotic, analgesics and antibacterial mouthwash. For all the subjects, Ryles tube were inserted and all of these

patients were started on Ryles tube feeding on 5th post-operative day. The patients were discharged when they felt less of post-operative pain. The patients were followed up regularly. Sleep study and DISE were repeated after 4 months of surgery.

RESULTS

A total of 16 patients were selected for the study who qualified the eligibility criteria. The age of the patient varied from 36 years to 53 years with mean age being 46.1 years. The BMI of the patients ranged from 26 to 34, the mean BMI being 29.25. They were subjected to preliminary evaluation like comprehensive history taking, detailed systemic examination, anthropometric evaluation, diagnostic nasal endoscopy and video-laryngoscopy. Excessive day time sleepiness was assessed with Epworth Sleepiness Score (ESS) score. All those patients underwent level 1 polysomnography. All the necessary blood investigations were done including thyroid function test. Radiological evaluation was done with lateral cephalometry, CT PNS.



Figure 1: Friedman tongue palate staging, the uvula is not visible.

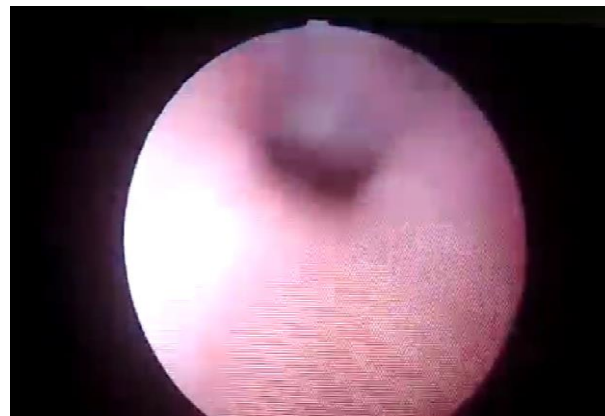


Figure 2: DISE showing circumferential collapse.

Table 1: Pre-operative data and indices.

Cases	Age	Sex	BMI	ESS	AHI	Lowest desaturation	Snoring episodes
1	40	M	30	23	56	68	504
2	44	M	27	23	47	71	692
3	47	M	28	23	88	72	693
4	53	M	27	23	76	66	689
5	52	M	28	22	96	76	498
6	49	M	28	22	42	80	522
7	46	F	30	23	48	72	534
8	50	M	27	22	52	70	612
9	38	M	33	20	49	63	531
10	41	M	29	18	30	73	490
11	45	F	34	21	44	81	601
12	48	M	26	16	39	74	584
13	52	M	30	22	62	60	539
14	36	M	30	20	26	69	431
15	50	M	32	19	58	78	590
16	47	M	29	20	74	69	675

Table 2: Post-operative indices.

Cases	ESS	AHI	Lowest desaturation	Snoring episodes
1	12	48	88	88
2	12	15	92	98
3	10	42	80	212
4	10	32	88	202
5	8	13	90	90
6	12	22	94	110
7	8	18	88	99
8	10	28	86	106
9	12	32	79	227
10	13	16	85	164
11	9	24	89	198
12	8	21	90	132
13	12	33	95	163
14	11	15	89	96
15	14	21	92	113
16	13	32	86	205

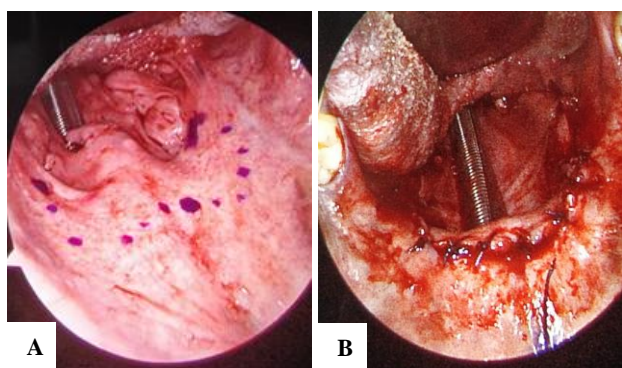


Figure 3 (A and B): Intra-operative images.

DISE was performed in all the 16 patients in our study to confirm the level of obstruction at velopharynx. The

comparison was done by assessing the pre-operative and post-operative symptoms and values using ESS and polysomnography. In polysomnography, the indices that were compared were AHI and lowest oxygen desaturation. Zetaplasty was done.

Of the 16 patients, 14 patients (87.5%) were male and 2 patients (12.5%) were female. This data correlates with the study by Khan et al where study group comprised of 81% male population. All the patients were regularly followed up. Polysomnography was repeated after 6 months and data were analysed. All the 16 patients had reduction in the symptoms which was assessed with history and Epworth Sleepiness Scale. The mean pre-operative ESS was 21.06 which after surgery improved to 10.9. In polysomnography indices, the apnoea hypopnoea index was very much lowered. The mean pre-operative

AHI was 55.4 which reduced to 25.8 in the post-operative period. There was an improvement in the lowest oxygen desaturation where the pre-operative mean was 71.4

which improved to a post-operative mean of 88.8. There was also a reduction in the total number of snoring episodes after the surgery.

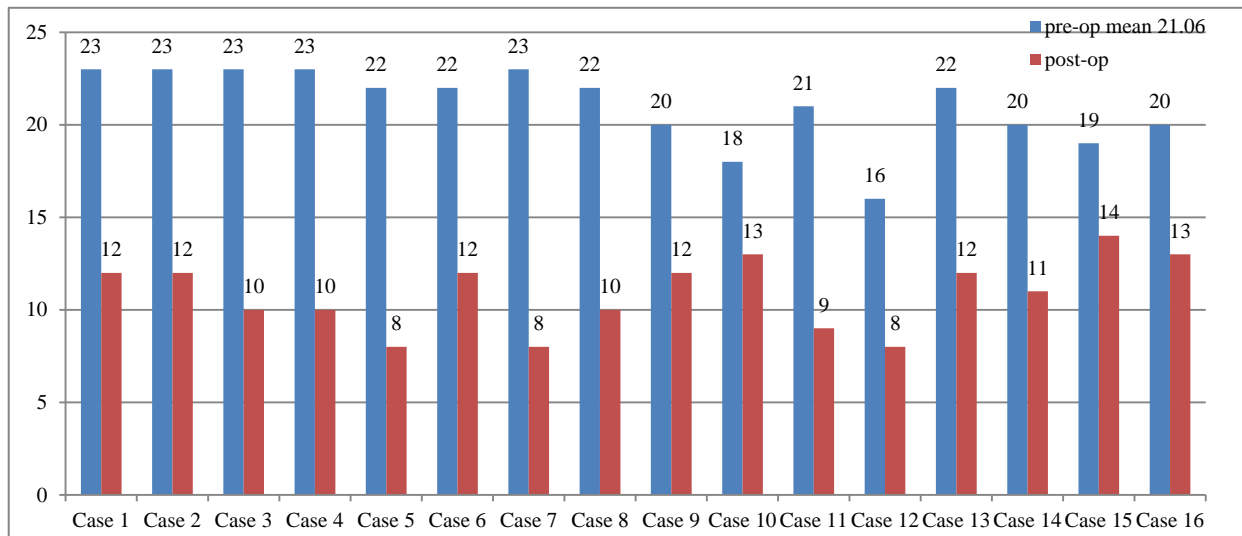


Figure 4: Comparison between pre-op and post-op ESS.

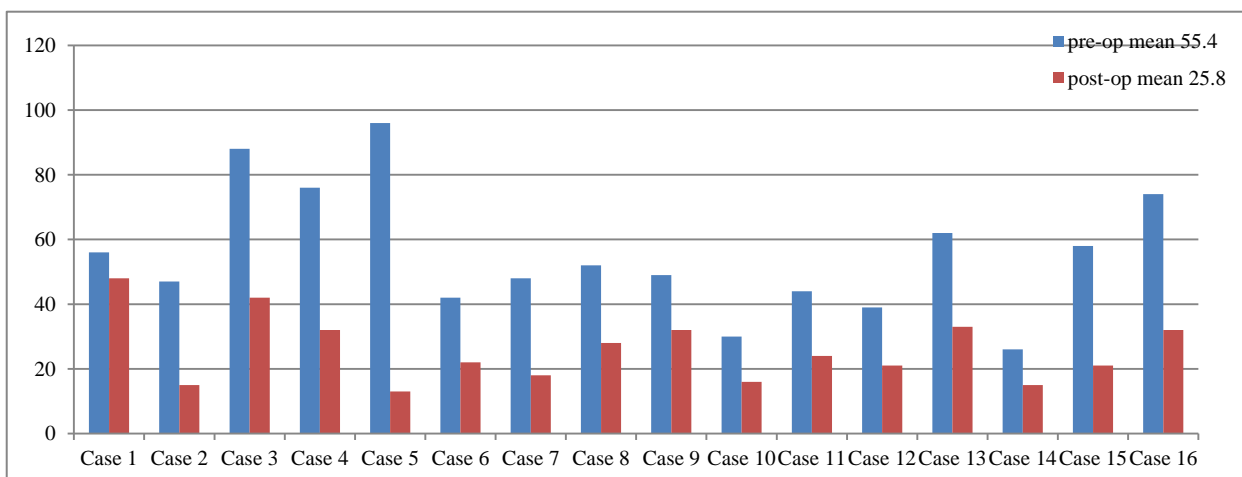


Figure 5: Comparison between pre-op and post-op AHI.

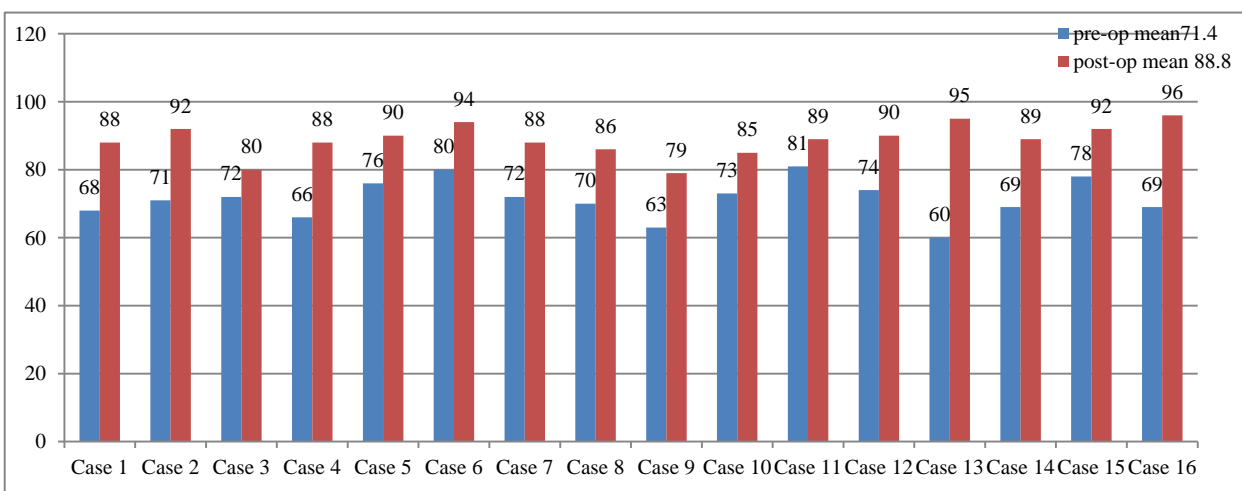


Figure 6: Comparison between pre-op and post-op lowest oxygen desaturation.

Complications

The following complications usually occur after a zetaplasty surgery: wound infection, wound dehiscence, dysphagia, foreign body sensation, temporary velopharyngeal insufficiency and permanent velopharyngeal insufficiency.



Figure 7: Follow-up.

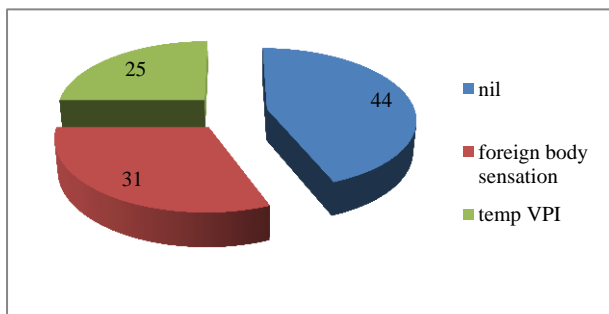


Figure 8: Complications of surgery.

In our study, due to tension-free epithelial closure, strict aseptic protocols and adequate antibiotic coverage, none of the patients had wound infection or wound dehiscence. Except for initial post-operative complaints of pain during swallowing, the patients didn't develop long term dysphagia. 5 patients had foreign body sensation in the throat. 4 patients developed temporary VPI which resolved in the due course of time. None of the patients developed permanent VPI.

DISCUSSION

Comparing the pre-op and post-op AHI, there has been a 47% reduction in the AHI which came close to the study

conducted by Elshaug et al where AHI was reduced to 55.2%.⁴ In all the patients, there has been a drastic reduction in the snoring as witnessed by their partners which correlates with the study conducted by Whyte et al.⁵ Lateral rerouting the uvula together with the soft palate improves the airway characteristics by enlarging the retropalatal space, which is a distinct advantage over the traditional uvulopalatopharyngoplasty.⁶ All these above references and indices strongly denote a drastic improvement in the quality of the life of the patient, both subjectively and objectively, assessed by improvement on snoring level, daytime sleepiness and overall well-being.

CONCLUSION

After thoroughly following up the 16 patients, we came to a conclusion that zetaplasty affords better quality of life and overall well-being for OSA patients having circumferential collapse at the level of velopharynx. Minimal complications in our study is attributed to meticulous surgical techniques and diligent postoperative care.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Not required

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Cite this article as: Venugopal M, Siddique SM. An analysis on evaluation of surgical outcomes in zetaplasty for circumferential collapse of velopharynx: a case series. Int J Otorhinolaryngol Head Neck Surg 2019;5:1259-63.