

Original Research Article

Comparative study on surgical outcome for benign vocal cord lesions by conventional method versus coblation

Muthuchitra Sundarm¹, Semmanaselvan Krishnaswamy², Sanjay Kumar^{2*}, Shaikh Mohideen¹

¹Department of Otorhinolaryngology, Government Kilpauk Medical College, Chennai, Tamil Nadu, India

²Department of Otorhinolaryngology, Government Royapettah Hospital, Chennai, Tamil Nadu, India

Received: 31 December 2020

Revised: 11 February 2021

Accepted: 12 February 2021

*Correspondence:

Dr. Sanjay Kumar,

E-mail: drksk1308@gmail.com

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ABSTRACT

Background: Benign vocal cord lesions are common laryngeal pathology found in routine clinical practice. microlaryngeal surgery is useful in excision for pathology. Coblation assisted microlaryngeal surgery is a new technique for the vocal cord lesions

Methods: Current study was conducted in Government Kilpauk medical college hospital and Government Royapettah hospital from the period of 2018 to 2019 in 40 patients with benign vocal cord lesion. The objectives of current study were to assess the voice handicap Index before and after surgery, to assess the surgical benefits and ease in doing the procedure intraoperatively and to assess the postoperative recovery in conventional micro laryngeal procedure.

Results: The overall analysis shows coblation being an evolving technique has advantages over the conventional cold knife method. Blood loss and the surgery duration was less in coblation. But the assessment tools of both voice handicap index, voice analysis and GRBAS score favours conventional micro laryngeal surgery with reduced scores and improvement in performance with statistically significant values probably due to minimal tissue handling and decrease in post op scarring in conventional micro laryngeal surgery.

Conclusions: The overall voice handicap index and voice analysis showed improvement post operatively in both the groups with more favoring response to conventional method with statistically significant values. In the same way the GRBAS score also favors the conventional method. Coblation being a newer technique can be employed for surgical treatment for micro-laryngeal surgery considering its advantages and less time consumption. Stroboscopy and other acoustic analysis along with long term follow up is needed.

Keywords: Coblation, Conventional microlaryngeal surgery, Voice handicap index, GRBAS score

INTRODUCTION

Micro laryngeal surgery, also known as phono microsurgery, is a workhorse procedure that deals with a variety of laryngeal conditions, including benign vocal fold cysts, vocal fold paralysis, vocal cord nodule, vocal polyp, Reinke's edema, vocal fold scarring, vocal fold leukoplakia or cancer, and airway stenosis.¹⁻³ A phonomicrolaryngoscopy is the examination of the larynx usually under general anaesthesia to further establish a diagnosis, but more importantly to surgically treat a

pathology with the aim of improving voice. Voice rest following surgery.⁴ postoperatively patient monitored with voice handicap index and voice analysis.^{5,6} The term coblation is derived from "controlled ablation". This procedure involves non-heat driven process of soft tissue dissolution using bipolar radiofrequency energy under a conductive medium like normal saline.⁷ When current from radiofrequency probe pass through saline medium it breaks saline into sodium and chloride ions. These highly energized ions form a plasma field which is sufficiently strong to break organic molecular bonds within soft tissue

causing its dissolution coblation causes low temperature molecular disintegration. This causes volumetric removal of tissue with minimal damage to adjacent tissue.⁸

Objectives

Objectives of current study were; to find out benign vocal cord lesions in patients presenting with dysphonia, to prepare conservative treatment failure patients for surgical management, to assess the voice handicap index before and after surgery, to assess the surgical benefits and ease in doing the procedure intra-operatively and to assess the postoperative recovery in both the procedure.

METHODS

Study design, place, duration and sample size

Current study was as interventional study conducted on 40 subjects admitted to Government Kilpauk medical college hospital and Government Royapettah hospital, Chennai, from May 2018 to April 2019.

Inclusion criteria

Inclusion criteria for current study were; patients reporting to ENT OPD with dysphonia and VLS suggestive of benign vocal cord lesion, patients treated with medical management wherever possible for duration of month and not responding for to the treatment.

Exclusion criteria

Exclusion criteria for current study were; previously operated/reoccurrence, malignant lesions and comorbidities.

Statistical analysis

Statistical analysis was performed using IBM. SPSS statistics software 23.0 version.

Procedure

Patients reporting to ENT OPD with hoarseness were screened for the study after obtaining consent. Detailed history was taken and documented. Basic investigations were done. Patients were screened by videolaryngoscopy under local anaesthesia to find out the organic pathology. Patients were explained about the disease, the probable cause and its line of management. Voice handicap index score and GRBAS score were used as assessment tool to know the severity of hoarseness.⁹ Conservative management like voice rest, antireflux measures was carried out wherever possible. Patients were followed up for a month. Treatment failure for conservative management was considered when there is no response at completion of one month of treatment. Partial responder/symptomatically no improvement with lesion were also considered for surgery. Patients were explained about

surgical management. Random numbers was assigned and patients were divided into two groups with 10 patients in each group (vocal cord cyst, vocal cord polyp, vocal nodule). One group was operated by conventional microlaryngoscopy excision and the other group by coblation.

Conventional surgery was done with a suitable sized rigid laryngoscope. A good view is obtained by use of a microscope but inspection of the larynx with a 0 and 30 degree telescope was recommended. A sulcus or small cyst might be revealed which otherwise would not have been without close inspection and palpation. The range of interventions includes biopsy and removal of lesions, vocal cord injection and laser surgery.¹⁰

Components of coblation system were; RF generator, foot pedal control, irrigation system and wand.¹¹ Modes of operation were dissection, ablation, and coagulation. Operating frequency was 100 kHz and power consumption was 110/240 V, 50/60 Khz (Table 1). Advantages of coblation are minimal use of instruments (single wand can be used for dissection and haemostasis), ease of instrumentation for surgeon, less operating duration, minimal blood loss and less tissue manipulation.

Table 1: Coblation and conventional electro-surgical devices.

	Coblation devices	Conventional electro-surgical devices
Temperature	40-70 °C	400 -600°C
Thermal penetration	Minimal	Deep
Effects on target tissue	Gentle removal / dissolution	Rapid heating, charring, burning and cutting
Effects on surrounding tissue	Minimal dissolution	Inadvertant charring/burning

With proper pre operative assessment, fitness and preparation, surgery was done under general anaesthesia. Patient under general anaesthesia was in Boyce position (Figure 1), suspension kleinsasser laryngoscope (Figure 2) was used and vocal cords visualised. Small pack was kept in sub-glottis. Lesion visualized and excised using micro-laryngeal instruments. Hemostasis was achieved and packs were removed, patient was extubated under steroid cover, recovered and shifted out to ward. Post operative instructions were given as per guidelines. Patients were followed up postoperatively at an interval of 1 week, 1 month and 3 months. In coblation method (Figure 3), coblator with laryngeal wand (Figure 4), irrigator and pedal was kept ready. Lesion was visualised and excised using laryngeal wands of coblator. Haemostasis was achieved and packs were removed, patient was extubated under steroid cover, recovered and shifted out to ward. Post-operative

instructions were given as per guidelines. Assessment was done using videolaryngoscopic findings, GRBAS score and voice handicap index.^{1,2}



Figure 1: Boyce position.



Figure 2: Conventional microlaryngoscopy instruments.

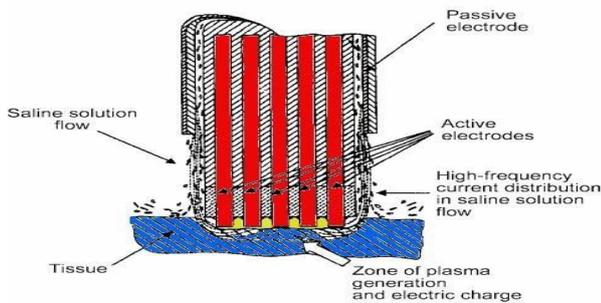


Figure 3: Coblator.



Figure 4: Coblator and wand.

Voice handicap index, contains statements in three parts (functional, physical and emotional) that many people have used to describe their voices and the effects of their

voices on their lives. Circling the response that indicates how frequently the patients have same experience like; 0: never, 1: almost never, 2: sometimes, 3: almost always and 4: always. Finally response was divided into three groups mild, moderate, severe (Table 2). GRBAS score. Perceptual evaluation of the voice refers to the process of assessing the characteristics of the voice and grading the severity of specific abnormal features such as hoarseness, roughness and breathiness. The GRBAS (grade, roughness, breathiness, asthenia and strain) scheme is probably the most widely used due to its relative simplicity. Each dimension is rated on a four-point scale where 0 is no perceived abnormality, 1 is mild, 2 is moderate and 3 is severe abnormality. The overall grade of hoarseness is the most reliable voice quality parameter with strain and asthenia (weakness) being relatively poor (Table 3). The assessed data was statistically analyzed using standard software.

Table 2: Voice handicap index.

Score	Range	Severity common association
0-30	Mild	Minimal amount of handicap
31-60	Moderate	Often seen in patients with vocal nodules, polyps, or cysts
61-90	Severe	Often seen in patients with vocal fold paralysis or severe vocal fold scarring.

Table 3: GBRAS scoring system.

Factor	Psychoacoustic/physiological correlates
Grade	Overall rating of severity of abnormality ('hoarseness') of voice
Roughness	Perceived irregularity in voice, irregular perturbation of pitch and amplitude, noise in low frequency region and the presence of spectral subharmonics
Breathiness	Audible breath or air escape on the voice, noise below the mid frequencies, incomplete closure of vocal folds resulting in high expiratory flow rate
Asthenia	Weakness or lack of energy in the voice, less harmonic content in the high-frequency region, irregularity of pitch and amplitude, a fading amplitude contour
Strain	Perception of excessive vocal effort, reflects higher pitch, noise in the higher frequencies, increased amplitude of the higher harmonics and increased pitch and amplitude perturbation

RESULTS

In current study of 40 patients with benign vocal cord lesions, the overall post operative recovery was good in both groups. Comparison of age distribution within

groups is shown in (Table 4). Surgical ease was observed to be better in the coblation group. Comparison of voice handicap index within groups is shown in (Table 5). Comparison of GRBAS score within groups is shown in (Table 6).

Table 4: Comparison of age distribution within groups.

Age (years)	Conventional MLE (%)	Coblation (%)
Up to 20	10.0	10.0
21-30	40.0	25.0
31-40	30.0	10.0
41-50	15.0	50.0
Above 50	5.0	5.0

The mean scores for MLE group preoperatively was 6.25 with standard deviation (SD) 1.585, first week mean was 3.30 and SD 0.979, first month mean was 2.25 and SD 0.550 and third month mean was 0.8 and SD 1.005. Meanwhile the mean scores for coblation group preoperatively were mean of 6.45 with SD 1.761, first week mean was 3.35 and SD was 0.988, first month mean 3.15 was and SD was 0.671 and third month mean was 1.95 and SD was 0.759. Both the VHI score and GRBAS score were observed to be better in conventional group with significant $p=0.005$.

DISCUSSION

Vocal cord lesions like vocal nodules, polyps and cysts though benign are significant because they disrupt the

vocal fold vibratory function causing dysphonia. Removal of lesion, restoring the vibratory function and optimising the voice are the goals of treatment of benign vocal fold lesions. Lesions not responsive to voice therapy/medical therapy have to be excised. Objective and subjective assessment of the laryngeal functions before and after surgery help to evaluate the effectiveness of the treatment. Quantification of such results also helps to compare voice outcome using different techniques considering surgical management in these patients conventional micro-laryngeal surgery as cold steel method is the modality of treatment. Conventional micro-laryngeal surgery is cost effective and showed good surgical outcomes. Laser, radiofrequency and coblation are being utilized as newer surgical modality. There have been very few studies about coblation stressing its advantages over the conventional method. In this study conducted in a tertiary care centre, patients with benign vocal cord lesions were selected. After initial conservative management for the patients with benign vocal cord lesions, nonresponders were selected. Voice handicap index and GRBAS score has been used to assess and compare the treatment outcome in these patients. In current study conducted in a tertiary care centre, patients with benign vocal cord lesions were selected. With the total sample size of 40, after initial conservative management for the patients with benign vocal cord lesions, nonresponders were selected. Out of total 40 patients 20 were selected for microlaryngeal surgery and 20 patients were selected for coblation randomly. Voice handicap index and GRBAS score has been used to assess and compare the treatment outcome in these patients.

Table 5: Comparison of voice handicap index within groups.

		N	Mean	SD	t value	P value
PRE	Conventional MLE	20	40.0	10.0	0.080	0.936
	Coblation	20	39.7	9.7		
First week	Conventional MLE	20	31.4	3.8	0.280	0.781
	Coblation	20	31.0	5.1		
First month	Conventional MLE	20	24.0	3.4	2.011	0.05
	Coblation	20	26.0	2.8		
Third month	Conventional MLE	20	7.8	3.8	3.823	0.0005
	Coblation	20	12.3	3.5		

Table 6: Comparison of GRBAS scores within groups.

		N	Mean	SD	t value	P value
PRE	Conventional MLE	20	6.25	1.585	0.377	0.780
	Coblation	20	6.45	1.761		
First week	Conventional MLE	20	3.30	0.979	0.161	0.873
	Coblation	20	3.35	0.988		
First month	Conventional MLE	20	2.25	0.550	4.639	0.0005
	Coblation	20	3.15	0.671		
Third month	Conventional MLE	20	0.80	1.005	4.083	0.0005
	Coblation	20	1.95	0.759		

Geetha et al had 30-40 years as the common age group of presentation in their study.¹³ In current study among the age group presented large number are from their third and fifth decade (32.5%) belong to group between 21-30 years, 32.5% to 41-50 years and least common presentation below 20 years of age group (10%). Singh et al, Pawan et al, Geetha et al and Vasconcelos et al all of them had male predominance in their study while Shanta et al alone had quoted female predominance.¹³⁻¹⁶ In current study, males outrange females in overall cases. Male accounting to 60% (24) of total cases when compared to female with 40% (16). Nibedita et al in their study found out the commonest lesion as being vocal cord polyp in 32%, while vocal nodule in 24%, rhenkes oedema in 20%. Geetha et al in their study had noted vocal nodules as the commonest lesion seen (35%) and bilateral vocal fold involvement was seen in 50% of the cases. In current study vocal cord polyp was the common lesion seen with total of 20 cases (50%), vocal nodules are next common with 12 cases (30%) and vocal cyst are least common presentation with total of 8 cases (20%). Chauhan et al and Qinfeng et al in their case report on treatment of laryngeal papilloma with coablation have stated that intraoperatively there was less bleed with shorter surgery duration.^{17,18} Qinfeng have also stated that there is less damage to surrounding tissue while using coablation. Similarly in this, intraoperatively less blood loss is seen in coblation group with decrease in total surgery duration in the same.

Voice handicap index is subjective method of assessment of dysphonia. Like that of Michael et al, Surya et al, Emily et al and Ayatullah et al in their study on impact of voice disorders and microlaryngeal surgery on psychological profiles.¹⁷⁻²⁰ There was a moderate relation between dysphonia and anxiety and depression according to the voice handicap index. In current study there was an overall decrease in the VHI total scores postoperatively. The mean scores for MLE group preoperatively were 40 with SD 10, first week mean 31.4 and SD 3.8, first month mean 24 and SD 3.4 and third month mean was 7.8 and SD 3.8. Meanwhile the mean scores for coblation group preoperatively were 39.7 with SD 9.7, first week mean 31 and SD 5.1, first month mean 26 with SD 2.8 and third month mean was 12.3 and SD 3.5. Comparing the VHI score in the post operative period, the initial first week assessment shows $p=0.781$ between both groups which is clinically insignificant. While post-operative first month and third month exhibits p value of 0.05 and 0.0005 respectively, this was clinically significant.

Webb et al in their study aimed to assess the reliability of three common scales' the buffalo voice profile, the vocal profile analysis scheme (VPA) and GRBAS. Seven experienced and trained speech and language therapists rated all voices on the three scales. The GRBAS was reliable across all parameters except strain. In current study there was an overall decrease in the GRBAS total scores postoperatively. The mean scores for MLE group preoperatively was 6.25 with SD 1.585, first week mean

was 3.30 and SD 0.979, first month mean was 2.25 and SD 0.550 and third month mean was 0.8 and SD 1.005. Meanwhile the mean scores for coblation group preoperatively were 6.45 with SD 1.761, first week mean 3.35 and SD 0.988, first month mean 3.15 and SD 0.671 and third month mean 1.95 and SD 0.759. Comparing the GRBAS score in the post operative period, the initial first week assessment shows $p=0.873$ between both groups which was clinically significant.

Limitations

Voice handicap index was used for a grading since it is a subjective test the quantification of outcome after the surgery was not assessed with stroboscopy and other acoustic analysis

CONCLUSION

The overall voice handicap index showed improvement post operatively in both the groups with more favouring response to conventional method with statistically significant values. In the same away the GRBAS score also favours the conventional method. But in surgical ease, blood loss and duration of surgery coblation is better but the accurate estimation of blood loss is lagging and so the pre-procedure setup in coblation. Coblation being a newer technique can be employed for surgical treatment for micro-laryngeal surgery considering its advantages and less time consumption. But comparatively due to lack of precision and post op scaring the performance status is less in a short term follow up. Stroboscopy and other acoustic analysis along with long term follow up is needed.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Sundarm M, Krishnaswamy S, Kumar S, Mohideen S. Comparative study on surgical outcome for benign vocal cord lesions by conventional method versus coblation. *Int J Otorhinolaryngol Head Neck Surg* 2021;7:493-8.