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Prospective analysis of type I thyroplasty using gore-tex implant

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ABSTRACT

Background: Vocal cord paralysis is a clinical sign caused by paralysis of intrinsic muscles of larynx due to dysfunction of recurrent laryngeal nerve. There are several methods available surgically for the medialisation of the abducted vocal cord. One of the common effective modality is the Gore-Tex medialisation thyroplasty. The results depend on a number of factors including the surgical expertise and extrusion of the Gore –Tex implant. This study is aimed at analysis of all Gore-Tex medialisation thyroplasty done at our centre. Prospectively asses and analyze the vocal outcomes and quality of life of patients in type 1 medialisation thyroplasty using Gore-Tex implant.
Methods: Prospective study of 48 months on 30 patients with unilateral vocal cord paralysis. Surgical procedure for the patients was standardized by using Gore-Tex implant to medialize the cord. Video-Laryngoscopy at end of 1st month and stroboscopy & voice analysis at end of 3rd month post treatment, the parameters used for the pre and post treatment objective analysis are a) stroboscopic analysis, b) psychoacoustic evaluation, c) maximum phonation time, d) patient's self-assessment.
Results: In our study of 30 patients with a follow up period of 48 months, we can conclude as follows – a)unilateral vocal cord paralysis does not have age or gender specificity, b)statistically significant vocal cord palsy affects the left side more by 70%, c)post op Gore-tex medialisation thyroplasty showed a statistically highly significant improvement in psychoacoustic, mean phonation time, d)post op Gore-Tex medialisation thyroplasty showed a statistically significant improvement in videostroboscopic analysis.
Conclusions: Psycho acoustic, mean phonation time analysis would complement each other in the assessment of the medialisation thyroplasty thus obviating videostroboscopy.

Keywords: Type I thyroplasty, Unilateral vocal cord palsy, Gore-Tex, Stroboscopy, Psychoacoustic analysis, Mean phonation time

INTRODUCTION

Vocal cord paralysis is a clinical sign caused by paralysis of intrinsic muscles of larynx due to dysfunction of recurrent laryngeal nerve. The etiology of these lesions is exhaustive, and the treatment strategies depend on the cause and the effect. Thyroplasty of the vocal cord is the gold standard for the effect of vocal cord paralysis.[1,2]

There are several methods available surgically for the medialisation of the abducted vocal cord. Type I Ishiki medialisation thyroplasty is an accepted tool worldwide.[2] The techniques and outcome of the medialisation varies and one of the common effective modality is the Gore-Tex medialisation thyroplasty.[3,4] The results depend on a number of factors including the surgical expertise and extrusion of the Gore –Tex implant.[5,6]

This study is aimed at analysing of all Gore-Tex medialisation thyroplasty done at our centre. This study was conducted with the objective to prospectively asses and analyse the vocal outcomes and quality of life of

patients in type I medialisation thyroplasty using Gore-Tex implant.

METHODS

We conducted a prospective study over duration of 48 months. Study population selected were 30 patients with unilateral vocal cord paralysis, based on the inclusion and exclusion criteria formulated. Once an informed consent were taken they were evaluated to identify cause of vocal fold paralysis as per the following with a thorough history taking followed by indirect laryngoscopy & video laryngoscopy for confirmation of the diagnosis. They were then investigated with CBC, FBS, PPBS, chest X-ray, TFT & CT neck/thorax (if indicated). Final evaluation and documentation using videolaryng-ostroboscopy and voice analysis was done.

Patients with idiopathic vocal cord paralysis will be subjected to voice therapy for 6 months by two trained speech pathologists and if these patients improve with speech therapy, they will continue with the same treatment.

Patients who do not show improvement even after 6 months will be taken up for surgical intervention. Patients presenting to OPD 6 months after the onset of idiopathic vocal cord palsy will be directly taken up for Surgical management i.e. surgical medialisation-Isshiki's type I thyroplasty using Gore-tex implant.[1-2]

Patients who present with unilateral vocal cord paralysis due to iatrogenic surgical trauma will be taken up for surgery after 6 months.

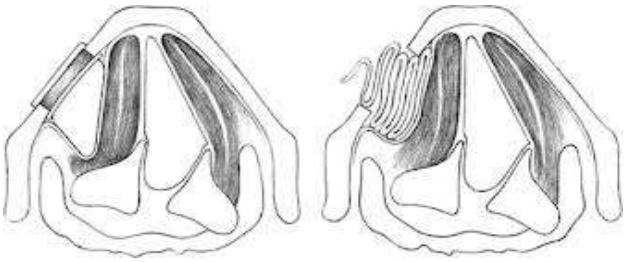

Figure 1: Type I thyroplasty using Gore-Tex implant.

Surgical procedure for the patients was standardized by using Gore-Tex implant to medialize the cord. Horizontal skin crease incision made at the level of thyroid cartilage on the affected side. Window was made over the thyroid cartilage using Koufman's formula. Gore-tex implant was adjusted and placed in the window according to improvement in voice of the patient on table and the end sutured to the inner perichondrium of the thyroid cartilage to prevent migration of the graft.[7] The schematic representation can be seen in Figure 1. Video-laryngoscopy is done at end of 1st month and stroboscopy and voice Analysis at end of 3rd month post treatment.

Inclusion criteria

Only these patients with the age group of 18 to 60 years who were clinically diagnosed cases of unilateral vocal cord paralysis were taken into the study group. The causes of the vocal cord paralysis were surgical trauma, accidental trauma, idiopathic and thyroid malignancy.

Exclusion criteria

Patients with history of previous laryngeal surgeries, non-thyroid malignancy and vocal cord surgeries were not considered for the study. All tracheostomised patients or patients with multiple cranial nerve palsies, Patients unfit for surgery were all excluded.

Pre and post treatment assessment

All the patients who were included in the study underwent type 1 thyroplasty and were objectively analysed on the following parameters.

Stroboscopic analysis.

We analysed the stroboscopic analysis for mucosal wave pattern, glottic closure and vocal cord symmetry. These parameters were analysed before and after surgery.[8]

Psychoacoustic evaluation

With the accepted GRBAS scale, the following five parameters are assessed, and these are grade (G), roughness(R), breathiness (B), asthenia (A), strain(S).[9]

Maximum phonation time

By assessing the maximum phonation time using a timer while the patient sustains 'e' or 'a'.[10]

Patient's self-assessment

All these data underwent statistical analysis with Student t-test and chi square test.

RESULTS

Age of the patients

The mean age of the study population was 42.57 years with a standard deviation of 13.349 years as seen in Table 1 below.

Gender

Out of the 30 patients, 13 were females and 17 were males, no statistical preponderance for any gender as seen in Table 2 below.

Table 1: Age range of the study population.

	N	Min.	Max.	Mean	S D
Age	30	21	66	42.57	13.349

Table 2: Gender distribution of the study population.

	Frequency	%	Valid %	Cumulative %
Male	17	56.7	56.7	56.7
Female	13	43.3	43.3	100
Total	30			

Etiopathology

Out of the 30 cases, 70% was left cord palsy and the rest 30% were right vocal cord palsy which was statistically significant suggesting left vocal cord palsy is more common.

Psychoacoustic evaluation

30 patients were assessed. All the patients had changes in Psychoacoustic evaluation post treatment, Grade, Roughness, Breathiness, Asthenia and Strain were the parameters assessed and on analysis of the results we found a significant improvement with a P value of less than 0.001as seen in the Table 3.

Table 3: Psychoaccoustic evaluation.

	Mean	Std Deviation	P Value
Pre Treatment	4.900	1.936	< .001
Post Treatment			

Table 4: Maximum phonation time.

	Mean	Std Deviation	P Value
Pre Treatment	-3.500	1.815	< 0.001
Post treatment			

Maximum phonation time

The postop MPT evaluation was statistically significant when compared with pre-op scores as seen in Table 4.

Voice disorder outcome profile

The postop subjective perceptual analysis was statistically significant when compared with pre-op scores with a P value of less than 0.001 as seen in Table 5.

Table 5: Voice disorder outcome.

	Mean	SD	P Value
Pre treatment	70.400	33.675	<0.001
Post Treatment			

DISCUSSION

Videolaryngostroboscopy with voice analysis aids in diagnosing and deciding the mode of management of unilateral vocal cord paralysis. They also help in detecting the changes visually and acoustically pre and post treatment. The present study of 30 patients consists of 17 males and 13 females with age ranging from 18 to 65 years. Left vocal cord palsy is seen in nearly 70% of the patients studied. Only patients with unilateral vocal cord paralysis that cause significant dysphonia as they disrupt normal vocal cord vibratory function were considered. Management of vocal cord paralysis, restoration of the vocal cord functions and optimizing the voice are the goals in the treatment. The stroboscopic and voice analysis can be clearly defined and evaluated as shown in this study. In our study out of 30 patients 10 patients had paralysis post-surgery and 20 patients were idiopathic. Patients who underwent medialization thyroplasty using Gore-tex were followed up and we found there was no extrusion or migration of the Gore-tex implants. This is achieved by suturing the Gore-tex implant to the inner perichondrium of the thyroid cartilage.

Psychoacoustic evaluation

Based on a scale of 0-3, with 3 being the maximum score for each patient, the mean score of grade improved from 2 to 1, breathiness from 3 to 0.5, roughness from 2.5 to 0.5, asthenia from 2.5 to 1 and strain from 2 to 0.25. Expected voice outcome following the treatment for unilateral vocal fold paralysis (UVFP) is excellent. Most patients resume normal speaking activities and functions and are able to meet all normal voice demands. Thomas R Carroll et al had almost all patients improve in GRBAS scale following treatment.[11] A significant value of p<0.001 was achieved post treatment in our study.

Maximum phonation time.

Nearly all the patients had an increase in their MPT as compared to pre and post treatment. The mean value was -3.500 and we achieved a highly significant value of p <0.001. In the study by Denk et al the MPT was measured pre and post treatment which showed an improvement in patients with a high statistically significant p value.[12]

Voice disorder outcome profile

All 30 patients were subjectively assessed with a questionnaire pre and post treatment. Pretreatment the score was more than 200 out of 320 for all patients. The mean value post treatment was 70.400. A significant value of p <0.001 was achieved post treatment showing tremendous improvement in physical, functional and psychosocial abilities of each patient. Significant changes were noted only after 3rd month post treatment.

Stroboscopic analysis-symmetry

Revealed all patients' pretreatment had asymmetrical vocal fold movement. 97% of patients had symmetrical vocal fold movement following treatment at 3rd month post treatment. The remaining 1 patient did not show much improvement post treatment. A statistically significant value cannot be achieved as symmetry pretreatment is constant. Speyer et al almost showed 80% of subjects he studied had symmetrical vocal fold movement post treatment.[13]

Glottic closure

Glottic closure was achieved in almost all patients post treatment. 29 out of 30 patients had complete glottic closure post treatment. Patients who underwent surgery had complete glottis closure post treatment.

Mucosal waveform

Mucosal waveform was present and small in 29 patients and absent in one patient pretreatment. At 3 months post treatment 29 patients had mucosal waveform present. In 1 patient the waveform was present and small. Brodnitz et al laryngoscopic examination post treatment revealed mucosal waveform, amplitude and magnitude were normal.[14] Hence stroboscopic analysis, psychoacoustic analysis and Voice Disorder Outcome Profile complement each other on means of diagnosis and management and follow up of patients with unilateral vocal cord paralysis.

CONCLUSION

In our study of 30 patients with a follow up period of 48 months, we can conclude as follows that unilateral vocal cord paralysis does not have age or gender specificity, statistically significant vocal cord palsy affects the left side more by 70%, postoperative Gore-tex medialisation thyroplasty showed a statistically highly significant improvement in psychoacoustic Mean phonation time. Post op Gore-tex medialisation thyroplasty showed a statistically significant improvement in Video-stroboscopic analysis. Psycho acoustic, mean phonation time analysis would complement each other in the assessment of the medialisation thyroplasty thus obviating videostroboscopy.

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

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