



Original Article:

Causes of Acquired Vocal Cord Palsy in Indian Scenario.

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Abstract: Vocal cord paresis or paralysis occurs due to lesion in the vagus nerve. Vocal cord paralysis can lead to dysphonia as well as dysphagia which lead the patient to frustration and emotional problems. The literature available on the etiology and the problems faced by them in Indian population is very scanty. Hence a prospective study was done on 41 Patients with vocal cord palsy who were referred to the Department of ENT for voice assessment and management from March 1st 2012 till 1st August 2012. The medical and surgical reports were examined. They were evaluated by an otorhinolaryngologist, and a Speech Language Pathologist. Diagnosis was made based on video stroboscopic findings. We also examined voice-related quality of life (V-RQOL) outcomes in these patients. In this study, endo-tracheal intubation (15/41; 36.5%) was the major cause of vocal cord palsy. The second major cause for vocal cord palsy in our study was surgical trauma (iatrogenic) which constituted 26.8% (11/41), out of which thyroidectomy contributed to 81.81% (9/11) and cardiac surgery (Coronary Artery Bypass Grafting (CABG) contributed to 18.18% (2/11). Neurological problems caused 14.63% (6/41) of the total cases. Non-surgical trauma constituted 9.75% (4/41) of the total patients. Left recurrent laryngeal nerve paralysis was found as a complication of heart disease in 7.3% (3/41). Tuberculosis of lungs and cancer of lungs accounted to be the rarest causes. Hoarseness of voice was the most common symptom with associated dysphagia in a few. The voice related quality of life of these patients was found to be poor. They were found to have problems in the social-emotional domain and physical functioning domain.

Keywords: Vocal cord paralysis; Endo-tracheal intubation; Hoarseness of voice

Introduction:

Vocal cord paresis or paralysis occurs due to lesion in the vagus nerve arising from the nucleus ambiguus in the medulla oblongata. Vagus nerve branches in the neck into Pharyngeal branches, Superior laryngeal nerve and recurrent laryngeal nerve. Branches of the pharyngeal plexus supply the pharyngeal muscles and mucous membrane and palate except for the tensor palatini muscle. The superior laryngeal nerve further branches into an internal and external branch. The internal branch provides sensation to the larynx above the level of the true vocal folds. The external branch of the SLN innervates the cricothyroid muscle. The recurrent laryngeal nerve innervates the posterior cricoarytenoids, lateral cricoarytenoids, thyroarytenoids and interarytenoids. The left recurrent laryngeal nerve has a similar course to the right recurrent laryngeal nerve, except that it loops around the aortic arch. There is a high risk for injury to the left recurrent nerve compared to much shorter right sided course. (1)

The causes of vocal cord palsy include neurologic disorders, viral infections, cancer of lung/ thyroid, a skull base tumor, blunt neck or chest trauma, thoracic disorders that compresses the vagus nerve, inadvertent injury during surgery or Complication from endotracheal intubation. Vocal cord paralysis can lead to dysphonia as well as dysphagia which lead the patient to frustration and emotional problems. The literature available on the etiology and the problems faced by them in Indian population is very scanty .Hence it was decided to conduct a prospective study to find out the etiology as well as the emotional and social problems (voice-related quality of life) faced by these patients in the Indian scenario.

Methodology

A prospective study was done on 41 Patients with vocal cord palsy who were referred to the Department of ENT for voice assessment and management from 1st March 2012 till 1st August 2012. The medical and surgical reports were examined. These patients were evaluated by a Speech pathologist and an Otorhinolaryngologist. Diagnosis was made based on videostroboscopic findings. We also examined voice-related quality of life (V-RQOL) outcomes in these patients. The V-RQOL measure is a validated instrument designed to evaluate voice disorders.(2) There are ten questions, four of which come under the socio- emotional domain (questions 4,5,8,10) and six questions come under the physical functioning domain (questions 1,2,3,6,7,9). Each question is scored on a five point scale, one being the best score and five being the worst problem. The Global domain presents varying values between 0 and 100; 0 being the worst value and 100 being the best value. A subject with a value of 50 for a certain domain can be considered median for this domain.

NAME: _____	DATE: _____
<p>We are trying to learn more about how a voice problem can interfere with your day to day activities. On this paper, you will find a list of possible voice-related problems. Please answer all questions based upon what your voice has been like over the past two weeks. There are no "right" or "wrong" answers.</p> <p>Considering both how severe the problem is when you get it, and how frequently it happens, please rate each item below on how "bad" it is (that is, the amount of each problem that you have). Use the following scale for rating the amount of the problem:</p>	
<p style="text-align: center;"> 1= None, not a problem 2=A small amount 3=A moderate (medium) problem 4=A lot 5=Problem is as "bad as it can be" </p>	
Because of my voice,	How much of a problem is this?
1. I have trouble speaking loudly or being heard in noisy situations.	1 2 3 4 5
2. I run out of air and need to take frequent breaths when talking.	1 2 3 4 5
3. I sometimes do not know what will come out when I begin speaking.	1 2 3 4 5
4. I am sometimes anxious or frustrated (because of my voice).	1 2 3 4 5
5. I sometimes get depressed (because of my voice).	1 2 3 4 5
6. I have trouble using the telephone (because of my voice).	1 2 3 4 5
7. I have trouble doing my job or practicing my profession (because of my voice).	1 2 3 4 5
8. I avoid going out socially (because of my voice).	1 2 3 4 5
9. I have to repeat myself to be understood.	1 2 3 4 5
10. I have become less outgoing (because of my voice).	1 2 3 4 5

Fig. 1: Voice-related quality of life (V-RQOL) questionnaire

Scoring Algorithm for V-RQOL Measure	
<i>V-RQOL General Scoring Algorithm</i>	
$100 - \frac{(\text{Raw Score} - \# \text{ Items in Domain or Total})}{\text{Highest Possible Raw Score} - \# \text{ Items}} \times 100$	
<i>Social-Emotional Domain (Items 4, 5, 8, 10)</i>	
$100 - \frac{(\text{Raw Score} - 4)}{16} \times 100$	
<i>Physical Functioning Domain (Items 1, 2, 3, 6, 7, 9)</i>	
$100 - \frac{(\text{Raw Score} - 6)}{24} \times 100$	
<i>Total Score (Items 1-10)</i>	
$100 - \frac{(\text{Raw Score} - 10)}{40} \times 100$	
<i>Example for Total Score</i>	
If Raw Score is 30 (Such As If a "Medium Problem" Exists With All Items), Then:	
$100 - \frac{(30)}{40} \times 100$	
$=100 - (0.5 \times 100) = 100 - 50 = \text{Standard Score}$	

Fig. 2: Expressions used for calculation of scores (2)

Table 1: Grading of scores on voice-related quality of life (2)	
100	Excellent
75	Fair to good
50	Poor to fair

25	Poor
0	Worst possible

Results

The results are shown in the tables below.

Discussion

Totally 41 patients including 25 males and 16 females were studied. The patient's age range was between 17 years to 67 years. Out of the 41 patients with vocal cord palsy, 31 (75.6%) had left vocal cord palsy, 9 (21.9 %) had right vocal cord palsy and 1 (2.4%) had bilateral adductor palsy .The increased % of involvement of left side is a proven fact due to the high risk for injury to the left recurrent nerve compared to much shorter right sided course.(1)

Endo-tracheal intubation constituted 15/41 (36.5%) of the total vocal cord palsy patients in this study which turned out to be the major cause. Endotracheal intubation for general anesthesia or assisted breathing has the possibility of causing vocal cord palsy. Trauma can be also caused by the use of an inappropriately sized endotracheal tube cuff causing indirect pressure trauma or a direct trauma by endotracheal tube or nasogastric tube. Trauma due to intubation can also occur in patients connected to ventilator for elective ventilation to avoid respiratory insufficiency in intensive care units. Tracheostomy will be a better option when a longer post-operative intubation time is anticipated, because it would be effective for both respiratory assistance as well as vocal cord protection (20). In case of any abnormalities recognized after extubation it is important to have consultation with an otorhinolaryngologist to differentiate between vocal cord palsy and arytenoid dislocation. In case of arytenoid dislocation surgical treatment can be done and delayed diagnosis leads to a complicated situation where ankylosis of cricoarytenoid articulation makes repositioning more difficult.(3)

The second major cause for vocal cord palsy in our study was surgical trauma (iatrogenic) which constituted 26.8 %(11/41) out of which Cardiac surgery (Coronary Artery Bypass Grafting (CABG) contributed to 18.18% (2/11) and thyroidectomy contributed to 81.81% (9/11). Nerve injury during cardiac- thoracic surgery could be either due to intubation trauma or a direct manipulation and retraction procedure during the surgery. Hyperextension of the neck during cardiovascular surgery increases the chance of compression of the recurrent laryngeal nerve because of displacement of the cuff and esophageal traction.(4,5) Studies show 1% to 2% incidence of injuries to RLN when performed by an experienced surgeon and the incidence is higher when thyroidectomy is done by less experienced surgeon.(6) Sometimes the nerve is purposely removed in case of aggressive cancer.(7) According to Echternach et al (8) in a study of 761 patients; laryngeal complications after thyroidectomies are primarily caused by injury to the vocal folds from intubation and to a lesser extent by injury to the laryngeal nerve. In health care there is always a probability of disastrous consequences. It is this awareness that often precludes such occurrences as we tenaciously heighten our attention and alertness when we encounter risky situations or tasks. Hence, surgeons need to be alerted towards adopting safer thyroidectomy techniques. RLN should be always identified during all surgical procedures on thyroid gland (9,10) and this requires surgeons to have the knowledge of the anatomic course of the nerve and its variations.(11-13) The use of nerve monitoring device may help the surgeon in preserving the RLN.(14,15) Maintaining intraoperative hemostasis is also important.(16)

Table 2: Profile of patients with vocal cord palsy

Cause	No of patients (%)	Age	Sex	Rt/Lt	Symptoms
Intubation trauma	15/41 (36.5%)	24yrs	M	Lt	Hoarseness
		36yrs	M	Lt	Hoarseness
		54yrs	F	Rt	Hoarseness; Aspiration with liquids and solids
		54 yrs	F	Lt	Hoarseness
		52yrs	M	Rt	Hoarseness
		32yrs	M	Rt	Hoarseness
		54yrs	M	Lt	Hoarseness
		34 yrs	M	Lt	Hoarseness
		42 yrs	M	Lt	Hoarseness
		54 yrs	F	Rt	Hoarseness
		52yrs	M	Lt	Hoarseness
		32yrs	M	Lt	Hoarseness
		54yrs	M	Lt	Hoarseness
		34 yrs	M	Lt	Hoarseness
		42 yrs	M	Lt	Hoarseness
Surgical	11/41 (26.8%)				
Cardiac surgery (Coronary Artery Bypass Grafting [CABG])	2/41 (4.8%)	56yrs	M	Lt	Hoarseness
		64 yrs	M	Lt	Hoarseness
Thyroideectomy (Total thyroideectomy for papillary carcinoma of thyroid)	1/41 (2.4%)	38 yrs	F	Lt	Hoarseness, Aspiration for Liquid intake
Total thyroideectomy for multinodular goi	8/41 (19.5%)	54yrs	F	Lt	Ventricular dysphonia
		53yrs	F	Lt	Hoarseness
		46yrs	F	Rt	Hoarseness
		58yrs	F	Lt	Hoarseness
		48yrs	F	Lt	Hoarseness
		46yrs	F	Lt	Hoarseness
		44yrs	F	Lt	Hoarseness
		67yrs	F	Rt	Hoarseness
Non-surgical Trauma	4/41 (9.7%)				
Direct trauma to larynx (cut on the throat with knife)	1/41 (2.4%)	18 yrs	F	Rt	Hoarseness, Aspiration with liquids
Direct trauma to larynx (motor vehicle accident)	2/41 (4.8%)	23yrs	M	Lt	Hoarseness
		34yrs	M	Lt	Hoarseness
Cervical injury due to fall	1/41 (2.4%)	28yrs	M	Rt	Ventricular dysphonia
Neurological	6/41 (14.6%)				
Lateral Medullary syndrome	3/41 (7.3%)	46yrs	F	Lt	Hoarseness, Severe dysphagia – could not swallow even saliva
		44yrs	M	Lt	Hoarseness, Severe dysphagia – could not swallow even saliva
		67yrs	M	Lt	Hoarseness, Severe dysphagia – could not swallow even saliva
Left Sphenopetroclival meningioma	1/41 (2.4%)	48 yrs	M	Lt	Hoarseness
Myasthenia gravis	1/41 (2.4%)	52 yrs	M	Bilateral adductor palsies	Breathy voice
Traumatic brain injury	1/41 (2.4%)	62yrs	M	Rt	Global aphasia, breathy voice, Aspiration of solids and liquids
Cardiac disorders (Ortner syndrome/cardio-vocal syndrome)	3/41 (7.3%)				
Dilatation of the pulmonary artery.	1/41 (2.4%)	47yrs	M	Lt	Hoarseness
Cardiomegaly	2/41 (4.8%)	63yrs	M	Lt	Hoarseness, High pitch probably due to increased muscle tension while trying for compensatory adduction of normal cords
		46yrs	F	Lt	Hoarseness
Tuberculosis of lungs	1/41 (2.4%)	17 yrs	F	Lt	Hoarseness
Cancer of lungs	1/41 (2.4%)	57 yrs	M	Lt	Hoarseness

Table 3: Scores obtained by vocal cord palsy patients on voice-related quality of life (V-RQOL).

	Scores	SD	Grading
Physical functioning domain	4.17	1.2	Poor
Social emotional domain	12.5	2.1	Poor
Global domain	22.5	3.2	Poor

Neurological problems turned out to be 14.6% (6/41) of the total cases. Lateral medullary syndrome (also called Wallenberg syndrome and posterior inferior cerebellar artery syndrome) due to stroke in the lateral part of the medulla in the brainstem in our patients resulted in hoarseness as well as severe dysphagia (inability to swallow including one's own saliva) due to involvement of the nucleus ambiguus. The other neurologic causes for vocal cord palsy were Left Sphenopetroclival meningioma, Myasthenia gravis and Traumatic brain injury.

Non-surgical trauma constituted 9.7% (4/41) of the total patients which included patients with direct trauma to larynx (cut on the throat with knife, motor vehicle accident) and cervical injury due to fall.

Left recurrent laryngeal nerve paralysis was found as a complication of heart disease in 4.8% (2/41). Ortner syndrome also known as cardio-vocal syndrome, first described by Ortner in 1897 is a clinical entity characterized by hoarseness (secondary to left sided recurrent laryngeal nerve palsy) caused by cardio vascular diseases.(18, 19) According to Stocker et al (20) pulmonary artery plays a crucial role in cardiovocal syndrome. Vocal cord palsy can be caused by compression of the left recurrent laryngeal nerve between the enlarged hypertensive pulmonary artery, the aorta and the ligamentum.

Acquired cardiovascular disease such as cardiomegaly, pulmonary hypertension, aortic arch aneurysm, right subclavian aneurysm, ductus arteriosus aneurysm, or an enlarged left atrium may compress or stretch the left recurrent laryngeal nerve.(21-26) Data is scanty on vocal cord palsy in patients with cardio vascular pathology. This could be because of the focus given on patient's survival rather than secondary complications of the disease and its treatment.(27)

We had one patient (2.4%) with unilateral vocal cord palsy due to recurrent laryngeal nerve entrapment and compression by enlarged tubercular mediastinal lymph nodes. Enlarged tracheobronchial lymph nodes can compress the left recurrent laryngeal nerve.(17) Vocal cord palsy of the left side was found in one patient (2.4%) with lung cancer.

The voice related quality of life of these patients was found to be poor (Table 2). They were found to have problems in the social emotional domain (Mean 12.5, SD 2.1) and physical functioning domain (Mean 4.17, SD 1.2.)

Hoarseness of voice is the most common symptom with associated dysphagia in few. Patients with vocal cord paralysis have an increased risk of aspiration. Ventricular dysphonia was also found in few patients which probably would have developed as a compensatory strategy for impaired true vocal cord movements.

Conclusion

The most frequent cause for vocal cord palsy in our study was Intubation trauma followed by surgical trauma, neurological conditions, non-surgical trauma and cardiac disorders. Tuberculosis of lungs and cancer of lungs accounted to be the rarest cause. The voice related quality of life of these patients was found to be poor. Hoarseness of voice is the most common symptom with associated dysphagia in few.

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