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A study to analyze vocal cord palsy with reference to nerve involvement presenting in tertiary care hospital in Eastern India

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Abstract

Background: Common causes of vocal could paralysis are neoplasms (bronchial, esophageal, thyroid), trauma, idiopathic, neurological, inflammatory & miscellaneous. With limited resource at our disposal, present study was aimed to find out etiopathology & classification of vocal cord palsy at our tertiary hospital.
Material and Methods: Present study was single-center, prospective, observational study, conducted in confirmed cases of vocal cord paralysis.
Results: This study was done on 44 patients of vocal cord paralysis. Majority were from 41-50 years age group (29.55%) followed by 51-60 years age group (20.45%). Sex incidence in this series revealed 27 male cases and 17 female cases. In present study common causes of vocal cord paralysis were Neoplastic growth (32%) followed by surgical trauma (30%), Blunt Trauma over front of neck (4%), pulmonary tuberculosis (11%), Idiopathic (16%), Cardiac hypertrophy (4%), cranial polyneuritis (4%) & Corrosive ingestion (4%). Left cord palsy, right cord paresis and bilateral paresis was noted in 55%, 27% & 18% cases respectively. 8 patients in this study were suffering from bilateral vocal cord paralysis and rest of the patients (36) had unilateral paralysis. So total number of paralyzed cords was 52. Out of these, 47 vocal cords were paralyzed completely and incomplete paralysis was seen in case of 5 cords. n most of the cases (27) it was in paramedian in position. Paralyzed cord was in midline in 12 cases, cadaveric in 8 cases. Incomplete palsy with restricted mobility was seen in 5 cases.
Conclusion: Neoplastic growth, trauma (surgical and non-surgical) & pulmonary TB were most common causes for vocal cord paralysis. Vocal cord paralysis was common in male patients, on left side & unilateral involvement.

Keywords: Vocal cord paralysis, neoplastic growth, trauma, pulmonary TB

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Introduction

Common causes of vocal could paralysis are neoplasms (bronchial, esophageal, thyroid), trauma, idiopathic, neurological, inflammatory & miscellaneous [1]. Paralysis of vocal cord (VCP) is caused by pathology involving the vagus nerve. Vagus nerve may be involved anywhere, from its central origin in medulla up to the motor nerve unit on laryngeal muscles [2].

Patients of vocal cord palsy generally present with altered voice, aphonia or dyspnea. Altered voice may be caused by lot of other pathologies; common are localized mass lesion and respiratory tract infection [3]. Thorough examination is required to exclude the cases with other pathologies than pure vocal cord paralysis due to involvement of vagus nerve.

Pathology of thyroid gland plays a major role in the etiopathology of vocal cord paralysis. Laryngeal nerves may be involved either directly by neoplastic growth of thyroid, or indirectly during thyroid surgery. With limited resource at our disposal, present study was aimed to find out Etiopathology & classification of vocal cord palsy at our tertiary hospital.

Material and Methods

Present study was single-center, prospective, observational study, conducted in department of otorhinolaryngology, at Indira Gandhi Institute of Medical Sciences, Sheikhpura, India. Study duration was of 2 year (1st July 2019 to June 2021). Study was approved by institutional ethical committee.

Inclusion criteria

- Confirmed cases of vocal cord paralysis

Exclusion criteria

- Cases with fixed vocal cord due to local causes like any growth

After selection of cases, detailed clinical examination and investigations were done as per proforma to diagnose the cause of vocal cord paralysis. Detailed history and through clinical examination was the cornerstone to arrive at the diagnosis. Surgical traumas to the vagus nerve or its laryngeal branches were very obvious from detailed history and clinical examination.

Patients were subjected to detailed history collection (Age, Sex, Chief Complaints, Past Medical/Surgical History, Family History & Personal History), examination (Systemic examination- specially CNS and all the cranial nerves, ENT Examinations:- Through examination of nose, nasopharynx, paranasal sinuses, oral cavity and oropharynx, neck, hypopharynx, larynx, Aryepiglottic folds and arytenoids, Vestibular fold and vocal cords as well indirect laryngoscopy). Investigations done were CBC, ESR, Sugar (F), sputum for AFB,

X-Ray (chest, soft tissue neck), if required CT scan (chest, brain, nose and paranasal sinuses, neck), MRI of Brain, ECG, Echocardiography were done. Whenever required direct laryngoscopy, Micro-laryngoscopy, Esophagoscopy, Nasal Endoscopy, Trans nasal Fiberoptic Laryngoscopy, Bronchoscopy and biopsy/lavage were done. Biopsy and histopathological Examinations were done.

Data was collected and compiled using Microsoft Excel, analysed with descriptive statistics.

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Results

This study was done on 44 patients of vocal cord paralysis. Majority were from 41-50 years age group (29.55%) followed by 51-60 years age group (20.45%). Sex incidence in this series revealed 27 male cases and 17 female cases.

Table 1: Age & gender distribution

Age groups	Male	Female	Total
10-20	0	3 (6.82%)	3 (6.82%)
21-30	4 (9.09%)	3 (6.82%)	7 (15.91%)
31-40	3 (6.82%)	4 (9.09%)	7 (15.91%)
41-50	8 (18.18%)	5 (11.36%)	13 (29.55%)
51-60	7 (15.91%)	2 (4.55%)	9 (20.45%)
61-70	2 (4.55%)	0	2 (4.55%)
71-80	3 (6.82%)	0	3 (6.82%)
Total	27 (61.36%)	17 (39.64%)	44

In present study common causes of vocal cord paralysis were Neoplastic growth (32%) followed by surgical trauma (30%), Blunt Trauma over front of neck (4%), Pulmonary tuberculosis (11%), Idiopathic (16%), Cardiac hypertrophy (4%), Cranial polyneuritis (4%) & Corrosive ingestion (4%).

Table 2: Etiopathology of vocal cord paralysis

Etiopathology	No. of patients	Percentage
Neoplasm	14	32%
Surgical Trauma	13	30%
• Thyroidectomy	10	76%
• Coronary artery by-pass grafting	1	8%
• Excision of carotid body tumour	1	8%
• Esophagoscopy	1	8%
Idiopathic	7	16%
Pulmonary Tuberculosis	5	11%
Non-surgical Trauma	2	4%
Cardiac Hypertrophy	1	2%
Cranial Polyneuritis	1	2%
Corrosive Ingestion	1	2%

Vocal cord paralysis were caused by neoplastic lesion involving vagus nerve or its laryngeal branches. Common neoplastic lesions were of thyroid gland (36%) (3 cases had papillary carcinoma and 1 each case of follicular and medullary carcinoma), mediastinum (36%) (3 cases had bronchogenic carcinoma. Malignant lymphoma and carcinoma esophagus in upper 1/3rd was seen in 1 each case) & metastasis in cervical node (14%).

Table 3: Neoplastic lesion causing vocal cord paralysis (N=14)

Etiopathology	No. of patients	Percentage
Thyroid neoplasm	5	36%
• Papillary carcinoma	3	60%
• Follicular carcinoma	1	20%
• Medullary carcinoma	1	20%
Neoplastic growth in mediastinum	5	36%
• Bronchogenic carcinoma	3	60%

• Malignant lymphoma	1	20%
• Carcinoma esophagus	1	20%
Metastasis in cervical lymph node	2	14%
NHL in cervical lymph node	1	7%
Carcinoma of Nasopharynx	1	7%

In present study 23 patients with vocal cord palsy had some causes in neck. Most of the neck causes of vocal cord palsy were due to surgery in neck region (49%), followed by primary carcinoma in neck region (30%), metastasis in cervical lymph node (8.5%), non-surgical trauma (8.5%) & accidental ingestion of corrosive (4%).

Table 4: Vocal cord paralysis caused by different pathology in neck (n=23)

Etiopathology	No. of patients	Percentage
Neck surgery	11	49%
Primary carcinoma in neck region	7	30%
Metastasis in cervical lymph node	2	8.5%
Non-surgical Trauma	2	8.5%
Corrosive Ingestion	1	4%

Out of 13 cases with some pathology in mediastinum, most of the patients had neoplastic lesion in mediastinum (38%) or pulmonary tuberculosis (38%).

Table 5: Different causes in mediastinum

Etiopathology	No. of patients	Percentage
Neoplastic lesion	5	38%
Pulmonary tuberculosis	5	38%
Surgical Trauma	2	16%
Cardiac Hypertrophy	1	8%

We have documented 15 cases of traumatic vocal cord paralysis. Majority had surgical trauma (87%). Non-surgical trauma was found in two cases. Both presented with bilateral abductor paralysis just after the severe blunt trauma in front of neck.

Table 6: Traumatic causes of vocal cord paralysis.

Etiopathology	No. of patients	Percentage
Surgical Trauma	13	87%
Non-surgical Trauma	2	13%

In present study, left cord palsy, right cord paresis and bilateral paresis was noted in 55%, 27% & 18% cases respectively.

Among, left sided vocal cord paralysis common causes were pathology in mediastinum or any operative procedure there, presented with left vocal cord paralysis exclusively (in 12 cases). Right vocal cord paralysis was seen in 12 cases and 11 of them had pathology or operative procedure in the cervical region only.

Table 7: Side & Etiopathology of vocal cord paralysis

Etiopathology	No. of patients	Percentage
Left vocal cord paralysis (N=24)		
Pathology in mediastinum	12	50%
Pathology in neck	7	29%
Pathology is idiopathic	4	17%

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Central cause	1	4%
Right vocal cord paralysis (N=12)		
Pathology in neck	11	92%
Idiopathic	1	8%
Bilateral vocal cord paralysis (N=8)		
Surgical trauma in neck	3	37.5%
Idiopathic	2	37.5%
Non-Surgical trauma in neck	3	25%

8 patients in this study were suffering from bilateral vocal cord paralysis and rest of the patients (36) had unilateral paralysis. So total number of paralyzed cords was 52. Out of these, 47 vocal cords were paralyzed completely and incomplete paralysis was seen in case of 5 cords. n most of the cases (27) it was in paramedian in position. Paralyzed cord was in midline in 12 cases, cadaveric in 8 cases. Incomplete palsy with restricted mobility was seen in 5 cases.

Table 8: Incidence of different position of paralysed vocal cord (N=52).

Position of vocal cord	No. of patients	Percentage
Paramedian	27	52%
Median	12	23%
Cadaveric	8	15%
Incomplete palsy	5	10%

Discussion

In present study, out of 15 cases of thyroid neoplasm, preoperative vocal cord paralysis was noted only in 5 (11.5%) cases all of them had malignant neoplasm of thyroid gland. In the remaining 10 (23%) cases laryngeal nerves were injured during thyroidectomies.

Stell and Maran [1] have described surgical trauma mostly thyroidectomy as the cases of vocal cord paralysis in 20% cases. They have also noticed thyroid carcinoma in 2.5% cases of vocal cord paralysis. Sturar M *et al*., [4] in their study of 608 cases of thyroid surgery for benign and malignant disease have described transient recurrent laryngeal nerve palsy in 3.4% and 7.2% of cases respectively and it was permanent palsy in 0.3% and 1.2% of cases respectively.

Five cases of vocal cord paralysis due to carcinoma of thyroid gland were documented. Among these 3 (60%) cases were diagnosed as papillary carcinoma. Medullary and follicular carcinoma were seen one (20%) in each case. As per Robbins and Cotran [5] incidence of papillary carcinoma is 75-85%, follicular carcinoma 10-15% and medullar carcinoma is 5% only. So it can be inferred that the risk of nerve involvement and vocal cord paralysis is much more for medullary and follicular carcinoma than papillary carcinoma.

Stell and Maran [1] described malignant disease in 25% of cases. Among this bronchial carcinoma was seen in 50% of cases, esophageal carcinoma in 20%, and thyroid carcinoma in 10% and other malignancy in 20% of cases. They also described surgical trauma (20%) mostly in the form of neck surgery and non-surgical trauma (15%) as the case of vocal cord paralysis. Similar findings were noted in present study.

Laoughran S [2] has shown a very high rate (43%) of vocal cord paralysis due to bronchial carcinoma in Scotland. Incidence of bronchogenic carcinoma varies from region to region. Such a high rate of vocal cord paralysis caused by lung cancer in Scotland is due to increased number of smokers there. In present study, very low rate vocal cord palsy due to bronchogenic carcinoma. This may be explained by following facts.

Incidence of lung cancer is low in India. As per K. Park [3, 6] the age standardized cancer

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incidence per 100,000 populations in England and Wales in 72.0 and 19.0 in mate and female respectively. The same incidence in India is 15.7 in male and 3.5 in female.

High rate of pulmonary tuberculosis as the cause of vocal cord palsy. It is as high as 11.5% of total cases. As patients suffering from pulmonary tuberculosis are referred to super specialty and apex hospitals like ours.

There were 27 male and 17 female patients in this study. Etiopathology of vocal cord paralysis differed markedly in male and female. Thyroid pathology, either directly by carcinoma of thyroid or indirectly after thyroidectomy, played major role in female patients. It was responsible in female and male sex in 53% and 22% of cases respectively. Thyroid related etiopathology is more than double in females as compared to males.

Incidence of discrete thyroid swelling and thyroid neoplasm is more in females. Annual incidence of thyroid neoplasm was 3.7 per 100.00 populations and the sex ratio is three females to one male [7]. Thyroid nodules are 3-4 times more common in females. Incidence of thyroid carcinoma is also more in females. A female predominance has been among patients who develop thyroid cancer in early and middle adult life, perhaps related to the expressions of estrogens receptors on the neoplastic thyroid epithelium [6].

In this study pulmonary tuberculosis was responsible for 18.5% cases of vocal cord paralysis in male patient exclusively. There was no such case in female sex in this study. As described by K. Park [6], the prevalence of tuberculosis is 35% in males and 25% in females. Prevalence of infection increased with age up to the age of 45-54 years in males. Peak incidence in females is in below 35 years of age. Tuberculosis is becoming a disease of elderly males. So complications of pulmonary tuberculosis (e.g. vocal cord paralysis) increases with increased prevalence of this disease in male sex.

In this study 7 cases had vocal cord paralysis for which no causes could be found. Different study reveals different incidence of idiopathic vocal cord paralysis which varies from 11 to 15% [Loughran S^2-11%, Stell and Maran[1]-15%]. Eckel HE *et al*., [8] had documented very low rate of idiopathic vocal cord paralysis (2.2%) Such a low rate may be due to the fact that, he had also documental 14.7% cases of arytenoids cartilage fixation which mimics vocal cord paralysis.

Incidence of vocal cord paralysis is more on left side than right. But when cervical pathology is concerned it is the right vocal cord which is more vulnerable. In our study of 44 cases of vocal cord paralysis it was left sided in 24(55%), right sided in 12(27%) and bilateral in 8 cases (18%).

Right recurrent laryngeal nerve has more incidence of injury in cervical region. Incidence of non-recurrent recurrent laryngeal nerve [NRRLN] is exceeding rare but it is more on right side. NRRLN is more prone to injury during neck surgery. Sciume *et al*., [9] have reviewed 263 right RLN and 251 left RLN exposure. They had noticed only 2 cases of NRRLNs and that too was in right side for an incidence of 0.39% [0.76% only for right dissection]. NRRLN are rare and is associated with a right subclavian artery arising from distal aortic arch.

Right recurrent laryngeal nerve after its origin in front of first part of right subclavian artery, curves below and behind it and then ascends obliquely and medially by the side of trachea [10]. So at the base of neck right RLN may has an oblique course before in reach the tracheo-esophageal groove. On the contrary, left recurrent laryngeal nerve after curving below and behind the left end of arch of aorta, ascends directly in the tracheo-esophageal groove. Also right recurrent laryngeal nerve is more anterior than left one & equally anterior to, posterior to or intermingled with the terminal branches of the of the artery. This increases the chances of injury to right recurrent laryngeal nerve during neck surgery.

Sophisticated investigation procedures may detect etiopathogenesis in a sizable number of idiopathic cases of vocal cord paralysis. So factors like advance investigation procedures, economic status and awareness of patient play a major role to find out the exact etiopathology

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of vocal cord paralysis.

Conclusion

Neoplastic growth, trauma (surgical and non-surgical) & pulmonary TB were most common causes for vocal cord paralysis. Vocal cord paralysis was common in male patients, on left side & unilateral involvement.

Conflict of Interest: None to declare.

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