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Original Article

A Comparative Study of Fiberoptic Laryngoscopy (FOL) and Indirect Laryngoscopy in the Diagnosis of Patients with Vocal Cord Lesions

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Abstract:

Background: Change of voice is one of the common complaints in ENT practice and hoarseness of voice is the commonest symptom of changed voice quality. Hoarseness is invariably the earliest manifestation of conditions directly or indirectly affecting the voice apparatus. Though most common causes of hoarseness are benign and vocal abuse is the commonest among them, but we should always investigate for more sinister pathology like malignancy. The aim of this study was to compare the diagnostic yields of fiberoptic laryngoscopy (FOL) with that of indirect laryngoscopy in the diagnosis of vocal cord lesions.

Objectives: To compare fiberoptic laryngoscopy (FOL) and indirect laryngoscopy in the diagnosis of vocal cord lesions as the cause of voice change.

Methods: This is a cross-sectional study which has been conducted in the Department of ENT and Head Neck Surgery, SSMC Mitford Hospital with a sample size of 87 cases for a period of six months from 10th February' 2020 to 9th August' 2020. The patients with vocal cord lesions were selected according to the eligibility criteria by purposive sampling.

Results : On indirect laryngoscopic examinations, 29.89% were vocal cord polyp, 16.09% suspected vocal cord neoplasm, 14.94% vocal cord edema, 11.49% vocal

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cord nodule, 5.74% vocal cord palsy and 2.61 were ulcerative lesion of vocal cords whereas poor view were in 18.39% cases. On fiberoptic laryngoscopy (FOL), 29.89% were vocal cord polyp, 19.54% suspected vocal cord neoplasm, 17.24% vocal cord edema, 16.09% vocal cord nodule, 8.04% vocal cord palsy and 6.90% were ulcerative lesion of vocal cord. 2.30% revealed normal study. Study showed that fiberoptic laryngoscopic examination is superior to indirect laryngoscopy in diagnosing vocal cord lesions. **Conclusion** : Fiberoptic laryngoscopy (FOL) is significantly superior to indirect laryngoscopy in the diagnosis of vocal cord lesions. Indirect laryngoscopy sometimes may miss to diagnose a sinister disease like malignancy.

Keywords: Fiberoptic laryngoscopy (FOL), Indirect laryngoscopy (IL), Voice change, Vocal cord lesion, Laryngeal malignancy.

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Introduction:

Hoarseness is usually the earliest manifestation of conditions directly or indirectly affecting the voice apparatus. Usually it is the symptom of vocal cord lesions and should not be ignored if it persists more than 2 weeks or not responding to conventional treatment. Though most common causes of hoarseness are benign and vocal abuse is the commonest among them, but we should always exclude more sinister pathology like malignancy. Although many patients are examined with indirect laryngoscopy, this is not always conclusive and visualization is often poor. The areas which cannot be seen by indirect laryngoscopy are anterior commissure, laryngeal part of epiglottis and subglottis. Hoarseness is the term used to describe a change in normal quality of voice which is caused by abnormal vocal cord movement.^{1,2} The hoarseness could be divided into acute or chronic.³ The acute onset is more common and mainly caused by inflammation like acute laryngitis whereas other causes may be smoking, voice abuse, laryngeal trauma or thyroid surgery.⁴ The chronic onset is mainly caused by vocal cord nodule, polyp, laryngeal papillomatosis, benign and malignant tumor

of vocal cord, functional dysphonia, smoking, voice abuse, laryngopharyngeal reflux, post nasal drip, neoplasm of thyroid gland, esophagus, lung, chronic granulomatous disease like tuberculosis or systemic disease like diabetes mellitus.⁵⁻⁷ The complaints of hoarseness may imply serious disease like carcinoma of larynx, so it should not be ignored.⁸ Voice quality can be evaluated using the GRBAS (Grade, Roughness, Breathiness, Asthenia and Strain) assessment.⁹ ENT assessment should include examination of the larynx by indirect laryngoscopy and fiberoptic laryngoscopy, stroboscopy and narrow band imaging.¹⁰ Fiberoptic Laryngoscopy (FOL) is the procedure by which larynx can be examined appropriately with adequate illumination and visualization. Findings can also be displayed with monitor and can be documented for further reference.¹¹

Fiberoptic imaging was initially developed to visualize inaccessible regions of the body.¹² Current fiberoptic nasopharyngolaryngoscopes are lighted, are flexible with 2-way articulation, provide high resolution photo and video capabilities, and can have a distal diameter as small as 2 mm¹³. Fiberoptic laryngoscopy is indicated when visualization of the nasopharyngolaryngeal anatomy is

needed for diagnosis, treatment, or both as well as for follow up¹⁴. In the nasal cavity, fiberoptic laryngoscopy can visualize polyps, tumors, foreign bodies, or sources of epistaxis. In the nasopharynx, the scope can help identify suspected tumors or adenoidal hypertrophy¹⁵. In the oropharynx or hypopharynx, fiberoptic laryngoscope be used to evaluate foreign bodies and potential airway obstruction from such etiologies as neoplasm and also other pathologies like tonsillar hypertrophy, glossoptosis, or laryngomalacia¹⁶.

In the vocal cords- polyps, nodules, edema, sulcus vocalis, cyst, tumors both benign and malignant and impairment of their movement can be identified properly with fiberoptic laryngoscopy¹⁷. FOL is considered as a safe procedure with few contraindications and mild complications in experienced hands. Often it seems to be difficult to diagnose vocal cord lesions by conventional indirect laryngoscopy (I/L), especially when the lesion is at an early stage. In this situation fiber optic laryngoscopy (FOL) is very helpful. This study has been designed to compare fibreoptic laryngoscopy (FOL) and indirect laryngoscopy as a diagnostic tool for vocal cord lesions.

Materials and Methods:

Total 87 patients with vocal cord lesions studied in 06 months period from 10th February' 2020 to 9th August' 2020 in the Department of ENT & Head-Neck Surgery, Mitford hospital, Dhaka. The patients with vocal cord lesions were selected according to the eligibility criteria by purposive sampling. Then the data were collected by the active participation of the patients interviewed by the pretested data sheet, then data were gathered decorated and tabulated after data cleaning and edition in prospective method. The results were presented in graphical and tabulated form.

Results:

Table-I : Age distribution of the study population (n=87)

Age group (Years)	Study patients	Percentage (%)
11-20	07	8.05 %
21-30	13	14.94 %
31-40	26	28.89 %
41-50	12	13.80 %
51-60	19	21.84 %
>60	10	11.49 %
Total	87	100 %

Commonest age group was 31-40 years (28.89 %) followed by the age group of 51-60 years (21.84%)

Table II: Relation of smoking & vocal cord lesions in study population (n=87)

Habit	No. of patient	Percentage %
Smoker	38	43.68 %
Non smoker	49	56.32 %
Total	87	100 %

A large number of patients had habit of cigarette smoking. 38 patients out of total 87 patients with vocal cord lesions were smoker (43.68 %). So, smoking was frequently occurring in patients with vocal cord lesions.

Table III: Clinical presentation of study population (n=87)

Presentation	No. of cases	Percentage
Change of voice	87	100
Vocal fatigue	24	27.59
Breathlessness	5	5.74
Sore throat	4	4.59
Difficulty in swallowing	13	14.94
Irritating cough	19	21.84
Stridor	2	2.29

Apart from the symptom of change in voice (100 %), other common presentations were vocal fatigue (27.59 %), irritating cough (21.84 %), difficulty in swallowing (14.94%), breathlessness (5.74%), sore throat (4.59%) and stridor (2.29%) in descending order of frequency.

Table IV: Duration of change of voice (n=87)

Duration of hoarseness of voice	No of cases	Percentage
<3 months	42	48.27%
3 to 6 months	19	21.84%
6 to 12 months	9	10.34%
> 12 months	17	19.54%
Total	87	100%

Table V: Indirect laryngoscopic findings (n=87)

Findings	No. of patients	Percentage (%)
Vocal cord polyp	26	29.89
Vocal cord edema	13	14.94
Vocal cord nodule	10	11.50
Suspected vocal cord neoplasm	14	16.09
Vocal cord palsy	5	5.74
Ulcerative lesion of vocal cord	3	3.45
Poor view	16	18.39

On indirect laryngoscopic examinations (I/L) 29.89% were vocal cord polyp, 16.09% Suspected vocal cord neoplasm, 14.94%

vocal cord edema, 11.49% vocal cord nodule, 5.74% vocal cord palsy and 2.61% were ulcerative lesion of vocal cords. Poor view was in 18.39% cases.

Table VI: Fibreoptic laryngoscopy (FOL) findings (n=87)

Findings	No. of patients	Percentage (%)
Vocal cord polyp	26	29.89
Vocal cord edema	15	17.24
Vocal cord nodule	14	16.09
Suspected vocal cord neoplasm	17	19.54
Vocal cord palsy	7	8.04
Ulcerative lesion of vocal cord	6	6.90
Poor view	0	0
Normal study	2	2.30

On fibreoptic laryngoscopic examinations (FOL) 29.89% were vocal cord polyp, 19.54% Suspected vocal cord neoplasm, 17.24% vocal cord edema, 16.09% vocal cord nodule, 8.04% vocal cord palsy and 6.90% were ulcerative lesion of vocal cords. 2.30% revealed normal study. There were no poor view.

Table VII: Comparison between findings of indirect laryngoscopy (I/L) and fibreoptic laryngoscopy (FOL) (n=87)

Findings	I/L(n=87)		FOL(n=87)	
	n	%	n	%
Vocal cord polyp	26	29.89	26	29.89
Vocal cord edema	13	14.94	15	17.24
Vocal cord nodule	10	11.50	14	16.09
Suspected vocal cord neoplasm	14	16.09	17	19.54
Vocal cord palsy	5	5.74	7	8.04
Ulcerative lesion of vocal cord	3	3.45	6	6.90
Poor view	16	18.39	0	0
Normal study	0	0.00	2	2.30
Total	87	100%	87	100%

Table VIII: Chi-square test of indirect laryngoscopy (I/L) and Fibreoptic laryngoscopy (FOL) findings (n=87)

Procedure	Lesion	No lesion	Total	χ^2	df	p-value
I/L	71(81.6%)	16(18.4%)	87 (100.0%)	12.145	1	<.0005
FOL	85(97.7%)	2(2.3%)	87 (100.0%)			

On I/L examination, lesions found in 71 cases out of 87 whereas on FOL examination, lesions found in 85 cases out of 87. Chi-square test was done. Here

p-value is <.0005. So this difference is statistically significant.

Discussion:

A total of 87 patients were included in this study. Majority of patients were seen in age group of 31-40 years (28.89%) and 21.84 years (20.69%) followed by 3rd decade 21-30 years (14.94%). Baitha et al²¹ also found majority of patients (28.18%) in the age group of 31 to 40 years. Batra et al²² found largest group comprising 25% in 31 to 40 years age group. Kumar H et al²³ found 31% patients in 31-40 years age group. In our study 56.32% patients were seen in age group of 21-50 years. This observation slightly differs from Deshmukh²⁴, Mehta AS²⁵ and Baitha et al²¹ with 63.1%, 67.2% and 61.81% patients in 21-50 years age group respectively. So my study result slightly differs with the results of all these studies.

In this study, males were 56 (64.37%) and females were 31 (35.63 %), with male predominance and male to female ratio of 1.81:1. This coincides with study by Karan Sharma et al²⁶, Parikh N²⁷, Ahmad et al²⁸, Baitha S et al²¹, Mehta AS²⁵, Deshmukh²⁴, Banjara H et al²⁹, Kumar H et al²³, Batra et al²² and Behera et al³⁰. All these studies were showing male predominance and male to female ratio between 1.65:1 to 2:1. Smoking and exposure to noxious agents, overuse of

voice etc. are more common in male which might be predisposing factors for male preponderance. Regarding occupation of study population, 29 were businessman (33.33%); 16 were day labourer (18.39%), 10 were teacher (11.50%), 7 were student (8.05%), 22 were housewife (25.28%) and 3 were jobless (3.45%). All of the students were from madrasa (Hifz).

Regarding educational status 65% were at and below secondary level, 18% higher secondary level, 8% university level and 9% were illiterate. It has been seen that, the more educated patients are more health conscious & presents early, thus disease is detected at an early stage. Many cancer patients can be treated with a curative intend if they presents at an early stage of the disease. In this study, regarding personal habit, smoking was frequently occurring in patients with vocal cord lesions (43.68%). Our study correlates with study of Banjara H et al²⁹ and Behera et al³⁰ with 43% and 43.75% patients were associated with smoking. Chronic mucosal irritation by heavy smoking, excessive intake of alcohol and tobacco chewing in Asian countries play significant role in etiology of hoarseness. It was observed that in India and other developing countries the prevailing lower economic status, poor nutrition and general health, vocal habits, smoking and alcohol drinking habits, unhealthy environment, and different social customs influence the incidence of hoarseness²⁰.

In this study, change in voice was found in all patients (100%). Other symptoms were vocal

fatigue, breathlessness, sore throat, difficulty in swallowing, irritating cough and stridor. Mehta AS²⁵, Parikh N²⁷ and Baitha et al²¹ also found change in voice in all 100% patients. Other symptoms were also comparable with our study. Vocal abuse was found in 36.78% patients. It correlates with study of Banjara H et al²⁹, Behera et al³⁰ with 31% and 35% patients with vocal abuse respectively. In our study, vocal abuse was main predisposing factor in vocal nodules, vocal cysts and vocal cord polyps. Duration of change of voice ranged from 7 days to more than 3 years. Most of presenting complaints 48.27% were seen within 3 months, 21.84% within 3 to 6 months, 10.34% within 6 to 12 months and 19.54% complaints were of more than 1 year duration. Batra et al²² found 59% patients within first five months of appearance of symptoms and 86% of patients were found to present within first year of appearance of symptoms. Baitha et al²¹ noted duration range from 1 day to 5 years and 50% patients had duration of voice change in months. Chopra and Kapoor³¹ found 68.65% patients with duration of change of voice of less than one year. Banjara H et al²⁹ found 20.72% complaints were of more than 1 year duration. In our study, 19.54% complaints were of more than 1 year duration. So, our study correlates with all these studies.

On indirect laryngoscopic (I/L) examination, 29.89% were vocal cord polyp, 14.94% vocal cord edema, 11.5% vocal cord nodule, 16.09% suspected vocal cord neoplasm, 5.74% vocal cord palsy and 3.45% ulcerative lesions of vocal cord whereas 18.39% were poor vision. On fiberoptic laryngoscopic examinations (FOL) 29.89% were vocal cord polyp, 19.54% suspected vocal cord neoplasm, 17.24% vocal cord edema, 16.09% vocal cord nodule, 8.04% vocal cord palsy and 4.60% were ulcerative lesion of vocal cords. 2.30% cases were diagnosed

as laryngeal web whereas another 2.30% revealed normal study. Vision were clear in all cases. A prospective study- "Benign vocal cord lesions - a study of 25 cases" was carried out in the department of Otolaryngology and Head-Neck Surgery of Mitford Hospital, Dhaka.³² The study revealed- Vocal cord polyp- 12(48%), Vocal cord nodule- 05 (20%), Vocal cord papilloma- 1(04%) and Multiple papillomatoses 07(28%). In one study- a comparative study among direct, indirect and fiber optic laryngoscopy to evaluate v. cord paralysis after thyroid surgery revealed that FOL is the best method for evaluating the upper airway disorders³³.

Vocal cord nodule was seen more in patients who were housewife & had small children. A comparison has also been done between findings of I/L and FOL in tabulated form to see the difference at a glance. On I/L examination, lesions found in 71 cases out of 87 whereas on FOL examination, lesions found in 85 cases out of 87. This showed that fiber optic laryngoscopic examination is superior to indirect laryngoscopy in diagnosing vocal cord lesions. Finally chi-square test was done between I/L and FOL findings. Here *p*-value was <.0005. So this difference is statistically significant.

So, this study revealed that Fiberoptic Laryngoscopy (FOL) is superior to indirect laryngoscopy in the diagnosis of patients with vocal cord lesions.

Conclusion:

A patient presenting with change of voice may have any of a wide range of pathological conditions including malignant lesion which may be aggressive. Therefore early diagnosis of the underlying cause becomes all the more important in every case. Study showed that many of the study subjects having poor vision and normal I/L findings had lesions on FOL.

Some new lesions (e.g. laryngeal web) were also detected on FOL which were not detectable on I/L. Therefore, routine FOL evaluation is valuable and more accurate in the diagnosis of patients with vocal cord lesions causing voice change. It should always be considered in patients with persisting and progressive symptoms even though I/L appeared normal.

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