
Videolaryngoscopy by Using 70 – Degree 4 mm Rigid Sinuscope in Comparison with Flexible Fiberoptic Laryngoscopy Ehab Taha Yaseen FICMS (ENT)*

Abstract

Background: Laryngeal disorders are often multifactorial in etiology. There are 4 main causes of voice disorders which are inflammatory, structural or neoplastic, neuromuscular and muscle tension imbalance. Visual inspection of the larynx is mandatory for diagnosis or exclusion of laryngeal disease. This is usually performed in the clinic. The method of laryngeal examinations varies from indirect mirror laryngoscopy to the use of rigid and flexible endoscopes. Laryngoscopy can be supplemented with stroboscopy, laryngography or digital acoustic voice analysis.

Objective: To compare the accessibility and convenience of videolaryngoscopy using 70 - degree rigid sinuscope with flexible fiberoptic laryngoscopy in assessment of laryngeal lesions.

Method: This study incorporated 67 patients with predominant laryngeal symptoms. All of them had been examined by videolaryngoscopy using 70 – degree rigid sinuscope and flexible laryngoscope. Six parameters had been evaluated and compared between the two procedures including: time of examination, successfulness, acceptance for the examination, no. of trials needed for optimum information, complications and discomfort level.

Results: Successfulness was 95.5% in rigid videolaryngoscopy and 100% in flexible laryngoscopy. Patient's acceptance for examination revealed no significant differences between both procedures, however the average time spent during rigid videolaryngoscopy was significantly shorter than that spent by flexible laryngoscopy. No significant differences between both procedures regarding the no. of trials required for optimum examination but negligible level of discomfort was significantly less during rigid videolaryngoscopy. Failure of examination by rigid videolaryngoscopy was not significantly different than by flexible laryngoscopy.

Conclusion: Using rigid videolaryngoscopy was significantly better regarding the average time spent by examination and the negligible level of discomfort felt by the patient.

Keywords: Rigid videolaryngoscopy. Videolaryngoscopy. Flexible laryngoscopy. Laryngeal lesions. Laryngoscopy.

Introduction:

Although Garcia was credited with first description of mirror indirect laryngoscopy^[1]. Bozzini was actually the first to report on mirror visualization of the larynx and described the first indirect laryngoscope^[2].

Killain in 1909 introduced the suspension laryngoscopy and in 1960 Kleinsasser developed monocular telescope and discovered the great possibilities of this magnification in detecting early pathological changes^[3]. Late in the same year Scalo described the use of Zeiss operating microscope with the suspension laryngoscopy^[4].

Hopkin rods have greatly enhanced the magnification and depth for detailed observation during examination of the larynx; also they were modified to view in different angles^[5].

The invention of Hopkin rod telescope and flexible endoscope reserved direct laryngoscopy for therapeutic intentions. Laryngeal disorders are often multifactorial in etiology and to complicate matters patients may develop compensatory vocal behaviors in order to be able to communicate effectively. This may mask the true underlying or primary disorder. There are 4 main causes of voice disorders which are inflammatory, structural or neoplastic, neuromuscular and muscle tension imbalance^[6]. Visual inspection of the larynx is mandatory for diagnosis or exclusion of laryngeal disease. This is usually performed in the clinic^[6].

The method of laryngeal examinations varies from indirect mirror laryngoscopy to the use of rigid and flexible endoscopes. Laryngoscopy can be supplemented with stroboscopy, laryngography or digital acoustic voice analysis^[7].

Aims:

The aim was to compare the accessibility and convenience of videolaryngoscopy using 70 - degree rigid sinuscope with flexible fiberoptic laryngoscopy in assessment of laryngeal lesions.

Patients and method:

This study was of private clinic based videolaryngoscopies using 70 degree rigid sinuscope and fiberoptic flexible nasolaryngoscopy. Adult patients with predominant laryngeal symptoms were selected consecutively on their presentation.

Eligibility for the study

- Age eligible for the study: 15 years and above
- Genders eligible for the study: Both
- Site of the study: Personal clinic and Al-Yarmouk Teaching Hospital
- Criteria:

Inclusion criteria: All patients with predominant complaints of laryngeal symptoms. Any duration of symptoms were accepted for evaluation. Patients with no or with past medical history of laryngeal diseases or surgical laryngeal procedure were accepted for inclusion.

Exclusion criteria: Age below 15 years of age. Those with acute airway obstruction and had history of allergy to local anesthesia.

The numbers of patients who fulfilled the above criteria and qualified for the study were 67 patients. Full clinical assessment was done for every patient. Special awareness was taken regarding voice changes, pain on vocalizations, pain and or difficulties in swallowing, feeling something in the throat, frequent throat clearing, history of trauma to the neck or foreign body ingestion, history of

tracheostomy, heart burn and acidity, respiratory problem and past history of any previous surgery or endotracheal intubation.

All patients underwent videolaryngoscopy using 70 – degree, 4 mm rigid sinuscope (Private clinic based examination).

Equipment used for rigid videolaryngoscopy by sinuscope:

Seventy degree, 4 mm diameter × 175 mm length rigid sinuscope Tian Song, Cold light source PL-300, 250 W Tian Song, Fiberoptic light guide cable, Camera system F-068D Water proof single chip Tian Song, Capture device DVD maker 2, Dell Vostro 1015 laptop, Monitor 17" LCD Sony and Defogging agent.

Technique for laryngoscopy using 70 – degree 4mm rigid sinuscope:

The procedure completed while the patient was sitting on chair. Usually no topical anaesthesia was required; however, 10% Xylocaine spray was applied to base of the tongue and the posterior pharyngeal if there is over sensitive gag reflex. The Otolaryngologist stands in front of the patient while he was bending slightly forward with slight extension of the head. The tongue of the patient is pulled out with the doctor's left hand using a piece of gauze and with his right hand the scope lens was facing down and introduced forward through the oral cavity avoid touching the tongue. If any difficulty was faced to examine the anterior commissural area of the larynx, extension of the head was increased, care was taken to those with cervical problems, the sinuscope handle was further elevated to make its shaft touches the upper incisors and the tip of the scope is slightly further advanced to aid viewing these area. In order to evaluate all parts of the larynx, the scope was half rotated to the sides. Video movies were recorded for every examination as mpeg 2 formula. Picturing the findings can be done when needed. The time needed to complete the test was recorded once the tongue of the patient is grabbed with the gauze until the end of the examination.

All the 67 patients were re-examined with flexible laryngoscopy in the routine way as early as possible, local anesthesia was applied for all. The time needed to complete the test was recorded once the scope introduced into the nostril till the end of the examination. The following parameters were considered and compared between the two procedures:

- **Time consumed by the examination**
- **Successfulness:** was recorded by counting the successful examination against failed one.
- **Patients acceptance for the examination:** after finishing the examination, the patients were asked about their feelings regarding the examination whether they accept it or not, no matter how the level of discomfort.
- **Number of trials needed for optimum information gained by the examiner:** actually this was not always related to level of discomfort and failure of examination in fact sometimes the procedure was repeated to be certain about the diagnosis especially in evaluating suspected tumors.
- **The occurrence of complications:** e.g. trauma, bleeding and laryngeal spasm
- **Discomfort level was assigned as follow:**

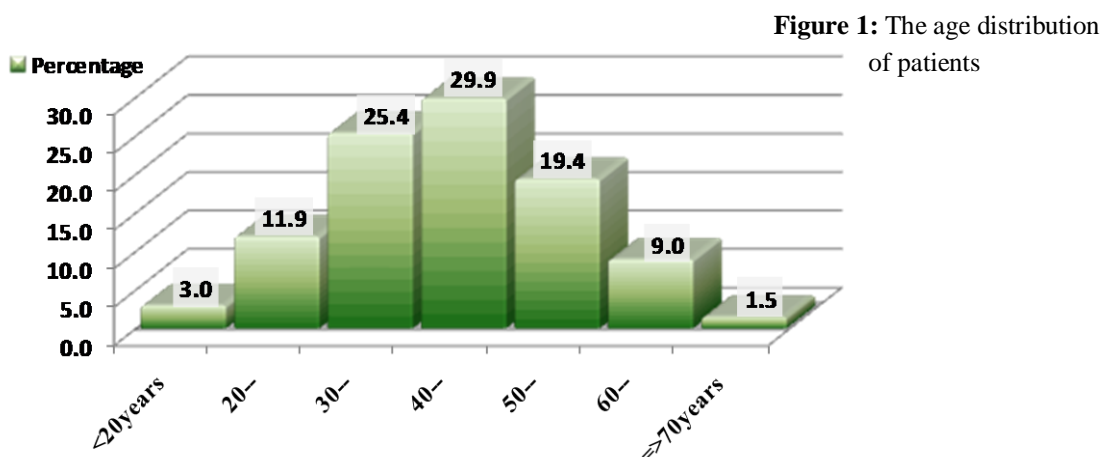
Negligible: when no discomfort was experienced by the patient

Mild: when the patient was very little annoyed

Moderate: when the patient was annoyed by increased discomfort of examination but not to a degree that need to stop the examination.

Severe: When the patient was annoyed by examination to a degree that to stop the examination, reassurance and to repeat the examination but finally the examination can be completed

Failure: the examination cannot be completed no matter reassurance and explanation were tried
Analysis of data was done using Pearson chi-square test for difference between percentages or Student-t-test for difference between two independent means at 0.05 level of significance



Results:

Rigid videolaryngoscopy by sinuscope was successful in 64/67 patients (95.5%). While flexible laryngoscopy was successful in all patients (100%).

The Mean age of the patients= 42.14years (± 11.16) and the commonest age group affected by laryngeal diseases was 40 – 49 years. Forty two patients were males (62.7%) and 25 patients were females (37.3%) with 1.68: 1 as male: female ratio.

Table 1: The frequency of chief complaints

Chief complaints	No	%
Voice changes	47	70.1
Neck mass	2	3.0
Throat pain	4	6.0
Difficulty in swallowing	1	1.5
Feeling something in the throat	3	4.5
Foreign body	2	3.0
Chocking during feeding	1	1.5
Cough	2	3.0
Excessive throat cleaning	2	3.0
Heart burn & acidity	-	-
Apnea	2	3.0
Noisy breathing	1	1.5
Total No. of patients	67	100

Table 2: The overall symptoms in the evaluated patients

Symptoms	No	%
Voice changes	57	85.1
Neck mass	6	9.0
Throat pain	12	18.0
Difficulty in swallowing	6	9.0
Feeling something in the throat	8	12.0
Foreign body	2	3.0
Chocking during feeding	3	4.5
Cough	27	40.3
Excessive throat cleaning	6	9.0
Heart burn & acidity	6	9.0
Apnea	2	3.0
Noisy breathing	1	1.5

Table 3: The Provisional diagnosis in the evaluated patients

Provisional diagnosis	No	%	Males	%	Females	%
Negative findings	1	1.5	-	-	1	1.5
Acute non-specific laryngitis	22	32.8	15	22.4	7	10.4
Chronic non-specific laryngitis	3	4.5	3	4.5	-	-
Vocal cord paralysis	4	6.0	2	3	2	3
Vocal abuse	4	6.0	2	3	2	3
Vocal cord nodule	9	13.4	3	4.5	6	8.9
Vocal cord polyp	6	9.0	5	7.5	1	1.5
Laryngeal mass	4	6.0	4	6	-	-
Hypopharyngeal mass	1	1.5	-	-	1	1.5
Reinke'sodema	3	4.5	3	4.5	-	-
GERD, LPR	7	10.4	4	6	3	4.4
Foreign body	2	3.0	1	1.5	1	1.5
Granuloma	1	1.5	-	-	1	1.5
Total no.	67	100	42		25	

Table 4: The comparison between successfulness, anesthesia, acceptance, complications and time of examination

	Videolaryngoscopy		Flex. laryngoscopy		P value
	No.	%	No.	%	
Successfulness	64	95.5	67	100	-
Topical anesthesia	4	6	67	100	
Patient's acceptance	62	92.5	58	86.6	0.259
Complications	-	-	-	-	-
Average time (seconds) Mean \pm SD	48.8 \pm 7.1		59.5 \pm 8.1		0.0001*

*Significant using Pearson chi-square test for difference between percentages or Student-t-test for difference between two independent means at 0.05 level of significance

Table 5: The number of trials required for optimum examination

Trials	Videolaryngoscopy		Flex laryngoscopy		P value
	No	%	No	%	
First	60	89.5	64	95.5	0.878
Second	3	4.5	2	3.0	
Third & more	1	1.5	1	1.5	
Failure	3	4.5	-	-	

*Significant using Pearson chi-square test at 0.05 level of significance

Table 6: The level of discomfort experienced by the patients

Discomfort level	Videolaryngoscopy		Flex laryngoscopy		P value
	No	%	No	%	
Negligible	20	29.8	8	11.9	0.035*
Mild	38	56.7	47	70.2	
Moderate-severe	6	9.0	12	17.9	
Failure	3	4.5	-	-	

*Significant using Pearson chi-square test at 0.05 level of significance

Discussion:

Among all patients, laryngitis whether acute or chronic, vocal cord polyps, laryngeal mass, reinke's edema and GERD were more common in males while vocal cord nodule, hypopharyngeal mass and granuloma were more in females. All patients with carcinoma of the larynx were males while the only patient with hypopharyngeal carcinoma was female. In consistency with the studies of Bastian (2010)^[8], Nagata et al (1983)^[9] and Wendler and Seidner (1971)^[10] all stated that nodule usually were more common in woman while vocal cord polyp were more common in men particularly those who engaged in intermittent severe voice abuse. Kleinsasser (1991) also confirmed that polyps affects men more than women and usually seen between the ages of 30 and 50 years^[11].

Regarding reinke's edema, Mackenzie (2008) stated that the co-etiological factors of smoking and voice abuse results in a predilection for women in the middle age^[12]. Disparity from our results probably explained by that smoking so far is more practiced by the males of our locality; however, increasing smoking habit among females will influence the allocation of laryngeal disorders.

One female patient (1.5%) presented with intubation granuloma after caesarian section in the current study. mcGlashan (2008) stated that granuloma can seen in both genders but usually in female developed after intubation and in men tends to develop after hyperfunction^[6].

Histopathologic examination revealed squamous cell carcinoma in those 4 patients (100%) with laryngeal mass. All of them were males and their age was between the 6th and the 7th decades.

Rothman (1980) reported that laryngeal carcinoma is mainly a disease of middle aged men with peak incidence at the seventh decade^[13]. Parkin (1999) reported that laryngeal carcinoma in 90% of cases was squamous cell carcinoma^[14].

Biopsy from the female patient with hypopharyngeal mass revealed that squamous cell carcinoma of the postcricoid region. Jones (1998) reported that postcricoid carcinoma is more common in females than male's patients^[15].

In the current study inflammatory condition whether acute or chronic laryngitis and GERD were the commonest diagnosis, it were affecting 31 patients (47.7%). Disparity from these results Bastian (2010) reported that more than 50 % of patients with voice changes are suffering from benign vocal fold lesions^[8]. Brodnitz (1963) reported that 45% in his study had a diagnosis of nodules and polyps^[16]. Differences from our results are probably due to that the current study did not included evaluation of laryngeal lesions by stroboscope which may considerably change the diagnosis. Sataloff et al (1991)^[17], Casiano et al (1992)^[18] and Woo et al (1991)^[19] reported that stroboscope may lead to changes in the diagnosis in approximately 30% of cases when compared to examination with continuous light alone. Second probable elucidation explained by Merati (2010) that in the great majority of cases involving phonotrauma, medical attention is not sought^[20].

In the current study 4 patients (6%) had left vocal cord paralysis with equal sex incidence. Perry (2008) stated that left vocal cord paralysis is 10 times common than right vocal cord paralysis^[21].

In the current study all patients underwent flexible endoscopy under topical anesthesia while

almost all of them (63 patients 94%) required no anesthesia for examination with rigid videolaryngoscopy; this point is very significant in evaluating patients with allergy to local anesthetics.

In consistency with the current results Rammage et al (2001) [22], Hirano and Bless (1993) [23] and Izdebski et al (1990) [24], all were reported that examination of the larynx by rigid endoscope is simple and does not usually require topical anesthesia. Johnson et al (2003) stated that topical nasal administration of local anaesthesia is often used prior to flexible laryngoscopy in order to decongest the nose and facilitate examination [25].

Successfulness and acceptance of examination by rigid videolaryngoscopy were not significantly different than that by flexible laryngoscopy. The tolerability and patients acceptance of rigid laryngoscopy was compared to that of mirror laryngoscopy but not to that of flexible laryngoscopy.

A study by Barker and Dort (1991) revealed that the patients were found to tolerate the rigid rod lens significantly better than that of an indirect mirror [26]. No complications were recorded during examination by both methods in the current study. Jeannon and Macnamara (2008) stated that there is no significant discussion of complications of flexible nasendoscopy of variable degree and occasional epistaxis during difficult insertion, excessive gagging in the absence of local anaesthesia, transient laryngospasm [7].

The time spent by rigid videolaryngoscopy was highly significantly shorter than that spent by flexible laryngoscopy. The differences in the number of trials that were required for optimum examination was not significantly different between the 2 methods but examination by rigid videolaryngoscopy was associated with failure but did not reach the level of significance. Rigid videolaryngoscopy was significantly associated with negligible level of discomfort than flexible laryngoscopy. While in other levels of discomfort (mild, moderate and severe) no significant differences were recorded between both procedures.

The introduction of video digital recording equipments as capture devices, camera systems, monitors and the availability of computer's software had greatly enhanced the efficacy of examination by endoscopes. This will provide documentation and confirmation for reassessment without disturbing the patient with re-examination, data are also available for medicolegal reasons and provides a better way of teaching capability. Jeannon and Macnamara (2008) mentioned that photo documentation is becoming an important part of otolaryngology practice. It improves case review between clinicians and is increasingly forming part of routine practice in the current medicolegal climate [7]. Videolaryngoscopy can be recorded by both rigid and flexible

laryngoscope, however, transmission of light and therefore the picture, logically is much better through a straight line than crisscross way. Consequently the use of rigid endoscopes provides better way for illumination, picture resolution and depth perception. Yanagisawa and Yanagisawa (1993) reported that rigid Hopkins rod system is the favored technique for laryngologist in the 'voice clinic' because the rigid lens produces a much higher optical resolution for more detailed assessment of phonation [27]. Salman et al (2010) also supported these results and he added that there is a large selection of viewing angles endoscopes, however, phonation is usually limited to sustained vowels during examination by all rigid endoscope [28]. Södersten and Lindestad (1992) reported that the size of the glottis gap might appear exaggerated and the mobility of the arytenoids might not be accurately assessed with rigid endoscopes [29].

On the other hand, Salman et al (2010) mentioned that light transport and magnification of the image by flexible endoscopy are inferior to those of rigid endoscopy in addition there is distortion of the periphery with a trade-off between adequate focus and light fiber mismatch [28].

Conclusion:

Rigid videolaryngoscopy is significantly better regarding the average time spent and the negligible level of discomfort experienced during examination. No anaesthesia is required during rigid videolaryngoscopy. No significant differences between both procedures regarding successfulness, acceptance and the number of trials for optimum examination. No complications recorded during both procedures. Failure of examination by rigid endoscope did not reach the level of significance.

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