# Diagnostic Accuracy of Flexible Autoflourscence Laryngoscopy for Diagnosing Malignant Lesions of Larynx

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## ABSTRACT

**Aim:** To determine the diagnostic accuracy of flexible autoflourscence laryngoscopy for detection of malignancies of larynx.

**Study Design:** Prospective/Observational

**Place and Duration:** Study was conducted at ENT department of Mardan Medical Complex (MMC), Mardan for one year duration from 1st September 2019 to 31st August 2020.

**Methodology: Total** Fifty four patients of both genders clinically suspected to have carcinoma of larynx with ages 20 to 70 years were enrolled in this study. After taking written consent, detailed demographics including age, gender, body mass index and complete blood picture were recorded. Flexible autflourscence laryngoscopy was done to examine the malignant lesions of larynx. Biopsy specimens were sent to laboratory for histopathology examination. Sensitivity, specificity, PPV, NPV and diagnostic accuracy of flexible autoflourscence laryngoscopy were examined. Data was analyzed by SPSS 27.0.

**Results:** Out of 54 patients, 38 (70.37%) were males while 16 (29.63%) were females. Mean age of patients was 47.85±6.62 years. 28 (51.85%) patients had malignant lesion and 26 (48.15%) had benign by flexible autoflourscence laryngoscopy while 30 (55.56%) had malignant and 24 (44.44%) had benign lesions. Sensitivity, specificity, PPV, NPV and diagnostic accuracy of flexible autoflourscence laryngoscopy were 93.33%, 100%, 100%, 92.31% and 96.30%.

**Conclusion:** Flexible autoflourscence laryngoscopy is very effective and useful diagnostic tool for diagnosing malignancy of larynx.

**Keywords:** Larynx, Flexible Autoflourscence Laryngoscopy, Malignant Lesion

## INTRODUCTION

Accurate position determination and the extent of malignant larynx tumours are extremely critical for the planning and prognosis of treatment[1]. The otolaryngologist also faces the task of optimising diagnostic procedures for more sensitive identification and precise description of laryngeal pathology[2]. The standard diagnostics technique for the diagnosis and correct description of the laryngeal pathology is biopsy microlaryngoscopy (MLS). It is, however, an invasive operation under generalanaesthesia and sometimes the most representative histopathologic diagnosis specimen can be taken.

In patients with surgery and/or radiotherapy, repeated biopsies may also be required[3]. In order to enhance detection of malignant lesions, supravital mucosal staining with blue toluidin[4] or solution Lugol[5] has been used, but has not increased diagnostic efficacy during MLS[6]. Autofluorescence is a normal fluorescence potential of the tissue when exposed to a certain wavelength of light[7]. Flavine mononucleotide (FMN) is present as a coenzyme in normal cells in the aerobial glycolytic cycle, but not in the neoplastic cell anaerobic glycolytic pathway. When agitated by blue light, oxidised FMN emit green fluorescence in normal cells (Figure 1)[8]. A highly sensitive camera receives and amplifies this fluorescence and gives a pseudo-color picture in real-time on a high-resolution display. The normal tissue is presented as a green field in this picture, while precancerous and cancerous tissues are not autofluorescent and are present as a dark field[9].

We conducted present study to examine the diagnostic accuracy of flexible autoflourscence laryngoscopy for detection of malignant lesions of larynx.

## MATERIALS AND METHODS

This prospective/observational study was conducted at ENT department of Mardan Medical Complex (MMC), Mardan for duration of one year from 1st September 2019 to 31st August 2020. Total 54 patients of both genders clinically suspected to have carcinoma of larynx with ages 20 to 70 years were enrolled in this study. After taking written consent, detailed demographics including age, gender, body mass index and complete blood picture were recorded. Already diagnoses cases, and those with no consent were excluded from this study.

All patients have been subject to the Pentax FB-18RX System and Pentax System of AutofluorescentEndoscopy, locally-based fiber-optic larynx inspection (SAFE 1000). Endoscopic observations were captured on VHS videotape in white light and auto-fluorescent fashion and representative images were recorded on a personal computer using Wincoder software. Biopsy specimens were sent to laboratory for histopathology examination. Sensitivity, specificity, PPV, NPV and diagnostic accuracy

of flexible autoflourscence laryngoscopy were examined. All the data was analyzed by SPSS 27.0.

## RESULTS

Out of 54 patients, 38 (70.37%) were males while 16 (29.63%) were females. Mean age of patients was 47.85±6.62 years. Mean BMI of patients was 25.26±2.34 kg/m$^2$.

Table 1: Baseline details of all the patients

| Variables | Frequency No. | %age |
|-----------|---------------|------|
| Mean Age (Years) | 47.85±6.62 | - |
| Mean BMI (kg/m) | 25.26±2.34 | - |
| Gender | | |
| Male | 38 | 70.37% |
| Female | 16 | 29.63% |

28 (51.85%) patients had malignant lesion and 26 (48.15%) had benign by flexible autoflourscence laryngoscopy while 30 (55.56%) had malignant and 24 (44.44%) had benign lesions. Sensitivity, specificity, PPV, NPV and diagnostic accuracy of flexible autoflourscence laryngoscopy were 93.33%, 100%, 100%, 92.31% and 96.30%. (Table 2)

Table 2: Comparison of AFL with Histopathology

| AFL | Histopathology | | Total |
|-----|----------------|---|-------|
| | Positive | Negative | |
| Positive | TP 28 | FP 0 | 28 |
| Negative | FN 2 | TN 24 | 26 |
| **Total** | **30** | **24** | **54** |

| Statistic | Value | 95% CI |
|-----------|-------|--------|
| Sensitivity | 93.33% | 77.93% to 99.18% |
| Specificity | 100.00% | 85.75% to 100.00% |
| Positive Likelihood Ratio | | |
| Negative Likelihood Ratio | 0.07 | 0.02 to 0.25 |
| Disease prevalence (*) | 55.56% | |
| Positive Predictive Value (*) | 100.00% | |
| Negative Predictive Value (*) | 92.31% | 75.87% to 97.86% |
| Accuracy (*) | 96.30% | 87.25% to 99.55% |

Among 30 malignant lesion 18 (60%) were glottis, 10 (33.33%) were supraglottis and 2 (6.67%) were subglottis. (Figure 1)

Among 24 benign lesions, 12 (50%) were squamous papillomas, 4 (16.67%) were tuberculosis and 8 (33.33%) were vocal nodules. (Figure 2)

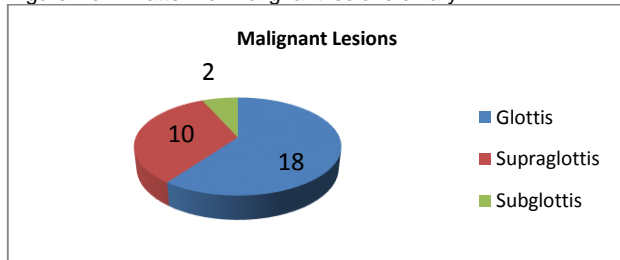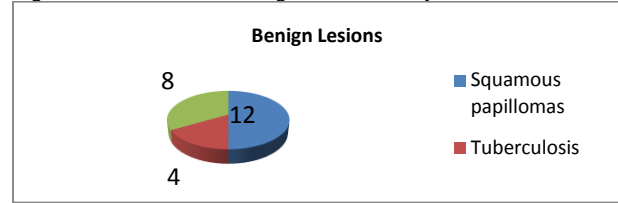Figure No 1: Pattern of malignant lesions of larynx



Figure No 2: Pattern of benign lesions of larynx



## DISCUSSION

Because of the favorable forecast of early malignant larynx disease, a clear understanding of clinical features of premalignant and early malignant larynx change is needed for the treating otolaryngologist[10-11]. Modern technology for enhancing the picture of endoscopes like NBI, SPIES, or i-SCAN, and today makes a high image resolution up to 4K, allow a minute definition of mucosal and vascular changes[12]. This should replace non-specific terminology such as erythroplakia with more detailed explanations of mucosal and vascular patterns[13], leading to improvements in endoscopic diagnostic precision and reproducibility in both preoperative and intraoperative settings[14]. We conducted present study to determine the diagnostic accuracy of flexible autoflourscence laryngoscopy to detect malignant lesion of larynx. In this regard 54 patients whom were clinically suspected to have laryngeal malignancies were enrolled. Majority 38 (70.37%) were males while 16 (29.63%) were females. Mean age of patients was 47.85±6.62 years. Mean BMI of patients was 25.26±2.34 kg/m$^2$. These results were similar to some previous studies in which male patients were high in numbers more than 55% as compared to females and the average age of patients was 50 years[13,15].

In present study we found that 28 (51.85%) patients had malignant lesion and 26 (48.15%) had benign by flexible autoflourscence laryngoscopy while 30 (55.56%) had malignant and 24 (44.44%) had benign lesions. A study conducted by Sakthivel P et al[16] regarding diagnostic accureacy of narrow band imaging for diagnosing malignant lesions of larynx and they reported that out of 30 patients 23 (76.7%) had malignant lesions, 6.7% had premalignant and 16.7% had benign lesions.

In our study we found that 28 cases were true positive, none was false positive 2 cases were false negative and 24 were true negative, so we found sensitivity, specificity, PPV, NPV and diagnostic accuracy of flexible autoflourscence laryngoscopy were 93.33%, 100%, 100%, 92.31% and 96.30%. Badar E et al[17] conducted study to examine the role of AFL for diagnosing malignant lesions of larynx and in their study e overall sensitivity of AFE for various pathologies was 90.625%, while the sensitivity of MLS was 75%. Combining the findings of AFL and MLS we had a 100% diagnostic yield.

Akihito Watanabe et al[18] documented narrow band imaging value and found that 21 lesions were listed by NBI as malignant. Sensitivity and specificity of diagnosing malignancy by NBI vision were 91.3 percent for sensitivity and 91.6 percent for specificity compared to histopathological performance.

The sensitivity and specificity of OSCCs and OED were previously stated to be 30–100% and 6–100% respectively[19-20] from 2007 to 2018. These findings

suggested that OSCC and OEDs could be identified by autofluorescence-based devices but that there were false positives greater than anticipated[21-22], implying that this test had difficulties differentiating between malignant and benign lesions. Autofluorescence imaging also detects inflammation sites and erythematous lesions, including gingivitis, pigmentation, ulceration or discomfort, as a lack of fluorescent visualisation (FVL)[23].

In our study we found that among 30 malignant lesion 18 (60%) were glottis, 10 (33.33%) were supraglottis and 2 (6.67%) were subglottis. Among 24 benign lesions, 12 (50%) were squamous papillomas, 4 (16.67%) were tuberculosis and 8 (33.33%) were vocal nodules.

## CONCLUSION
We concluded from this study that flexible autoflourscence laryngoscopy is very useful and effective diagnostic approach for diagnosing malignant lesions of larynx.

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