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Original Research Article

Correlation between exfoliative cytology and histopathology in laryngeal cancers - A descriptive study

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Abstract

Objectives: This study was done to evaluate the correlation between exfoliative cytology and histopathology in laryngeal malignancies.

Methods: 50 patients with suspected laryngeal malignancies who attended the outpatient department of a rural medical college for a period of one year were selected for the study. All the patients were subjected to direct laryngoscopy and biopsy and the specimen was simultaneously subjected to exfoliative cytological examination and histopathological examination. Cytological examination results were obtained in 24 hours while histopathological examination results took an average of one week to be obtained. Both results were compared to find out the extend correlation between the two.

Results: Histopathological examination was set as the gold standard in the study. In the 47 proven cases of squamous cell carcinoma, 33 (70.21%) were positive for cytology also. Specificity was found to be 100%. Of the 25 cases of histopathologically proved poorly differentiated squamous cell carcinomas, cytology was positive in 23 cases(92% diagnostic accuracy), whereas in 19 cases of moderately differentiated squamous cell carcinomas,only10 were cytologically positive(52.6% diagnostic accuracy).

Conclusion: Exfoliative cytology is a simple, rapid and fairly accurate diagnostic method to for laryngeal carcinoma and its diagnostic accuracy is best in poorly differentiated squamous cell carcinomas.

Keywords: Exfoliative cytology, histopathology, laryngeal cancer.

1. Introduction

As per the National Cancer data base, laryngeal malignancies constitute more than 20 % of all head and neck cancers. Of this, over 90% consisted of squalors cell carcinomas [1]. Early detection of the disease offers not only an increase in survival but also improves quality of life in view of reduced need for aggressive treatment.

Exfoliative cytology which was done by imprint method is the obtention and characterization of cells from the surface of laryngeal mucosa. Contrary to histopathology, exfoliative cytology is a simple, nonaggressive and relatively painless technique [2] that is readily accepted by the patient which aids in rapid diagnosis [3]. Cytology and histopathology are not in opposition, but are complimentary to each other. Our study aimed at correlating the results of cytological and histopathological studies. This would aid quick diagnosis and early initiation of treatment if the exfoliative cytology correlated well with histopathology.

2. Materials and Methods

2.1 Design and setting of study

This is a descriptive study to evaluate the diagnostic value of exfoliative cytology in patients with suspected laryngeal malignancies who attended the

outpatient department of Otorhinolaryngology of a rural Medical College in Kerala over a period of one year. Ethical committee approval was obtained for the study.

2.2 Subjects and selection of patients

50 patients with clinical features suggestive of laryngeal malignancy were selected on the basis of clinical features like hoarseness, dysphagia, referred otalgia, dyspoea and neck swelling. Patients who were not willing to take part in the study were excluded. Written informed consent in the local language was obtained from each patient.

2.3 Procedure

Selected patients were subjected to detailed history taking and clinical examination. Necessary investigations were done and were accurately entered in a proforma. These patients were subjected to direct laryngoscopy and biopsy under general anaesthesia. The specimens were subjected to exfoliative cytology and histopathology.

For exfoliative cytology, the biopsy specimen was gently scraped with a clean glass slide and the cells thus got were smeared onto microscopy slides. These slides were immediately fixed in a fixative (95% ethyl alcohol) provided in a Coplin's jar. These slides were stained with Papanicolaou stain before cytological examination. The biopsy specimen was sent to the Pathology department for histopathological studies. The results of cytology were compared with corresponding histopathology results.

2.4 Diagnostic criteria

Exfoliative cytology depends on individual cell recognition. The major criteria of diagnosis for malignant lesions are cellularity, dyshesion, nuclear membrane irregularity, anisonucleosis and eosinophilic macronuclei. Minor criteria included loss of polarity, nuclear crowding and piling, indistinct cell borders, cell enlargement, nuclear/cytoplasmic ratio alteration and clumped chromatin. Of these, cellularity and dyshesion were taken as the most important criteria. In order to ascertain interobserver agreement two pathologists screened the slides separately on the same day. Kappa statistics was employed to evaluate substantial agreement in observation.

2.5 Statistical analysis

The data collected were entered into a master sheet and statistical tables. Data were computed to compare different groups and to draw valid conclusions based on the observations. A descriptive statistical analysis was done to determine sensitivity, specificity, positive predictive value, negative predictive value and accuracy of exfoliative cytology.

3. Observations and Results

3.1 Age distribution

Table 1: Age distribution

Age group (in years)	Number of patients	Percentage (%)
<40	2	4
40-49	6	12
50-59	14	28
60-69	15	30
70-79	13	26
Total	50	100

3.2 Socioeconomic status

Table 2: Distribution according to socioeconomic status

Socioeconomic status	Number of patients	Percentage (%)
Lower class	**28**	**56**
Middle class	**19**	**38**
Upper class	**3**	**6**
Total	**50**	**100**

3.3 Distribution according to habits

Table 3: Distribution according to habits

Habits	Number of patients	Percentage (%)
Smoking alone	9	18
Pan chewing alone	12	24
Smoking + alcoholism	20	40
Smoking + alcoholism + pan chewing	3	6
No habits	6	12
Total	50	100

3.4 Distribution according to exfoliative cytology

Table 4: Distribution according to exfoliative cytology

Exfoliative cytology	Number of patients	Percentage (%)
Positive	33	66
Negative	17	34
Total	50	100

3.5 Distribution according to histopathology

Table 5: Distribution according to histopathology

Histopathology	Number of patients	Percentage (%)
Positive	47	94
Negative	3	6
Total	50	100

3.6 Correlation between Exfoliative cytology and histopathology

Out of 47 histopathologically proved squamous cell carcinomas, 33 cases (70.21%) were positive for exfoliative cytology which are true positives. The rest of the 14 cases (29.79%) were negative for exfoliative cytology are considered false negatives.3 histopathologically negative cases are also negative for cytology also and are considered as true negatives. Thus, for all cases that could not be picked up by histopathology for the first time, cytology also proved negative. All the cytology positive cases were positive for histopathology also.

Table 6: Correlation between Exfoliative cytology and histopathology

Cytology	Histopathology		Total
	Positive	Negative	
Positive	33(a)	0(b)	33
Negative	14(c)	3(d)	17
Total	47	3	50

(a)-True positives; (b)-False positives; (c)-False negatives
(d)-True negatives
Sensitivity = (a)/(a) +(c)= 70.21%
Specificity = (d)/(d) +(b) = 100%
Positive predictive value = (a)/(a) +(b) =100%
Negative predictive value =(d)/(c) + (d) = 17.64%
Accuracy = Ratio of all true positives and true negatives to the total sample =72%

3.7 Distribution according to grades of differentiation

Table 7: Distribution according to grades of differentiation

Grades of differentiation	Number of patients	Percentage (%)
Poorly differentiated	25	53.9
Moderately Differentiated	19	40.43
Well Differentiated	3	6.4
Total	**47**	**100**

3.8 Correlation between grades of differentiation and exfoliative cytology

Table 8: Correlation between grades of differentiation and exfoliative cytology

Grades of differentiation	Number of patients	Cytology			
		Positive		Negative	
		No.	%	No.	%
Well differentiated	3	0	0	3	100
Moderately differentiated	19	10	52.6	9	47
Poorly differentiated	25	23	92	2	8
Total	47	33	-	14	-

No.-number of patients**, %-** percentage of patients

Of the 25 histopathologically confirmed poorly differentiated squamous cell carcinomas, 23 cases (92%) were positive for cytology and 2 cases (8%) were negative for cytology. Similarly, out of 19 moderately differentiated squamous cell carcinomas, 10 cases (52.6%) were positive for cytology and 9 cases (47.4%) were negative for cytology. Out of 3 well differentiated cases of squamous cell carcinomas, all were negative for cytology (100%). So the diagnostic accuracy of cytology is maximum with poorly differentiated carcinomas. The accuracy of cytology was seen to decrease as the growth tended to be more and more differentiated.

4. Discussion

Carcinoma larynx which is the commonest head and neck malignancy [1] is easily amenable to treatment if detected early. Confirmatory diagnostic tools like histopathology which are at present available may create a delay of about a week for results to be produced. This delays the initiation of treatment even further. The quest for early diagnostic tools is still on. Thus exfoliative cytology gains relevance in this context as results may be obtained on the same day. Our study aimed at comparing the results of exfoliative cytology with histopathology which is considered as the gold standard investigation.

In this study it was seen that maximum number of patients (30%) belonged to 60-69 years age group which is in concurrence with studies by MA Qurieshi *et al* [4] which showed maximum incidence in the age group 65-75 years and studies by Bobdey S *et al* [5] whose study showed maximum incidence between 60-69 years. Majority of the patients belonged to low socioeconomic strata (56%) which is in concurrence with studies by NE Adler *et al*[6] and P Michelozzi *et al* [7].

It was seen that majority of the patients in this study (64%) were habituated to smoking. This fact was supported by studies by Vineis *et al* [8] and R Doll [9]. Alcoholism was the next commonly prevalent habit seen (46%).

Exfoliative cytology, though not a new procedure, was never given much importance as an early diagnostic tool. In our study we tried to find out its significance as a diagnostic test by measuring its sensitivity, specificity, positive predictive value, negative predictive value and accuracy. Cowpe JG *et al* [10] showed that exfoliative cytology is capable of detecting malignant changes through estimation of nuclear cytoplasmic ratio. In another study Cowpe *et al* showed that cells undergoing malignant transformation typically show a reduction in cytoplasmic area before reduction in nuclear area[11]. This was in concurrence with a study of Ramesh *et al* [12] Remmerbach *et al*[13], in a prospective study which evaluated the value of exfoliative cytology for early diagnosis of cancer, analysed DNA content and cytophotometric studies for suspected lesions. They found that joint use of both approaches gave 98% sensitivity and 100% specificity for detection of cancer. Our study showed a sensitivity of 70.21% and specificity of 100%. The sensitivity in our study may have come down due to the fact that we had not analysed DNA content.

Agarwal NK *et al*[14] in his study on exfoliative cytology found 60.22% cases of true positives and 30.33% of false negative cases with an accuracy of 66%.Our study showed true positives of 70.21% , false negatives of 29.78% and accuracy of 72% which is also comparable. His study also stated that cytodiagnosis was most accurate in poorly differentiated carcinomas (100%) whereas our study showed an accuracy of 92.9% in poorly differentiated carcinomas.

Hoare TJ *et al* [15] in 1993 in their study stressed the importance of early detection of laryngeal malignancies with cytology for a better prognostic outcome. Since there were no false positives in our study, it can be inferred that all cases positive for exfoliative cytology are true malignancies and treatment can be initiated on the basis of exfoliative cytology results. This will prevent undue delay in treatment thus leading to better prognosis. But exfoliative cytology can never replace histopathology. It can rather act as a complement to histopathology in diagnosing laryngeal malignancies.

In our study 14 cases proved to be false negatives. This number could have been brought down with better sampling and smearing techniques.

It may be recommended that all suspected malignant lesions of larynx should be subjected to exfoliative cytology since it is a very cheap, simple, cost effective, fairly accurate test which gives a speedy diagnosis.

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