Comparison between Anneroth's & Broder's Grading Systems in Oral Squamous Cell Carcinoma in Relation to Histopathological Prognostic Factors

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Abstract

Background: Oral squamous cell carcinoma (OSCC) is a commonly occurring head and neck cancer. It has a high prevalence, and is associated with a high mortality rate. OSCC occurs due to many etiological factors, but smoking and alcohol remain the most common risk factors. The histological grading of tumors has been used to predict the clinical behaviour of OSCC. Broder's initiated quantitative grading in cancer. Anneroth's and Hansen developed another grading system for grading of OSCC's. With this background, a study was undertaken to compare between Anneroth's & Broder's grading systems in oral squamous cell carcinoma in relation to histopathological prognostic factors. **Material & Methods:** A retrospective study was carried out on 50 formalin fixed paraffin embedded tissue blocks of the confirmed cases of Oral squamous cell carcinoma in the archives of department of oral pathology, Govt. Dental College & Hospital, Srinagar. The cases were evaluated on the basis of Broder's & Anneroth's grading systems for OSCC & the comparison of the systems was made pertaining to histopathological prognostic parameters. **Results:** In our study according to Anneroth's system maximum cases comes under grade III while in Broder's system maximum cases are in grade I & II. **Conclusion:** Anneroth's classification provides us a detailed analysis of grading the cases according to scoring of each parameter. Thus, it is more informative than Broder's grading system.

INTRODUCTION

Oral squamous cell carcinoma (OSCC) is a commonly occurring head and neck cancer. It has a high prevalence, and is associated with a high mortality rate. OSCC occurs due to many etiological factors, but smoking and alcohol remain the most common risk factors especially in the Western world. In South Asian countries, consumption of smokeless tobacco and areca nut products are the main etiological factors associated with OSCC.[1] Carcinogenesis is a complex biological process in which some genetic or epigenetic events alter the regulation of sustaining proliferate signaling, evading growth suppressors, resisting apoptosis, enabling replicative immortality, promoting genomic instability, reprogramming energy metabolism, inducing angiogenesis, activating invasion capacity, tumor-promoting inflammation, and escaping immune surveillance. The malignant transformation of oral SCCs is also the cumulative result of

dysfunction in these critical biological responses to the stimuli from endogenous or exogenous carcinogens.[2]

The histological grading of tumors has been used to predict the clinical behaviour of OSCC. Broder's suggested a system of grading tumors in which a grade I lesion was highly differentiated while grade IV was poorly differentiated. Broder's initiated quantitative grading in cancer. His classification has been used for many years in squamous cell carcinoma. A lack of correlation between Broder's degree of differentiation and prognosis has been reported. Anneroth's and Hansen developed another grading system for grading of OSCC's. According to this system, three parameters reflecting tumor cell features including keratinization, nuclear pleomorphism, and mitoses are evaluated in the whole thickness of the tumor. Tumor-host relationship is described in terms of Pattern of invasion, stage of invasion, and lymphoplasmacytic infiltration.[3]

With this background, a study was undertaken to compare between Anneroth's & Broder's grading systems in oral squamous cell carcinoma in relation to histopathological prognostic factors.

MATERIAL AND METHODS

A retrospective study was carried out on 50 formalin fixed paraffin embedded tissue blocks of the confirmed cases of Oral squamous cell carcinoma in the archives of department of oral pathology, Govt. Dental College & Hospital, Srinagar. The cases were evaluated on the basis of Broder's & Anneroth's grading systems for OSCC & the comparison of the systems was made pertaining to histopathological prognostic parameters.

RESULTS

The results of the observations are given in [Table 1]. Out of the 50 cases, 17 cases were of grade I, 17 cases were of grade II, and 16 cases were of grade III according to Broder's grading system [Table 2, Graph 1]. Most of the cases were of grade III (28), according to the Anneroth grading system. 19 cases were of grade II, and only 3 cases fall into grade I [Table 3, Graph 2].
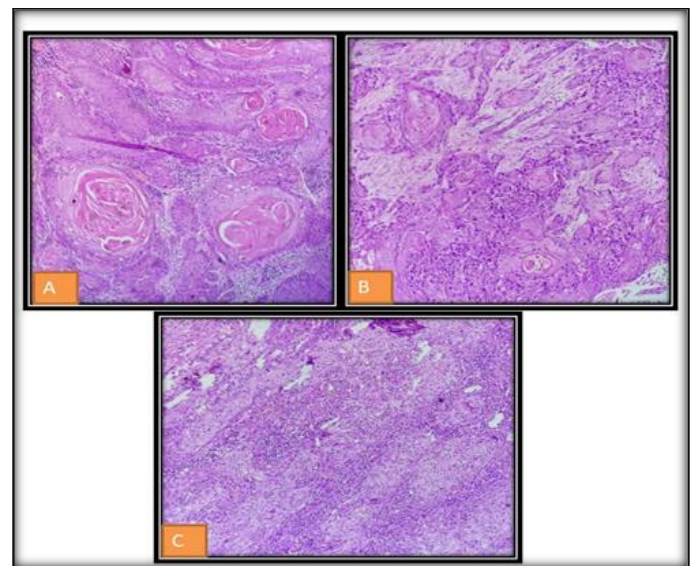

Figure 1: (A) well differentiated squamous cell carcinoma, (B) Moderately differentiated squamous cell carcinoma, (C) Poorly differentiated squamous cell carcinoma according to Broder's grading system

[Table 4 & Graph 3] shows the comparison of results between the two grading systems. 34% of cases fall in grade I as per Broder's grading system, whereas only 6% of cases fall in grade I according to the Anneroth grading system. 34% of cases fall into grade II as per Broder's grading

system, and 38% of cases fall into grade II according to the Anneroth grading system. Most of the cases (56%) were of grade III according to Anneroth grading system whereas according to Broders grading system, only 32% of cases were grade III.

score 2 (B) Nuclear pleomorphism; score 3, (C) Lymphoplasmacytic infiltrate; score 1 (D) Pattern of invasion; score 2.
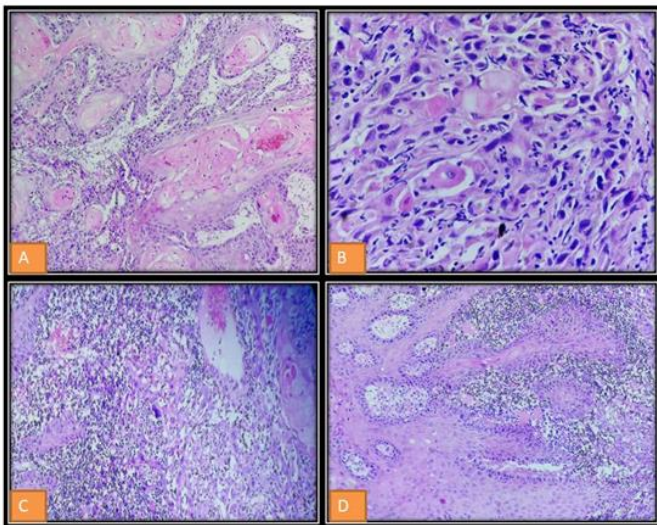

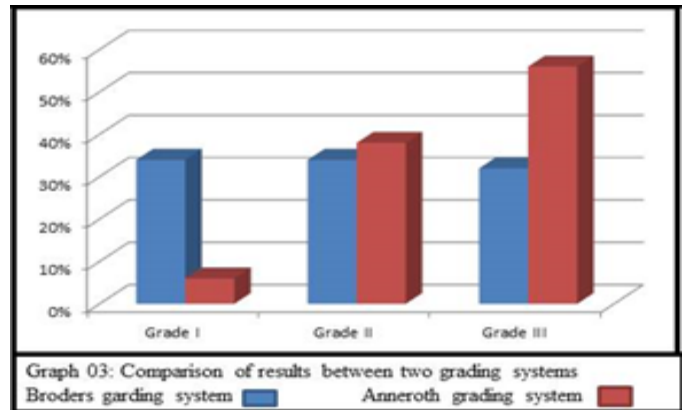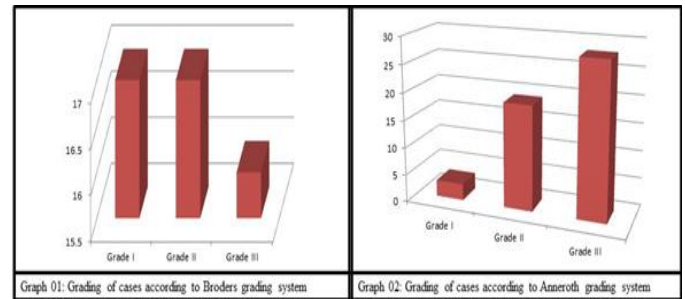**Figure 2:** Parameters according to Anneroth grading system. (A) Degree of keratinization;

Graph 01: Grading of cases according to Broders grading system

Graph 02: Grading of cases according to Anneroth grading system

Graph 03: Comparison of results between two grading systems
Broders garding system ▮ Anneroth grading system ▮

Table 1: Comparison of two grading systems

S.no	Broder's grading system	Anneroth grading system	S.no	Broder's grading system	Anneroth grading system
1.	Grade I	Grade II	26.	Grade III	Grade III
2.	Grade I	Grade II	27.	Grade III	Grade III
3.	Grade III	Grade III	28.	Grade III	Grade III
4.	Grade III	Grade III	29.	Grade III	Grade III
5.	Grade II	Grade III	30.	Grade III	Grade III
6.	Grade III	Grade III	31.	Grade II	Grade III
7.	Grade II	Grade II	32.	Grade III	Grade III
8.	Grade II	Grade III	33.	Grade II	Grade III
9.	Grade III	Grade III	34.	Grade II	Grade III
10.	Grade II	Grade II	35.	Grade II	Grade II
11.	Grade II	Grade III	36.	Grade II	Grade II
12.	Grade III	Grade III	37.	Grade I	Grade II
13.	Grade I	Grade II	38.	Grade I	Grade II
14.	Grade I	Grade I	39.	Grade III	Grade III

15.	Grade I	Grade II	40.	Grade II	Grade III
16.	Grade I	Grade I	41.	Grade III	Grade III
17.	Grade I	Grade II	42.	Grade I	Grade II
18.	Grade I	Grade II	43.	Grade I	Grade II
19.	Grade I	Grade III	44.	Grade I	Grade II
20.	Grade II	Grade III	45.	Grade II	Grade II
21.	Grade I	Grade II	46.	Grade II	Grade III
22.	Grade I	Grade II	47.	Grade II	Grade III
23.	Grade II	Grade III	48.	Grade III	Grade III
24.	Grade III	Grade III	49.	Grade II	Grade III
25.	Grade III	Grade III	50.	Grade I	Grade II

Table 2: Grading of cases according to Broders grading system

Grade of OSCC	No of cases	Percentage of cases
Grade I	17	34%
Grade II	17	34%
Grade III	16	32%

Table 3: Grading of cases according to Anneroth grading system

Grade of OSCC	No of cases	Percentage of cases
Grade I	03	6%
Grade II	19	38%
Grade III	28	56%

Table 4: Comparison of results between two grading systems.

Grade of OSCC	% of cases according to Broder's grading system	% of cases according to Anneroth's grading system
Grade I	34%	6%
Grade II	34%	38%
Grade III	32%	56%

DISCUSSION

Squamous cell carcinoma (SCC) of the head and neck accounts for almost 90% of malignant head and neck neoplasms with SCC of the oral cavity (OSCC) being the most common malignancy in this region4. In clinical routine, histopathological grading of OSCC is done according to the guidelines of the WHO classification of head and neck tumours, which is based on a grading system initially proposed by Broders et al in 1920. The histopathological diagnosis of a tumour includes the evaluation of its differentiation, which is reflected by the tumour grade. It represents the basis for clinical patient stratification to achieve optimal therapy decision-making. The purpose of a grading system is therefore to give exact prognostic and predictive information about the patient's

disease course and potential response to treatment schemes.[3]

Broder's suggested a system of grading tumors in which a grade I lesion was highly differentiated (its cell were producing much keratin) while grade IV was poorly differentiated (the cells were highly anaplastic and showed practically no keratin formation). Broder's initiated quantitative grading in cancer. His classification has been used for many years in squamous cell carcinoma and based on proportion of neoplasm resembling normal squamous epithelium. A lack of correlation between Broder's degree of differentiation and prognosis has been reported. One of the main reasons being that squamous cell carcinoma usually exhibits a heterogenous cell population with difference in degree of differentiation.[5]

Due to the lack of correlation between the Broders grading and prognosis, many authors have proposed different grading system by Jakobsson, Fischer, Lund, Crissman and Anneroth.[6,7,8,9] Anneroth modified previous existing systems and has considered certain parameters like keratinisation, nuclear pleomorphism, mitoses, pattern of invasion, stage of invasion and lymphoplasmocytic infiltration. Anneroth and other grading systems used entire tumor cell population in biopsy to estimate final grading of tumor.[9]

In our study according to Anneroth's system maximum cases comes under grade III while in Broder's system maximum cases are in grade I & II. Our study was consistent with the findings of Neena Doshi et al.[10] They found most of the cases come under grade I according to Broders system & grade II as per Anneroth system. The

findings of Mahmuda Akther et al,[3] were against our result as they didn't find significant differences in their cases between Broders & Anneroth grading systems. A wide range of scoring (5 to 20+) along with six parameters enables Anneroth's classification to provide us a detailed analysis, grading the cases according to scoring of each parameter. Thus, it is more informative than Broder's grading system. Degree of keratinisation and nuclear pleomorphism has comparatively less value as compared to pattern of invasion and number of mitosis for evaluation. Among these two systems (Anneroth's & Broder's grading system) Anneroth's grading system is more significant.[11] A main difference between these two grading systems is that Broders grade considers features within the tumor only, where as in Anneroth's new system show tumor cell features in addition to the relationship between the tumor and underlying connective tissue. Anneroth's system is more reliable and gives more specific results.[12] The clinical validity of this system was tested in a comprehensive study in a group of patients of squamous cell carcinoma in the floor of mouth. A statically significant correlation was found between mean total malignancy scores and clinical staging, frequency of recurrence, and death from first oral primary carcinoma.[13]

CONCLUSIONS

In conclusion, we consider that multifactorial grading system of OSCC according to Anneroth's classification could be taken as a valuable diagnostic & prognostic factor. A limitation of this study is that biopsies are not necessarily representative of the whole tumor content, but the biopsy is the only tissue sample available for histological evaluation. Further

studies including more sophisticated statistical methods and more comprehensive and homogeneous material might clarify whether the grading of OSCC is of any greater

significance in reflecting the growth capacity and malignancy of the tumor and in predicting the outcome of the disease at an early stage.

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