



Comparison of Anneroth's and Broder's grading systems in oral squamous cell carcinoma- A 5 year study

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Abstract

Background: Oral cavity is one of the leading site of cancer. The incidence of oral cancer in India is 30-50% of whole body tumors. Histological grading is an important diagnostic tool to predict the clinical and biological behaviour of oral squamous cell carcinoma. Analysis of the prognostic factors is important for predicting prognosis and reducing mortality in these patients. 1927 Broder's grading system was formed for grading of oral squamous cell carcinoma, this system was applied for many years, then in 1978 Anneroth's multifactorial grading system was established by Dr Anneroth, for evaluation of prognosis and prediction of survival period for oral squamous cell carcinoma patients.

Objective: To Compare Anneroth and Broder's grading systems in oral squamous cell carcinoma and to evaluate the Anneroth's grading as a standard as compare to Broder grading system.

Material and Method: Retrospective study was done on total 600 Biopsy and radical specimen cases which were reported as SCC in last 5yrs, were collected from record room of histopathology section in MGM Medical college & M.Y. Hospital Indore(M.P.) are included in study. All cases were reclassified according to Anneroth's system. Broder's system is based on only differentiation of cells while six parameters of Anneroth's system gives a detail about degree of keratinisation, nuclear pleomorphism, number of mitosis/hpf, pattern of invasion, stage of invasion and lympho plasmacytic infiltration.

Result: In this study, according to Border's grading system out of 600 cases 52% cases were grade I, 40% cases were grade II and 8% cases were grade III while according to Anneroth's grading system 37% were grade I, 55% were grade II, 7.0% were grade III and 1.0% were grade IV. Anneroth's grading system is more informative and gives better result regarding prognosis, action taking time and prediction of survival period than Broder's System.

Conclusion: Anneroth's system of grading can be taken as standard system for evaluation of prognosis and prediction of survival period in patient of OSCC.

Keywords: Oral Squamous Cell Carcinoma, Malignancy Grading System, Metastasis.

Introduction

Oral cancer is becoming a serious problem in the world and the WHO predicts a worldwide increase

in the number of patients with oral cancer every year.¹ According to WHO oral cancer is the most common cancer in South East Asia.² The

incidence of oral cancer in India is 30-50 % of whole body tumor³ while in UK and USA oral cancer accounts for only 2 % of all malignancy.⁵ 90% of oral cancers are squamous cell carcinoma. Oral malignancy is complex and multi-factorial cancer. It is suspected that in India widespread malnutrition together with high risk behaviour like betel chewing may contribute to the high incidence of OSCC. Areca nut chewing causes may oral leukoplakia and oral sub mucous fibrosis, both of which can be pre malignant in the oral cavity. Reactive oxygen species formed in human oral cavity causes oxidative DNA damage to tissue in oral cavity^{7,8} in liberation of carcinogenic chemical from tobacco.

In western countries smoking and alcohol consumption and sunlight exposure play important role in oral squamous cell carcinoma, where as in South East Asia betel chewing is the main etiological factor for oral cancer.

The histological grading of tumours has been used to predict the clinical behaviour of OSCC. The

biological activity of oral SCC is evaluated and descriptively categorized as highly, moderately and poorly differentiated. Broder's has developed quantitative grading of oral cancer in 1920 but this system of SCC, based on the differentiation or maturation of the tumour cell is of limited value as a basis for choice of treatment as well as for prediction of the outcome of the disease.¹¹⁻¹³

Anneroth's and Hansen developed another grading system for grading of OSCC's.¹⁵

Evaluation of six parameters of Anneroth's classification give more specific information, result, predict the prognosis and provide proper guidance for proper treatment plan. This system is consist by six histological parameters have important value in the determination of the grade of malignancy; three connected with the tumour cellular population (differentiation and proliferation mitosis), and three connected with tumour-host relationship (pattern and stage of invasion; and cellular

Table 1 Broder's Grading system⁶

Well differentiated (Grade I)	=	< 25% undifferentiated cells
Moderately differentiated (Grade II)	=	<50% undifferentiated cells
Poorly differentiated (Grade III)	=	<75% undifferentiated cells
Anaplastic / pleomorphic (Grade IV)	=	>75% undifferentiated cells

Anneroth's classification- According to this classification, three parameters reflecting tumor cell features including keratinization, polymorphism, and mitoses were evaluated in the whole thickness of the tumor and each scored from 1-4.^{11,12} Inflammatory infiltration and mode

of invasion and stage of invasion representing tumor-host relationship were graded in the most invasive margins and scored from 1-4. Then the sum of scores were grouped as follows: 5-10 grade I, 11-15 grade II, 16-20 grade III and the results were compared⁶.

Table 2 Anneroth's Multi-factorial Grading System (1987)⁶

Histologic grading of malignancy of tumour cell population				
Morphologic Parameter	Points			
	1	2	3	4
Degrees of keratinisation	Highly keratinized (>50% of the cells)	Moderately keratinized (20-50% of the cells)	Minimal keratinization (5-20% of the cells)	No keratinization (0-5% of the cells)
Nuclear polymorphism	Little nuclear polymorphism (>75% mature cells)	Moderately abundant nuclear polymorphism (50-75% mature cells)	Abundant nuclear polymorphism (25-50% mature cells)	Extreme nuclear polymorphism (0-25% mature cells)
Number of mitoses/Hpf	0 – 1	2 – 3	4 – 5	> 5

Histological grading of malignancy regarding tumor-host relationship				
Point				
Morphologic Parameter	1	2	3	4
Pattern of Invasion	Pushing, infiltrating borders	Infiltrating solid cords, bands and strands	Small groups or cords of infiltrating cells (n>15)	Marked cellular dissociation in small groups of cells (n<15) or in single cells
Stage of Invasion	Carcinoma in situ and	Distinct invasion, involving lamina propria only	Invasion below lamina propria, to muscles, salivary gland tissues and periosteum	Extensive and deep invasion replacing most of the stromal tissue and infiltrating jaw bone
Lympho-cytic infiltration	Marked	Moderate	Slight	None

Aims and Objective

To Compare Anneroth's and Broder's grading systems for oral squamous cell carcinoma over a period of 5yrs in M.Y. Hospital, Indore (M.P.) and to evaluate the Anneroth's grading as a standard as compare to Broder's grading system.

Materials and Methods

A retrospective study was carried out on 600 radical specimen cases of oral squamous cell carcinoma (OSCC) diagnosed in MGM Medical college & M.Y. Hospital Indore during last 5 year duration were collected from record room of histopathology section are included in study. All cases of OSCC were classified according to Broder's grading system. these cases were reclassified as per Anneroth grading system.

Inclusion Criteria: Those who were histopathologically proven to be the patient of squamous cell carcinoma. The tumors that originated from the tongue, floor of the mouth, cheek, gingiva, palate, or retro molar trigone, were included.

Exclusion Criteria: Biopsy specimen were excluded from our study.

Statistical analysis- It was done by calculating number and percentage cases of different grades of OSCC according to both grading system.

Results and Observation

Reviewing of all 600 cases of oral squamous cell carcinoma reported from 2014 to 2018 in M.Y. Hospital Indore (M.P.) In this study, according to

Border's grading system out of 600 cases 52% cases were grade I, 40% cases were grade II and 8% cases were grade III while according to Anneroth's grading system 37% were grade I, 55% were grade II, 7.0% were grade III and 1.0% were grade IV.

Table 3 Grading of cases as per Broder's grading system

GRADE OF OSCC	NO. OF CASES	% OF CASES
Cases of grade I OSCC	312	52
Cases of grade II OSCC	240	40
Cases of grade III OSCC	48	08
Cases of grade IV OSCC	00	00
Total number of cases	600	100

Table 4 Grading of cases as per Anneroth's grading system

GRADE OF OSCC	NO. OF CASES	% OF CASES
Cases of grade I OSCC	222	37
Cases of grade II OSCC	323	55
Cases of grade III OSCC	42	07
Cases of grade IV OSCC	06	01
Total number of cases	600	100

Table 5 Comparison of Result between two Grading System

GRADE	% of cases according to Broder's grading system	% of cases according to Anneroth's grading system
GRADE I	52%	37%
GRADE II	40%	55%
GRADE III	08%	07%
GRADE IV	00%	01%
TOTAL	100%	100%

Pie diagram showing % Of cases according to Broder's grading system



Pie diagram showing % of cases according to Anneroth's grading system

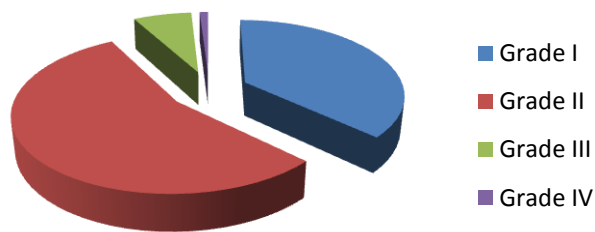


Table 5 Age wise distribution of cases

	NO. OF CASES	PERCENTAGE
<50 Years	200	33.33%
>50 Years	400	66.67%
TOTAL	600	100%

Table 6 Sex wise distribution of cases

SEX	NO OF CASES	PERCENTAGE
MALE	420	70
FEMALE	180	30
TOTAL	600	100

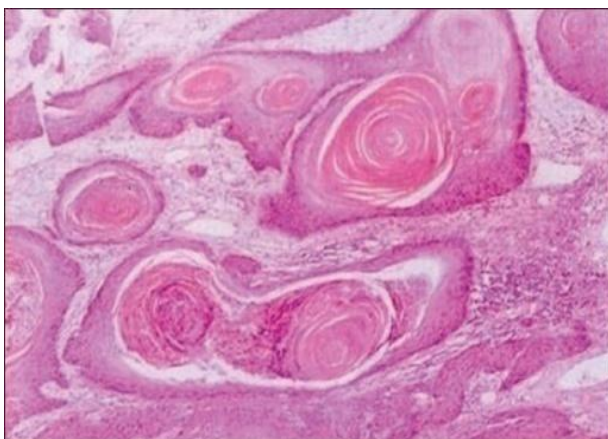


Figure.1 OSCC GRADE 1

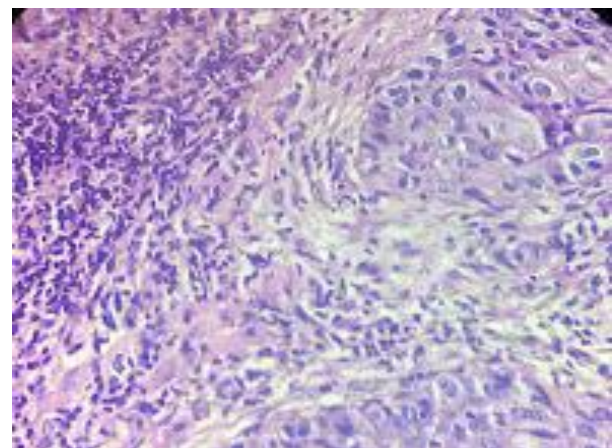


Figure.2 OSCC GRADE 2

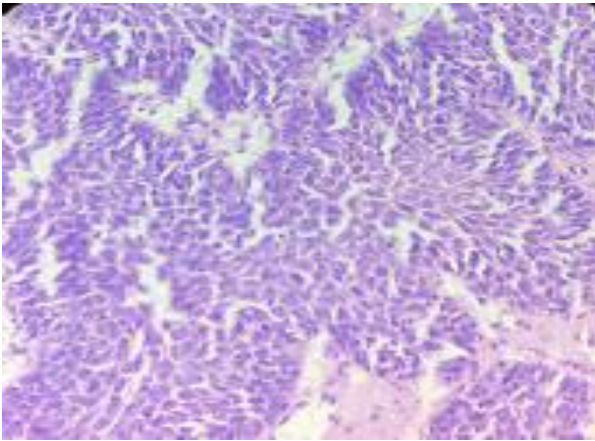


Figure 3 OSCC GRADE 3

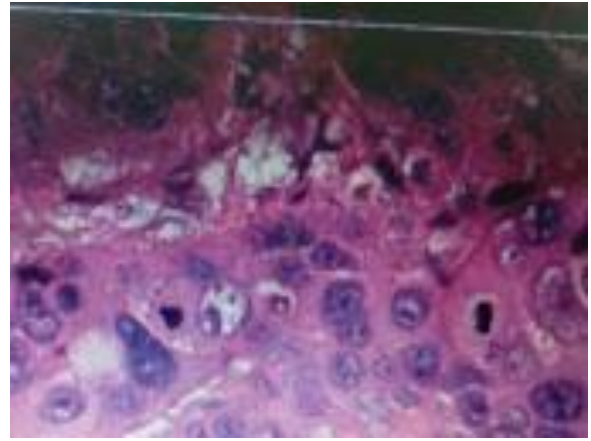


Figure.4 Nuclear pleomorphism



Figure.5 Excessive keratinisation

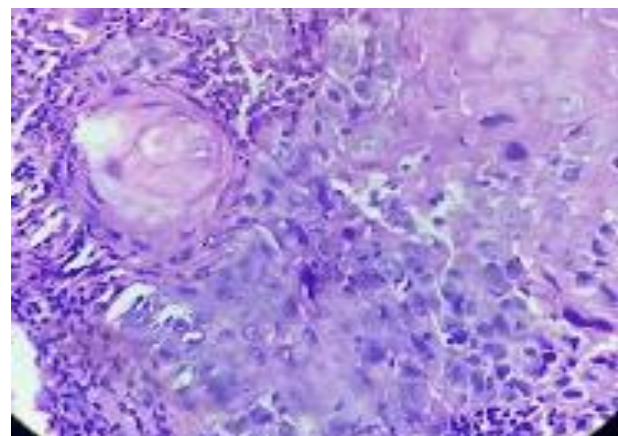


Figure 6 Lymphocytic infiltration

Discussion

Various numbers of studies on SCC's, correlating histologic malignancy grading with different clinical parameters such as clinical staging, recurrence and prognosis have been published.

Broder initiated the quantitative grading of cancer and his classification system used for many years but lack of correlation between Broder's grading system and prognosis has been found.

But poorly differentiated cells are believed to demonstrate a higher chances to metastasize than highly differentiated cells on oral cancer. As the presence of metastases is highly correlated with survival.

Jakobson et al. developed a multi factorial grading system in order to obtain a more precise morphologic evaluation of SCC.

Anneroth and Hansen modified the grading system developed by Jakobsson et al for application to SCC's.¹

Anneroth's grading system included three parameters indicating histological feature of tumour and three parameters indicating tumour host relationship. In our study according to Anneroth's system maximum cases comes under grade II while in Broder's system maximum cases are in grade I.

A wide range of scoring (5 to 20+) along with six parameters enables Anneroth's classification to provide us a detailed analysis, graded 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 compare to pattern of invasion and number of mitosis for evaluation⁹

Among this two system (Anneroth's & Broder's grading system) Anneroth's grading system is more significant. This review demonstrates that the histological grade is a strong predictor of

outcome that refines the prognostic information provided by the stage of disease.⁷

A main difference between these two grading systems is that Broders' grade considers features within the tumour only, where as in Anneroth's new system show tumour cell features in addition to the relationship between the tumour and underlying connective tissue.⁸

In our study radical specimens were the tissue sample available for evaluation of malignancy

histologically. We used the Anneroth et al. classification along with Broder's grading. Statistical analysis found between Broder's and Anneroth's classification. When we compared our study with other studies as per table 7, we found that in one of the our study result was similar i.e. according to Broder's system most of the cases belong to grade1 while according to Anneroth's grade 2 was most common.

Table 7 Comparison of studies

GRADE	Dr. Mahmuda Akther et al(2005) (50 cases) ⁶		Dr. Neena Doshi et.al(2011) (111 cases) ⁷		Current study(600 cases)	
	Broder's Grading%	Anneroth Grading%	Broder's Grading%	Anneroth Grading%	Broder's Grading%	Anneroth Grading%
GRADE I	44%	52%	45.2%	35.9%	52.0%	37%
GRADE II	46%	46%	45.2%	58.1%	40.0%	55%
GRADEIII	10%	02%	6.4%	6.0%	8.0%	07%
GRADEIV	0%	00%	3.2%	00%	00%	1.0%
TOTAL	100%	100%	100%	100%	100%	100%

Anneroth's system is more reliable and gives more specific results. Since this was a retrospective study, limited information were available in the records but we found most of OSCC patients habitually engaged in risky behaviour.

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