Histological depth of invasion and its correlation in oral squamous cell carcinoma- a retrospective study
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ABSTRACT

Introduction: Oral squamous cell carcinoma is the most prevalent head and neck tumour, which is also one of the main causes of cancer-specific mortality. The most often impacted area of OSCC is the tongue. Occult nodal metastasis is the most significant indicator for prognosis of early-stage OSCC with a clinically negative neck. It was discovered that depth of invasion was a highly accurate indicator of occult nodal metastasis in OSCC, making it potentially a very valuable tool for predicting the incidence of nodal dissemination and, consequently, prognosis.

Aim: To determine the correlation between depth of invasion and staging of cancer.

Materials and methods: Evaluated the records of OSCC patients retrospectively. Depth of invasion for 30 excision specimens were measured using the magna software. The data was statistically analysed using SPSS software.

Results: DOI less than 5mm can be considered as stage one of OSCC. Similarly DOI of 6-10 mm as stage 2 and 11-15 mm as stage 3. Furthermore, depth of invasion above 16mm can be considered as stage 4 which involves nodal metastasis.

Conclusion: The study concludes that there is correlation between depth of invasion and staging of OSCC, thus DOI can be considered as an important prognosis factor.

Keywords: Depth of invasion, nodal metastasis, oral squamous cell carcinoma, prognosis, Good health and well being

INTRODUCTION

Oral squamous cell carcinoma (OSCC) is a type of malignant oral epithelial neoplasia, which represents the most frequent of all oral neoplasms. About 90% of all oral cancers are OSCCs (1). Oral cancers that affect the salivary glands, pharynx, and oral cavity account for 2% to 4% of all cancer cases globally (2,3).
OSSC most commonly develops on the sites such as lips, tongue and floor of the mouth, while some OSCCs arise in apparently normal mucosa and some may be preceded by clinically obvious premalignant lesions like leukoplakia and erythroplakia (4,5). Typically, OSCC often presents as an ulcer with prominent exophytic margins or fissures (6). It can also develop as a lump, an enlarged, hard, or fixed cervical lymph node, a white or mixed white and red lesion, an extraction socket that won't heal, or a red lesion (erythroplakia) (7,8). If any of these characteristics last for longer than two weeks, OSCC should be taken into consideration (9).

The two biggest risk factors for oral cancer are smoking and alcohol consumption. 75% of all incidences of oral cancer are related to tobacco use. Smokers are six times more likely to get oral cancer than non-smokers (10). Alcohol drinkers are also six times more likely than non-drinkers to acquire oral cancer. Users of cigarettes and alcohol have an oral cancer risk that is fifteen times greater than non-users. While smoking and drinking are typically the biggest risk factors, it's vital to take into account other aspects as well, like betel quid chewing in some ethnic groups. Chewing betel nut is common among Indian and Taiwanese people, and it raises your risk of mouth cancer substantially (11). Use of cannabis, areca nuts, and opioids leads to a higher risk of oral cancer. Older men, people from poorer socioeconomic backgrounds, and members of ethnic minorities are most likely to have OSCC. There are additional considerations at play. These consist of decreased capacity to repair mutagen-induced DNA damage, an inability to digest cancer-causing substances, vitamins A, E, or C, or trace element deficiencies and immunity problems (12).

Oropharyngeal and oral SCC are becoming more common. Globally, there are about 263,000 new cases of oral cancer each year, and the illness claims 127,000 lives (13). It is the third most prevalent malignancy in India and causes close to 40% of fatalities. In India it is the second most frequent site in men and the fourth in women. Male incidence rates were 10.1 per 100,000 in 2012, while female incidence rates were 4.3 per 100,000 (14). Numerous single or multicenter studies have consistently shown a relationship between a number of prognostic markers and disease-specific survival, local and regional recurrence, and lymph node metastasis. The prognosticators are extranodal extension (ENE), lymphovascular invasion (LVI), perineural invasion (PNI), depth of invasion (DOI), and pattern of invasion (POI) (1,3,5).

DOI is regarded as an objective metric that has been examined by numerous researchers for the prognosis of OSCC. Although the majority of writers mostly concur that DOI is a crucial factor in determining nodal metastasis and survival, there is no set threshold for when neck dissection should be performed because the outcomes in the research differ. The aim of the present is to analyse the correlation between DOI and staging of OSCC.

**MATERIALS AND METHODS**

The Department of Oral and Maxillofacial Pathology's archives provided access to 30 formalin fixed paraffin embedded tissue blocks that represented the core specimens of excision specimens. The excision of oral squamous cell carcinoma and the removal of lymph nodes were both inclusion criteria for the study.

**Staining Protocol**

The sections were rehydrated with alcohol for 10 minutes after being deparaffinized with Xylene for 20 minutes. During the differentiation process the slides were dipped in acid alcohol and ammonia each for one dip, and then washed in running water for bluing. Harris's haematoxylin stain was used to stain the sections for 5 minutes after which it was rinsed in running tap water for 3-5 minutes. Slides were dehydrated using progressively stronger alcohol, after being dipped once in eosin. The slides were mounted with DPX after being cleaned in xylene.

The slides were observed under a microscope and the DOI was recorded and tabulated. Magna Software was used to measure the DOI. The patient’s information was recorded using the patient data. Measurements were taken in millimetres by an experienced pathologist.
Statistical analysis

The SPSS software was used to analyse the data. To summarise qualitative data, descriptive statistics expressed as percentage was generated.

FIGURE 2: DOI analysis in invasive SCC

RESULTS

The depth of invasion and staging of oral squamous cell carcinoma is correlated. DOI less than 5mm can be considered as stage one of OSCC. Similarly DOI of 6-10 mm as stage 2 and 11-15 mm as stage 3. Furthermore, depth of invasion above 16mm can be considered as stage 4 which involves nodal metastasis.

FIGURE 3: Bar graph depicting the correlation between DOI and mean staging. X axis represents the depth of invasion in millimetres and Y axis represents mean staging of OSCC.
**DISCUSSION**

Radical neck dissections have been conducted since the late 1800s to prevent cancer recurrences despite the fact that they resulted in serious postoperative problems such as shoulder dislocation. The lymph nodes that drained the tumour's initial site were removed during more focused neck dissections in the 1980s. Even with conservative care, shoulder dysfunction might still occur occasionally (15).

The size of the primary tumour, the location, the T stage, the grade, the depth of invasion, the biological tumour markers, the perineural invasion, and patient compliance are a few of the variables that can influence the rate of cervical metastasis and survival from oral cavity cancer (16)(17). Since the tumour breadth and the site were once thought to be the key prognostic determinants, numerous prognostic models were developed to determine the amount of metastasis dissemination. Recently, DOI has gained importance as a prognostic factor for early detection of OSCC.

The term "depth of invasion" refers to the extent cancer penetrated into the tissue below an epithelial surface. Some investigators restore a surface line after the epithelium has been damaged and measure along this line. However, rather than using precise millimetre measurements from a micrometre, the depth of invasion is frequently described in terms of the microscopic, deep anatomical structures that are reached.

In the present study we have assessed the depth of invasion of 30 excisional specimens and the correlation with staging and nodal metastasis. The lateral margin of the tongue and buccal mucosa are the two most frequent locations for tumours. Males are more likely to get cancer of the tongue, according to numerous research. Indian men are exposed to both smokeless and smoked tobacco, which explains why this is the case. But recently, some cases without any prior history of habits that can contribute to the emergence of oral cancers, including tongue cancer, have been identified.

In our study we have found that depth of invasion less than 5 mm can be considered as stage one of OSCC. Similarly DOI of 6-10 mm as stage 2 and 11-15 mm as stage 3. Furthermore, depth of invasion above 16 mm can be considered as stage 4 which involves nodal metastasis.

When the depth of invasion is greater than 5 mm, it was found that the cutoff threshold is most significantly associated with neck metastasis. Therefore, predicting the occult cervical lymph node metastases using the depth of invasion may be helpful. Similar investigations have shown that in cases of carcinomas of the lateral border of the tongue, level II nodes are the most frequently involved site, followed by level III nodes (6,18,19).

Depth of invasion also has its limitations; in some circumstances, particularly when there has been perineural invasion, it can be challenging to ascertain the depth of invasion. The fundamental issue with measuring tumour thickness in mucosal tumours, when there is frequently no mucosal surface on the slide to utilise as a reference point, is the difference in complexity (20). This issue was also brought up by several publications. Another drawback is that multiple cutoff values have been used to determine elective neck dissection for clinically negative necks due to the lack of a consistent way of assessing tumour thickness/depth of invasion.

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**. Correlation is significant at the 0.01 level (2-tailed).
invasion(21). Despite these drawbacks, it is evident from our research that there is a connection between the depth of invasion and nodal metastasis, which would provide us with newer perspectives when coordinating the patients’ treatment plan.

CONCLUSION
The study concludes that there is correlation between depth of invasion and staging of OSCC, thus DOI can be considered as an important prognosis factor for the early detection of oral squamous cell carcinoma.

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CONFLICT OF INTEREST
The author declares that there were no conflicts of interests in the present study.

Authorship Criteria
Reenu Joshy, Dr. R.Priyadharshini and Dr. Palati Sinduja framed the Concept, design of study or acquisition of data or analysis and interpretation of data
Drafting the article or revising was done by Dr.R.Priyadharshini and Dr.Palati sinduja
Final approval of the version to be published was done by Dr. R.Priyadharshini and Dr. Palati Sinduja

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REFERENCE
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