



## Radiodiagnosis

## QUANTIZATION OF DIAGNOSTIC CRITERIA IN ORAL SQUAMOUS CELL CARCINOMA BY ULTRASOUND TECHNIQUES

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## KEYWORDS :

## INTRODUCTION

The 6<sup>th</sup> most common cancer in the world is oral cancer and occurs in a wide geographic variation [1]. It is a major health problem in India and is of great importance to professionals of dental origin [2].

Tobacco chewing is the most common form of drug abuse with or without betel-quid and is taken as a major risk factor of oral cancer [3]. Oral cancer was commonly seen in countries with prevalent tobacco use and those which had cultural importance of tobacco in various ceremonies [4]. Other risk factors in oral cancer are poor oral hygiene, ill-fitting dentures, malnutrition, syphilis and broken teeth causing chronic irritation [5].

Recently, for detecting blood flow signals in vessels of malignant tumours color Doppler ultrasonography (CDUS) is being used by means of continuous pulsed-wave Doppler, and color flow mapping techniques [7]. The characteristic tumour flow signals are caused by the presence of arterio-venous shunts and absent muscular layer in the vessel wall. This low impedance tumour flow is helpful in differentiating benign from malignant tumours according to various studies. Also, tumour response to chemotherapy can be predicted by blood flow changes [8].

A promising new ultrasound technique, known as elastography, which measures the characteristics of tissue compliance. The principles underlying elastography are that tissue compression produces strain (displacement) within the tissue and that this strain is lower in harder tissues than in softer tissues.

Mapping the stiffness can either be estimated from the analysis of the strain in the tissue under a stress (quasi-static methods), or by the imaging of shear waves, mechanical waves, whose propagation is governed by the tissue stiffness rather than by its bulk modulus [9].

Elasticity imaging by USE provides complementary information to conventional US by adding stiffness as another measurable property to current US imaging techniques [10].

The Aim of the study was to use of Ultrasound techniques in diagnosis of buccal Squamous Cell Carcinoma (OSCC) in histopathologically proven cases and to determine the utility of Sonography, Color Doppler and Elastography in buccal squamous cell carcinoma and in determining hemodynamic parameters by spectral analysis.

## AIMS AND OBJECTIVES

## MATERIALS AND METHODS

**Place of Study:** The study was conducted in the department of Radiodiagnosis, AVBR Hospital, DMIMS, Sawangi (Meghe), Wardha during the period of 2015 to 2018.

**Study Design:** This is a cross-sectional type of study.

## Sampling Procedure:

Cases were selected randomly within the age group of 10-70 years, consist of 120 cases which are clinically and histopathologically diagnosed as squamous cell carcinoma of buccal mucosa

## Inclusion Criteria:

- Histopathologically diagnosed cases of buccal squamous cell carcinoma in the age group of 10-70 years.

## Exclusion Criteria:

- Squamous cell carcinoma of palate, tongue, alveolar mucosa and gingival mucosa.
- Recurrent cases of OSCC.

## Methodology:

1. **Histopathologically proven cases of buccal squamous cell carcinoma was studied.**
2. **Technique of USG, Colour Doppler and Elastography:**

The examination was carried out in the department of Radiodiagnosis using high resolution ultrasound machine with high frequency transducer probe of 7.5 -10 MHz. The patient was made to lie down with the shoulders supported by pillow. The coupling gel will be applied over the area of interest and the transducer was moved in the transverse or longitudinal direction. Compression was applied for elastogram.

## OBSERVATION &amp; RESULTS

## Size of the tumor of patient with OSCC

Size of the tumor	No of patients	Percentage
Equal or more than 4cm	88	70
Less than 4cm	32	30
Total	120	100

Size of the tumour was more than or equal to 4cm's in 88 patients (70%) out of 120 patients. Size of the tumour of less than 4 cm's was seen in 32 patients (30%)

## Correlation of histopathological grading of tumor with Pulsatility Index

Histological Grading	Number	PI
Well differentiated	76	0.88±0.22
Moderately differentiated	36	0.83±0.20
Poorly differentiated	8	0.87±0.04

Mean-0.86±0.20

In well differentiated buccal SCC, PI was found to be 0.88±0.22. In moderately differentiated buccal SCC PI was found to be 0.83±0.20 and a PI of 0.87±0.04 was seen in poorly differentiated buccal SCC patients.

## Correlation of histopathological grading of tumor with Resistive Index

Histological Grading	Number	RI
Well Differentiated	76	0.41±0.14
Moderately Differentiated	36	0.42±0.15
Poorly Differentiated	8	0.23±0.04

Mean-0.40±0.14

Mean Peak Systolic Velocity in patients with buccal SCC.

**Descriptive Statistics**

Group	Number	Mean	Std Deviation	Std error of mean
Malignant	120	31.72	13.84	2.52

**Based on elastography findings:**

Histological Grading	Number	Elastography findings
Well Differentiated	76	Blue in centre with peripheral green
Moderately and poorly Differentiated	44	Blue centre + periphery blue

In well differentiated buccal SCC patients (76), elastography finding was blue in centre with green in the periphery. Entire blue mass was noted in moderately and poorly differentiated buccal SCC.

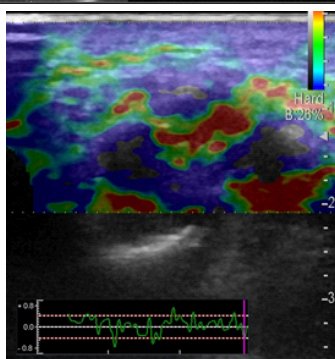
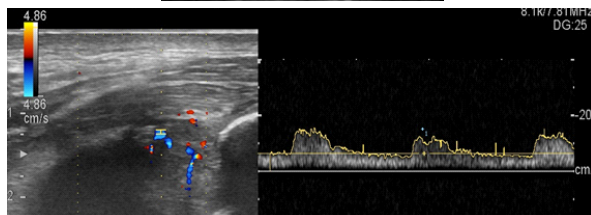
**CASE1**

A 25 year old male with h/o tobacco chewing since 2 years with submucosal fibrosis on right side.

B Mode findings: large ill defined heterogeneously hypoechoic mass of size 5x4.6 cms with calcifications within noted involving the right buccal mucosal and destruction of underlying bone.

On color Doppler: RI- 0.4 PI- 0.8 and PSV 31

Elastography : Blue in centre with peripheral red.



**DISCUSSION**

Oral cancer is the sixth most common cancer worldwide and shows marked geographic variation in occurrence<sup>1</sup>. Oral cancer is of paramount importance to Dental professionals and constitutes a major public health problem in India<sup>2</sup>.

In a study conducted by Aruna et al<sup>11</sup> in 2011, the mean age of patients with oral cancer was 55 years. In a study conducted by G. Ascani et al.

in 2005<sup>12</sup>, mean age of patients with oral squamous cell carcinoma was 66.6 years.

The present study consisted of 120 malignant patients, of which 106 were male and 14 were female patients, with male to female ratio being 7.5:1. This study confirms the results obtained in many other studies which shows higher incidence of oral squamous cell carcinoma in male patients. In a study conducted by G. Ascani et al. in 2005<sup>12</sup>, there were 46 males and 15 females with oral squamous cell carcinoma with male to female ratio being 3.06:1.

In the present study 66.33 % patients had risk habits for more than 10 years. Similar results were obtained in the study conducted by Sankaranarayanan et al<sup>13</sup>.

The ranges of pulsatility index and resistive index in benign and malignant tumors have been reported for several organs.

In previous studies, some authors suggested the existence of clear cut-off points of PI and RI of benign and malignant tumors; Kurjak et al<sup>14</sup> reported only one false positive and two false negative results in a screening program involving 624 benign ovarian tumors and 56 malignant tumors by using a cut-off value of RI 0.4. Timor-Tritsch et al<sup>15</sup> reported the RI value of 0.4 and sensitivity 93.8 % and specificity of 98.7%. In present study, it was considered low impedance flow as having PI of 1 or less, as originally described by Bourne et al<sup>16</sup>; and an RI of 0.5 or less.

Given that neovascularization is an obligate event in malignant change, this recognition may enable us to observe the earliest stages in oncogenesis.

In this study, Mean value for RI in malignant patient is 0.40±0.14 where as for healthy subjects it was 0.83±0.07. The cut off value was taken as 0.5. The sensitivity is 73.33%, specificity is 100%, positive predictive value is 100%, negative predictive value is 78.95 % and the accuracy of the test is 86.66%. Mean value for PI in malignant patient is 0.86± 0.20 .The cut off value was taken as 1. The sensitivity is 86.67%, specificity is 100%, positive predictive value is 100%, negative predictive value is 88.24% and the accuracy of the test is 93.33%. These findings agree with previous reports that a low impedance Doppler flow signal is associated with malignant tumors in other organs.

**CONCLUSION**

Results obtained in the present study were correlated with similar previous studies in the literature and conclusion was drawn.

Following conclusion could be drawn from this study:

1. 70% patients had a tumour size of more than or equal to 4cm's on ultrasonography.
2. A pulsatility index (PI) < 1.0 as indicative of malignancy was associated with: sensitivity 0.86, specificity 0.100.
3. A resistive index (RI) < 0.5 as indicative of malignancy was associated with: sensitivity 0.73, specificity 0.100. The decrease in resistance to blood flow is assumed to be responsible for the low impedance flow manifested as a low PI, RI correlates with neovascularity, a feature specific to malignant neoplasm.
4. The importance of elastography helps in knowing the tissue stiffness and thus we can correlate the tissue stiffness with malignancy with is almost directly proportional .
5. Color flow Doppler findings are specific enough to be used independent of gray-scale ultrasonography.
6. Color Doppler flow imaging provides information on blood flow that supplements the information gained by the routine sonography, and thus is useful in the diagnosis Oral Squamous Cell Carcinoma.
7. Color Doppler sonography is useful for showing vascularity in oral masses and very useful in differentiating malignant from healthy one.
8. Although ultrasonography, color Doppler and elastography

evaluation cannot replace histopathological procedures in knowing the status of malignant mass, it plays a definite role as an adjunct to clinical evaluation of buccal Squamous Cell Carcinoma.

Although ultrasonography, color Doppler and elastography shows promise as non invasive tool for characterizing oral masses, larger series of patient should be studied to validate this technique in clinical practice.

Also, these ultrasound techniques can be used in rural areas as a screening modality and a non invasive technique to know the characteristics of the mass, whether benign or malignant with extent.

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