ORIGINAL ARTICLE

DETERMINE THE DIAGNOSTIC ACCURACY OF MULTISLICE COMPUTED TOMOGRAPHY IN DETECTING SQUAMOUS CELL CARCINOMA OF ORAL CAVITY TAKING HISTOPATHOLOGY FINDINGS AS GOLD STANDARD

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ABSTRACT

INTRODUCTION: Carcinoma of the oral cavity is the second most common malignancy in both gender in Pakistan. Squamous cell carcinoma is the most common malignant tumor of oral cavity accounting for approximately 90% of oral cancer. Due to high morbidity and mortality associated with squamous cell carcinoma of oral cavity there need of early diagnosis and prompt management. Computed tomography is more common and valuable imaging modality in the evaluation of carcinoma of oral cavity. It is also best and sensitive in evaluating cortical bone invasion of mandible. **OBJECTIVE:** Determine the diagnostic accuracy of multislice computed tomography in detecting squamous cell carcinoma of oral cavity taking histopathology findings as gold standard. **METHODS:** A group of 161 patients with clinical suspicion of carcinoma of oral cavity were included in this study. Out of these 100 (62.1%) males and 61 (37.9%) females. All these patients underwent CT scan examination. Final diagnosis was based on histopathological examination which was done subsequently. **RESULTS:** It was observed that multislice CT has the sensitivity of 80.8%, specificity of 68.3%, positive predictive value of 88.3%, negative predictive value of 56% and accuracy of 78.3%. **CONCLUSION:** Multislice CT has good sensitivity and speficity in the diagnosis of squamous cell carcinoma of oral cavity.

Key words: Multislice computed tomography, Squamous cell carcinoma, Oral cavity

Introduction

Head and neck cancer is the fifth most common cancer worldwide.[1,2] Males are more affected than females. primary risk factors associated with Head and neck cancer include tobacco use and alcohol consumption, with a dose-response relationship and synergistic effect.[1] Betel nut chewing in Asia is an independent risk factor.[3] A subgroup of non-smoker non-drinker (NSND) patients has been identified: i)young to middle-aged men with oropharyngeal cancer associated with human papilloma virus infection, and ii)young women with oral tongue cancer, or elderly women with gingival/buccal cancer with no clear etiologic factor.[4,5]

The incidence rate of oral cancer is highest in Pakistan, France, India, and Brazil.[6] It is the second most common malignancy in both genders in Pakistan.[7] They are responsible for approximately 200,000 deaths per year world wide.[8] Squamous cell carcinoma is the most common malignant tumor of the oral cavity,[9] it accounts for approximately 2.5% of all cancers in

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the United States and are primarily associated with chronic consumption of alcohol and tobacco.[10,11] Oral precancerous lesions (PCLs) such as leukoplakia and sub mucosal fibrosis are early indicators of damage to the oral mucosa with a transformation rate of 2 - 12% to frank malignancies.[12] In Pakistan, cancer of the oral cavity and pharynx are amongst the commonest type of cancer. According to the reports published by Pakistan Medical Research Council (PMRC), it was the most common cancer among males and second highest to breast in females.[13] During the last 5-6 years it has been observed in one of the major hospitals in Karachi that the disease is appearing more in younger individuals, youngest being 12 years old.[14] Major contributors for this increased incidence include chewable tobacco i.e. qivam, pati, gutka and manpuri, betal quid containing areca nuts with fungus Aspergillus, HPV infection, familial predisposition and mutations of tumor suppressor genes. Smoking is considered an inappropriate habit socially for females; however the practice of chewing tobacco is high in all socio-economic circles. The age specific rates show a gradual rise to a maximum in the 7th decade in both sexes.[15]

Due to high morbidity and mortality associated with squamous cell carcinoma of oral cavity there need of early diagnosis and prompt management. Diagnosis depends upon clinical history examination and by the use of imaging modalities. The final confirmation is on histopathological examination. Various imaging modalities like computed Tomography (CT) and magnetic resonance imaging (MRI) have been used for early detection of squamous cell carcinoma of the oral cavity.

Computed tomogrophy is more common and valuable imaging modality in the evaluation of carcinoma of oral cavity. It is also best and sensitive in evaluating cortical bone invasion of mandible.[16] However there is limited data available regarding accuracy of computed tomography in detection of carcinoma. In one study computed tomography is 82% sensitive and 71% specific for assessment of squamous cell caricinoma.[17] The advantages of computed tomography are that it can identify the local or regional extent of tumor, location of primary site & presence or absence distant metastasis. It is a well established diagnostic imaging modality for initial staging and surgical planning of head and neek cancer as it provides structural information at a high spatial resolution.[18] In Pakistan computed tomography scan is generally preferred because of its cost effectiveness & wider availability.

Subjects and Methods

A cross-sectional analytical study, conducted at Department of Radiology, Ziauddin University Hospital, Karachi, from 1st January 2015 to 31st December 2015. The sample size was calculated on Lin Naing sample size calculator. The sensitivity and specificity of CT scan for detecting squamous cell carcinoma of oral cavity is reported to be 82% and 71%, respectively; and reported prevalence of 50%.[19,20] Thus at a confidence interval of 95%, with margin of error within 10% the sample size calculated to determine oral carcinoma on CT scan was 161 patients. Purposive non-probability sampling was used. Inclusion criteria were all patients (all ages) with any or all clinical presentation like fungating oral mass, oral ulcer patch on oral mucosal lining and difficulty in chewing, moving jaw and tongue was included. Patients with already diagnosed or who had taken treatment for oral carcinoma were excluded. Purpose and procedure of study was explained including the risks and benefits. After obtaining the informed consent, CT scan of suspected oral carcinoma was performed on TOSHIBA ASTEION multislice CT scanner with intravenous contrast. CT was performed in the coronal and axial planes.Imageswere analyzed by a senior radiologist having atleast 5 years post fellowship experience. Relevant patient data was collected on the proforma regarding their biodata, presenting complaints, provisional clinical diagnosis along with radiological findings, all patients in study underwent histopathology which was taken as gold standard in the study. Histopathology results were then followed and recorded on proforma. Data was collected and analyzed using IBM SPSS (Chicago, IL) version 20. Male to female ratio for gender and mean ± SD for age distribution was computed. Sensitivity, specificity, positive predictive value, negative predictive value and accuracy of computed tomography in detecting squamous cell carcinoma of oral cavity by taking histopathology as the gold standard. Kappa statistic was calculated to take into

account considering p-value of 0.05 as statistically significant.

Results

One hundred and sixty one patients fulfilling the inclusion criteria were included in this study.There were 100 (62.1%) males and 61 (37.9%) females. The mean ± standard deviation age of study population 43.9 ± 16.9 years and mean duration of symptoms was 19.1 ± 7 months. There were 14 (8.7%) patients in the < 20-20 years of age group, 59 (36.6%) patients were 21-40 years of age group, 57 (35.4%) patients were in the 41-60 years of age group and 31(19.3%) patients were in the >60 years of age group. On analysis of computed tomography findings of squamous cell carcinoma of oral cavity, it was observed that 111 (68.9%) patients had positive findings of squamous cell carcinoma on multislice computed tomography as compared to this 50 (31.1%) patients had negative findings. On analysis of histopathological findings of squamous cell carcinoma of oral cavity, it was observed that 117 (72.7%) patients had positive findings on histopathological examination for diagnosis of squamous cell carcinoma of oral cavity. 95 (59%) had true positive diagnosis, 28 (17.4%) had true negative diagnosis, 16 (9.9%) had false positive and 22 (13.7%) had false negative diagnosis.

On analysis of frequency of true positive, true negative, false positive and false negative cases among the age group, it was observed that out of 14 cases of <20-20 years of age group 04 (28.6%) had true positive diagnosis, 07 (50%) had true negative diagnosis, 02 (14.3%) had false positive diagnosis and 01 (7.1%) had false negative diagnosis. Out of 59 patients of 21-40 years of age group 30 (50.8%) had true positive, 15 (25.4%) had true negative, 03 (5.1%) had false positive and 11 (18.6%) patients had false negative diagnosis. Out of 57 patients of 41-60 years of age group 36 (63.2%) had true positive diagnosis, 05 (8.8%) had true negative diagnosis, 07 (12.3%) had false positive diagnosis and 09 (15.8%) had false negative diagnosis (p=0.001) (Tab. 1).

It was observed that multislice CT has the sensitivity of 80.8%, specificity of 68.3%, positive predictive value of 88.3%, negative predictive value of 56% and accuracy of 78.3% (Tab. 2).

Age group	True positive, True negative, False positive, False negative			
	True positive	True negative	False positive	False negative
<20-20 years	4	7	2	1
	28.6%	50.0%	14.3%	7.1%
21-40 years	30	15	3	11
	50.8%	25.4%	5.1%	18.6%
41-60 years	36	5	7	9
	63.2%	8.8%	12.3%	15.8%
>60 years	25	1	4	1
	80.6%	3.2%	12.9%	3.2%

P=0.001

Table 1: Analysis of frequency of true positive, true negative, false positive and false negative cases among the age group

Variable	Percentage
Accuracy	78.3%
Sensitivity	80.8%
Specficity	68.3%
PPV	88.3%
NPV	56%

Table 2: Analysis of diagnostic accuracy of computed tomography

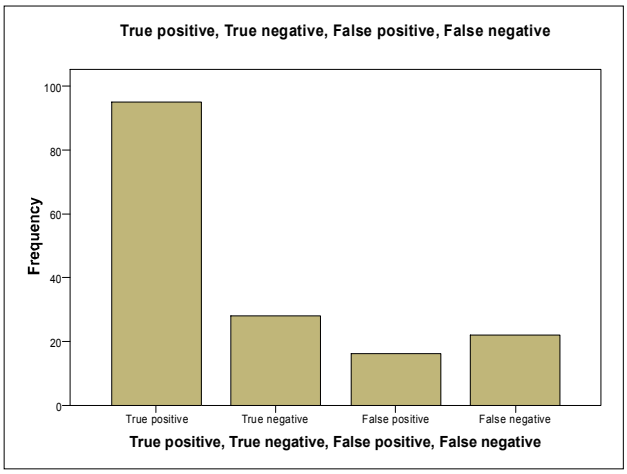

Figure 1: Analysis of true positive, true negative, false positive, false negative

Discussion

Carcinomas of the oral cavity and oropharynx constitute approximately 2% to 5% of head and neck cancers. Alcohol abuse and tobacco chewing, including chewing Shamma, predispose individuals to the development of cancer in the oral cavity.

A persisting rise in the age standardized incidence rate for oral cancer is observed in Karachi in both genders and in all age groups. A decrease in the inci-

Figure 1: Squamous cell carcinoma of right sided cheek

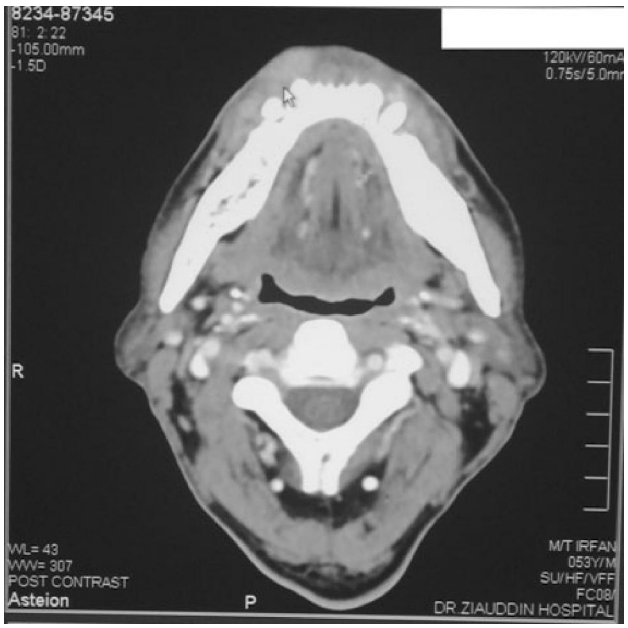

Figure 2: Squamous cell carcinoma of right sided lower lip

dence of lip cancer in males was associated with a leveling of rates in females. Moderate upward trends were observed for cancer tongue and a dramatic increase was observed for cancer cheek. As distinct from other geographical areas oral cancer remained equally common in males and females. A rising incidence is also equally observed in the young males and females in this population. Oral cancer trends should be interpreted in terms of exposure to risk factors such as betal quid, areca nut and tobacco use in the population. In Karachi specifically and in Pakistan generally, alcohol is a notable omission as a risk factor, however tobacco, areca nut, betal quid, paan masala, and poor diet are associated with aspergillus contamination of arecanut. The age-standardized annual incidence for cancer of the lip, remained unchanged as no change in the smoking habits has been observed in Karachi. There is however, a sharp upward trend in chewing habits in the recent past. Every year Pakistan imports over one lakh tonnes of areca nut from Indonesia and India.[21]

The oral cavity is a challenging area for radiological diagnosis. Soft-tissue, glandular structures and osseous relations are in close proximity and a sound understanding of radiological anatomy, common pathology and pathways of disease spread is required. A combination of CT, MRI and ultrasonography may be used. CT and MRI are complementary in the assessment of head and neck pathology.[22] CT is readily accessible and offers faster image acquisition; therefore, CT serve as a first-line investigation to broadly distinguish pathological processes. In imaging head and neck cancer, CT provides a better assessment of cortical bone involvement[23] and MRI has the advantage of better characterising local tumour extent, bone marrow involvement and detection of perineural spread.[24] Ultrasound with a high-resolution linear transducer can be used to assess the submandibular region and to guide biopsy. Intra-oral ultrasound is used less frequently. Some malignant lesions may mimic a benign tumor, such as the adenoid cystic or mucoepidermoid carcinoma. Histopathologic diagnosis is therefore necessary for the final diagnosis before treatment by surgery or radiotherapy. PET scanning is indicated in the following instances: in search of an unknown primary tumor, in patients who have a neck mass secondary to carcinoma, if a recurrent carcinoma may be present, or where CT is inconclusive for metastatic lymph nodes in the neck.[25]

Oral cancers can spread by the following routes: extension along the submucosa, direct invasion into adjacent structures, perineural spread and lymph node metastasis. The oral mucosal space has bilateral drainage to the submental and submandibular lymph nodes. Any asymmetrically enlarged lymph nodes in the primary drainage site should be regarded as sus-

picious, even if they are subcentimetre. The retero mandibular trigone (RMT) and root of tongue are two important sites of tumour spread. Involvement of the root of tongue upstages oral cavity tumours to T4 by the TNM staging system. Involvement of the lingual septum renders the patient unsuitable for hemiglossectomy.[26]

CT technique can be modified to demonstrate pathology. Puffed cheek CT has a useful role in assessing mucosal tumours where mucosal surfaces are opposed.[27] Small tumours in the mucosa may otherwise not be seen.

Malard O et al.[28] in their study reported that oral and oropharyngeal carcinomas are characterized by a high incidence of node metastatic involvement and local extension. The study compared the TN stage of patients by clinical and computed tomography (CT) examination to postoperative histopathology. Sensitivity of CT for tumor extension was 82%, predictive value for bone involvement 67%. Clinical examination was poor in predicting the presence (54%) or absence (56%) of node involvement. Sensitivity of CT for assessment of node involvement was 80%, specificity 71%, positive predictive value 67%, and negative 83%.

Freire AR , et al. in their study reported that clinical examination alone is not enough to establish the true extent of local involvement and regional metastases. It has been suggested that computed tomography (CT) may provide valuable information for pretreatment staging.

Conclusion

Multislice CT had good sensitivity and speficity in the diagnosis of squamous cell carcinoma of oral cavity.It is also best in evaluating cortical bone invasion. It is cost effective & widely available. Early detection and treatment is the short-term goal because this results in considerably better survival rates.

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