EVALUATION OF AETIOLOGICAL ROLE OF MISDIRECTED TOOTH IN THE INCIDENCE OF SQUAMOUS CELL CARCINOMA OF ORAL CAVITY

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ABSTRACT

BACKGROUND

The incidence and progression of the oral cancer varies according to various cultural and lifestyle factors. In India, tobacco usage in the form of smoked and non-smoked tobacco both is a common practice. In Western population smoking and alcohol consumption are the main risk factors. Studies have shown that there is also role of non-modifiable risks like HPV infections and chronic irritation by continuous trauma from misdirected tooth in causation of Oral Squamous Cell Carcinoma (OSCC).

AIMS

To find out the role played by chronic irritation due to misdirected tooth as an aetiological factor for OSCC.

METHODS AND MATERIALS

This is a retrospective clinical study done in 42 patients with OSCC from July 2014 to March 2016.

RESULTS

23.8% patients who consumed alcohol and had misdirected tooth developed cancer, whereas only 4.76% patients with alcohol consumption history alone developed cancer; 26.19% patients used tobacco and had misdirected tooth developed cancer and only 7.14% with tobacco usage alone developed cancer. In 19.04% patients who took alcohol and tobacco both and with misdirected tooth developed cancers and in 7.14% cases developed cancer when there is only history of alcohol and tobacco usage alone and no misdirected tooth was present; 7.14% patients developed cancers only with the presence of misdirected tooth alone; 4.76% patients developed cancer de novo even with not any risk factor involved.

CONCLUSION

We came to the conclusion that there is a significant role of irritation by misdirected tooth in the causation of OSCC as well as it is a major synergistic factor when combined with tobacco and alcohol consumption.

KEYWORDS

Misdirected Tooth, Chronic Mucosal Irritation, Oral Squamous Cell Carcinoma, Tobacco Use, Aetiological Factors.

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INTRODUCTION

Oral cavity consists of lips, buccal mucosa, alveolus and dentition, hard palate and anterior 2/3rd of the tongue. Oral cavity carcinoma is the 6th commonest cancer worldwide.[1] and the third most common in South East Asia.[2] Countries in Indian subcontinent especially India, Pakistan, Sri Lanka and Bangladesh have the highest incidence of oral carcinoma with up to 25% of all new cases.[3] compared to 6% in France and 3% in the UK.[4] In India head and neck squamous cell carcinoma is one of the most common cancers. In India, Bhopal has the highest age adjusted incidence rates of 9.6 of 100,000 males for oral cancer.[2] Histologically, the most common type of oral carcinoma is squamous cell carcinoma which accounts for 90% of the oral carcinomas followed by adenocarcinoma 5%, lymphomas 2%, verrucous carcinoma 2% and the rest are relatively rare like sarcomas.[5] The commonest site of involvement of the oral carcinoma is tongue (up to 50%) where lateral borders and anterior 2/3rd are being commonly involved.[6]

Oral Squamous Cell Carcinoma (OSCC) is a malignant tumour of the squamous lining of the oral cavity mucosa. The incidence of OSCC is high at around sixth and seventh decade of life and the risk is more in men compared to women.[7,8] According to a few recent studies, although the global incidence of OSCC has decreased, the incidence has increased among people less than 40 years of age.[6] One more study done by Warnakulasuriya S, et al; 2007 also reported increasing incidence of OSCC in patients under 45 years of age.[9]

The incidence and progression of the oral cancer varies significantly according to the various cultural and lifestyle factors. Hence, incidence of oral cancer varies in different parts

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of the world. The cultural habit of Alcohol use in parts of Western Europe has been associated with high incidence of OSCC.[10] In Bundelkhand region of India, where our study was conducted and also in other parts of Indian sub-continent tobacco chewing, betel nut chewing, gutkha chewing is a common practice. Gutkha is a local preparation of areca nut and tobacco. Betel Nut has Arecoline a brother of Acetylcholine which acts on neuromuscular junction causing constant muscle spasm. While irritable and ulcerative component in it damages the mucosa and submucosa which heal on these muscle already in spasm, leading to contracture and more contracture. This fibrosed mucosa is not pliable during chewing, so even slightly misdirected tooth starts rubbing and damaging it leading to carcinoma of buccal mucosa or tongue at that site quite often. Scale made of tobacco quid deposited on teeth and gum junction causes Periodontitis and Carcinoma of lower gingivobuccal sulcus. While on upper gingivobuccal sulcus, same can occur but is less common.

Recent studies have shown that there is a role of carcinogenic viruses like Human Papilloma virus and chronic irritation caused by continuous trauma from misdirected tooth or jagged tooth in causation of squamous cell carcinoma of the oral cavity. Misdirected tooth especially the sharp border of the lower first molar tooth tends to cause chronic irritation to the lateral aspect of the tongue if it is directed lingually and to the buccal mucosa if it is directed buccally causing CA tongue and CA cheek respectively.

If a patient having misdirected tooth also consumes alcohol or tobacco, it can cause more tissue damage increasing the incidence of cancer.[11] Dental trauma caused by edges of a sharp, jagged and misdirected tooth is an important aetiology of OSCC.[12] Nitrosonornicotine, Aryl Hydrocarbons (Most common of it is Benzopyrene that is known as common tar of tobacco) are the carcinogenic substance present in the tobacco that increases the risk of cancers by causing tissue damage at molecular level.

There is also a group of OSSC patients without any history of tobacco and alcohol consumption.[13,14] For these patients, the aetiologic factors including HPV 16-18, diet and nutrition especially deficient in vit A, C, D; Iron and Zinc, genetics, oral hygiene, dental trauma might play a significant role and many studies have been done and still so many researches are going on.[14,15,16,17,18]

The parts of oral cavity like lips, tongue and buccal mucosa are easily visible and cancers of these parts usually present at a relatively early stage. Retromolar Trigone (RMT) is an ill-defined triangular area in the oral cavity posterior to the upper and lower third molar teeth with the maxillary tuberosity at its apex. It is a relatively uncommon site for oral squamous cell carcinoma. Jagged tooth mainly upper last molar is a common cause of CA retromolar trigone. The prognosis for retromolar trigone area SCC is poor because of the presentation at an advanced stage.[19,20,21]

This study has been conducted with an aim to evaluate the aetiological role of presence of misdirected tooth in oral squamous cell carcinoma.

METHODS AND MATERIALS

This is a retrospective study conducted in the Department of ENT and Head and Neck surgery, MLB Medical College, Jhansi, Uttar Pradesh, India. The study included 48 patients who came to the OPD with non-healing chronic ulcer (s) in the oral cavity between the interval of July 2014 and March 2016.

Inclusion Criteria

Patients who came to our OPD with history of chronic non-healing oral ulcers were taken and examined in this study.

Exclusion Criteria

Patients having other of oral lesions like oral lichen planus, oral candidiasis, aphthous ulcers, any lacerations or any other acute lesions were not included in this study. Patients having any other dermatological illnesses or any other systemic illnesses were also not included in the study.

Complete history taking and local examination of the lesion was done in the OPD. All the patients had chronic non-healing ulcer or swelling in the oral cavity were admitted as in-patients and punch biopsy was done under local anaesthesia. Histopathological evaluation of the sample was done by experts and the results turned out to be squamous cell carcinoma in case of 42 patients (87.5%) and the rest 6 cases were non-neoplastic lesions (Exclusion criteria) of non-specific causes (Table 1 and Figure 1).

Our study was concentrated to only these 42 patients and the underlying risk factors for every individual patient were identified by further probing into the history in detail. Special attention was given to the relationship between the chronic irritation caused to the oral mucosa by misdirected or jagged tooth and the incidence of squamous cell carcinoma of the oral cavity.

Dental trauma was classified into three basic conditions namely dental decay, broken teeth and teeth with sharp margins. We also considered tobacco smoking habits of the patients like number of cigarettes per day. Additionally, former smokers and former drinkers were defined as individuals who had stopped smoking and drinking for at least 2 years at the time of the interview. According to UK Department of Health, alcohol consumption for men who drink less than 21 units/week and for women who drink less than 14 units/week is not classified as abusive.[11]

RESULTS

Out of the 42 OSCC cases, 38 were males and 4 were females (Table 2). The patients were belonging to different age groups ranging from 20 years to 80 years with the maximum number of patients coming under the 41-60 years of age (47.61%) (Table 3).

22 patients (52.38%) were having squamous cell carcinoma originating from tongue followed by 18 cases of buccal mucosa. Lesions of cancer in other sites of oral cavity were 2 cases, who were having ulcer in retromolar trigone. In our study we did not encounter a single patient with exclusively alveolar involvement (Table 4).

10 (23.8%) patients who consumed alcohol along with the presence of misdirected tooth developed cancer, whereas only 2 (4.76%) patients with alcohol consumption history alone developed cancer; 11 (26.19%) patients who had history of tobacco usage along with the presence of misdirected tooth developed cancer and only 3 (7.14%) patients with tobacco usage alone developed cancer of the oral cavity. In 8 (19.04%) patients with history of alcohol and tobacco usage along with misdirected tooth developed cancers and in 3 (7.14%) cases they developed cancer where there is only history of alcohol and tobacco usage alone and no misdirected tooth was present; 3 (7.14%) patients developed cancers only with the

presence of misdirected tooth alone; 2 (4.76%) patients developed cancer de novo even with not any risk factor involved (Table 5 and Figure 2).

Diagnosis	Number of Cases
Malignant ulcer or growth	42
Non-malignant ulcer or growth	6

Table 1: Showing the Various Diagnosis among the Cases Studied (n=48)

Sex	Male	Female
Number	38	4
Percentage	90.47%	9.53%

Table 2: Showing the Sex Distribution among the Cases Diagnosed to have Oral Squamous Cell Carcinoma

Age Group	<20 years	20-40 years	41-60 years	>61 years
No. of cases	-	4	20	18
Percentage	0%	9.53%	47.61%	42.86%

Table 3: Shows the Age Group of the Patients having Malignancy

Site of Lesion	Tongue	Cheek Mucosa	Alveolus	Retro Molar Trigone
No. of cases	22	18	-	2
Percentage	52.38%	42.86%	0%	4.76%

Table 4: Showing the Various Sites of Involvement of the Squamous Cell Carcinoma in the Oral Cavity

Risk Factors for OSCC	No. of Patients with the Mentioned Risk		Percentage
Alcohol consumption alone	With presence of misdirected tooth (AmD)	10	23.8%
	Without presence of misdirected tooth (AWmD)	2	4.76%
Tobacco usage alone (smoking or smokeless tobacco)	With presence of misdirected tooth (TmD)	11	26.19%
	Without presence of misdirected tooth (TWmD)	3	7.14%
Both alcohol and tobacco consumption	With presence of misdirected tooth (CmD)	8	19.04%
	Without presence of misdirected tooth (CWmD)	3	7.14%
Presence of misdirected tooth alone	3		7.14%
Not having any of the above mentioned risk factors	2		4.76%

Table 5: Various Aetiological Factors and their Impact on OSCC

Fig. 1: Misdirected Upper Last Molar Tooth Buccally causing Ulcer over Left Buccal Mucosa

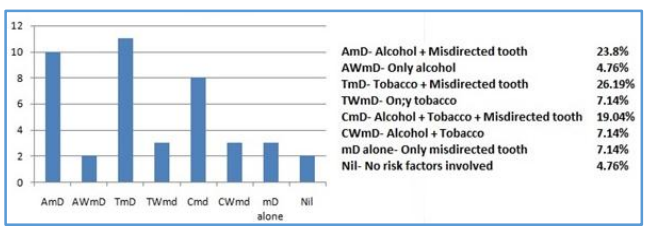

Fig. 2: Bar Diagram showing the Number of Cases with Various Aetiological Factors and Discussed

DISCUSSION

OSCC especially occurs in males.[12,16,22,23,24] whereas in our study we are having more number of male patients with carcinoma, i.e. 90.47% to only 9.53% in females. This can be attributed to the higher number of male patients with alcohol or tobacco abuse in India.

Among the different sites of OSCC, carcinoma tongue is the most common (Approximately 50%).[2,25] Other studies like (Huang et al, 2006; Rao et al, 2013; Yazici et al, 2005) also supports the commonest incidence of carcinoma tongue.[26,27,28] In our study, carcinoma tongue is present in 52.38% of the patients which is on par with the other studies. Total number of alcoholic patients having misdirected tooth are having increased risk of 19.03% than not having misdirected tooth. Total number of tobacco users having misdirected tooth are having increased risk of 19.04% than not having misdirected tooth. Total number of patients (Alcoholic and Tobacco users both) having misdirected tooth are having increased the risk by 11.89% than not having misdirected tooth.

Chronic physical irritation of oral mucosa by misdirected tooth may be an independent cause of OSCC.[29] In this study patients having only misdirected tooth without any other risk factors have 7.14% risk of developing oral cancer. While in our study, 4.76% patients who are not having misdirected tooth or any other behavioural risk factors developed oral cancer. It shows that oral cancers can occur even without having any of the above mentioned risk factors.

Misdirected tooth and tobacco usage cause constant irritation to the oral mucosa. It is a very common aetiology of oral SCC.[30] Lockhart PB et al reported that 44% of patients

with OSCC of tongue origin had a site of constant irritation by sharp teeth or dentures.[31]

The incidence of oral SCC involving buccal mucosa is quite common in Asian populations, especially Indian sub-continent countries due to cultural betel quid and tobacco chewing habits. In Sri Lanka, OSCC involving buccal mucosa accounts for 40% of all OSCC cases.[2,32] Buccal mucosa comes out to be the second commonest site (42.85%) of oral squamous cell carcinoma in our study in which right buccal mucosa proves to be more common. It can be attributed to the local practice of keeping tobacco and Gutkha in the right vestibule as told by the patients during history and examination session.

Patients were chewing tobacco and some patients were also giving history of keeping it inside the mouth while sleeping. This caused long duration of contact and irritation to the buccal mucosa.

Alcohol and Tobacco causes their carcinogenic effects by contact mechanism. Studies in animal models have shown that there is an effect of ethanol on the penetration of nitrosonornicotine (From tobacco) into the oral mucosa.[33]

CONCLUSION

This clinical retrospective study included 48 patients having chronic non-healing ulcer(s) in the oral cavity between the interval of July 2014 and March 2016. On histopathological examination, 42 patients were found to be OSCC patients.

These 42 patients were examined clinically for the presence of misdirected tooth and whether this misdirected tooth causing constant irritation or trauma to nearby structures in oral cavity leading to chronic non-healing ulcer. The data mentioned above strongly supports the hypothesis that chronic mechanical trauma caused by misdirected tooth plays a role in aetiology of oral SCC.

Males show a higher incidence of oral SCC compared to the females. Carcinoma tongue is the most common site of OSCC. Patients with oral SCC are most likely to be in the age group of 40-60 years. Our results are consistent with the results that chronic physical irritation or trauma caused by misdirected tooth is likely to cause OSCC and this can be considered as an independent risk factor.

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