

# Evaluation between the Association of Chronicle of Tooth Extraction with Oral Alveolar Carcinoma: An Observational Clinco-pathological Institutional Assessment

## Abstract:

**Objective:** The intra-alveolar carcinoma of the jaw is an unusual and separate entity among the malignant tumors of the jaws. One of the most important reasons for the increase in the number of patients diagnosed with oral carcinoma and its association with the high mortality rates is the late detection of the carcinoma.

**Aims:** The aim of the study was to analyse the clinic-pathological relationship between oral alveolus carcinoma and with history of tooth extraction.

**Materials & Methods:** It was an observational, clinic-pathological study. 952 Patients aged 30–80 years diagnosed with alveolus carcinoma of the jaws with a history of recent tooth extraction and unhealed socket at the extraction site were included in the study. Demographic, clinical, and disease-related continuous variables were computed for each subject and presented as descriptive statistics including calculation of percentages (% age). Categorical variables were analysed using Chi-square test. Regression analysis was used to identify habits and disease-related variables which can affect the incidence of oral carcinoma.

**Results:** 2655 (33.78%) were diagnosed with alveolus carcinoma while 952 (12.11%) patients were associated with a history of dental extraction as a chief complaint. 553 (58.08%) patients had developed carcinoma in the proximity of the site of placement of the tobacco, and 431 (45.27%) patients underwent extractions as they do not want preventive treatment.

**Conclusions:** The focus of the current study is on early diagnosis and appropriate treatment planning, both of which can affect prognosis. It will also contribute to the enhancement of clinical awareness following tooth extraction.

**Key-words:** Alveolus, carcinoma, tooth extraction, tooth mobility, unhealed socket.

## Introduction:

Head and neck carcinomas are more common because of the social oral habits as a risk factor and often curable if it diagnosed early.[1,2] In India oral carcinoma is one of the broad-spectrum neoplasm and it constitutes a major health problem.[3,4] In 1971, Pindborg coined the term 'primary intra alveolar carcinoma'. [5,6] According to WHO, it is defined as squamous cell carcinoma arising within the jawbones without connection to the oral mucosa, probably from odontogenic epithelial residues.[7,8,9]

In India, the main reason for the outbreak proportion of oral carcinoma is the rampant use of quid/tobacco chewing as a

psychoactive stimulant which may over a period of time leads to tooth mobility and thus later patients will come for extraction of the teeth following tooth mobility.[4] In some instances, after extraction of a tooth, the carcinoma appears to develop rapidly and proliferate out of the socket, which could

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probably be due to the unobstructed growth of the neoplastic tissue along the periodontal ligament and then sudden proliferation after extraction.[10,11] However, if such cases are carefully examined, it can usually be ascertained that the tooth was extracted because of a gingival lesion or pulpal disease or mobility which in fact was a tumor, which at the time of treatment went undiagnosed or may not be considered suspicious by a dental clinician. This leads to delay in the final diagnosis being made and subsequently late detection of the tumor leading to greater morbidity, and a vast intricate treatment. Previous studies data suggest that the risk of gingival squamous cell carcinoma recurrence and cervical lymph node metastasis is increased in patients with a history of tooth extraction.[11] Usually, alveolar carcinoma is diagnosed late, following invasive procedures such as extraction or curettage [12,13] Apart from that poor oral hygiene and post-extraction negligence is one of the etiological factors for the occurrence of oral carcinoma which needs to be paid attention to.[14,15]

Various causes for the mobility of teeth have been mentioned in the literature including periodontitis, trauma, etc, but the dental practitioner should be cautious while extracting teeth that are mobile without any underlying clinically visible pathology. Thus any tooth which is mobile without any etiologic or clinically relevant pathology should be undergoing a radiographic examination to rule out underlying intra-alveolar carcinoma. There is a paucity of literature, reporting on the patients undergoing tooth extraction which is followed by the occurrence of alveolar carcinoma at the extraction site. These studies are crucial in order to document the association of occurrence of tumors followed by extraction at the same site and other related risk factors. Keeping this in mind, this study was conceptualized to analyse the relationship between oral alveolus carcinoma followed by the history of tooth extraction.

### **Subjects and Methods:**

This institutional, observational, clinic-pathological study was performed from April 2019 to May 2022; total data of 7858 oral carcinoma patients who visited to the outpatient department were examined. 2655 were diagnosed and screened with carcinoma of the alveolus and to find out the association of history of tooth extraction in patients with carcinoma of an alveolus in the maxilla and mandible. The study included demographic data of all patients along with the site of the lesion, clinical appearance, and histopathological diagnosis. The study protocol was approved by the institutional ethical board (02/IEC/RDCHR/2019/2079).

### **Inclusion and exclusion criteria:**

Patients are aged 30–80 years of both genders diagnosed with carcinoma of the alveolus of maxilla and mandible with a history of extraction in the past few days to a few months with unhealed extraction socket/wound/swelling at extraction site were included in the study. Patients with a previous history of malignancy/radiotherapy/chemotherapy were excluded.

### **Study Design:**

The study aimed to assess the duration of unhealed extraction wound/socket for early detection of malignancy, site of placement of quid/tobacco, and occurrence of the lesion. All study patients diagnosed with oral carcinoma attending the Department of oral medicine and radiology were examined and analysed by three researchers (K.G, S.A, and J.K) K.G is an oral medicine specialist with more than ten years of clinical experience, whereas S.A and J.K are an oral medicine postgraduate who completed oral cancer continuing education course tailored for the purpose of this study and for inter-observer reliability. Patients were assessed for a history of tooth extraction followed by detection of carcinoma at the extraction site. Written informed consent was obtained from all the study patients and their records were reviewed for demographic details, medical history, reasons for dental extraction, the time interval between tooth extraction and doubt of any major problem, post-extraction signs and symptoms, duration of unhealed wound/socket, nature of habits (any deleterious habits such as quid/tobacco or one of its commercial preparations), investigations prior to extraction, biopsy report and tumor site. TNM classification was done for the study group patients.[16]

### **Statistical Analysis:**

The data were analysed using IBM SPSS Statistics-version 21 (IBM Corp., Released 2012. IBM SPSS Statistics for Windows, version 21.0. Armonk, NY: IBM Corp. USA). Demographic, clinical, and disease-related continuous variables were computed for each subject and presented as descriptive statistics including calculation of percentages (% age). Categorical variables were analysed using the Chi-square test. Multiple linear regression analysis co-relates the age and gender variables and is used to identify habits and disease-related variables which can affect the incidence of oral carcinoma. All values were considered statistically significant for  $P < 0.05$ .

**Results:**

In the current research, 2655 (33.78 %) of the 7858 oral carcinoma patients who visited the dental outpatient department were diagnosed with carcinoma of the alveolus. 952 (12.11 %) of the 2655 patients with carcinoma of the alveolus in the maxilla and mandible were found to have a history of dental extraction with the major complaint of an unhealed extraction wound/socket/swelling.

**Demographic and clinical details:**

Out of 7858 patients, 4362 (55.51%) were male and 3496 (44.48%) were female patients with an age range of 20 to 70 years and the median age was 43.22 years. Oral carcinoma followed by the history of extraction was found more common in 40-50 years of age (2.52%) followed by (2.37%) in the 50-60 years of age group and more in males (59.55%). [Table-1]

Table 1 Demographic distribution of study patients

Age group (in years)	Patients n (%)	Patients with carcinoma n (%)	Carcinoma patients with history of extraction (%)	F-statistics	P value *
20-30 years	1328(16.89%)	396(5.03%)	107(1.36%)	4.385886	0.010432
30-40 years	1237(15.74%)	309(3.93%)	154(1.95%)		
40-50 years	1469(18.69%)	492(6.26%)	198(2.52%)		
50-60 years	1628(20.72%)	635(8.08%)	187(2.37%)		
60-70 years	1294(16.47%)	519(6.61%)	185(2.35%)		
>70 years	902(11.47%)	304(3.87%)	121(1.54%)		
Total	7858	2655(33.78%)	952(12.11%)		
<b>Gender</b>					
Male	4362	1569(59.09%)	567(59.55%)		
Female	3496	1086(40.90%)	385(40.44)		

\*P significant for < 0.05.

**Site of placement of quid/tobacco and occurrence of lesion:**

Out of a total of 952 study group patients, 553 (58.08%) patients had developed carcinoma in the proximity to the site of placement of the quid/tobacco. 219 (23%) patients had found no co-relation. 144 (15.13%) patients had carcinoma contralateral to the site of placement of the quid/tobacco. By using the chi-square test it was found that there was an association between the location of quid/tobacco placement and site of carcinoma (p = 0.001). Using Logistic regression analysis it was found that the odds ratio for the location of quid/tobacco and site of tumor was 25.444 (p = 0.001). Thus

indicating more chances of occurrence of carcinoma at the site of placement of quid/tobacco. [Table-2]

Site of placement of quid/tobacco and occurrence of lesion	Carcinoma patients with a history of extraction n - 952 (%)	Chi-square value (X <sup>2</sup> )	P-value*
Carcinoma at the side of quid/tobacco chewing	553(58.08%)	220.9667	< 0.00001
Carcinoma had no correlation with the side of quid/tobacco chewing	219(23%)		
Carcinoma at the contralateral side of quid/tobacco chewing	144(15.13%)		
Patient not using quid/tobacco products	36(3.78%)		

\*P significant for < 0.05.

Table 2 Co-relation between the site of placement of quid/tobacco and occurrence of lesion identify the need for clinical awareness following dental extraction and assessment of duration of unhealed extraction wound for early detection of malignancy

Among 952 study group patients, 431 (45.27%) patients underwent extractions as they did not want preventive treatment while 326 (34.24%) patients underwent extraction because of mobility of teeth. 108 (11.34%) of the patients had an extraction done where the primary reason was dental pain and discomfort was reported. 87 (9.13%) of the patient underwent removal of teeth to prevent trauma to the tongue and cheek. In the current study 785 (82.45%) patients reported a history of unhealed socket/wound/swelling as the first sign. 167 (17.54%) did not have any of the above symptoms but they were diagnosed with carcinoma at the extraction site. 290 (30.46%) patients gave a history of extraction duration of more than four weeks while 81 (8.50%) gave less than one 1-week duration history. [Table-3]

Cause for extraction	Carcinoma patients with a history of extraction (n - 952)
Do not want preventive treatment	431(45.27%)
Periodontal pathology (teeth mobility/poor oral hygiene)	326(34.24%)
Periapical pathology (dental pain/ carious tooth)	108(11.34%)
To prevent trauma to the tongue and cheek	87(9.13%)
<b>Post extraction Symptoms</b>	
Unhealed wound/ swelling	785(82.45%)
Tumour growth	167(17.54%)
<b>Duration of extraction (in weeks)</b>	
< 1 week	81(8.50%)
1-2 week	126(13.23%)
2-3 weeks	167(17.54%)
3-4 weeks	290(30.46%)
> 4 weeks	288(30.25%)

Table 3 Distribution of carcinoma study patients according to the cause of extraction, symptom, and duration of extraction

**History of extraction as per jaw involvement and radiographic investigations:**

Among the study group of patients, mandible posteriors were found to be the most common jaw involved 742 (77.94%) followed by mandible anterior 115 (12.07%) and maxillary posteriors were the least involved jaw 95 (9.97%). 259 (27.20%) study group patients underwent extraction of mobile teeth without any radiographic while 693(72.79%) were advised radiographic investigations like computed tomography (CT scan), orthopantomography (OPG), and intraoral radiograph. [Table-4]

Variables		Carcinoma patients with a history of extraction (n - 952)
Jaw involvement	Maxillary posteriors	95(9.97%)
	Mandibular anterior	115 (12.07%)
	Mandibular posteriors	742 (77.94%)
Investigation	A radiographic investigation is done before extraction	693(72.79%)
	Radiographic investigation not done	259(27.20%)

Table 4 Distribution of study patients with jaw involvement and radiographic investigations

Assessment of TNM staging of carcinoma for early detection of malignancy 104(10.92%) patients had the lesion at T4 a/b, 241(25.31%) were at T3, 348(36.55%) were at T2 and 259(27.20%) had T1 carcinoma. This shows that still there is tremendous need of clinical awareness so that malignancy can be detected at an early stage. [Table-5]

TNM Staging of patients	Carcinoma patients with a history of extraction (n - 952)
T1*	259(27.20%)
T2**	348(36.55%)
T3***	241(25.31%)
T4a/T4b#	104(10.92%)

\*T1 Tumour 2 cm or less in greatest dimension

\*\*T2 Tumour more than 2 cm but not more than 4 cm in greatest dimension

\*\*\*T3 Tumour more than 4 cm in greatest dimension

#T4a: Lip Tumour invades through cortical bone, inferior alveolar nerve, the floor of the mouth, or skin of the face (ie, chin or nose) Oral Cavity Tumour invades through cortical bone, into the deep extrinsic muscle of tongue (genioglossus, hyoglossus, palatoglossus, and styloglossus), maxillary sinus, or skin of the face

#T4b: Tumour involves masticator space, pterygoid plates, or skull base and/or encases internal carotid artery

Table 5 TNM distribution of carcinoma study patients with a history of extraction

**Discussion:**

The focus of this research was to see if there was an association between tooth extraction and the diagnosis of carcinoma and the treatment outcome. Intra alveolar carcinomas are rare carcinoma that spreads quickly and has a poor prognosis. Intra alveolar carcinomas are usually asymptomatic until they have grown to a significant size. The majority of intra-alveolar carcinomas can occur at any age, with males being probably more common, as observed in the current study when females were less numerous.<sup>[3]</sup> Intra alveolar carcinoma risk factor includes tobacco chewing exposure in various forms. In the study conducted by Dholam K et al, 77.5% of patients had a habit of tobacco consumption in various forms and other added components, which is the most common etiology of oral carcinoma which was found similar to the current study findings where it was also suggested that higher chances of occurrence of carcinoma at the site of placement of quid/tobacco rather than on the contralateral site.[13]

In the present study majority of patients underwent extraction as patients do not want preventive treatment with the mean duration of the unhealed socket after extraction was 3-4 weeks which was found different from the study results of Dholam K et al where 70.5% of patients underwent extraction due to chief complaint of mobility of tooth with a mean duration of the unhealed socket after extraction was 2 - 6 months for 63% patients, suggesting the need of clinical awareness following tooth extraction.<sup>[13]</sup> The most common signs and symptoms of intra-alveolar carcinoma include pain, swelling, history of excessive tooth mobility. Early symptoms of these carcinomas are inconsistent and are often misdiagnosed as secondary ulceration of the oral mucosa caused by traumatic tooth extraction, ulceration caused by a nonhealing extraction socket, and periodontal and periapical diseases. Previous reports showed that an ulcer formation is a rare event in intra-alveolar carcinomas this alarming difference certainly raises the possibility of diagnostic delay.[3,13,17]

In intra alveolar carcinoma of the oral cavity, the posterior mandibular region is predominant in location but the reports of the lesion in the posterior maxilla are very less because of the difficulty of differentiating intra alveolar carcinoma from carcinoma of maxillary sinus origin.[18] In the study done by Singh T et al, the posterior mandible was the most common

site affected (58%) which was found similar to the current study, followed by the anterior mandible, and very less patients were found with maxilla affected.[14] In a study done by Singh T et al, all patients had stage IV disease, with 7 of the 9 (78%) post-extraction cases having cervical metastatic disease while in the current study stage II was found to most common disease stage among patients, and stage IV was the least present stage.<sup>[14]</sup> Some studies have shown a similar increased incidence of cervical metastases in post-extraction cases compared with those with similar lesions who had not received dental extractions prior to diagnosis of oral squamous cell carcinoma.[19,20] As suggested in the literature, this may reflect more aggressive tumor behaviour after dental extraction or surgical manipulation.<sup>[21,22]</sup> It has been suggested that spreading out cancer cells into the circulation during invasive procedures could increase the risks of distant metastases However, the association between survival and history of the previous extraction remains controversial. [22,23]

#### Study limitations:

Outcome data have been difficult to ascertain due to the short follow-up period in many of our study cases was one of the limiting factors in our study. Follow-up of this cohort of patients and comparison with a control group would be useful in the long term to determine whether this delay in diagnosis has any significant impact on patient outcomes. Although survival data are important, one area that is often overlooked is the added psychological distress and frustrations often felt by patients and their family when an incorrect initial clinical diagnosis has been made by any health practitioner resulting in a delay in treatment.

#### Conclusion:

Orofacial cancer is a complex disease with a short life expectancy, and dentists and dental experts play an essential part in treatment planning at all stages. Intra alveolar carcinoma might appear as an ordinary dental disorder, contributing to misdiagnosis or a delay in diagnosis. As a response, for timely identification of intra-alveolar carcinoma, rigorous assessment and follow-up are recommended, and emphasis should be placed on the need for clinical awareness following tooth extraction. Every patient with oral cancer should be treated by a multidisciplinary team that approaches the treatment of head and neck malignancies, and any suspicious lesions should be properly diagnosed as early as possible. The dental practitioner's many roles and

responsibilities in the management of oral cancer include prevention through education about smoking cessation and protected alcohol consumption, detection and early referral of premalignant lesions and oral cancers, and ongoing monitoring, follow-up, and preservation of oral health.

#### References:

1. Shah JP, Patel SG, Singh B. Jatin Shah's head and neck surgery and oncology. 4th ed. Philadelphia, PA: Elsevier Mosby, 2012.
2. Zwetyenga N, Pinsolle J, Rivel J, Majoufre-Lefebvre C, Faucher A, Pinsolle V. Primary intraosseous carcinoma of the jaws. Arch Otolaryngol Head Neck Surg 2001; 127:794-7.
3. Mahabaleswara CH, Lal SS, KirubaSK, Kulkarni S, Mohammed BB. Intra alveolar carcinoma diagnosed after teeth extraction - case series and a review. IJADS 2020; 6: 356-58
4. Sheno R, Devrukhkar V; Chaudhuri, Sharma BK, Sapre SB, Chikhale A. Demographic and clinical profile of oral squamous cell carcinoma patients: a retrospective study. Indian J Cancer. 2012 ;49:21-6. doi: 10.4103/0019-509X.98910
5. Kramer IR, Pindborg JJ, Shear M. The WHO Histological Typing of Odontogenic Tumours. A commentary on the Second Edition. Cancer. 1992; 70:2988-94. doi: 10.1002/1097-0142(19921215)70:12<2988::aid-cncr2820701242>3.0.co;2-v.
6. Zwetyenga N, Pinsolle J, Rivel J, Majoufre-Lefebvre C, Faucher A, Pinsolle V. Primary intraosseous carcinoma of the jaws. Arch Otolaryngol Head Neck Surg. 2001; 127:794-7.
7. To EH, Brown JS, Avery BS, Ward-Booth RP. Primary intraosseous carcinoma of the jaws. Three new cases and a review of the literature. Br J Oral Maxillofac Surg. 1991;29:19-25. doi: 10.1016/0266-4356(91)90168-5.
8. Bodner L, Manor E, Shear M, van der Waal I. Primary intraosseous squamous cell carcinoma arising in an odontogenic cyst: A clinicopathologic analysis of 116 reported cases. J Oral Pathol Med. 2011; 40:733-38.
9. Müller S, Waldron CA. Primary intraosseous squamous carcinoma. Report of two cases. Int J Oral Maxillofac Surg. 1991; 20:362-65
10. Saxby PJ, Soutar DS. Intra-oral tumors presenting after dental extraction. Br. Dent. J. 1989;166: 337-38

11. Choi EJ, Zhang X, Kim HJ, Nam W, Cha IH. Prognosis of gingival squamous cell carcinoma diagnosed after invasive procedures. *Asian Pac J Cancer Prev*. 2011;12:2649-52.
12. Orbak R, Bayraktar C, Kavrut F, Gu'ndogdu C. Poor oral hygiene and dental trauma as the precipitating factors of squamous cell carcinoma". *Oral Oncology Extra* 2005;41: 109-13.
13. Dholam K, Kharade P. Association of History of Tooth Extraction and Carcinoma of Alveolus as Well as Gingiva. *EC Dent Sci* 2017; 14: 03-06.
14. Singh T, Schenberg M. Delayed diagnosis of oral squamous cell carcinoma following dental treatment. *Ann R Coll Surg Engl* 2013; 95: 369-73 doi 10.1308/003588413X13629960045599
15. Obuekweo N, Akpata O, Ojo MA, Madukwe IU, Osaguona AO. Malignant tumours presenting after dental extraction: a case series. *East Afr Med J*. 2005 ;82:256-9. doi: 10.4314/eamj.v82i5.9316.
16. Patel SG, Shah JP. TNM staging of cancers of the head and neck: striving for uniformity among diversity. *CA Cancer J Clin*. 2005 ;55:242-58 doi: 10.3322/canjclin.55.4.242
17. Tandon P, Dadhich A, Saluja H, Bawane S, Sachdeva S. The prevalence of squamous cell carcinoma in different sites of oral cavity at our Rural Health Care Centre in Loni, Maharashtra – a retrospective 10-year study. *Contemp Oncol (Pozn)* 2017; 21: 178-83. doi: <https://doi.org/10.5114/wo.2017.68628>
18. Suei Y, Tanimoto K, Taguchi A, Wada T. Primary intraosseous carcinoma: Review of the literature and diagnostic criteria. *J Oral Maxillofac Surg* 1994; 52:580-83.
19. Suzuki K, Shingaki S, Nomura T, Nakajima T. Oral carcinomas detected after extraction of teeth: a clinical and radiographic analysis of 32 cases with special reference to metastasis and survival. *Int J Oral Maxillofac Surg* 1998; 27: 290-94.
20. Papageorge MB, Lincoln RE. Nonhealing extraction sites: two case reports and a differential diagnosis. *J Mass Dent Soc* 1994; 43: 20-26.
21. Hong SX, Cha IH, Lee EW, Kim J. Mandibular invasion of the lower gingival carcinoma in the molar region: its clinical implications on the surgical management. *Int J Oral Maxillofac Surg* 2001; 30: 130-38.
22. Kusakawa J, Suefuji Y, Ryu F, Noguchi R, Iwamoto O, Kameyama T. Dissemination of cancer cells into circulation occurs by incisional biopsy of oral squamous cell carcinoma. *J Oral Pathol Med*. 2000 ;29:303-7. doi: 10.1034/j.1600-0714.2000.290703.x.
23. Wong TSC, Wiesenfeld D. Oral Cancer. *Australian Dental Journal* 2018; 63: S91-99.