

Squamous Cell Carcinoma Linked to Prosthodontic-Dental Irritation: A Report of Three Cases

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Abstract

Today, oral cavity cancers present a significant public health challenge due to their aggressiveness, the complex burden of their management, and their high mortality rate. Over 90% of these cancers are oral squamous cell carcinomas (OSCC), which develop in the mucosal lining of the oral cavity [1]. The prevalence is higher among men than women. The main risk factors are dominated by alcohol and tobacco use. Other risk factors include chronic irritation.

Through the presentation of three clinical cases of squamous cell carcinoma diagnosed in our oral surgery department at the CCTD in Casablanca, this report aims to outline the diagnostic features of epidermoid squamous cell carcinoma to promote early detection and ensure optimal care for patients.

Keywords: Squamous Cell Carcinoma (SCC); Oral Squamous Cell Carcinomas (OSCC); Oral Cavity

Introduction

Squamous cell carcinoma (SCC) represents a major public health concern due to its significant mortality and morbidity. According to the World Health Organization (WHO), this type of cancer accounts for approximately 95% of cancers affecting the lip, oral cavity, and pharynx. This high prevalence highlights the considerable impact of this disease on public health, requiring effective strategies for prevention, diagnosis, and treatment.

In Morocco, according to the Cancer Registry of Casablanca Region (2013-2017), a total of 810 new cases were recorded for lip, oral cavity, and pharynx cancers, which 91.1% were squamous cell carcinomas.

While traditional risk factors for the development of squamous cell carcinoma include tobacco use, alcohol consumption, and human papillomavirus (HPV) infection, there is growing evidence suggesting that chronic local trauma may also contribute to its onset. Sources of trauma such as ill-fitting dentures, sharp tooth edges, or repetitive biting can lead to continuous irritation of the oral mucosa, potentially triggering a cascade of inflammatory and cellular changes that favor malignant transformation.

By presenting three clinical cases of squamous cell carcinoma diagnosed in our oral surgery department at the CCTD in Casablanca, this report aims to raise awareness among dentists about the diagnostic elements of squamous cell carcinoma, facilitating early detection in patients with chronic irritation related to prosthodontics, ensuring timely intervention and improved patient outcomes.

Case Presentations

Case n°1

A 66-year-old female patient was referred for consultation to the Oral Surgical Department at the CCTD in Casablanca due to an exophytic lesion on the anterior mandibular alveolar ridge, which had appeared 6 months ago and had been progressively increasing in size.

The patient appeared to be in good health, she reported no history of alcohol or tobacco use. During the interview, it was revealed that the patient had experienced trauma six months ago following the placement of a bridge. She reported returning to her dentist due to the appearance of a painful, budding gingival lesion under the bridge. The dentist then removed the bridge and excised the lesion without sending it for histopathological examination.

After this invasive procedure, the lesion continued to progressively increase in size, prompting the patient to seek our consultation.

The extraoral examination revealed no abnormalities. Upon intraoral examination, the lesion appeared as an ulcerative and budding lesion with an indurated base and non-detachable whitish deposits. It was painful to palpation and bled upon contact. There were no associated palpable cervical lymph nodes (Figure 1).



Figure 1: Ulcerative and budding lesion observed on the anterior mandibular alveolar ridge.

The panoramic radiography showed no pathological radiographic images (Figure 2).

Case n°2

A 60-year-old patient, in apparent good general health, reported no history of alcohol or tobacco use, presented with painful whitish lesions along the edentulous ridge of the right mandibular premolar-molar region, which had been evolving under her removable denture for the past 2 months. The denture showed imbalance in its fit, with no palpable lymphadenopathy.



Figure 2: Panoramic radiograph of the patient.

The extraoral examination was unremarkable, showing no significant abnormalities.

The intraoral examination revealed a firm, fissured ulceration with a hardened base and non-detachable white deposits located on the edentulous ridge of the right mandible, extending to the inner cheek, and non-bleeding upon palpation (Figure 3). While the radiological examination showed no abnormalities (Figure 4).



Figure 3: A keratotic ulcerative lesion situated on the edentulous ridge of the right mandible, extending to the inner cheek.

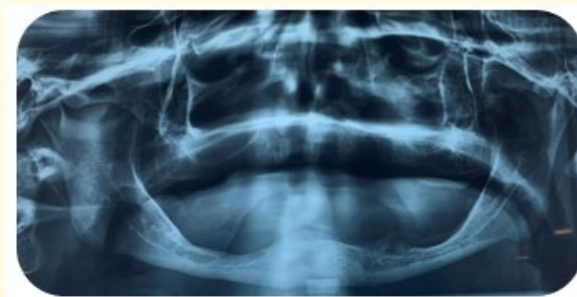


Figure 4: Panoramic radiograph of the patient showing no pathological radiological findings.

Case n° 3

An 81-year-old patient with controlled hypertension and no history of alcohol or tobacco use presented for consultation due to an ulcerative lesion on the right lateral border of the tongue. This lesion is associated with a decrease in tongue mobility.

The patient history revealed a trauma from 3 months ago, caused by the worn surfaces of the prosthetic teeth on their mandibular removable prosthesis.

The extraoral examination showed no particular abnormalities. On intraoral examination, there was an ulcerative-proliferative lesion with irregular, raised borders located on the left lateral border of the tongue. The lesion was situated anterior to the lingual “V” and did not extend beyond the midline. Its base was indurated and very painful upon palpation, bleeding with minimal contact. No associated palpable cervical lymphadenopathy was noted (Figure 5). The panoramic radiograph was unremarkable (Figure 6).



Figure 5: An ulcerative and exophytic lesion with an indurated base and raised borders, located on the left lateral border of the tongue.



Figure 6: Panoramic radiograph of the patient showing no pathological radiological findings.

In all three cases, a malignant process was suspected based on the medical history and clinical presentation. A biopsy was promptly performed for each patient. Histopathological examination confirmed the presence of a well-differentiated, keratinizing, and infiltrating squamous cell carcinoma (Figure 7). Following this diagnosis, each patient was referred to a specialized hospital center for further management and treatment.

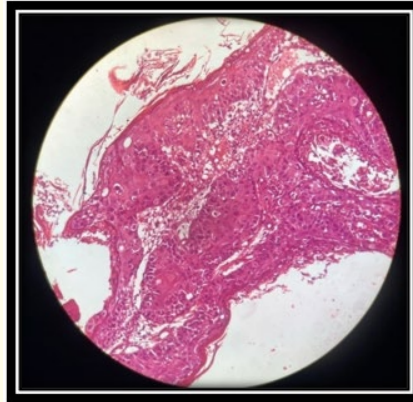


Figure 7: Histological section of a well-differentiated, keratinizing, and infiltrating squamous cell carcinoma.

Discussion

According to the WHO, 377,713 new cases of lip and oral cavity cancer were reported globally in 2020, affecting individuals of all genders and age groups. Squamous cell carcinomas constituted 95% of these cases, making them the most prevalent type of oral cavity cancer. This particular cancer type surpasses others such as adenocarcinomas of the salivary glands, lymphomas, melanomas, and Kaposi's sarcoma. It also exhibits a higher incidence in men compared to women. In addition, the geographical prevalence varies globally; For example, in Southeast Asian countries, OSCC is the most common cancer, whereas in Finland, it is the 16th most common cancer [6].

In Morocco, according to the Cancer Registry of the Greater Casablanca region (2013-2017), a total of 810 new cases were recorded for cancers of the lip, oral cavity, and pharynx, 91.1% of which were squamous cell carcinomas [7].

The most common sites for this type of cancer are: the lips (30%), the tongue (24%, including 18% on the lateral borders), the buccal mucosa (14.5%), the gingivo-alveolar complex (12%), the floor of the mouth (10.8%), the soft palate (10.8%), and the retromolar region (10%) [8]. For our cases, one patient had a lesion on the tongue, while the other two had lesions on the gingivo-alveolar complex.

The etiological factors for squamous cell carcinoma of oral cavity are multifactorial, with alcohol and tobacco use being predominant. Tobacco consumption is a shared risk factor in approximately 80 to 96% of patients diagnosed with this malignancy [3]. The International Agency for Research on Cancer (IARC) classifies tobacco as a major carcinogen for oral cavity cancers. High-risk tobacco use includes not only cigarette smoking but also pipe smoking, betel quid chewing, hookah use, snuff, and tobacco combined with cannabis [5].

The risk of developing cancer increases with the intensity and duration of tobacco use, with a "dose-effect" relationship, where the critical threshold is estimated at 20 pack-years (one pack of cigarettes per day for 20 years). Moreover, it is only 20 years after quitting smoking that the risk of developing oral cavity cancer begins to normalize. It is also important to consider the role of passive smoking, which is also recognized as a cancer risk factor for non-smokers [5,9].

Alcohol ranks as the second most significant modifiable risk factor for cancer, following tobacco. It acts synergistically with tobacco, amplifying the risk of oral squamous cell carcinoma by up to 35 times [5]. Ethanol induces mucosal atrophy in the oral epithelium, facilitating the absorption and dissolution of tobacco's carcinogenic compounds. However, squamous cell carcinomas can still occur in patients without a history of alcohol or tobacco use, as demonstrated by the cases of our three patients [5,10].

Although smoking and alcohol are the primary risk factors associated with oral squamous cell carcinoma, other elements also deserve examination. Among these factors are:

- **Infection with human papillomavirus (HPV):** HPV, particularly types 16 and 18, has been identified as a significant contributor to the development of cancers of the oropharynx and tonsils (with 80% showing positive HPV), and less so in oral locations [13].
- **Potentially malignant lesions:** These also present a risk of transformation into oral squamous cell carcinoma [12].
- **Nutritional factors:** Chronic deficiencies in vitamins A and C appear to be involved in the occurrence of cancers of the oral cavity. A deficit in retinoic acid may lead to abnormalities in the maturation of epithelial tissue, which could promote the emergence of pre-neoplastic lesions that are susceptible to degeneration into cancer [10].
- **Genetic predisposition** [11].
- **Immunosuppression:** Patients infected with the human immunodeficiency virus (HIV) have a higher rate of cancers compared to the general population. Similarly, patients treated with immunosuppressive agents would have an increased cancer risk [11].

Furthermore, local trauma may also play a significant role in development of squamous cell carcinoma. Several authors agree that repeated local trauma or chronic irritation caused by severely decayed teeth or poorly fitting dentures can lead to lesions that may transform over time, depending on the individual's background [14].

Takahashi., *et al.* studied the influence of dental treatments (extraction, incision, or curettage) on the prognosis of patients with squamous cell carcinoma. They compared a group of 26 patients who underwent dental treatments at the site of gingival squamous cell carcinoma (Group I) to a control group of 76 patients (Group II). Their results showed that 54% of patients in Group I had lymphadenopathy, compared to 29% in Group II ($p = 0.002$) [15].

The study by Suzuki., *et al.* focused on the clinical and radiographic analysis of 32 patients with gingival squamous cell carcinoma diagnosed after dental extraction, compared to a control group of 64 patients with gingival squamous cell carcinoma without prior extraction. Among the patients who underwent extraction (Group I), 25 out of 29 (86%) presented with lymphadenopathy, compared to 31 out of 64 (48%) in the group without prior extraction (Group II) [22]. Conversely, Yamagata., *et al.* found no significant differences regarding bone invasion, five-year survival (except for maxillary cases), or metastases, leaving the influence of dental treatments on the prognosis of squamous cell carcinoma uncertain [16].

The existing literature does not allow for a definitive conclusion regarding the influence of invasive procedures on the prognostic factors of squamous cell carcinoma. There is a lack of scientific evidence to establish a definitive link between these procedures and squamous cell carcinoma. Further investigations are necessary to better understand this relationship.

Our patient No. 1 reported a history of trauma caused by a bridge at the site of the gingival squamous cell carcinoma. Additionally, patients No. 2 and No. 3 mentioned repeated trauma caused by a mandibular removable prosthesis.

Clinically, the lesion most often appears as ulcerative, vegetative, or ulcerovegetative. In some cases, it may present as fissured, interstitial nodular, or extend superficially. The lesion can also arise within a pre-existing precancerous lesion [5,11].

Among the cases presented by our patients, the most common forms are the ulcerative-budding form (cases 1 and 3) and the ulcerative form (case 2), while the fissured and interstitial nodule forms are seen less often.

The positive diagnosis of oral cancer relies on a triad: a detailed medical history aimed at identifying the most incriminating risk factors, a thorough clinical examination of the oral cavity (both external and internal) with palpation of all cervical lymphatic territories, and a biopsy followed by histopathological analysis, which allows for a definitive diagnosis.

The current gold standard for oral squamous cell carcinoma (OSCC) and potentially malignant disorder (PMD) diagnosis is histopathological analysis, usually performed on preoperative incisional biopsies.

Several tools have been proposed, such as [18-21]:

- The VELscope® system, which allows visualization of tissue fluorescence directly in the oral cavity. A blue light is directed at the surface of the oral mucosa. Normal tissues fluoresce and take on a pale green color, while abnormal tissues lose this fluorescence and change color, ranging from dark brown to black.
- Optical coherence tomography is another light-based method for the detection and assessment of oral potentially malignant lesions (OPMLs) and OSCC, providing cross-sectional images of biological tissues through optical reflection measurements.
- Oral brush cytology is a minimally invasive and safe method for extracting cells from the oral mucosa.
- Liquid biopsy is a painless, accessible, and low-cost procedure for detecting oral squamous cell carcinoma by highlighting biomarkers, including circulating tumor DNA (ctDNA), extracellular vesicles (EVs), and microRNAs (miRNAs). These minimally invasive tools enable dentists to make diagnoses at advanced stages. Indeed, early detection of the disease (during stages 1 or 2) is associated with a significant improvement in survival rates. In fact, 80% of patients survive for five years compared to a survival rate of 20% among those with more advanced disease (stages 3 and 4).

For our patients, we adopted the gold standard, performing the histopathological examination on the same day as the consultation to confirm the diagnosis of squamous cell carcinoma.

The management of squamous cell carcinomas involves several approaches, including surgery, radiotherapy, and chemotherapy. The indications differ based on the stages of the disease. The TNM classification helps assess the extent of the disease and guides the choice of various therapeutic modalities.

Conclusion

Dentists play a crucial role in the early detection of oral cavity cancers. They bear significant responsibility if they fail to identify cancerous lesions, as delayed diagnosis can worsen the patient's prognosis. Dentists actively contribute to:

- **Early detection:** By identifying the early signs of squamous cell carcinomas during routine dental examinations.
- **Prevention:** By advising patients on healthy lifestyle habits, such as quitting smoking and reducing alcohol consumption, as well as eliminating irritating factors within the oral cavity.
- **Before/during/after oncological management:** By preparing the oral cavity before cancer treatment, managing complications during treatment, and providing post-treatment follow-up to monitor for recurrences.

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