CASE REPORT
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Peri-Implant Oral Squamous Cell Carcinoma in a Non-Smoking, Non-Alcoholic Patient: A Case Report

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Abstract:

More than 90% of oral malignancies are diagnosed as oral squamous cell carcinoma (OSCC). Chronic inflammation and mechanical irritation, including peri-implantitis, may contribute to carcinogenesis, with early malignant lesions often mimicking peri-implantitis, leading to delayed diagnosis. This case report underscores the importance of vigilant monitoring of peri-implant lesions by presenting a case of OSCC development in a non-smoker, non-alcoholic patient in the peri-implant region. A male patient aged 84 presented with gingival complaints that had persisted for 12 weeks. His medical history included prior heart surgery and current consumption of Aspirin, Losartan, and Carvedilol medications. He had no history of smoking or alcohol consumption. Five years earlier, a dental implant had been placed in the anterior left mandible area that was removed due to gingival complications roughly three months before the referral; however, the precise reason for this decision remained unclear. Intraoral examination revealed an exophytic lesion with a granular surface and central ulceration on the left mandibular edentulous ridge, extending buccally into the vestibular depth, lingually toward the floor of the mouth, mesially to the midline, and distally to the molar region. Radiographs showed a localized radiolucent lesion with poorly defined, non-corticated borders. An incisional biopsy was performed due to the suspicion of malignancy. Histopathological evaluation confirmed the diagnosis of OSCC. Vigilant follow-up of implant patients is crucial for identifying and managing peri-implant lesions to prevent potential malignant transformation. Further research is required to clarify the relationship between dental implants and OSCC.

Keywords: Dental Implants; Carcinoma; Squamous Cell Carcinoma; Peri-Implantitis; Inflammation; Carcinogenesis

Introduction

Squamous cell carcinoma (SCC) ranks as the sixth most common malignancy, [1] and the second most prevalent cutaneous malignancy globally [2]. However, Oral SCC (OSCC) is the predominant malignant lesion in the oral cavity (accounting for more than 90% of oral malignant lesions) [3-5]. Worldwide, OSCC is more prevalent in males than females and typically affects individuals over 60 years old. However, recent trends indicate a demographic shift, with an increasing incidence in patients under 40 [6, 7].

Risk factors for OSCC include tobacco use (both smoked and smokeless), alcohol consumption, human papillomavirus (HPV) infection, and various systemic, environmental, and behavioral factors [3, 8]. A well-known hypothesis suggests that chronic mechanical irritation may serve as a co-factor in carcinogenesis [9, 10] by perpetually over-activating tissue repair systems through sustained inflammation [11]. Consequently, chronic inflammatory responses in oral mucosa are also considered a potential risk factor for OSCC.

As the epidemiological patterns of OSCC continue to evolve, the use of dental implants has simultaneously risen significantly [12]. Dental implants have become a preferred approach for oral rehabilitation, offering an effective solution for the treatment of edentulous patients. The growing use of dental implants has been accompanied by a rise in associated complications, particularly peri-implantitis. Inflammation and progressive loss of supporting tissues around the implant may potentially contribute to inflammation-driven carcinogenesis [13, 14]. Additionally, early malignant lesions may mimic the presentation of peri-implantitis, potentially delaying the accurate diagnosis and treatment [15].

This case report aimed to highlight the importance of monitoring peri-implant lesions and emphasized the need for continuous follow-up after fixture insertion by presenting a case of OSCC development in a non-smoker, non-alcoholic patient within the peri-implant region.

Case

An 84-year-old man with a chief complaint of a gingival problem during the past three months was referred to the Department of Oral Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

The patient's medical history revealed prior heart surgery and current use of Aspirin, Losartan, and Carvedilol. The self-reported dental history indicated a previous insertion of a dental implant in the anterior left region of the mandible five years ago, which was subsequently removed three months prior to being referred to us, due to the onset of gingival issues. Both familial and psychosocial histories were unremarkable, with no history of smoking or alcohol consumption reported.

After completing the comprehensive history-taking process, an intraoral examination was conducted, revealing an exophytic lesion with a granular surface texture and a central ulcer, measuring 3× 3.5 cm^2. The lesion was located on the left side of the mandibular edentulous ridge and extended buccally into the vestibular depth, lingually toward the floor of the mouth, mesially to the midline, and distally to the molar region (Figure 1).

Figure 1: Intraoral examination revealed an exophytic lesion with a granular surface and central ulceration in the area of previous implantation

Cropped panoramic (orthopantomogram) and occlusal radiographs demonstrated a localized, solitary radiolucent lesion in the left mandibular canine-premolar region. The lesion exhibited a poorly defined, non-corticated margin, which was associated with destruction of the buccal bone plate and a cookie bite radiographic appearance (Figures 2,3).

Given that the clinical and paraclinical findings so far had been unable to establish a definitive diagnosis, while suggesting the presence of a malignancy with a differential diagnosis of OSCC, an incisional biopsy was first performed. The specimen, preserved in formalin, consisted of three pieces of irregular, creamy-brown, elastic tissue with a total size of 1.5 × 0.8 × 0.3 cm. Histopathologic examination demonstrated a malignant epithelial neoplasm composed of nests and islands of squamous cells infiltrating the underlying connective tissue. The neoplastic cells exhibited marked pleomorphism, hyperchromatic nuclei, an elevated nucleus-to-cytoplasm (N/C) ratio, prominent nucleoli, and individual cell keratinization along with keratin pearl formation (Figure 4). Furthermore, the presence of acute and chronic inflammatory cells was observed. Based on these findings, a definitive diagnosis of OSCC was confirmed.

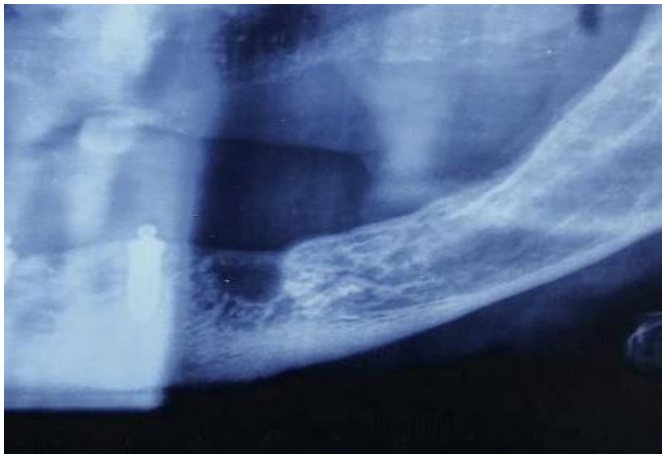

Figure 2: The cropped panoramic image showed a radiolucent lesion with a poorly defined, non-corticated margin and cookie bite appearance in the left mandibular canine-premolar region

Figure 3: The cropped occlusal image illustrated a radiolucent lesion with poorly defined borders, causing destruction of the buccal bone plate

Ultimately, the patient underwent tumor resection with a safe margin of one centimeter, followed by marginal mandibulectomy and selective neck dissection.

The patient provided informed consent for the anonymous use of his medical and dental records in this publication.

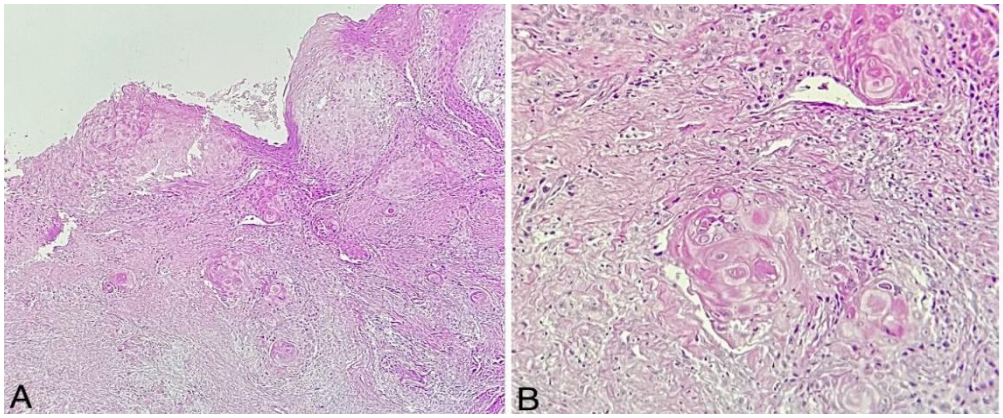

Figure 4: Histopathologic sections show (A): invasion of nests and islands of dysplastic squamous cells into the connective tissue, with the surface epithelium exhibiting dysplastic changes (H&E, 40×). (B) Malignant epithelial cells show pleomorphism and individual cell keratinization. (H&E, 100×)

Discussion

Implant-associated SCC development is rare but can occur not only in the oral region but also in other areas, such as the breast [16, 17]. Reports of oral malignancies occurring near dental implants have become more frequent [18-20]. However, existing data lack statistical evidence to establish a direct correlation between dental implants and OSCC [21]. Consequently, further research is needed to clarify whether a causal relationship exists or if the observed association is incidental.

Although OSCC is typically more prevalent in males, with tobacco and alcohol being major risk factors, Afrashtehfar et al. [22] noted that most cases of OSCC adjacent to dental implants occurred in females without identifiable risk factors. They reported that the mandible was the most common site, often presenting as an exophytic mass or ulceration. These findings align with the case presented in this study, differing only in the patient's gender.

The oral mucosa is highly vulnerable to malignant transformation due to its continuous exposure to inflammatory processes, chemical agents, and inadequate oral hygiene. The precise mechanisms of inflammation-driven carcinogenesis in dental implant cases remain unclear, and a direct relationship has yet to be established. However, potential contributing factors may include the action of pro-inflammatory cytokines [23], or the galvanic currents between prosthetic components [24]. Prostaglandins play a pivotal role in initiating and sustaining carcinogenesis by suppressing both humoral and cellular immune responses, allowing malignant cells to evade elimination [25, 26]. Additionally, interleukin-6 (IL-6) promotes carcinogenesis by stimulating keratinocytes to increase its activator, which subsequently drives abnormal keratinocyte proliferation [27].

Seo et al. reported that all patients with OSCC around dental implants in their study had a history of peri-implantitis. They supported the notion that inflammation associated with implant-supported prostheses could potentially contribute to the development of malignancies [24].

Ultimately, it is worth mentioning that close monitoring is essential during the follow-up of patients with dental implants, regardless of the presence of typical OSCC risk factors. Peri-implant oral lesions should be meticulously evaluated to both exclude malignancy, as they could potentially be life-threatening [28], and address underlying inflammatory conditions (which may act as triggers for malignant transformation), thereby reducing the risk of cancer development.

Conclusion

Meticulous follow-up of implant patients, regardless of demographics or habitual risk factors, is essential to address peri-implant lesions and prevent potential malignant transformation. Further studies are needed to clarify the relationship between dental implants and OSCC, with the aim of guiding clinical practice.

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Ethical Approval Code: Not applicable
All cases included in the study were reported with the participants' consent and without revealing their identities.

Informed Consent Statement: The patient provided informed consent for the anonymous use of his records in this publication.

Data Availability Statement: The case details documented during the current study are available from the corresponding author upon reasonable request.

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Conflict of Interest: The authors declare no conflict of interest.

References

1. Kademani D, editor Oral cancer. Mayo Clinic Proceedings; 2007: Elsevier.
2. Dreyfuss I, Kamath P, Frech F, Hernandez L, Nouri K. Squamous cell carcinoma: 2021 updated review of treatment. Dermatol Ther. 2022;35(4):e15308. doi: 10.1111/dth.15308
3. Chamoli A, Gosavi AS, Shirwadkar UP, Wangdale KV, Behera SK, Kurrey NK, et al. Overview of oral cavity squamous cell carcinoma: Risk factors, mechanisms, and diagnostics. Oral Oncol. 2021:121:105451. doi: 10.1016/j.oraloncology.2021.105451.
4. Rivera C. Essentials of oral cancer. Int J Clin Exp Pathol. 2015 Sep 1;8(9):11884-94..
5. Warnakulasuriya S. Global epidemiology of oral and oropharyngeal cancer. Oral Oncol. 2009;45(4-5):309-16. doi: 10.1016/j.oraloncology.2008.06.002.
6. Nocini R, Lippi G, Mattiuzzi C. Biological and epidemiologic updates on lip and oral cavity cancers. Annals of Cancer Epidemiology. 2020;4. doi: 10.21037/ace.2020.01.01
7. Kademani D, Bell RB, Schmidt BL, Blanchaert R, Fernandes R, Lambert P, et al. Oral and maxillofacial surgeons treating oral cancer: a preliminary report from the American Association of Oral and Maxillofacial Surgeons Task Force on Oral Cancer.J Oral Maxillofac Surg. 2008;66(10):2151-7. doi: 10.1016/j.joms.2008.06.030.
8. Baher MK, Moscowchi A, Atarbashi-Moghadam S. Prevalence of oral HPV in healthy and lesion-bearing populations in Iran: a systematic review and meta-analysis. BMC Oral Health. 2025;25(1):699. doi: 10.1186/s12903-025-06085-0
9. Piemonte E, Lazos J, Belardinelli P, Secchi D, Brunotto M, Lanfranchi-Tizeira H. Oral cancer associated with chronic mechanical irritation of the oral mucosa. Med Oral Patol Oral Cir Bucal. 2018;23(2):e151-e160. doi: 10.4317/medoral.22017..
10. Yoithapprabhunath TR, Ganapathy N, Renugadevi S, Rafath JM, Aparna V, Dineshshankar J. Cytogenetic analysis of genetic damage in young individuals exposed to chronic mechanical irritation in the lateral border of the tongue due to sharp teeth–a novel study. Med Pharm Rep. 2021;94(1):88-93. doi: 10.15386/mpr-1567.
11. Kawabata M, Nagano H, Iuchi H, Umakoshi M, Ohori J, Kurono Y. Squamous cell carcinoma at sites of old maxillary fractures. Auris Nasus Larynx. 2020;47(3):477-80. doi: 10.1016/j.anl.2019.03.008
12. Park G, Lee S, Lee B-S, Kwon Y-D, Choi B-J, Lee J-W, et al. Oral squamous cell carcinoma around dental implants: A case report. 2022. doi:10.54527/jdir.2022.41.4.81
13. Jeelani S, Rajkumar E, Mary GG, Khan PA, Gopal H, Roy S, et al. Squamous cell carcinoma and dental implants: a systematic review of case reports. J Pharm Bioallied Sci. 2015;7(Suppl 2):S378-80. doi: 10.4103/0975-7406.163457.
14. Nariai Y, Kanno T, Sekine J. Histopathological features of secondary squamous cell carcinoma around a dental implant in the mandible after chemoradiotherapy: a case report with a clinicopathological review. J Oral Maxillofac Surg. 2016;74(5):982-90. doi: 10.1016/j.joms.2015.11.004.
15. Chainani-Wu N, Chang C, Sim C, Wu TC, Cox D, Sirjani D, Silverman Jr S. Oral Squamous Cell Carcinoma Mimicking Peri-Implantitis. Clin Adv Periodontics. 2016;6(2):83-8. doi: 10.1902/cap.2015.150041.
16. Xia Z, Han B, Wang L, Ning G, Guo Z, Zhang J, et al.

Breast implant-associated squamous cell carcinoma in a male patient: A case report and review of the medical literature. Front Surg. 2023:9:983611. doi: 10.3389/fsurg.2022.983611.

17. Badri D, Copertino N. Breast implant capsule-associated squamous cell carcinoma: a systematic review and case presentation. Aesthetic Plast Surg. 2024;48(12):2287-93. doi: 10.1007/s00266-023-03693-5.

18. Watanabe T, Kawahara D, Inoue R, Kato T, Ishihara N, Kamiya H, Bessho K. Squamous cell carcinoma around a subperiosteal implant in the maxilla and the association of chronic mechanical irritation and peri-implantitis: a case report. Int J Implant Dent. 2022;8(1):10. doi: 10.1186/s40729-022-00409-3.

19. Moergel M, Karbach J, Kunkel M, Wagner W. Oral squamous cell carcinoma in the vicinity of dental implants. Clin Oral Investig. 2014;18(1):277-84. doi: 10.1007/s00784-013-0968-5.

20. Noguchi M, Tsuno H, Ishizaka R, Fujiwara K, Imaue S, Tomihara K, et al. Primary peri-implant oral intra-epithelial neoplasia/carcinoma in situ: a case report considering risk factors for carcinogenesis. Int J Implant Dent. 2017 ;3(1):47. doi: 10.1186/s40729-017-0109-z.

21. Gupta AK, Gupta R, Gill S, Narula V. Malignancy around implants in patients with a history of a potentially malignant or malignant lesion: a systematic review. Gen Dent. 2024;72(3):34-40.

22. Afrashtehfar KI, Almomani MM, Momani M. Lack of association between dental implants and oral squamous cell carcinoma. Evid Based Dent. 2022;23(1):40-2. doi:10.1038/s41432-022-0250-2.

23. Jeng J-H, Wang Y-J, Chiang B-L, Lee P-H, Chan C-P, Ho Y-S, et al. Roles of keratinocyte inflammation in oral cancer: Regulating the prostaglandin E 2, interleukin-6 and TNF-α production of oral epithelial cells by areca nut extract and arecoline. Carcinogenesis. 2003;24(8):1301-15. doi: 10.1093/carcin/bgg083

24. Seo MH, Eo MY, Park MW, Myoung H, Lee JH, Kim SM. Clinical retrospective analysis of peri-implant oral malignancies. Int J Implant Dent. 2024;10(1):5. doi: 10.1186/s40729-024-00527-0.

25. Honn KV, Bockman RS, Marnett LJ. Prostaglandins and cancer: a review of tumor initiation through tumor metastasis. Prostaglandins. 1981;21(5):833-64. doi: 10.1016/0090-6980(81)90240-9

26. Elattar T. Cancer and the prostaglandins: a mini review on cancer research. J Oral Pathol. 1985;14(7):511-22. doi: 10.1111/j.1600-0714.1985.tb00524.x.

27. Oyama N, Iwatsuki K, Homma Y, Kaneko F. Induction of transcription factor AP-2 by inflammatory cytokines in human keratinocytes. J Invest Dermatol. 1999;113(4):600-6. doi: 10.1046/j.1523-1747.1999.00734.x.

28. Atarbashi-Moghadam F, Sadeghi HMM, Atarbashi-Moghadam S. Peri-implant squamous cell carcinoma mimicking peri-implantitis: a case report. Gen Dent. 2022;70(2):19-21.