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*Research Article*

# Malignancies Surrounding Dental Implants and Their Relationship to Medical History

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## Abstract

Malignancies that develop around dental implants often mimic peri-implantitis in both clinical and radiographic presentations. However, knowledge regarding primary tumors and metastatic cases in these areas remains limited. This study aims to systematically investigate implant-associated malignancies, with a focus on the role of medical and social history while addressing the clinical overlap with peri-implantitis. A literature search was conducted using the NYU Libraries Research Database and MEDLINE (PubMed). The review identified cases of breast and lung cancer metastasizing to the jaw, resulting in malignancies around dental implants. These malignancies were most found in patients over 60 years old, particularly those with a history of tobacco and alcohol use. Additionally, a correlation was observed between poor oral hygiene and implant-associated malignancies. The mandible was found to be twice as likely as the maxilla to develop malignancies around implants. Furthermore, the history of oral cancer was associated with an increased risk of malignancy in peri-implant tissues. These findings highlight the potential risk factors for peri-implant malignancies. Given their clinical and radiographic resemblance to inflammatory peri-implant lesions, a thorough differential diagnosis and biopsy are essential for accurate identification and timely intervention.

**Keywords:** Dental Implants; Peri-Implantitis; Oral Malignancy; Squamous Cell Carcinoma; Metastasis; Oral Cancer; Implant-Associated Carcinoma; Risk Factors

## Introduction

Implants have become one of the most effective treatment options for restoring missing teeth and are now widely used to improve oral function in edentulous areas [7]. However, this usage of dental implants is accompanied by complications such as peri-implantitis [7]. Peri-implantitis is a common benign inflammatory condition affecting the soft tissue and alveolar bone surrounding dental implants, clinically marked by redness, edema, purulent discharge, peri-implant pocketing and bone loss [8,9]. The clinical and radiographic presentation of peri-implantitis, at the same time, mimics the presentation of malignancies that can appear around dental implants [2,8].

Malignancies around dental implants have various manifestations and etiologies that lead to its occurrence, which may arise as a primary lesion or from metastasis from a distant site [3,10,12]. There are several types of oral cancers, with approximately 90% being Squamous Cell Carcinomas (SCC) [10,11]. SCC can arise without any distinguishable risk factors or with a combination of risk factors, such as smoking, excessive alcohol consumption, HPV, prolonged sun exposure and dietary insufficiencies [2,13]. Due to the resemblance between inflammatory processes and malignancies surrounding dental implants, clinicians should have a high index of suspicion for any changes in peri-implant tissues, especially in patients with a characteristic medical history and social risk factors [2,7].

**Objective**

The aim of this study is to provide broader insight and perform a systematic examination of these implant-associated malignancies with a background analysis of the medical and social history as well as outline the implications resulting from clinical overlap with conventional peri-implantitis.

**Ethical Statement**

The project did not meet the definition of human subject research under the purview of the IRB according to federal regulations and therefore, was exempt.

**Material and Methods**

An electronic literature search was conducted through the NYU Libraries Research Database and MEDLINE (PubMed). The search was limited to articles written in English. Keywords included in the search were "squamous cell carcinoma", "malignancies around implants", "peri-implantitis", "primary tumors" and "metastases". 16 Articles were included in this study.

*Inclusion Criteria*

- Articles written in English discussing malignancies associated with dental implants
- Case reports, retrospective analyses or reviews describing primary or metastatic oral malignancies involving peri-implant tissues
- Studies providing radiographic or histopathologic evidence confirming malignancy

*Exclusion Criteria*

- Non-English publications
- Studies addressing only benign peri-implant conditions without histopathologic evidence of malignancy
- Animal studies and laboratory-based *in-vitro* investigations unrelated to human subjects

**Results**

Patients with a prior history of oral cancer were more likely to later develop malignancies around implants [7,10]. Some malignancies were not new primary oral cancers but metastases from cancers elsewhere in the body, such as breast cancer and lung cancer. The systematic search found that there was an incidence of patients diagnosed with breast cancer who subsequently had metastasis to their jaw causing a malignancy around their established implant [1,5]. Likewise, another finding indicated that the metastasis of lung cancer could be found in the mandibular region [3,12]. In terms of general location, the mandible is twice as likely to have an implant malignancy in comparison to the maxilla [13]. Furthermore, malignant neoplasms around implants were common among patients above 60 years of age who also had a social history of tobacco and alcohol use [7,13]. A correlation between incidence of malignancies and poor oral hygiene was also found [9,13].

In one study, 95% of patients with implant-associated malignancies had moderate-to-poor hygiene, while only 5% maintained good hygiene [9]. Fig. 1 illustrates this distribution, highlighting the strong association between oral hygiene status and implant-associated malignancy.

Additionally, chronic peri-implant inflammation was frequently reported as a recurring feature among affected patients [8,9,13]. Several studies noted that persistent inflammation and bacterial accumulation may contribute to the development of a microenvironment rich in cytokines and growth factors, predisposing peri-implant tissues to malignant transformation [13,14]. Some studies also revealed that local trauma, particularly from surgical interventions such as implant placement or bone grafting, was present in multiple cases preceding the diagnosis of malignancy [5,14]. These findings suggest that tissue injury and wound healing responses could potentially facilitate the entrapment and proliferation of circulating tumor cells, as noted in cases involving metastatic breast and lung cancers [1,3,5].

Demographically, the average patient age exceeded 60 years, with a notable predominance among individuals with systemic comorbidities or prior oncologic diagnoses [7,10,13]. A significant proportion of patients also reported lifestyle-related risk factors such as tobacco and alcohol use, both of which are known to potentiate oral carcinogenesis [7,13].

Clinically, the most frequently documented presenting symptoms included swelling, ulceration, tooth mobility, localized pain, halitosis and paresthesia of the lower lip [11,15]. These manifestations often mimicked peri-implantitis, contributing to initial misdiagnoses in several cases [2,8]. Inflammatory peri-implant lesions often resemble oral cancer and account for differential diagnosis and biopsy [2,8]. Fig. 2 demonstrates the clinical similarity between peri-implantitis and squamous cell carcinoma around an implant.

Several reports emphasized that biopsy was the definitive diagnostic method distinguishing malignant lesions from inflammatory ones [2,8,11,15]. Non-healing or irregular peri-implant soft tissue responses following conventional treatment were the most frequent indicators prompting further investigation and histopathologic evaluation [8,16].

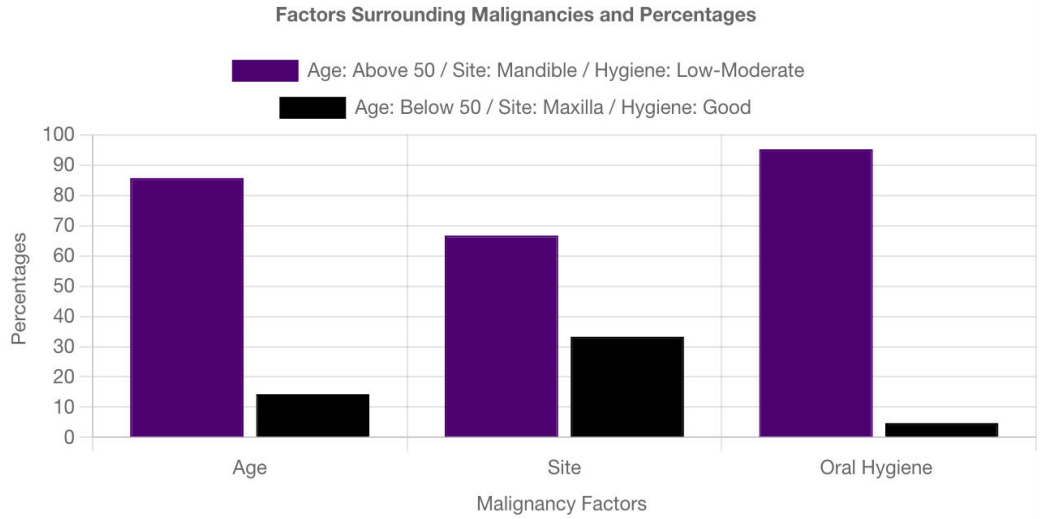


**Figure 1:** Factors related to implant-associated malignancies.

**Figure 2:** Squamous cell carcinoma surrounding implants.

**Discussion**

The clinical presentation for metastatic lesions involving the oral cavity and jaws often mimics other common pathological conditions and is a relatively uncommon entity, which makes diagnosis challenging for dental professionals. Careful clinical examination and a detailed medical history both hold great significance in helping diagnose oral lesions, which consequently affects patient quality of life and reduces the risks of oral complications [5]. Aggregated findings from the literature demonstrate that implant-associated malignancies, while rare, exhibit strong associations with advanced age, poor oral hygiene, chronic inflammation, history of oral or systemic cancers and prior surgical trauma. These risk factors appear to act synergistically in facilitating tumor development or metastatic colonization around dental implants [7,9,13,14].

This literature review suggested metastatic lesions from distant organs, such as the lung and breast, can occur in the oral cavity, specifically around implants and local factors, such as trauma, may promote the proliferation of circulating tumor cells [1,3]. Consequently, surgical interventions, like implant placement, could potentially contribute to the spread of malignant cells [5,14]. Emerging evidence supports this, showing that tissue trauma can promote the establishment of circulating tumor cells. Malignant cells may become trapped during clot formation in freshly injured tissue and the proliferative environment of healing wounds provides fertile ground for their expansion because it is rich in host-derived growth factors. In such contexts, regenerating tissues with elevated cellular turnover can support accelerated tumor growth [14]. This underscores the possibility that peri-implant sites, particularly those with recent surgeries, may provide favorable conditions for metastatic colonization [6,7,13,14].

In addition to surgical trauma, chronic inflammation from poor oral hygiene may also play a role in malignant transformation around implants. The results of this review highlight that 95% of patients with implant-associated malignancies presented with moderate-to-poor oral hygiene [9]. Chronic peri-implant inflammation creates a vascular-rich environment that can entrap circulating tumor cells, much like gingival metastases in other contexts [15]. Thus, inadequate oral hygiene not only contributes to peri-implantitis but may also provide local conditions that facilitate tumor colonization, underscoring the need for preventive care and vigilant monitoring in high-risk patients.

As demonstrated in Fig. 1, the majority of patients with implant-associated malignancies exhibited moderate-to-poor oral hygiene, aligning with the findings reported by Seo, et al., and Kaplan, et al. [8,13]. This correlation reinforces the notion that long-standing inflammation and bacterial biofilm accumulation create a biologically favorable environment for tumor establishment. The vascular and cytokine-mediated responses within chronically inflamed peri-implant tissues may promote neoplastic transformation or metastatic seeding, similar to mechanisms proposed by Ruggiero, et al. [14]. Consequently, implementing strict oral hygiene and maintenance protocols could be a crucial preventive strategy for reducing the risk of implant-associated malignancies.

The study by Dib, et al., describes a 67-year-old female patient who presented with irritation, swelling, pain and low-grade numbness in the lips [5]. Her medical history included breast cancer and an amelanotic tumor in the left eye, which eventually metastasized to the lungs, bones, liver and brain. She also had a dental history of bone grafting followed by implant placement. Intraoral examination revealed eight implants, with significant ulceration and inflammation in the maxilla. Radiographs showed extensive bone loss. After biopsy, the diagnosis was metastatic carcinoma from the breast to the jaw [5]. According to our literature search, the most frequently reported symptoms of oral metastases include pain, swelling, intraoral masses, tooth mobility, gum irritation, halitosis, numbness or paresthesia of the lower lip and trismus [11,15]. The findings in this case were consistent with these patterns. In some patients, the identification of an oral metastasis may even lead to the discovery of an underlying primary malignancy [3,12]. Hirshberg, et al., noted that gingival metastasis is more likely in sites with chronic inflammation, as the rich capillary network of inflamed gingiva can entrap circulating tumor cells [15,17]. In this patient, the previous oral surgeries bone grafting and implant placement may have provided conditions conducive to tumor spread from the breast to the jaw [5,14].

This observation is in line with Epker, et al., who emphasized that dentists and oral surgeons may be the first to diagnose metastatic tumors of the jaw if thorough medical and dental histories are reviewed [16]. Other reports similarly note that oral metastasis can initially be misdiagnosed as inflammatory conditions, delaying recognition and treatment [2,4,7,8]. In these patients, it appears that earlier opportunities for diagnosis may have been missed during prior oral surgeries, highlighting the critical importance of vigilance and biopsy in cases of atypical implant complications [2,8,16].

Fig. 2 further exemplifies this diagnostic dilemma. The squamous cell carcinoma surrounding the implant shown in the image closely resembles severe peri-implantitis in its clinical presentation, with ulceration and erythematous soft-tissue changes that can easily mislead clinicians. This mirrors the clinicopathologic findings described by Bhandari, et al. and Kaplan, et al., where inflammatory peri-implant lesions were initially mistaken for peri-implantitis before biopsy confirmed malignancy [2,8]. The resemblance between malignancy and inflammation supports the observations of Regezzi et al., and Ogutcen-Toller, that microscopic evaluation remains the only definitive diagnostic method [11,15]. Therefore, biopsy should be considered mandatory for any non-healing, ulcerative or irregular peri-implant site especially in patients with oncologic histories or

unexplained symptoms to prevent diagnostic delays and improve survival outcomes. Beyond individual cases, systematic reviews and case analyses show that while implant-associated malignancies are rare, they are significantly associated with systemic conditions such as breast and lung cancers [1,3,12]. Risk is heightened in patients over 60, with a history of tobacco or alcohol use, poor oral hygiene or prior oral surgeries [7,9,13]. Notably, the mandible is affected more often than the maxilla, suggesting a site-specific vulnerability [13]. This suggests that the mandible may provide conditions that favor tumor development or colonization, possibly due to higher vascularity in inflamed regions, frequent exposure to dental procedures that can induce local trauma and its denser bone structure in comparison to the maxilla [13]. These findings highlight the importance of integrating thorough medical and social histories into routine dental evaluations [2,7]. Dental professionals must remain vigilant for signs that deviate from conventional peri-implantitis, such as persistent pain, ulceration, unexplained implant mobility or numbness, particularly in patients with oncological histories or atypical healing after implant placement [2,8]. For patients with non-healing or suspicious peri-implant lesions, timely biopsy is essential [8,16]. Where systemic disease is known or suspected, interprofessional collaboration with oncologists and radiologists can ensure optimal patient-centered care [7].

While lesions around implants in high-risk patients should always be biopsied and examined histopathologically [8,16], quantifying risk factors or improving diagnostic accuracy in daily practice remains challenging due to limited data. Longitudinal studies with larger populations are needed to clarify risk patterns and clinical outcomes [10,13]. Establishing clear clinical guidelines to distinguish peri-implant malignancies from common inflammatory conditions is a priority [7,10]. Further investigation into the biological mechanisms underlying tumor colonization particularly the role of wound healing, surgical trauma and regenerative tissue environments will be crucial for advancing prevention and early detection strategies [14].

## Conclusion

This study highlights the diagnostic challenges of distinguishing implant-associated malignancies from peri-implantitis. Although rare, such malignancies are often linked to systemic cancers, high-risk behaviors and prior oral surgeries, with the mandible being more commonly affected. Dental professionals should maintain a high index of suspicion, especially in patients with systemic disease or atypical peri-implant symptoms and prioritize timely biopsies and interdisciplinary collaboration to ensure early detection and improved patient outcomes.

## Conflict of Interest

The authors declare no conflicts of interest that may have influenced the research, authorship or publication of the article.

## Informed Consent Statement

Informed consent was taken from the patient.

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## Authors' Contributions

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## References

1. Aksoy S, Bayındır H, Berberoğlu A, Ozan O, Orhan K, Şeker BK. Numb chin syndrome as a manifestation of possible breast cancer metastasis around dental implants. J Craniofac Surg. 2011;22(3):942-5.
2. Bhandari S, Rattan V, Panda N, Vaiphei K, Mittal BR. Oral cancer or periimplantitis: A clinical dilemma. J Prosthet Dent. 2016;115(6):658-61.
3. Capodiferro S, Limongelli L, Tempesta A, Maiorano E, Ingravallo G, Maffei R, Favia G. Peri-implant metastasis as first manifestation of an unknown lung cancer: Literature review and two new cases. J Oral Implantol. 2022;48(6):590-4.
4. Clapp C, Wheeler JC, Martof AB, Levine PA. Oral squamous cell carcinoma in association with dental osseointegrated implants: An unusual occurrence. Arch Otolaryngol Head Neck Surg. 1996;122(12):1402-3.

5. Dib LL, Soares AL, Sandoval RL. Breast metastasis around dental implants: A case report. Clin Implant Dent Relat Res. 2007;9(2):112-5.
6. Filippi A. Implantat-Metastase. 2025. [Last accessed on: October 27, 2025] https://www.andreas-filippi.ch/pdfs/Implantat%20Metastase.pdf
7. Jané-Salas E, López-López J, Roselló-Llabrés X, Rodríguez-Argueta OF, Chimenos Küstner E. Relationship between oral cancer and implants: Clinical cases and systematic literature review. Med Oral Patol Oral Cir Bucal. 2012;17(1):e23-8.
8. Kaplan I, Zeevi I, Tal H, Rosenfeld E, Chaushu G. Clinicopathologic evaluation of malignancy adjacent to dental implants. Oral Surg Oral Med Oral Pathol Oral Radiol. 2017;123(1):103-12.
9. Brägger U. Long-term follow up of implant therapy: occurrence of cases with peri-implant mucositis or peri-implantitis in a 21-26-year follow-up study. Br Dent J. 2017;223(10):780-5.
10. Pinchasov G, Haimov H, Druseikaite M, Pinchasov D, Astramskaite I, Sarikov R, et al. Oral cancer around dental implants in patients with or without a history of malignancy: A systematic review. J Oral Maxillofac Res. 2017;8(1):e1-9.
11. Regezzi JA, Sciubba JJ, Jordan RCK. Oral pathology: Clinical pathologic correlations. St. Louis: Elsevier. 2008;330-1.
12. Seo MH, Eo MY, Park MW. Clinical retrospective analysis of peri-implant oral malignancies. Int J Implant Dent. 2024;10(5):1-7.
13. Ruggiero SL. Stimulation of tumour growth by wound-derived growth factors. Proc Natl Acad Sci USA. 1987;84(21):7716-20.
14. Ogutcen-Toller M. Metastatic tumors of the jaws: Review of the literature and report of a case. Int J Oral Maxillofac Surg. 1990;19(5):267-71.
15. Epker BN. Metastatic tumors of the mandible: Review of the literature and report of three cases. Oral Surg Oral Med Oral Pathol. 1969;27(5):631-4.
16. Hirshberg A, Leibovich P, Buchner A. Metastatic tumors to the oral cavity: Pathogenesis and analysis of 673 cases. Oral Oncol Oral Surg Oral Med Oral Pathol. 1993;76(6):769-74.