
PERI-IMPLANTITIS. ETIOLOGY, CLINIC, DIAGNOSIS, TREATMENT. SUMMARY OF LITERATURE.

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ABSTRACT

Peri-implantitis is an inflammatory reaction with less supporting bone in the tissue around a functional implant. First, the bacteria damage the supporting apparatus of the implant, then we have the presence and accumulation of the plaque, leading to irreversible tissue damage. Peri-implantitis predisposing factors are: poor oral hygiene, diabetes, osteoporosis, smoking, etc.

The possibility for peri-implant is higher when the patient has lost his natural teeth due to periodontitis, caries or any oral trauma. The diagnosis is based on: the blood flow around the implant, the depth of the probe, the mobility of the implant, radiological evidence of the bone shortness around the implant. Prevention of peri-implant is the first step towards the success of the dental implant: regular visits, education, plaque control with the relevant procedures especially around the implant, instrumentation around the implant up to the raising of the medical flap for access, routine radiography. In some cases, laser irradiation sessions can also be applied. The peri-implant is a very difficult person to treat, so prevention and early detection are the key to the success of the dental implant. An important role is also played in the awareness of the patient and the learning of the necessary instruments to achieve a healthy oral environment.

Key words: periimplantitis, predisposing factors, durability of the dental implant.

INTRODUCTION

Peri-implantitis is an inflammatory condition that affects the tissues surrounding dental implants. It is characterized by the inflammation of the soft and hard tissues around the implant, including the gums and the bone supporting the implant. This condition is similar to periodontitis, which affects natural teeth, but peri-implantitis is specific to dental implants. (1). It manifests as mucositis around the implant and as peri-implantitis. Mucositis is for me a reversible inflammatory change without losing bone. Peri-implantitis is more advanced, irreversible in the soft and hard tissues around the implant (2-5).

MATERIALS AND METHODS

For this article, electronic searches were done in Pubmed, Google Scholar and Web of Science from 2010 to 2023. Only articles published in the English language were considered. Articles published in a language other than English were not taken into consideration. The criteria that should be taken into consideration for our research are: classifications of peri-implant, predisposing factors of peri-implantitis, diagnosis and separation if the pathology is mucositis or peri-implantitis, treatment and prevention of peri-implantitis. Our aim was to show that although

these are defined as accurate criteria to evaluate and treat peri-implantitis, attention should be focused on preventing peri-implantitis.

CLASSIFICATION

When we present the periimplantitis classification, we refer to several different authors:

1. Schwarz et al.'s classification (2)

(This classification of periimplantitis is based on the configuration of the bone defect.)

- A. First class defect - intraosseous
- B. Second class defect – supra-alveolar in the crestal area of the implant insertion

2. Classification of Spiekerman et al. (3)

(This classification is based on bone resorption)

- A. First class - horizontal
- B. Second class – y shape
- C. Third class - funnel shape
- D. Fourth grade - gap form
- E. Fifth class- horizontal and circular shape

3. Retrograde Peri-Implantitis (4)

(A periapical lesion that develops quickly after the placement of the implant while the coronal part of the implant has normal bone around the surface of the implant)

- A. First class - soft (< 25% of the implant length starting from the apex of the implant);
- B. Second class - moderate (25-50% of the length of the implant starting from the apex of the implant);
- C. Third class - hard (>50% of the length of the implant starting from the apex of the implant).

RISK FACTORS

The following factors are classified as risk factors in the occurrence of peri-implantitis (5-8): smoking, oral hygiene, systemic disease, iatrogenic reasons, soft tissue not good in the implantation area, previous history of failure of dental implants.

PREVALENCE

The prevalence of peri-implantitis can vary depending on factors such as study populations, implant types, and follow-up periods. Generally, research indicates that peri-implantitis affects a percentage of dental implants, with reported prevalence rates ranging from around 1% to 20% or higher. Long-term studies help provide more accurate estimates, and the prevalence may change as more data becomes available and as preventive and treatment strategies evolve (9,11).

ETIOLOGY

Poor Oral Hygiene:

One of the primary causes of peri-implantitis is inadequate oral hygiene. Just like natural teeth, dental implants require proper care to prevent the accumulation of plaque and bacteria that can lead to inflammation.

Smoking: Smoking has been identified as a risk factor for peri-implantitis. The chemicals in tobacco smoke can compromise the body's ability to heal and increase the likelihood of infections around the implant.

Pre-existing Periodontal Disease: Individuals with a history of periodontal (gum) disease are at a higher risk of developing peri-implantitis. This is because the bacteria associated with periodontal disease can impact the health of the tissues around dental implants.

Systemic Diseases: Certain systemic diseases, such as diabetes, can affect the body's ability to heal and may contribute to the development of peri-implantitis. (7-9,12)

SYMPTOMS OF PERI-IMPLANTITIS.

Gum Inflammation: Redness, swelling, and tenderness in the gums surrounding the implant may be early signs of peri-implantitis. **Bleeding Gums:** Bleeding during brushing or flossing around the implant site can indicate inflammation. **Pus Formation:** The presence of pus or discharge from the implant site may suggest an infection. **Loose or Shifting Implant:** As peri-implantitis progresses, the bone supporting the implant may be compromised, leading to implant mobility. **Pain or Discomfort:** Patients may experience pain or discomfort around the implant, especially during chewing or biting.

DIAGNOSIS

The diagnosis is made by probing: in mucositis around the implant, we have immersion of the paradontal probe ≤ 4 mm and not always we have the presence of redness or pain, while in the peri-implant we have immersion of the probe ≥ 5 mm and bone loss is observed on radiographs. Diagnosing peri-implantitis involves a combination of clinical assessments and diagnostic tools. Key elements in the diagnosis include:

Clinical Examination:

Probing Depth: Increased probing depths around implants compared to baseline measurements may indicate peri-implantitis. **Bleeding on Probing (BOP):** Bleeding during probing is a common sign of inflammation. **Suppuration:** Pus exudation upon probing suggests an active infection.

Radiographic Imaging:

Periapical Radiographs: Evaluate bone levels around implants to identify bone loss.

Panoramic Radiographs: Provide an overall view of implant health and surrounding structures.

Cone Beam Computed Tomography (CBCT): Offers detailed 3D imaging for a more comprehensive assessment.

Microbiological Analysis: **Microbial Sampling:** Collecting samples from the implant site for laboratory analysis to identify specific pathogens contributing to the infection.

Biomarkers:Salivary and Peri-Implant Fluid Biomarkers: Assessing specific biomarkers associated with inflammation and bone destruction.

Visual Inspection:Soft Tissue Changes: Observe changes in the color, contour, and texture of the peri-implant mucosa.

Patient History:Risk Factors: Evaluate patient habits (smoking, systemic conditions) that may contribute to peri-implantitis (12-14).

TREATMENT OPTIONS:

Improved Oral Hygiene:Enhancing oral hygiene practices is crucial for managing and preventing peri-implantitis. Regular brushing, flossing, and professional cleanings are essential.**Antibiotic Therapy:**In cases of infection, antibiotics may be prescribed to control the spread of bacteria and promote healing.**Scaling and Root Planing:**Similar to the treatment for periodontal disease, scaling and root planing can be performed around the implant to remove plaque and bacteria.**Surgical Interventions:**In advanced cases, surgical procedures may be necessary to clean the implant surface, remove damaged tissues, and potentially graft bone to support the implant.**Lifestyle Changes:**Quitting smoking and managing systemic conditions like diabetes can contribute to the success of peri-implantitis treatment. (10, 15-19).

COMPLICATIONS.

Peri-implantitis can lead to several complications, including:**Bone Loss:** Inflammation around the implant can result in the loss of supporting bone. This can compromise the stability of the implant and, in severe cases, lead to implant failure.**Implant Mobility:** Progressive bone loss can cause the implant to become mobile, affecting its function and potentially requiring removal.**Soft Tissue Recession:** Inflammation may lead to the recession of the gum tissue around the implant, exposing the implant surface. This can contribute to aesthetic concerns and increase the risk of further complications.**Infection Spread:** If left untreated, peri-implantitis can lead to the spread of infection to surrounding tissues, potentially causing more extensive oral health issues.**Prosthetic Complications:** Peri-implantitis can impact the stability and fit of prosthetic components attached to the implant, leading to problems with chewing, speech, and overall function.**Pain and Discomfort:** Inflammation and infection associated with peri-implantitis can cause pain and discomfort for the patient.**Financial Implications:** Treatment of peri-implantitis can involve various interventions, including professional cleanings, antimicrobial therapy, and, in severe cases, surgery. (21) The associated costs can be significant.**Implant Failure:** In advanced stages, peri-implantitis may lead to the failure of the dental implant, requiring removal and potential replacement. This can result in additional costs and treatment time.

DISCUSSIONS AND CONCLUSIONS.

In conclusion, we can say that with the introduction of dental implant treatment for dental patients, there is an urgent need:

- a. First to educate the patients towards the prevention of this pathology by showing them all the stages of care and hygiene
- b. Secondly, to educate the patients with regular check-up sessions so that the pathology can be identified in the first stages.
- c. The third to be followed by periodic control graphs

We should also focus on the prevention of the pathology of peri-implantitis rather than treatment in order to extend the life of dental implants.

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REFERENCES

1. Albrektsson T, Isidor E Consensus report of session W. In: Lang NP, Karring T, ed. Proceedings of the First European Workshop on Periodontology. London: Quintessence, 1994; 365-369.
2. Schwarz F, Sahm N, Becker J. Aktuelle Aspekte zur Therapie periimplantärer Entzündungen. Quintessenz 2008; 59:00.
3. Spiekermann H: Implantologie. Stuttgart: Thieme; 1984.
4. Shah Rucha, Thomas Raison, Tarunkumar A.B., Singh Mehta Dhoom. A radiographic classification of retrograde periimplantitis. J Contemp Dent Pract. 2016; 17(4): 313-321.
5. Lindhe J, Meyle J. Peri-implant diseases: consensus report of the sixth European workshop on periodontology. J Clin Periodontol. 2008; 35: 282-285.
6. Fürst MM, Salvi GE, Lang NP, Persson GR. Bacterial colonization immediately after installation on oral titanium implants. Clin Oral Implants Res 2007; 18: 501-8.
7. Mombelli A, Lang NP. Microbial aspects of implant dentistry. Periodontology 2000 1994; 4: 74-80.
8. Mombelli A, Buser D, Lang NP. Colonization of osseointegrated titanium implants in edentulous patients. Early results. Oral Microbiol Immunol 1988; 3: 113-20.
9. Romeo E, Ghisolfi M, Murgolo N, Chiapasco M, Lops D, Vogel G. Therapy of peri-implantitis with resective surgery. A 3-year clinical trial on rough screw-shaped oral implants. Part I: clinical outcome. Clin Oral Implants Res. 2005; 16: 9-18.
10. Muthukuru M, Zainvi A, Esplugues EO, Flemmig TF. Non-surgical therapy for the management of peri-implantitis: a systematic review. Clin Oral Implants Res. 2012; 23 (Suppl 6): 77-83.

11. Rocuzzo A, Stähli A, Monje A, Sculean A, Salvi GE. Peri-Implantitis: A Clinical Update on Prevalence and Surgical Treatment Outcomes. *J Clin Med*. 2021 Mar 6;10(5):1107. doi: 10.3390/jcm10051107. PMID: 33800894; PMCID: PMC7962026.
12. Smeets R, Henningsen A, Jung O, Heiland M, Hammächer C, Stein JM. Definition, etiology, prevention and treatment of peri-implantitis--a review. *Head Face Med*. 2014 Sep 3;10:34. doi: 10.1186/1746-160X-10-34. PMID: 25185675; PMCID: PMC4164121.
13. Schwarz F, Derks J, Monje A, Wang HL. Peri-implantitis. *J Clin Periodontol*. 2018 Jun;45 Suppl 20:S246-S266. doi: 10.1111/jcpe.12954. PMID: 29926484.
14. Belibasakis GN, Manoil D. Microbial Community-Driven Etiopathogenesis of Peri-Implantitis. *J Dent Res*. 2021 Jan;100(1):21-28. doi: 10.1177/0022034520949851. Epub 2020 Aug 12. PMID: 32783779; PMCID: PMC7754824.
15. Wang CW, Ashnagar S, Gianfilippo RD, Arnett M, Kinney J, Wang HL. Laser-assisted regenerative surgical therapy for peri-implantitis: A randomized controlled clinical trial. *J Periodontol*. 2021 Mar;92(3):378-388. doi: 10.1002/JPER.20-0040. Epub 2020 Aug 25. PMID: 32761810.
16. Al-Sabbagh M, Shaddox LM. Is Peri-Implantitis Curable? *Dent Clin North Am*. 2019 Jul;63(3):547-566. doi: 10.1016/j.cden.2019.02.003. Epub 2019 Apr 15. PMID: 31097144.
17. Barootchi S, Wang HL. Peri-implant diseases: Current understanding and management. *Int J Oral Implantol (Berl)*. 2021 Aug 20;14(3):263-282. PMID: 34415128.
18. Faot F, Nascimento GG, Bielemann AM, Campão TD, Leite FR, Quirynen M. Can peri-implant crevicular fluid assist in the diagnosis of peri-implantitis? A systematic review and meta-analysis. *J Periodontol*. 2015 May;86(5):631-45. doi: 10.1902/jop.2015.140603. Epub 2015 Feb 13. PMID: 25675962.
19. Holtzman LP, Donno S, Lafori A, D'Emidio F, BlayaTarraga JA, Cordaro L. The Association Between Suppuration on Palpation and Diagnosis of Peri-implantitis: A Cross-sectional Study. *Int J Oral Maxillofac Implants*. 2021 Nov-Dec;36(6):e167-e173. doi: 10.11607/jomi.8987. PMID: 34919615.
20. Jepsen S, Berglundh T, Genco R, Aass AM, Demirel K, Derks J, Figuero E, Giovannoli JL, Goldstein M, Lambert F, Ortiz-Vigon A, Polyzois I, Salvi GE, Schwarz F, Serino G, Tomasi C, Zitzmann NU. Primary prevention of peri-implantitis: managing peri-implant mucositis. *J Clin Periodontol*. 2015 Apr;42 Suppl 16:S152-7. doi: 10.1111/jcpe.12369. PMID: 25626479.
21. Nibali L, Gkraniias N, Mainas G, Di Pino A. Periodontitis and implant complications in diabetes. *Periodontol 2000*. 2022 Oct;90(1):88-105. doi: 10.1111/prd.12451. Epub 2022 Aug 1. PMID: 35913467; PMCID: PMC9805043.