

Apical Peri-Implantitis: A Review

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Abstract

Apical peri-implantitis, also termed “retrograde peri-implantitis,” is a biological implant complication and is defined as a clinical symptomatic periapical lesion that usually develops after the placement of an implant. The bone- to- implant interface at the coronal portion remains normal, while radiographically, a radiolucency in the periapical portion of the implant can be noticed. This review aims to overview the etiology, diagnosis, proposed classification, and treatment of a condition that is still not well understood due to the lack of studies with larger patient samples, which is also unknown to many clinicians.

Keywords: Apical peri-implantitis, retrograde peri-implantitis, apical implant lesions

Introduction

During the last decades, replacing missing teeth with dental implants has become the gold standard in dentistry. Dental implants have a mean survival rate of 94.5% after functional loading periods of 13.3 years (1). Despite these implant survival rates, it has been realized that osseointegrated implants can suffer biological complications. These types of complications mainly refer to inflammatory conditions associated with bacteria. (2). According to the 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions, implant-related biological complications can be classified as peri-implant mucositis and peri-implantitis. Schwarz et al. also described a third pathological entity, affecting only the periapical portion of the implant, known as periapical peri-implantitis (3). Mucositis and peri-implantitis have in common the fact of an inflammatory lesion; however, in peri-implantitis, there is a loss of supporting bone (2,3). Apical peri-implantitis was first reported in 1992 by Mc Allister et al. They observed the presence of an apical radiolucency around implants with a sinus tract, causing osseointegration failure (4). Soon after, Reiser and Nevins described an infection located at the apex of an implant which they defined as “implant periapical lesión.” (5). In 2005, Quyrinen et al. defined it as a clinically periapical lesion, diagnosed as a radiolucency, that develops shortly after implant insertion, while the coronal portion of the implant shows a normal bone to implant interface (6). Periapical lesions around dental implants can be differentiated into active or inactive lesions. Active lesion symptoms can include pain, swelling, redness, dull percussion, redness, a fistulous tract at the buccal part of the implant, and a radiographic radiolucency at the implant apex. On the contrary, the inactive lesions are only detected radiographically, where a radiolucency around the implant can be noticed. (6)(7). Its prevalence is very low and is more common in the mandible (2,7%) than in the maxilla (1,6%), however its prevalence increases to 7.8% when teeth adjacent to implants present and endodontic infection. (1)

Etiology

Up to date, there’s no consensus about the Apical peri-implantitis etiology. Different etiological factors have been proposed mainly in case reports. Initially, some authors referred that the possible cause was residual bacteria remaining at the site of implant placement (6)(8), excessive heating or bone compression (8)(9), overextension during the preparation of implant insertion (8)(10) and remaining microorganisms from previous lessons (viruses and bacteria) (11)(12). However, the most common possible etiology and the most accepted aetiological factor nowadays is the endodontic infection of the teeth adjacent to the neighboring implants (3) (13)(14)(15)(16)(17)(18). In a literature review, Sarmast et al. showed that the probability of developing Apical- periimplantitis in an implant placed at an adjacent tooth with periapical infection was about 25% (19).

In a retrospective case-control study conducted at the University of Minnesota, Chatzopoulos & Wolff concluded that remanent bacteria in the bone adjacent to implants due to a failed endodontic treatment might induce implant failure (20).

Diagnosis

An implant periapical lesion diagnosis is based on clinical and radiological findings. The symptoms and signs may appear depending on the stage of the lesion. There are no symptoms when a lesion is inactive and is radiologically found due to a radiolucency around the implant apex. On the other hand, active lesions are frequently clinically symptomatic, showing as clinical findings intense pain, inflammation, dull percussion, and the presence of a fistulous tract at the buccal plate of the implant, which may be noticed between 1 and 8 weeks and up to 4 years after the initial implant placement. A radiological radiolucency is also seen. (7) (21). Small-volume cone-beam computed tomography (CBCT) helps establish an early diagnosis, allowing the clinician to have a clear image of the lesion and the magnitude of the bone loss. In cases where the diagnosis is more complex, exploratory surgery is recommended (22). The prognosis of these lesions is favorable. The literature reports survival rates range between 73,2% and 97.4% of the implants treated with a maximum follow-up of 20 years (1).

Clinical Classification

Sussman initially classified the periapical implant lesions in 1998 according to the main infection pathway: (1) implant to tooth, which occurs during the implant osteotomy preparation either by direct trauma or indirect damage, which causes the adjacent pulp to undergo devitalization, and (2) tooth to implant, which occurs shortly after placement of an implant when an adjacent tooth develops periapical pathology, either because of operative damage of the pulp or the reactivation of a previous apical lesion (23). Since the 1998 classification, additional causes of Apical- peri-implantitis have been described. Therefore, Sarmast et al. updated the Sussman classification by adding two more infection pathways (3) an apical lesion that develops because of an incorrect placement or angulation of the implant (placed outside the bone plates) and (4) an Implant apex lesion that develops due to residual infection at the placement site. This new classification aims to guide the clinician in making a proper referral and treatment (24).

Treatment

Based on their clinical classification, Sarmast et al. proposed different treatment modalities. The main recommendation is to evaluate natural teeth adjacent to the implants with Apical peri-implantitis. If they are endodontically involved, as in types 1 or 2, endodontic therapy should resolve the pathology. If the periapical lesion remains, surgical implant debridement should be done (with or without guided bone regeneration). On the contrary, if the evaluated teeth are not endodontically compromised, endodontic treatment is not required (24). Many authors support Sarmast et al. recommendation on this topic (6)(8)(10)(13)(14)(15)(18)(25). For Sarmast et al. types 3 and 4, different approaches have been reported by other authors: (1) surgical debridement of the lesion, bone graft, and membrane (1),(6), (9), (11), (16), (25), (26)(27); (2) surgical debridement of the lesion, implant apex resection, bone graft, and membrane (8), (17), (28), (29) and (3) systemic antibiotics only (10). In another publication in 2016, Sarmast et al. proposed a decision tree based on 20 case reports. Therefore, when an implant becomes symptomatic, the first step is to evaluate the adjacent teeth endodontically; if they are vital, surgical debridement of the implant should be performed with or without guided bone regeneration. However, implant apicoectomy with guided bone regenerations should be performed if the lesion persists. At reevaluation, the clinician should decide whether the implant has a good prognosis or should be explanted. Supposing that the endodontic treatment was performed and there is no lesion resolution during the follow-ups, tooth apicoectomy with surgical debridement should be performed (with or without guide bone regeneration) (30).

Conclusions

Apical peri-implantitis is a pathological condition with a very low prevalence. The affected implants can show a periapical radiographic radiolucency with or without clinical signs of inflammation (redness, edema, fistula, abscess formation). Its more common etiology is an infection of neighboring teeth which can be diagnosed between the first weeks up to 6 months after implant placement. The early diagnosis during the osseointegration phase is paramount to increasing implant survival rates. Thus, referral to an endodontist before implant placement is essential for treatment because of the nature of the disease and treatment management. There is a need to design prospective studies since the present data is primarily derived from case reports.

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