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Review

Systemic antibiotics and the risk of superinfection in peri-implantitis

Fernando Verdugo[a,*], Theresia Laksmana[b], Agurne Uribarri[c]

[a] Department of Periodontics, VA Hospital, Greater Los Angeles Healthcare System, USA
[b] Advanced Periodontology, University of Southern California School of Dentistry, Los Angeles, CA, USA
[c] Department of Oral Medicine, School of Medicine and Odontology, University of Basque Country, Leioa, Spain

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ABSTRACT

Peri-implantitis has emerged in the last few years as a complication difficult to resolve. The etiopathogenesis consensus is mainly attributed to bacteria. Following the preferred reporting items for systematic reviews and meta-analysis (PRISMA) guidelines, a PubMed/Medline literature search was performed using the US National Library of Medicine database up to 2015 to analyze available scientific data on the rationale and risk of superinfection associated to systemic antimicrobials in human peri-implant disease. A hand search was also conducted on relevant medical and microbiology journals. The methodological index for non-randomized studies (MINORS) was independently assessed for quality on the selected papers. Proposed combined therapies use broad-spectrum antibiotics to halt the disease progression. A major associated risk, particularly when prescribed empirically without microbiological follow-up, is the undetected development of superinfections and overgrowth of opportunistic pathogens difficult to eradicate. Peri-implant superinfections with opportunistic bacteria, yeast and viruses, are plausible risks associated to the use of systemic antibiotics in immunocompetent individuals. Lack of microbiological follow-up and antibiotic susceptibility testing may lead to ongoing microbial challenges that exacerbate the disease progression. The increased proliferation of antimicrobial resistance, modern implant surface topography and indiscriminative empiric antibiotic regimens may promote the escalation of peri-implant disease in years to come. A personalized 3-month supportive therapy may help prevent risks by sustaining a normal ecological balance, decreasing specific pathogen proportions and maintaining ideal plaque control.

Contents

* Corresponding author at: 2028 North Lake Avenue, Altadena, California 91001, USA. Fax: +1 626 797 0523.
E-mail address: fverdugo@perio.org (F. Verdugo).

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1. Introduction

Osseointegrated dental implants have become a predictable treatment option in providing function in partial or total edentulism, delivering high success rate outcomes long term (Albrektsson, Zarb, Worthington, & Ericsson, 1986). However, with an estimated twelve million implants placed annually worldwide, peri-implant disease has increasingly become a complication, often, difficult to resolve (Persson, Samuelsson, Lindahl, & Renvert, 2010a; Esposito, Grusovin, & Worthington, 2012; Albrektsson, Dahlin, Jemt, Sennerby, Turri, & Wennerberg, 2014).

Controversy exists regarding disease initiation, namely whether specific pathogenic microbiota are indeed the true initiators of bone loss around implants or if they are secondary to a disbalanced foreign body reaction coupled with background factors such as poorly fabricated implants placed by unqualified clinicians (Albrektsson et al., 2014; Qian, Wennerberg, & Albrektsson, 2012). Nevertheless, the European Federation of Periodontology consensus proposed that bacteria are the sole cause of peri-implant disease with associated risk factors such as poor oral hygiene, history of periodontitis, diabetes or smoking (Lindhe, Meyle, Group D of European Workshop on Periodontology).

Regardless of the initiating etiological factors, there is agreement that the disease process is exacerbated and maintained by specific microbial infection with bacteria and possibly viruses (Rams, Degener, & van Winkelhoff, 2014; Verdugo et al., 2015a; Verdugo, Castillo, Castillo, & Uribarri, 2015; Heitz-Mayfield, Salvi, Mombelli, Faddy, & Lang, 2012). Specific microbial contamination has been shown to impair osteogenesis, and increased bone loss has been associated with the presence of key anaerobic species and salivary Epstein-Barr virus (EBV) (Verdugo et al., 2012).

Therefore, some research groups have proposed combined, surgical and non-surgical, therapies where systemic antibiotics are administered to empirically target specific putative bacteria (Rams et al., 2014a; Heitz-Mayfield et al., 2012). The risks associated with empiric therapy are not only potential antibiotic resistance but, most importantly, the development of superinfections difficult to eradicate (Rams, Degener, & van Winkelhoff, 2014a; Rams, Degener, & van Winkelhoff, 2014b). Peri-implant opportunistic infections may be a significant risk associated with empiric broad-spectrum antibiotic regimens in immunocompetent individuals. The negative impact of antimicrobial agents on the normal protective microflora has been documented for decades (Sullivan, Edlund, & Nord, 2001). The human oropharyngeal, intestinal and vaginal ecological balance can be altered after antibiotic exposure, favoring the overgrowth of opportunistic pathogens (Sullivan et al., 2001).

Lack of follow-up and antibiotic susceptibility testing may leave specific ongoing microbial challenges difficult to eliminate, allowing disease progression to perpetuate. So far, superinfections have not been documented with the use of broad-spectrum antibiotics in peri-implant disease. However, there have been reports of rapidly progressive, non-responsive to treatment peri-implantitis, in cases where broad-spectrum antibiotic therapy was used (Emrani, Chee, & Slots, 2009; van Winkelhoff & Wolf, 2000). Indeed, the increase of subgingival superinfecting agents, such as, *Enterobacter*,*Candida*, or *Staphylococcus* species, can flourish after the administration of systemic antimicrobials (Helovuo, Hakkarainen, & Paunio, 1993).

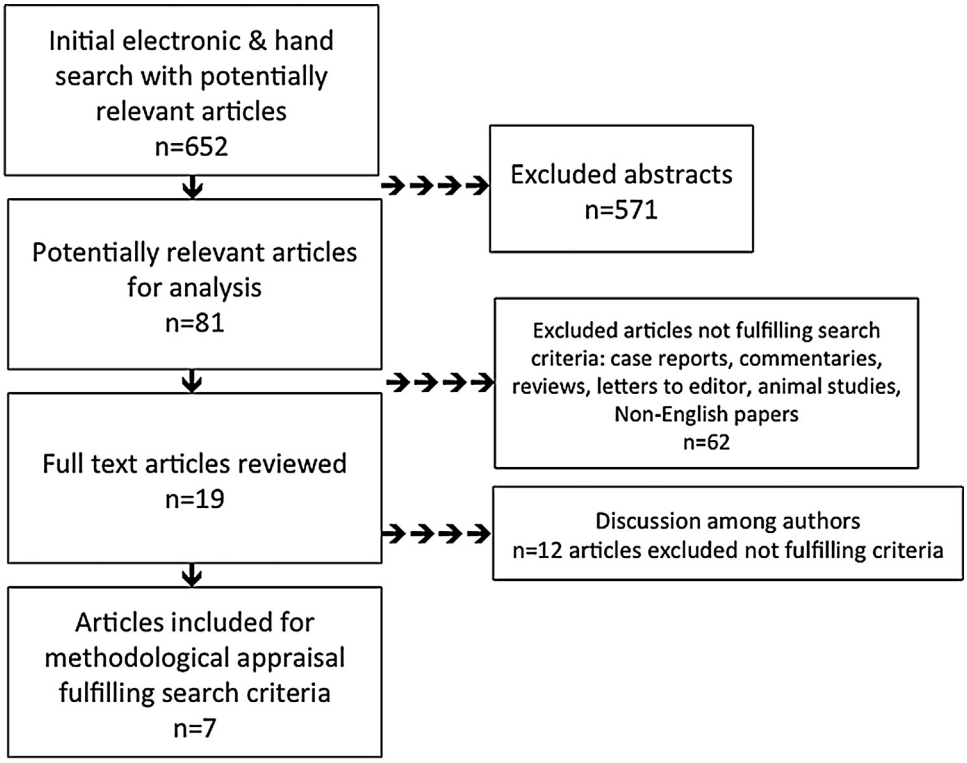

Fig. 1. Search strategy flowchart summary of systematic review following PRISMA guidelines.