



Maintaining Osseointegration: Understanding, preventing, and treating Risk Factors for Peri-implant Diseases

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How to cite this article: Danesh-Sani SA. Maintaining Osseointegration: Understanding, preventing, and treating Risk Factors for Peri-implant Diseases. *J Contemp Dent Pract* 2016;17(9):711-712.

Source of support: Nil

Conflict of interest: None

INTRODUCTION

The dental implant is a predictable way of restoring fully and partially edentulous patients and has shown high success rate for managing a broad range of clinical conditions. Improving implant surfaces has revolutionized the osseointegration of implants and changed the focus of implant research from osseointegration more toward the risk factors associated with the failure of implants in the long-term. Shifting implant surface from machined to rough surface has significantly improved osseointegration and success rate of implants. Currently, the main concern for clinicians is not achieving osseointegration, rather it is how to maintain it by understanding, preventing, and treating various risk factors affecting the health of the implant and long-term success of it.

This paper mainly focuses on understanding the risk factors associated with peri-implant diseases, therefore, facilitate clinical decision-making in preventing and treating these risk factors. Different risk factors, with varying levels of impact, have been recognized that compromise the implant success including anatomic, host-related, and prosthetic factors.

An important anatomic risk factor is malpositioning of the implant, which results in less than optimal amount of bone surrounding the implant. Minimum amount of bone is necessary to cover the implant that provides the vasculature and blood supply to the surrounding bone and prevents from further bone loss and implant thread exposure. It has been shown that 1.5 to 2 mm of bone thickness is optimal for having long-term bone stability around the implant.¹ Proximity of the implant relative to the other teeth or implants should also be considered when placing implants to avoid hard and soft tissue loss around implants.

Other anatomic factors that recently raised an attention are soft tissue thickness and the amount of keratinized tissue surrounding the implant. Soft tissue thickness has a significant influence on marginal bone stability around implants. Linkevicius et al² found that if the tissue thickness is less than 2 mm up to 1.45 mm of crestal bone loss might be anticipated, which can be avoided by increasing the tissue thickness to more than 2.5 mm. Thick vs thin biotype represents thicker bony architecture with rich blood supply and vasculature and more resistance to bone loss at the time of inflammation.

Systematic reviews have shown that inadequate keratinized tissue around dental implants is related to more plaque accumulation, tissue inflammation, marginal soft tissue recession, and attachment loss.³

Smoking, history of periodontitis, and poor oral hygiene are the host-related risk factors with strong evidence, while limited evidence existed for uncontrolled diabetes. Smoking is a definite risk factor with a significant negative impact on implant survival and success. Bain proposed a smoking cessation protocol with considerable improvement in the success rate of implants involving cessation of smoking 1 week prior and 8 weeks after implant placement.⁴ Different studies have shown more prevalence of peri-implantitis in periodontally compromised patients compared to periodontally healthy patients.

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Biologic complications (i.e., peri-implantitis) become more prominent in patients with aggressive periodontitis.⁵

Inadequate fitting of prosthetic components and screw loosening result in micromotion at the interface of the abutment and implant platform, leading to inflammation and marginal bone loss. Proper prosthetic design avoids presence of cantilever and excessive occlusal force and facilitates better oral hygiene and plaque removal around the implant.

Excess cement is associated with signs of peri-implant disease due to providing a good housing for bacterial plaque. It is noteworthy to mention that using of cement-retained implant restorations usually results in leaving cement around the implant and surrounding tissue.⁶ Therefore, it is recommended to use screw retained restorations to avoid risk of peri-implant diseases associated with excess cements.

Further clinical studies are needed to evaluate the effect of other factors, such as reusing of healing abutments, various implant surfaces, and some systemic diseases on the implant survival in the long-term.

In conclusion, maintaining osseointegration means understanding, preventing, and treating all the risk factors that can provoke the inflammatory response in a way that cannot be tolerated by the host and results in crestal bone loss and further complications around the

implant. The final recommendation centered on plaque management by improving individual oral hygiene and professional maintenance after placement of implant restoration.

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