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Review

Platform switch and dental implants: A meta-analysis

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ABSTRACT

Objectives: To test the null hypothesis of no difference in the implant failure rates, marginal bone loss (MBL) and postoperative infection in patients who received platform-switched implants or platform-matched implants, against the alternative hypothesis of a difference.
Data: Main search terms used in combination: dental implant, oral implant, platform switch, switched platform, platform mismatch, and dental implant–abutment design.
Sources: An electronic search without time or language restrictions was undertaken in December/2014 in PubMed/Medline, Web of Science, Cochrane Oral Health Group Trials Register plus hand-searching.
Study selection: Eligibility criteria included clinical human studies, either randomized or not.
Conclusions: Twenty-eight publications were included, with a total of 1216 platform-switched implants (16 failures; 1.32%) and 1157 platform-matched implants (13 failures; 1.12%). There was less MBL loss at implants with platform-switching than at implants with platform-matching (mean difference −0.29, 95% CI −0.38 to −0.19; $P < 0.00001$). An increase of the mean difference of MBL between the procedures was observed with the increase in the follow-up time ($P = 0.001$) and with the increase of the mismatch between the implant platform and the abutment ($P = 0.001$). Due to lack of satisfactory information, meta-analyses for the outcomes 'implant failure' and 'postoperative infection' were not performed. The results of the present review should be interpreted with caution due to the presence of uncontrolled confounding factors in the included studies, most of them with short follow-up periods.
Clinical significance: The question whether platform-matched implants are more at risk for failure and loose more marginal bone than platform-switched implants has received increasing attention in the last years. As the philosophies of treatment alter over time, a periodic review of the different concepts is necessary to refine techniques and eliminate unnecessary procedures, forming a basis for optimum treatment.

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1. Introduction

One reference criterion to evaluate implant success includes the assessment of changes in crestal bone level over time.[1] After a two-piece implant is uncovered, bone loss of 1.5–2 mm in the vertical axis and 1.4 mm in the horizontal axis was expected with respect to micro-gap (the implant–abutment interface).[2] This pattern of bone loss is usually noted when submerged dental implants are restored using a matched abutment and implant platform. An abutment with a smaller diameter than that of the implant platform (an approach known as platform switching) was first observed in the mid-1980s, when larger-diameter implants were often restored with narrower abutments because congruent abutments were often unavailable.[3] A radiographic follow-up study has found that the placement of platform-switched implants resulted in a smaller vertical change in the crestal bone level than was commonly seen when restoring conventional implants with abutments of matching diameter.[4]

The main hypothesis raised in the literature to explain this phenomenon is the fact that the platform-switching concept requires the implant–abutment interface be placed away from the implant shoulder and closer towards the axis to increase the distance of the microgap from the bone,[4] and thereby decrease its bone resorptive effect[5] caused by the bacterial microleakage.

Researchers have been trying to evaluate whether the insertion of implants receiving abutment with a switched platform may influence the survival of dental implants and the marginal bone level (MBL). However, some studies may lack statistical power, given the small number of patients per group in the clinical trials comparing the techniques. Recent reviews[6,7] showed a significantly less mean MBL change at implants with a platform-switched compared to a platform-matched configuration. However, the authors stressed that the studies included were of relatively short follow-up periods. Moreover, only prospective controlled studies were included, limiting the number of eligible papers. Adding more information from observational studies may aid in clinical reasoning and establish a more solid foundation for causal inferences.[8]

The ability to anticipate outcomes is an essential part of risk management in an implant practice. Recognizing conditions that place the patient at a higher risk of failure will allow the surgeon to make informed decisions and refine the treatment plan to optimize the outcomes.[9] The use of implant therapy in special populations requires consideration of potential benefits to be gained from the therapy. To better appreciate this potential, we conducted a systematic review and meta-analysis of both prospective and retrospective studies to compare the survival rate of dental implants, postoperative infection, and MBL of platform-switched and platform-matched dental implants. The MBL between the two approaches was also compared in relation to different observation periods.

2. Materials and methods

This study followed the PRISMA Statement guidelines.[10] A review protocol does not exist.

2.1. Objective

The purpose of the present review was to test the null hypothesis of no difference in the implant failure rates, MBL and postoperative infection in patients who received platform-switched implants or platform-matched implants, against the alternative hypothesis of a difference. The focused question was elaborated by using the PICO format (Participants, Interventions, Comparisons and Outcomes): to compare three outcomes (implant failure rates, MBL, and postoperative infection) of clinical studies including patients undergoing implant-prosthetic rehabilitation comparing endosseous implants with platform switching and platform-matching implant–abutment configurations.

2.2. Search strategies

A structured electronic systematic search without time or language restrictions was undertaken in December 2014 in the following databases: PubMed/Medline, Web of Science, and the Cochrane Oral Health Group Trials Register. The following terms were used in the search strategy on PubMed/Medline, refined by selecting the term:

{Subject AND Adjective}
{*Subject*: (dental implant OR oral implant [text words])
AND
Adjective: (platform switch OR platform switching OR switched platform OR platform switched OR platform mismatch OR dental implant-abutment design [text words])}

The following terms were used in the search strategy on Web of Science, in all databases:

{Subject AND Adjective}
{*Subject*: (dental implant OR oral implant [topic])
AND
Adjective: (platform switch OR platform switching OR switched platform OR platform switched OR platform mismatch OR dental implant-abutment design [topic])}

The following terms were used in the search strategy on the Cochrane Oral Health Group Trials Register:

(dental implant OR oral implant AND (platform switch OR platform switching OR switched platform OR platform switched OR platform mismatch OR dental implant-abutment design))

A manual search of dental implants-related journals, including *British Journal of Oral and Maxillofacial Surgery*, *Clinical Implant Dentistry and Related Research*, *Clinical Oral Implants Research*, *European Journal of Oral Implantology*, *Implant Dentistry*, *International Journal of Oral and Maxillofacial Implants*, *International Journal of Oral and Maxillofacial Surgery*, *International Journal of Periodontics and Restorative Dentistry*, *International Journal of Prosthodontics*, *Journal of Clinical Periodontology*, *Journal of Dental Research*, *Journal of Craniofacial Surgery*, *Journal of Cranio-Maxillofacial Surgery*, *Journal of Dentistry*, *Journal of Maxillofacial and Oral Surgery*, *Journal of Oral Implantology*, *Journal of Oral and Maxillofacial Surgery*, *Journal of Oral Rehabilitation*, *Journal of Periodontology*,