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Declarative Title: There is no clear evidence of superiority concerning the platform-switching in the preservation of the marginal bone level

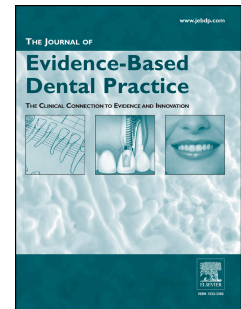
Ahmed Yaseen Al-Qutaib

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REVIEW ANALYSIS AND EVALUATION

Declarative Title: There is no clear evidence of superiority concerning the platform-switching in the preservation of the marginal bone level.

Article Title and Bibliographic Information

Impact of platform switching on marginal peri-implant bone level changes. A systematic review and metaanalysis. Strietzel FP, Neumann K, Hertel M. *Clin Oral Implants Res* 2014;26(3):342-58

Purpose/Question

Is there an impact of platform switching (PS) on marginal bone level (MBL) changes around endosseous implants compared to implants with platform matching (PM) implant abutment configurations?

Type of Study/Design

Systematic review and meta-analysis

Reviewer Name and Contact Information

Ahmed Yaseen Al-Qutaib

PhD Student, Department of Prosthodontics, Faculty of Oral and Dental Medicine, Cairo University, Cairo, Egypt; Assistant Lecturer, Department of Prosthodontics, Faculty of Oral and Dental Medicine, IBB University, IBB, Yemen.

E-mail: am01012002@gmail.com

SUMMARY

Selection Criteria: A systematic literature search was done in the electronic databases PubMed/Medline, Web of Science, Journals@Ovid Full Text and Embase. The search strategy

used search term and MeSH. Moreover, to detect data from unpublished studies, the following electronic registers of clinical trials were searched, from the following web sites <http://apps.who.int/trialsearch/>; <http://www.clinicaltrialsregister.eu/>; www.clinicaltrials.gov; www.centerwatch.com; www.controlledtrials.com. Finally a manual search was conducted in two German journals, namely the Journal of Oral Implantology (Zeitschrift für zahnärztliche Implantologie) and Implantologie. The search was conducted by two reviewers independently.

Selections were either randomized controlled trials (RCTs) or prospective controlled clinical studies (PCCS) published from 2005 to June 2013 in English or German that compared MBL changes at implants with PS or PM-implant abutment configurations as a primary outcome.

Data were independently extracted by two reviewers. The statistical heterogeneity among the RCTs selected for meta-analysis was assessed by using the DerSimonian–Laird estimate τ^2 for inter study variance. The

meta-analysis was performed by using a random effects model to investigate on possible differences between the mean bone loss in the groups of PS- compared with PM-implant abutment configurations on an implant-based analysis. A forest plot was generated to show means and standard deviations of all studies considered, and a funnel plot was generated to detect possible bias in the selection of studies.

A quality assessment for only the RCTs included in the meta-analysis was done following the recommendations for systematic reviews of interventions of the Cochrane collaboration. The difference of the assessment results was low, resulting in a j score of 0.923 (disagreement in four of 105 fields) between the reviewers. Consent was reached by discussion.

Investigations on the methodological quality of the RCTs revealed that most information was obtained from studies with an unclear or high risk of bias for one or more key domains. Due to the nature of the studies, personnel blinding was excluded from the assessment of performance bias. As only a few studies reported on radiographic examiners different from surgeons involved in the patients' treatment, the bias concerning the outcome assessment was rated unclear or high in 10 of 15 RCTs. Drop-outs accounted for attrition bias in 7 of 15 RCTs.

Main Results

Twenty-two studies published from 2005 to 2013 met the inclusion criteria for systematic review and qualitative synthesis (7 PCCS and 15 RCTs). Of the 15 RCTs 6 had more than 12months' follow-up, 8 had 12months' follow-up, and 1 had less than 12months' follow-up. Thirteen RCTs (including 1035 implants) were eligible for inclusion into a meta-analysis. A κ -score of 0.90 indicates a high reviewers' agreement regarding the included publications. The DerSimonian–Laird estimate for interstudy variance $s^2 = 0.182$ ($I^2 = 96.2\%$) differed significantly from 0 ($p < 0.0001$), indicating a substantial degree of heterogeneity. Therefore, treatment effects were assumed to be not homogeneous among the studies considered, and a random effects model for combining the effects of all studies was applied. A mean difference of marginal bone loss of 0.49 mm (95% confidence interval [CI]: 0.26; 0.73) between PM implants and PS implants was found significantly different from 0 ($p < 0.0001$, mixed effects model). Mean bone loss for PS implants was 0.49 mm (95% CI 0.38; 0.60) and 1.01 mm (95% CI: 0.62; 1.40) for PM implants.

Conclusions

Platform-switching may preserve crestal bone levels more than platform matching when placing implants but the evidence is insufficient to avoid controversy.

Commentary

The change of the peri-implant bone level is considered an important criterion for the evaluation of implant therapy outcome and evidence for the presence or absence of peri-implant tissue health.¹⁻³ Therefore, efforts were made to maintain peri-implant marginal bone loss (MBL) stability after and throughout the prosthetic loading phase. In recent years, platform-switching has been increasingly investigated as a viable technique to decrease the amount of the MBL that occurs around an implant collar when it is exposed to the oral environment. Platform-switching involves the placement of a smaller diameter prosthetic component on a larger diameter implant fixture. This connection shifts the perimeter of the implant-abutment junction (IAJ) inward toward the central axis of the implant.⁴

This review was designed to address whether there is an impact exerted by platform switching on MBL changes around endosseous implants compared to implants with platform matching (PM) implant-abutment configurations.

MBL around implant fixtures after surgical placement and loading is well documented in the literature, with radiographic bone loss ranges of 1.5 mm during the first year, followed by 0.2 mm in subsequent years being an important parameter in assessing the success of the implant fixture.¹

The aim of this systematic review and meta-analysis was to investigate whether or not there was an evidence-based rationale for the use of platform-switched as opposed to platform-matched components in the preservation of MBLs.

Strengths of this systematic review

An important strength of this systematic review and meta-analysis is in the authors' use of the most recent guidelines of Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA).⁵ The PRISMA guidelines were developed to help authors improve the reporting of systematic reviews and meta-analyses. When used as a basis for reporting, the PRISMA methodology helps to ensure a more consistent, higher quality outcome. By the authors' use of this methodology in conducting their systematic review and subsequent meta-analysis, the appropriate and detailed work was performed. It was done in a logical, prescribed manner.

A well-defined and focused PICO question used by authors is creditable and enabled them to summarize their objectives and inclusion criteria, as well as an aid in their evidence-based search strategy.

Weakness of this systematic review

According to the indexed PRISMA checklist, additional analysis, that includes subgroup analysis, was not planned; it would have been preferable for the authors to consider planning of subgroup analysis. As a result of clinical, methodological, and statistical heterogeneity ($I^2 = 96.2\%$) a subgroup analysis was recommended to explore the sources of heterogeneity by examining the influence of the sample size, implant-placement method, degree of discrepancy

between implant and abutment diameters, and the length of the observation period on the overall effect size.

A previous systematic review that included 9 of the 13 articles in this systematic review and meta-analysis would agree with the authors' conclusions.⁶ The authors of that previous publication were unable to perform a meta-analysis due to concern over the heterogeneity among the publications in terms of surgical protocols (submerged vs. non-submerged and crestal vs. sub-crestal placement), loading protocols (immediate vs. delayed), and platform surface configuration (smooth vs. threaded), but were able to provide narrative detail on the outcomes of the selected articles. They also concluded that platform-switching seemed to have some beneficial effect on peri-implant MBLs.⁶

Potential drawbacks to this study include the limitations of using conventional radiographs (in most of the studies included) to assess buccal and lingual bone levels, as well as noting that mesial and distal bone levels were assessed in only one dimension--vertically. Although radiographs remain one of the most convenient and readily accessible diagnostic methods to evaluate crestal bone loss, they do have limitations. Radiographs clearly represent the mesial and distal aspect of the implant, but they fail to show accurately the facial/buccal aspect where bone loss often occurs, and this is regarded as assessment bias in that study.⁷

The search was limited to English and German language publications, which may have introduced a publication bias and excluded other relevant articles.

Conclusion

PS when compared PM implant abutment configuration might preserve bone around dental implants and this is supported clinically. However, this is not recommended as evidence-based decision making. Further long-term, well-conducted, randomized controlled studies considering the effect of possible variables are needed to confirm the superiority of the platform concept.

Level of Evidence

Level 2

Limited-quality, patient-oriented evidence

Strength of Recommendation Grade

Grade B: Inconsistent, limited-quality patient-oriented evidence

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