

Summarised from *Journal of Clinical Periodontology*, Volume 51, issue 7 (July 2024), 936-965

Editor: Andreas Stavropoulos, chair, EFP scientific affairs committee

**Rapporteurs:**

Jackie Yiu and An-Lun Cheng supervised by Dr Su Sheng Quach, Assoc. Prof. Ryan Lee, and Prof. Saso Ivanovski

**Affiliation:**

Postgraduate programme in periodontology at the University of Queensland, Brisbane, Australia

*study*

# Short versus long implants: when does size matter?

**Authors:**

Andrea Ravidà, Matteo Serroni, Wenche S. Borgnakke, Mario Romandini, I-Ching (Izzie) Wang, Claudia Arena, Marco Annunziata, Gennaro Cecoro, Muhammad H. A. Saleh

## Background

Post-extraction horizontal and vertical ridge dimensional changes may affect the complexity of implant treatment.

Augmentation procedures, such as maxillary sinus elevation and mandibular supracrestal bone augmentation, are available to mitigate the anatomical challenges of ridge resorption. But they often require high technical skills from clinicians, increase the costs and duration of treatment, and carry higher risks of complications and patient morbidity.

Therefore, the use of short dental implants ( $\leq 6\text{mm}$ ) in atrophic posterior sites has been proposed as an alternative treatment option. However, the evidence supporting the use of short implants is not robust.

Previous systematic reviews have not separately examined short and long implants in different clinical scenarios, while factors such as bone quality, location in the mouth, and the type of edentulism being reconstructed have not been considered, although they may affect the success of short implants.

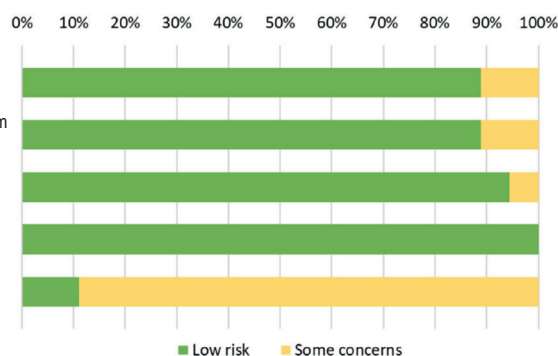
## Aim

To evaluate the survival rates (primary outcome), as well as marginal bone loss (MBL) and complications of short implants ( $\leq 6\text{mm}$ ) compared to long implants ( $\geq 10\text{mm}$ ) in specific clinical scenarios.

## Materials & methods

- A systematic review/meta-analysis of randomised controlled trials (RCTs), with no restrictions in terms of publication date or language, was conducted to evaluate implant survival, MBL, and biological and prosthetic complications in short ( $\leq 6\text{mm}$ ) implants compared to long ( $\geq 10\text{mm}$ ) implants.
- Studies examining patients of any age, comparing  $\geq 1$  short ( $\leq 6\text{mm}$ ) with  $\geq 1$  standard-length ( $\geq 10\text{mm}$ ) dental implants (with or without bone augmentation), restored with a fixed prosthesis and a one-year follow-up were included.
- The systematic review followed the Cochrane Handbook guidelines and results were reported according to the 2020 Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.
- Risk of bias was assessed through the Cochrane risk-of-bias tool.
- Meta-analyses were conducted upon stratification of  $\geq 2$  studies with the same exposure, outcome, and observation duration.
- Certainty or quality of evidence was evaluated according to the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach.
- A subgroup analysis by type of bone augmentation procedure in the control group (vertical bone augmentation in the mandible, sinus lift in the maxilla, none, native bone) and type of restoration (full-arch rehabilitations or others) was performed.

**Risk of bias as percentage of the included studies according to domain**



**Figure:** Risk of bias scored by proportion of the included 19 randomised clinical trials by domain

**Table:** Summary of the level of certainty/quality of the evidence assessed by GRADE for relative risk ratios for survival rates of short ( $\leq 6$ mm pooled) compared with long ( $\geq 10$ mm) implants according to different clinical scenarios and study durations

Clinical scenario (source)	Study duration	Short implants $\leq 6$ mm (pooled), risk ratio (95% CI); [No. RCTs]; GRADE certainty/quality score	Reason for GRADE score downgraded from high*
Sinus floor augmentation (maxilla)	1 year	1.01 (0.98; 1.03) [n = 10 RCTs] MODERATE‡	‡ $\leq 6$ mm at 1 year: serious indirectness
	3 years	1.00 (0.96; 1.03) [n = 7 RCTs] MODERATE§	§ $\leq 6$ mm at 3 years: serious indirectness
	5 years	0.99 (0.94; 1.03) [n = 6 RCTs] LOW¶	¶ $\leq 6$ mm at 5 years: serious indirectness and imprecision
	10 years	n/a [n = 1 RCT] No GRADE score	
Vertical ridge augmentation (mandible)	1 year	1.06 (1.01; 1.11) [n = 5 RCTs] VERY LOW††	†† $\leq 6$ mm at 1 year: serious inconsistency, indirectness and imprecision
	3 years	1.02 (0.97; 1.07) [n = 4 RCTs] LOW‡‡	‡‡ $\leq 6$ mm at 3 years: serious indirectness and imprecision
	5 years	1.01 (0.96; 1.07) [n = 4 RCTs] LOW§§	§§ $\leq 6$ mm at 5 years: serious indirectness and imprecision
	10 years	No RCT	
Native bone in either jaw	1 year	0.98 (0.94; 1.01) [n = 4 RCTs] MODERATE¶¶	¶¶ $\leq 6$ mm at 1 year: serious indirectness
	3 years	0.96 (0.92; 1.00) [n = 3 RCTs] MODERATE†††	††† $\leq 6$ mm at 3 years: serious indirectness
	5 years	0.96 (0.91; 1.00) [n = 3 RCTs] MODERATE‡‡‡	‡‡‡ $\leq 6$ mm at 5 years: serious indirectness
	10 years	n/a [n = 1 RCT] No GRADE score	
Full-arch rehabilitation in either jaw	1 year	1 (0.98; 1.02) [n = 3 RCTs] VERY LOW§§§	§§§ $\leq 6$ mm at 1 year: serious inconsistency, indirectness and imprecision
	3 years	1 (0.07; 14.55) [n = 1 RCT] No GRADE score	
	5 years	0.99 (0.96; 1.03) [n = 3 RCTs] MODERATE¶¶¶	¶¶¶ $\leq 6$ mm at 5 years: serious indirectness
	10 years	No RCT	

Note:

- Moderate certainty/quality evidence for RR for short compared with long implants.
- Low/Very Low certainty/quality evidence for RR for short compared with long implants.
- Insufficient evidence for RR for short compared with long implants.

Abbreviations: CI, confidence interval; No, number; RCT, randomised clinical trial; RR, relative survival ratio risk ratio (also known as relative risk).

## Results

- A total of 19 RCTs were included, which comprised a total of 1,097 short ( $\leq 6$ mm) and 1,117 long ( $\geq 10$ mm) implants.
- 10 RCTs compared the survival rate of  $\leq 6$ mm implants versus  $\geq 10$ mm implants placed after maxillary sinus lifting.
- There is high-certainty evidence that 6mm implants have similar survival and complication rates compared to  $\geq 10$ mm implants placed after maxillary-sinus floor elevation.
- There is inconclusive evidence for shorter implants (4-5mm) as alternatives to long implants ( $\geq 10$ mm) placed after maxillary sinus-floor elevation.
- Five RCTs compared the survival rate of  $\leq 6$ mm versus  $\geq 10$ mm implants placed in native bone.
- There is moderate-certainty evidence that short implants ( $\leq 6$ mm) have similar survival and complication rates compared to long implants ( $\geq 10$ mm) when placed in native bone (either jaw).
- Three RCTs compared the survival rate of  $\leq 6$ mm versus  $\geq 10$ mm implants placed for full-arch rehabilitations.
- There is moderate-certainty evidence that short implants ( $\leq 6$ mm) have similar survival and complication rates compared to long implants ( $\geq 10$ mm) as part of a full-arch rehabilitation (either jaw).
- Six RCTs compared the survival rates of  $\leq 6$ mm versus  $\geq 10$ mm implants placed in vertically augmented mandibular bone.
- There is inconclusive evidence that short implants ( $\leq 6$ mm) have similar survival and complication rates compared to long implants ( $\geq 10$ mm) in vertically augmented mandibular bone.
- Two RCTs reported reduced costs and higher patient satisfaction with the use of 6mm implants compared to  $\geq 10$ mm implants.

### Limitations

- Non-RCT longitudinal intervention studies of high quality were not included in the study but might also have been of value to examine.
- Because of heterogeneity and insufficient number of studies, subgroup analysis to evaluate the following confounding factors was not possible:
  - Implant factors – materials, widths, macro-design, surface characteristics.
  - Surgical factors – technical approach, biomaterials, healing time.
  - Population characteristics – age, ethnicity, sex.
  - Site and placement factors – implant location, tilted or axially positioned.
- Patient-reported outcome measures were not examined.

### Conclusions & impact

- The results support the use of 6mm implants as an alternative treatment option to sinus lifts with long implants ( $\geq 10$ mm), as well as the use of short implants ( $\leq 6$ mm) placed in native bone or as part of full-arch rehabilitations in either jaw.
- The evidence backing the use of short implants ( $\leq 6$ mm) in vertically augmented mandibular ridges is inconclusive.
- The lack of moderate- or high-certainty evidence to support other lengths or clinical scenarios does not imply that short implants should not be placed in these situations, but only that evidence from the examined RCTs is insufficient.
- Future research should evaluate specific implant lengths individually instead of as a group (e.g.,  $\leq 6$ mm) and for specific clinical scenarios.

JCP Digest 127, published in July 2024, is a summary of "Short ( $\leq 6$ mm) compared with  $\geq 10$ -mm dental implants in different clinical scenarios: A systematic review of randomized clinical trials with meta-analysis, trial sequential analysis and quality of evidence grading". *J Clin Periodontol.* 2024; 51(07):936-965. DOI: 10.1111/jcpe13981

<https://www.onlinelibrary.wiley.com/doi/10.1111/jcpe.13981>

Access through EFP members' page log-in: <http://efp.org/members/jcp.php>

With kind permission from Wiley Online Library. Copyright © 1999-2024 John Wiley & Sons, Inc. All rights reserved.

JCP Digest is published by the European Federation of Periodontology (EFP). EFP office: Cink Coworking, office No. 17, calle Henri Dunant 15-17, 28036 Madrid, Spain. [www.efp.org](http://www.efp.org)