

How does implant diameter influence survival rate? Comparison of narrow diameter implants vs standard diameter implants

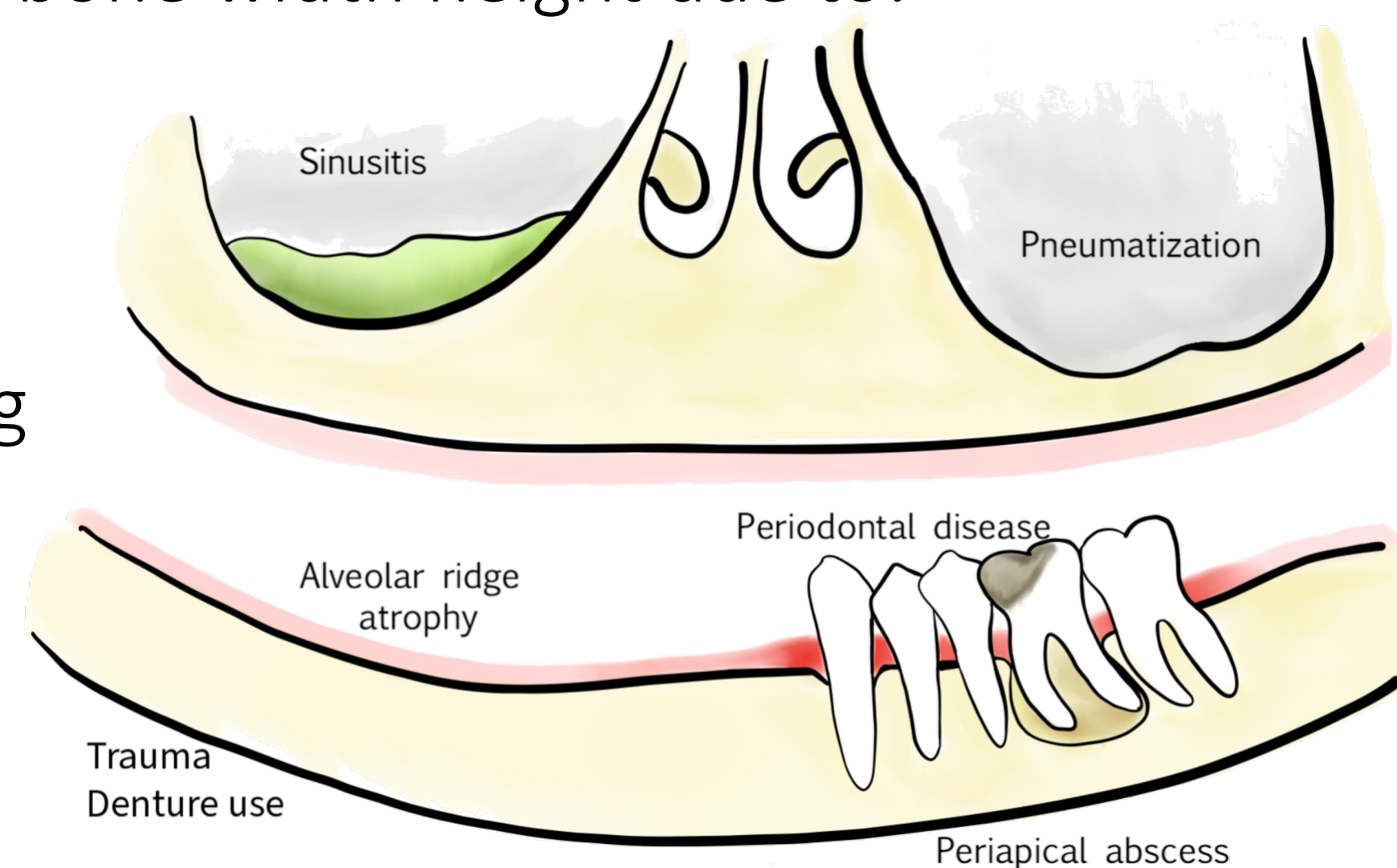
Aya Abdelkarim, Sabrina Bouferguene & Bushra Khan

Background

The issue:

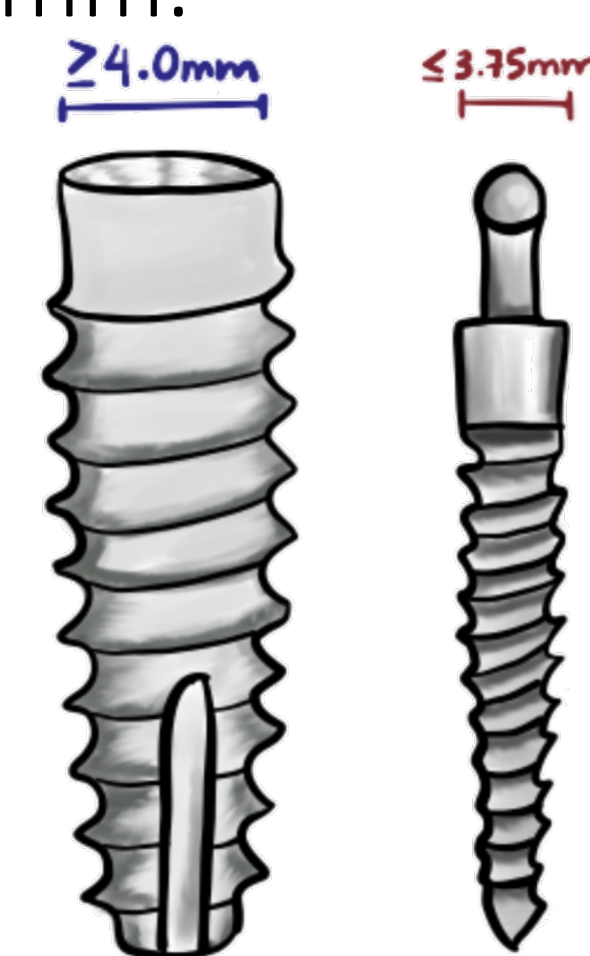
Implant placement complicated by atrophy of the alveolar crest with reduced bone width height due to:

- Trauma
- Malformation,
- Neoplasia,
- Denture wearing
- Marginal periodontitis



Narrow Diameter Implants (NDI):

- Also referred as "Mini-Implants".
- Usually defined as implants of diameter $\leq 3.75\text{mm}$ or $\leq 3.00\text{mm}$.
- Claimed to be a reasonable alternative to bone augmentation procedures for standard diameter implants (SDI).



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| <p>SDI</p> <ul style="list-style-type: none"> - Diameter $> 4.0\text{mm}$ - Requires adequate ridge width | <p>NDI</p> <ul style="list-style-type: none"> - Diameter typically 3.75mm or less - Reduced buccal-lingual width of bone - Alveolar ridge atrophy |
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Clinical question

In patients receiving dental implants, to what extent do small diameter dental implants ($< 3\text{mm}$) affect osseointegration, crestal bone loss and longevity compared to conventional diameter dental implants ($> 4\text{mm}$)?

Evidence Search

- Search date: Feb 2, 2022
- Embase: 405 evidence sources
- Additional search: Cochrane Reviews Database, C. A. T. Database, TRIP Database, Journal of Evidence Based Dental Practice.

Cruz, R. S., et al., (2021)	Schiegnitz, E., & Al-Nawas, B. (2018)
<ul style="list-style-type: none"> • Systematic review with a meta-analysis. • The primary outcome: implant survival rate; secondary outcomes: marginal bone loss (MBL) and biological and mechanical complication rates. • Implant type: RDI: (Regular Diameter Implants: 3.75–4.1 mm) vs Narrow Diameter Implants: (NDIs: $< 3.75\text{ mm}$). 	<ul style="list-style-type: none"> • Systematic review with meta-analysis. • Primary outcome: survival rates of NDI; secondary outcome: marginal bone level • Implants classified into 3 categories ($< 3.0\text{ mm}$, $3\text{--}3.25\text{ mm}$, $3.3\text{--}3.5\text{ mm}$) vs standard ($4.0\text{mm} +$).

Results

Significance of the results

- **Cruz et al. (2021):** RD = 0.01 (95%CI: -0.01 to 0.03). There was 1 excess case of failure per 100 implant patients compared to regular diameter implants over a period of 12-84 months. Implant survival rate
- **Schiegnitz et al. (2018):** Implant survival rate, meta-analysis: OR = 4.54 (CI 95% 1.51–13.65). Implant survival is 4.54 times less likely to occur in the NDI. RD= 12.74 (1.84, 45.4). NDI had 13% more risk to fail compared to SDI in edentulous or partially edentulous patients.

Evidence Quality

- There is limited, moderate quality evidence indicating that NDIs of $< 3.75\text{ mm}$ do not have a clinically meaningful difference compared to SDIs in terms of survival rate, while NDIs of $< 3.0\text{ mm}$ do have a clinically significant difference, but they are not clinically decisive within a limited time frame (12-84 months).

Strengths

- Multiple databases: grey literature, non-peer-reviewed literature and specific journals search. Use of PRISMA and validated risk of bias tools. In both reviews, independent assessment of studies.

Limitations

- Limited sample population characterization, limited follow-up periods (12-84 months), high risk of bias, lack of randomization and lack of non-exposed cohort or no additional comparison factor in selected studies.

Clinical Bottom Line

There is limited evidence that narrow diameter implants ($\leq 3.75\text{mm}$ or $\leq 3.00\text{mm}$) differ from conventional diameter dental implants ($> 4\text{mm}$) in terms of longevity.

There is a need for further evidence, particularly randomized controlled trials with large populations and long-term follow-up periods.

Applicability

- Longevity: no conclusion can be drawn based on the limited follow-up period.
- Population: difficult to apply to the Canadian population receiving implants in private practices since included studies were conducted various countries, health care settings and populations.
- Clinical relevance: One of the reviews studied implants in the context of rehabilitating in the anterior region, while the study by included all types of rehabilitation. As the most common interest in NDIs fall within rehabilitation in the anterior region (implant overdenture) results could be utilized in the setting of Canadian private dental practices with stronger evidence.
- Technical aspect: surgical intervention required for NDIs placement is less invasive, allowing more Canadian edentulous patients to receive implant-supported overdentures. However, current results indicate that this may be associated with a reduced survival rate of NDIs.
- Costs: costs of SDIs are comparable to NDIs

Acknowledgments

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References

1. Cruz, R.S., Lemos, C.A.A., de Batista, V.E.S., Yogui, F.C., Oliveira, H.F.F. and Verri, F.R., 2021. Narrow-diameter implants versus regular-diameter implants for rehabilitation of the anterior region: A systematic review and meta-analysis. *International Journal of Oral and Maxillofacial Surgery*, 50(5), pp.674-682.
2. Schiegnitz, E. and Al-Nawas, B., 2018. Narrow-diameter implants: A systematic review and meta-analysis. *Clinical oral implants research*, 29, pp.21-40.