

Implant Length / Width

Short vs. long implants

1. TN Rossi F, Botticelli D, Cesaretti G, De Santis E, Storelli S, Lang NP. Use of short implants (6 mm) in a single-tooth replacement: a 5-year follow-up prospective randomized controlled multicenter clinical study. *Clin Oral Implants Res.* 2016 Apr;27(4):458-64. doi: 10.1111/clr.12564.
2. ES Papaspyridakos P, De Souza A, Vazouras K, Gholami H, Pagni S, Weber HP. Survival rates of short dental implants (≤ 6 mm) compared with implants longer than 6 mm in posterior jaw areas: A meta-analysis. *Clin Oral Implants Res.* 2018 Oct;29 Suppl 16:8-20. doi: 10.1111/clr.13289.
3. BT Vazouras K, de Souza AB, Gholami H, Papaspyridakos P, Pagni S, Weber HP. Effect of time in function on the predictability of short dental implants (≤ 6 mm): A meta-analysis. *J Oral Rehabil.* 2020 Mar;47(3):403-415. doi: 10.1111/joor.12925
4. AK Carlo Barausse, Andrea Ravidà, Lorenzo Bonifazi, Roberto Pistilli, Muhammad H A Saleh, Roberta Gasparro, Gilberto Sammartino, Hom-Lay Wang, Pietro Felice Extra-short (4-mm) implants placed after regenerative failures in the posterior atrophic mandible: A retrospective study *Int J Oral Implantol (Berl)* . 2023 Mar 2;16(1):31-38.
5. TV Luigi Guida 1 2, Umberto Esposito 3, Massimiliano Sirignano 3, Paolo Torrisi 4, Marco Annunziata 1 2, Denis Cecchinato 5 6 mm short versus 11 mm long inter-foraminal implants in the full-arch rehabilitation of edentulous non-atrophic mandibles: 5-year results from a multicenter randomized controlled trial *Clin Oral Implants Res* . 2023 Feb;34(2):127-136.
6. DL Manuel Toledano1, Enrique Fernández-Romero1, Cristina Vallecillo, Raquel Toledano1, María T. Osorio1, Marta Vallecillo-Rivas1 Short versus standard implants at sinus augmented sites: a systematic review and meta-analysis *Clinical Oral Investigations* (2022) 26:6681–6698
7. CM Giorgio Lombardo 1, Annarita Signoriello 1, Mauro Marincola 2, Pietro Liboni 1, Estevam A Bonfante 3, Pier F Nocini 1 Survival rates of ultra-short (< 6 mm) compared with short locking-taper implants supporting single crowns in posterior areas: A 5-year retrospective study *Clin Implant Dent Relat Res* . 2021 Dec;23(6):904-919.

Crown to implant ratio / splinted vs. non splinted

8. VX Malchiodi L, Ricciardi G, Salandini A, Caricasulo R, Cucchi A, Ghensi P. Influence of crown-implant ratio on implant success rate of ultra-short dental implants: results of a 8- to 10-year retrospective study. *Clin Oral Investig.* 2020 Sep;24(9):3213-3222.
9. TN Ravidà A, Barootchi S, Alkanderi A, Tavelli L, Suárez-López Del Amo F. The Effect of Crown-to-Implant Ratio on the Clinical Outcomes of Dental Implants: A Systematic Review. *Int J Oral Maxillofac Implants.* 2019 September/October;34(5):1121–1131. doi: 10.11607/jomi.7355. Epub 2019 Feb 19. PMID: 30892286.
10. ES Clelland N, Chaudhry J, Rashid RG, McGlumphy E. Split-mouth comparison of splinted and nonsplinted prostheses on short implants: 3-year results. *Int J Oral Maxillofac Implants.* 2016;31(5):1135-1141
11. BT Guo-Hao Lin 1, Christine Tran 1, Karolina Brzyska 1, Joseph Y Kan 2, Hom-Lay Wang 3, Donald A Curtis 4, Richard T Kao 1 The significance of vertical platform discrepancies and splinting on marginal bone levels for adjacent dental implants *Clin Implant Dent Relat Res* 2023 Apr;25(2):321-329.
12. AK Vigolo P, Mutinelli S, Zaccaria M, Stellini E. Clinical evaluation of marginal bone level change around multiple adjacent implants restored with splinted and nonsplinted restorations: a 10-year randomized controlled trial. *Int J Oral Maxillofac Implants.* 2015;30(2):411-418
13. TV Ravidà A, Saleh MHA, Muriel MC, Maska B, Wang HL. Biological and technical complications of splinted or nonsplinted dental implants: a decision tree for selection. *Implant Dent.* 2018;27(1):89-94

Wide vs. Narrow implants

14. DL André Barbisan de Souza, Flávia Sukekava, Livia Tolentino, João Batista César-Neto, João Garcez-Filho, Mauricio G. Araújo. Narrow- and regular- diameter implants in the posterior region of the jaws to support single crowns: A 3- year split- mouth randomized clinical trial *Clin Oral Impl Res.* 2018;29:100–107

15. CM Francesco Pieri 1, Caterina Forlivesi 1, Ernesto Caselli 2, Giuseppe Corinaldesi 3 Narrow-(3.0 mm) Versus Standard-Diameter (4.0 and 4.5 mm) Implants for Splinted Partial Fixed Restoration of Posterior Mandibular and Maxillary Jaws: A 5-Year Retrospective Cohort Study J Periodontol 2017 Apr;88(4):338-347.
 16. VX Ortega-Oller, I., Suárez, F., Galindo-Moreno, P., Torrecillas-Martínez, L., Monje, A., Catena, A., & Wang, H. L. (2014). The influence of implant diameter on its survival: A meta-analysis based on prospective clinical trials. Journal of Periodontology, 85, 569–580
 17. TN Eik Schiegnitz 1, Bilal Al-Nawas 1 Narrow-diameter implants: A systematic review and meta-analysis Clin Oral Implants Re 2018 Oct;29 Suppl 16:21-40.
 18. ES Dong-Woon Lee 1, Na-Hong Kim 2, Young Lee 3, Yeon-Ah Oh 1, Jae-Hong Lee 4, Hyung-Keun You. Implant fracture failure rate and potential associated risk indicators: An up to 12-year retrospective study of implants in 5,124 patients Clin Oral Implants Res . 2019 Mar;30(3):206-217.
-

Short vs. long implants

Topic: Short vs Long Implants

Authors: Rossi F, Botticelli D, Cesaretti G, De Santis E, Storelli S, Lang NP.

Title: Use of short implants (6 mm) in a single-tooth replacement: a 5-year follow-up prospective randomized controlled multicenter clinical study.

Source: Clin Oral Implants Res. 2016 Apr;27(4):458-64

DOI: 10.1111/clr.12564.

Type: RCT

Reviewer: Trisha Nguyen-Luu

Keywords: Dental Implants, early loading, implant length, protective randomized, short implant

Background:

Purpose: To compare the clinical and radiographic outcomes of 6 mm and 10 mm SLA posterior single implants that were loaded at 7 weeks for 5 years.

Material and methods:

- 45 patients requiring posterior implants were included in this study
 - o **Control:** 30 implants **4.1 x 10 mm** Straumann with SLA modified surface
 - o **Test:** 30 implants **4.1 x 6 mm** Straumann with SLA modified surface
- Bone density status, final insertion torque values was recorded after placement
- Impression was taken at 6 weeks post insertion and restored with a gold-palladium alloy and porcelain fixed prosthesis.
- Clinical crown/ implant ratio was determined, and survival rate and marginal bone loss was evaluated at 6 months and every year for 5 years.

Results:

- 5 implants failed:
 - o Control: 1 implant failed within the 1st year of function
 - o Tests: 1 failed before loading, 2 failed within the 2nd and 3rd year and 1 failed during the 4th year post-op
- 5 year survival rate:
 - o Control: 96.7 %
 - o Test: 86.7%
- Mean bone level around implants 5 year follow up
 - o Control: 0.18 mm
 - o Test: 0.14 mm
- Clinical C/I ratio: stable throughout the whole follow up period
 - o Control: 7.3 mm
 - o Test: 7.7 mm

Conclusions

- 6 mm implants have a higher loss compared to 10 mm implants – most likely due to consequences of fracture of the surrounding supporting bone
- Similar minimal marginal bone loss occurred between the prosthesis delivery and 5 year follow up for both 6 and 10 mm implants.
 - o Most bone loss between time of surgery and prosthesis delivery due to deeper positioning of short implant (0.38 mm) compared to long implant (0.36 mm) in order to get primary stability
- 1 test implant that failed before loading was placed in maxillary premolar site with type IV bone and a final insertion torque of 0-15 Ncm --> avoid using short implants in these areas
- Survival is slightly higher in mandible than maxilla
- 6 weeks may be an adequate period of healing for loading 6 mm implants --> only 1 implant did not integrated

Topic: long vs. short implants

Authors: Papaspyridakos P, De Souza A, Vazouras K, Gholami H, Pagni S, Weber HP

Title: Survival rates of short dental implants (≤ 6 mm) compared with implants longer than 6 mm in posterior jaw areas: A meta-analysis.

Source: Clin Oral Implants Res. 2018 Oct;29 Suppl 16:8-20

DOI: 10.1111/clr.13289

Type: meta-analysis

Reviewer: Erin Schwoegl

Keywords: dental implants, short dental implants

Purpose: To systematically review long-term survival of short DIs (6mm or less) vs long (>6mm) DIs

Material and methods:

- The following PICO question was used to guide the search, “in pts with posterior dental implant restorations, do short implants compared to longer implants to demonstrate similar clinical and pt-based outcomes?”
- Only included RCTs with follow-ups from at least 1 year post-loading

Results:

- Survival rates
 - o Short DIs: ranged 86.7-100%
 - o Long DIs: 95-100%
 - o Risk ratio of 1.29 for implant failure
 - Short DIs have 29% higher risk of failure
- Marginal bone levels
 - o Short DIs: ranged +0.6 to -1.22
 - o Long DIs: +0.02 to -1.54
 - NSSD
- Biologic complications
 - o Short: 0-26% of pts
 - o Long: 0-90%
 - o Most complications were related to immediate postop period, included transient paresthesia, Schneiderian membrane perforation, and mandibular graft infection
- Prosthesis survival
 - o Short: 90-100%
 - o Long: 95-100%

Conclusions:

- Short implants had higher variability and lower predictability after 1-5 years in function
 - o The mean survival rate for short DIs was 96% and 98% for long DIs
- Risk ratio for short implant failure was 1.29 vs long DIs
- Prosthesis survival was similarly high for both groups

- Indications for short DIs should be carefully selected bc they may present a greater risk for failure over time vs. longer implants

Topic: Short Dental Implants

Authors: Vazouras K, de Souza AB, Gholami H, Papaspyridakos P, Pagni S, Weber HP

Title: Effect of time in function on the predictability of short dental implants (≤ 6 mm): A meta-analysis.

Source: Eur J Oral Implantol. 11(suppl 1):S123–S136

DOI: 10.1111/joor/12925

Type: Meta- analysis

Reviewer: Brook Thibodeaux

Keywords: clinical outcomes, dental implants, implant dentistry/implantology, meta- analysis, short dental implants, systematic reviews and evidence-based medicine

Background: Short implants has been a controversial issue, mainly due to the fact that the term “short implant” varies in studies from <6 to <10 mm. A recent ITI consensus concluded that short implants ≤ 6 mm have high variability in outcome versus longer implants that are longer than 6mm.

Purpose: To examine based on time in function, the outcome failure rates of short implants through a systematic review.

Material and methods: Systematic review and meta-analysis. Use of PRISMA guidelines and PICO format.

- PICO: “Does the predictability of short dental implants (≤ 6 mm) supporting posterior fixed restorations decrease with time in function?”
- Electronic search: Medline/PubMed
- Primary outcome: failure rate of dental implants based on time in fxn
- Secondary outcomes: time of failure (early/late), type of restorations (single crowns/fixed dental prosthesis), location (max/mand), XR bone level.
- 20 studies included: 11 RCTs and 9 prospective studies.

Results:

- 1238 short implants in 747 patients
- Max/mand: 11 studies, Max only: 3 studies, Mand only: 6 studies
- Only implants ≤ 6 mm included, varied between 4-6mm implants (14 studies- 6mm imp)
- Failure rate
 - o Meta-analysis: 4% failure rate
 - Follow up 1 year: 2%
 - Follow up $>1-3$ years: 2%
 - >3 years: 10%
 - o Early failure: none in 9 studies, 1.87-4.76% in eleven studies
 - o Late failure: none in 9 studies w/ follow ups 1-3ys, none in 1 study w/ follow ups 5ys, 0.93-14.81% in 10 studies (6/10 studies had 4-5y follow up)
- Time in function
 - o Only late failures are considered for time in function because it is after the implant is loaded
 - 0% late failures in 2/6 studies with 1y follow up
 - 1% late failure in 2/7 studies w/ 1-3y follow up
 - 8% late failure in 6.7 studies w/ 5y follow up
 - o Short Dis w/ greater than 3y follow ups had a 10% failure rate, 90% survival rate
 - 8% due to late failures (after loading), MC reason due to loss of osseointegration more than 3y post loading
- Restoration type
 - o 6 studies restored using only single crowns for short implants
 - 386 short implants w/ single crowns
 - 4% failure rate
 - Short implants + single crowns+ time in function with >3 year follow up failure rate: 9%
 - o 4 studies restored using only FDPs for short implants

- 461 implants restored FDP
 - 2% failure rate
 - Short implants+ FDP+ time in function with >3 year follow up failure rate: 6%
 - 4 studies used single crowns and FDPs for short implant restorations
 - 6 studies did not report type of restoration.
 - Short DIs w/ more than 3y of loading restored with single crowns had a higher failure rate when compared to those restored with FDPs
- Maxilla vs Mandible
 - 535 short implants in maxilla- 3% risked failure rate
 - 625 short implants in mandible- 3% risked failure rate
 - Similar failure rate for the maxilla vs mandible
- Marginal Bone level
 - Marginal bone levels: -0.06 to -1.34mm reported
 - 4/6 RCTs on short vs long DI reported NSSD on MBL
 - 6 studies found SS difference btwn short vs long DI on MBL
 - 4 showed SS more bone loss around short DI
 - 2 showed SS lower bone level around longer Dis
- This study showed a time dependent higher risk of short implant ≤ 6 mm failure versus implants greater than 6mm in length

Conclusions: Short DIs ≤ 6 mm in length showed higher failure rates when >3 y in function compared to those in function for ≤ 3 years. Short DIs restored with FDPs had decreased failure rates >3 years in function compared to short implants restored with single crowns. A 90% survival long term survival rate was found. This can potentially be an alternative when there is lack of bone quality and invasive bone augmentation is required.

BL: Short dental implants had a higher failure rate with time and single crown restorations. LT survival= 90%. Location (max vs mand) did not effect failure rate.

Topic: extra short implants

Authors: Carlo Barausse, Andrea Ravidà, Lorenzo Bonifazi, Roberto Pistilli, Muhammad H A Saleh, Roberta Gasparro, Gilberto Sammartino, Hom-Lay Wang, Pietro Felice

Title: Extra-short (4-mm) implants placed after regenerative failures in the posterior atrophic mandible: A retrospective study

Source: Int J Oral Implantol (Berl) . 2023 Mar 2;16(1):31-38

DOI: NA

Reviewer: Amber Kreko

Type: retrospective case series

Keywords: bone regeneration, dental implants, reconstructive surgical procedure, treatment failure

Purpose: To explore whether extra-short (4-mm) implants could be used to rehabilitate sites where regenerative procedures had failed in order to avoid additional bone grafting.

Material and methods:

- Retrospective case series with patients of placement of extra short dental implants in posterior mandible after bone regeneration with follow up ≥ 1 year after loading and had radiographs available at time of implant placement and at 1, 3, and 5 years after loading.
- Cases divided into:
 - Early regenerative failure – failure occurred before long implant placement
 - Late regenerative failure – failure occurred after long implant placement and loading
- Patient information was recorded including age, sex, smoking, diabetes, reconstructive surgery, and hygiene
- Implant position, brand, length, diameter, prosthesis type, and number were recorded

- Primary outcome – failure rate for extra-short implants; secondary outcomes – implant complications and peri-implant marginal bone loss

Results:

- Chart review was conducted for 353 patients but only 35 met inclusion criteria including 103 extra-short implants.
- 32 splinted in pairs, 22 three splinted, 1 had four splinted
- 98.06% implant survival rate, 86.4% success rate after 5 years.
- 35.9% placed after previously failed guided bone regeneration, 30% after inlay grafting, 24.3% after only grafting, and 9.7% after distraction osteogenesis
- 79.6% experienced late regenerative failure, 20.4% early regenerative.
- 42.9% were non smokers, 37.1% were moderate smokers, and 20.0% were heavy smokers
- 2 had controlled diabetes
- Mean marginal bone loss at 5 years was 0.32mm.
- Biological complication was 6.79% and prosthetic complication was 3.88%

Conclusions: Extra short implants are a good clinical option to manage reconstructive surgical failures, reducing surgical invasiveness and rehabilitation time.

Topic: implant width

Authors: Guida L, et al

Title: 6 mm short versus 11 mm long inter-foraminal implants in the full-arch rehabilitation of edentulous non-atrophic mandibles: 5-year results from a multicenter randomized controlled trial

Source: Clin Oral Implants Res . 2023 Feb;34(2):127-136

DOI: 10.1111/clr.14024

Reviewer: Tam Vu

Type: RCT

Keywords: short dental implants, edentulous ridge, implant width

Purpose: to compare 6 mm short and 11 mm long implants for rehabilitation of completely edentulous non-atrophic mandibles

Material and methods:

- 30 pts received fixed full-arch Mn implants (5)
 - 15 test: 6 mm implants
 - 15 control: 11 mm implants
- Screw-retained full-arch prosthesis placed after 3 months of healing
- Pt on 6 mo recall
- Peri-implant MBL change, implant and prosthesis survival rate, and biological/technical complications evaluated up to 5 years

Results:

- No implant/prosthesis failure reported: 100% survival rate in both groups
- NSSD in MBL changes in both groups
 - Trend for higher marginal bone loss in long implants
- NSD in biological and technical complications between groups
 - Biological and prosthetic complications were able to be treated and resolved (peri-mucositis, peri-implantitis, prosthesis fracture)

Conclusion: Short implants (6 mm) yield comparable clinical and radiographic outcomes to long (11 mm) implants, and is a reliable option for rehab of completely edentulous non-atrophic mandibles.

In the present RCT, the MBLc registered up to 5 years of follow-up was very limited in both test and control groups, even if the cumulative frequency distribution of MBLc showed a trend

for higher marginal bone loss for long implants compared to short ones. These results were comparable to those reported by other studies, that, similarly to the present one, measured MBLc considering the prosthetic loading as baseline; in fact, the majority of the available RCTs showed no significant differences in MBLc between short and long implants at the 5-year follow-up (Guljé et al., 2021; Romeo et al., 2014; Rossi et al., 2016). Only one study showed a significantly higher mean MBLc in the long implant group at 5 years (Cannizzaro et al., 2018), and, in another one (Guljé et al., 2021), a higher rate of long implants (8.7%) experiencing a > 1 mm marginal bone loss compared to short implants (3.3%) was reported. However, any comparison appears difficult in consideration of the significant differences in the study protocol among the studies.

Topic: Short vs long implants

Authors: Toledano, M., Fernández-Romero, E., Vallecillo, C., Toledano, R., Osorio, M., Vallecillo-Rivas

Title: Short versus standard implants at sinus augmented sites: a systematic review and meta-analysis

Source: Clin Oral Investig. 2022 Nov;26(11):6681-6698.

DOI: 10.1007/s00784-022-04628-1

Reviewer: Daeoo Lee

Type: Meta-Analysis

Keywords: implant survival (IS), marginal bone loss (MBL), PICO

Purpose: To address the following focused question: In patients with edentulous posterior atrophic jaws, what is the efficacy of placing short implants (≤ 6 mm) compared to standard-length implants (≥ 8 mm) performing sinus lift techniques, in terms of implant survival and maintenance of peri-implant bone?

- Population (P): Patients not affected by systemic conditions, older than 18 years, with edentulous posterior atrophic jaws requiring implant rehabilitation.
- Intervention (I): Implant rehabilitation with extra-short and short implants (≤ 6 mm).
- Comparison (C): Implant rehabilitation with standard implants (≥ 8 mm) associated with maxillary sinus elevation.
- Outcome (O): Outcomes measuring survival rate of the implants (implants lost during study follow-up), and mean differences of marginal bone loss as primary outcomes and secondary variables such as implant characteristics, implant stability, periodontal health parameters, and patient-reported outcome.
- Study (S): Randomized controlled clinical trials.

Material and methods: An electronic search across the National Library of Medicine (MEDLINE by PubMed), the Cochrane Oral Health Group Trials Register, EMBASE, and Web of Science (WOS) was performed for clinical studies. Inclusion criteria: 1) Randomized controlled clinical trials. 2) Comparisons between short implants (≤ 6 mm) without maxillary sinus augmentation and standard-length implants (≥ 8 mm) with maxillary sinus augmentation in the same study. 3) Studies that consider short implants, those with a length equal or less than 6 mm.

Results: 14 studies (616 patients and 901 implants) examined both implant survival (IS) and marginal bone loss (MBL); the IS, when comparing the experimental and control groups, was 1.02 risk ratio (RR), suggesting the IS is similar for both techniques.

SS difference when comparing MBL; for less than a year, MBL was 0.11, indicating that the marginal bone loss is greater for standard implants with sinus lift elevation. Also, for more than a year, MBL was 0.23, indicating that the marginal bone loss is greater for standard-length implants with sinus lift elevation.

Conclusions: Within the limitations of the present study, it can be concluded that short dental implants can be used as an alternative to standard-length implants plus sinus elevation, to support fixed prostheses. Higher marginal bone loss was observed in the groups of standard-length implants, but implant survival was similar in both groups. When short implants were used, a reduced postoperative discomfort, minimal invasiveness, shorter treatment time, and reduced costs were found.

On MBL difference: It is speculated that the lack of precision in studies with non-significant results may be the reason for this behavior. The average 0.11 mm (≤ 1 year of follow-up) and 0.23 mm (> 1 year of followup) of differences between groups was statistically significant, though it may have a slight clinical significance.

Topic: Ultra-short implants

Authors: Lombardo et al.

Title: Survival rates of ultra-short (< 6 mm) compared with short locking-taper implants supporting single crowns in posterior areas: A 5-year retrospective study

Source: Clin Implant Dent Relat Res. 2021;23:904–919.

DOI: 10.1111/cid.13054

Reviewer: Cyrus J Mansouri

Type: Retrospective

Keywords: bone loss, crown-to-implant ratio, peri-implantitis, single crown, success, survival, ultra-short

Background: The success of short dental implants (6-8 mm) has led to the development of ultra-short implants (< 6 mm). Systematic reviews and meta-analyses have supported their use, but limited information on long-term follow-up exists in the literature, especially acting as an unsplinted, single crown restoration.

Purpose: To evaluate clinical and radiographic results of ultra-short (5 mm) locking-taper implants supporting single crowns compared to short (6-8 mm) implants after 5 years.

Material and methods:

A retrospective search was completed for patients treated between 2007 and 2015.

Inclusion criteria:

- Single tooth replacement via an 8-, 6-, or 5-mm locking-taper implant supporting a single crown.
- No previous consent for bone augmentation procedures.
- Locking-taper (Morse taper or Morse cone) dental implants were characterized as convergent crest module, platform switching, plateau root-form design, and an Integra CP surface (HA treated and acid-etched) (Bicon Dental Implants).
- Implants were placed, uncovered after 4-6 months, and restored after soft tissue healing.
- Yearly recalls were completed for a 5-year follow-up.
- Study outcomes were implant survival, marginal bone loss, and implant success after 5 years.
 - o Regarding survival, failure was considered as the need for implant removal either before loading (early failure) or after loading (late failure).
- Crest bone level, average bone loss, and average apical shift of bone to implant contact point were collected between loading time and the 5-year follow-up.
- Peri-implant soft tissues were assessed by modified bleeding index, modified plaque index, PPD, and KT and by assessing for peri-implant mucositis or peri-implantitis.
- Radiographic bone loss to diagnose peri-implantitis was set to 1 mm.
- Success was defined as absence of persistent pain, dysesthesia, or paresthesia in the implant area, absence of peri-implant infection, absence of mobility, and absence of peri-implant bone resorption greater than 1 mm during follow-up.

Results:

A total of 142 patients received at least one implant.

- 52.83% of pts had a history of periodontal disease.

333 implants were placed.

- 127 were 8-mm length, 115 were 6-mm length, and 91 were 5-mm length.

Overall implant survival was 96.10%.

- One early implant failure.
- Twelve implants were lost and removed after functional loading in 12 pts.
- 28 implants experienced bone loss > 1 mm.

- 19 were treated for peri-implantitis, of which 9 were successfully treated and demonstrated stable bone levels 5 years later.
- 23 exhibited peri-implant mucositis

SSD in change of marginal bone loss was found regarding history of periodontal disease and for change in average apical shift of bone to implant contact point regarding arch.

Overall implant success was 94.06%.

No difference was found between 8-, 6-, and 5-mm length implants concerning implant survival, implant success, and marginal bone change.

Conclusion: Outcomes from this study show stable crestal bone levels over time with no SSD between survival and success with short and ultra-short implants.

Crown to implant ratio / splinted vs. non splinted

Topic: Ultra-short implants

Authors: Malchiodi L, Ricciardi G, Salandini A, Caricasulo R, Cucchi A, Ghensi P.

Title: Influence of crown-implant ratio on implant success rate of ultra-short dental implants: results of a 8- to 10-year retrospective study.

Source: Clin Oral Investig. 2020 Sep;24(9):3213-3222.

DOI: 10.1007/s00784-020-03195-7.

Type: Clinical Study

Reviewer: Veronica Xia

Keywords: ultra-short dental implants, crown-implant ratio

Background: Ultra-short implant: $\leq 5\text{mm}$

Purpose: Determine how implant success rate is influenced when ultra-short (5x5mm), sintered porous-surfaced (SPS) implants with 3:1 C/I ratio are used

Material and methods:

- 41 patients
- Measured anatomical/clinical crown to implant ratio
 - Anatomical: fulcrum at interface between implant shoulder and crown/abutment complex
 - Clinical: fulcrum at most coronal bone—implant contact
- Implants
 - Sintered porous surface (SPS)
 - Coronal 1mm machine collar
- Surgery
 - AB prophylaxis: amox plus clavulanic acid 2g/day for 6 days starting 1hr before surgery
 - All to penicillin: clindamycin 600mg/day for 6 days
 - Anti-inflammatory with NSAIDs: nimosulide 200mg/day for 3 days (200mg 1hr before surgery)
 - Two-stage approach
 - Soft diet 2 weeks, CHX 3xday
 - Heal 3 months (mand) or 4 months (max)
 - Definitive restoration
- Implant success by Buser and Albrektsson/Zarb criteria
 - Peri-implantitis: clinical inflammation and radiographic evidence $>2\text{mm}$ bone loss

Results:

- Success rate: 94%
- PBL (implant insertion to latest follow-up): $1.01 \pm 0.45\text{mm}$
 - Stable PBL (peri-implant bone loss)
- Mean anatomical C/I ratio: 2.44 ± 0.36

- Mean clinical C/I ratio at prosthetic loading: $2.87 + 0.5$
- Mean clinical C/I ratio at follow-up: $3.34 + 0.66$

Conclusions:

- C/I ratio greater than 3:1 did not negatively affect implant success rate and CBL of ultra-short implants
 - Similar results to longer implants

Topic: Crown to implant ratio/ splinted vs. Non-splinted

Authors: Ravidà A, Barootchi S, Alkanderi A, Tavelli L, Suárez-López Del Amo F.

Title: The Effect of Crown-to-Implant Ratio on the Clinical Outcomes of Dental Implants: A Systematic Review.

Source: Int J Oral Maxillofac Implants. 2019 September/October;34(5):1121–1131

DOI: 10.11607/jomi.7355.

Type: Systematic Review

Reviewer: Trisha Nguyen-Luu

Keywords: crown-to-implant ratio, dental implants, evidence-based dentistry, peri-implant bone loss, short implants

Purpose: To evaluate the effect crown to implant ratio has on marginal bone loss, implant survival rate and prosthetic complications.

Material and methods:

- Electronic and hand search for prospective cohort studies and randomized clinical trials on C/I ratios with a minimum of 1 year follow up in patients that are partially edentulous
- PICO: in partially edentulous patients requiring implant placement for support of definitive prosthesis how are clinical parameters such as survival rate, marginal bone levels and the occurrence of prosthetic complications affected by a low C/I ratio compared to higher C/I ratio?

Results:

- 1,548 implant were analyzed including Straumann, SPS implants, ITI, Astra Tech, Nobel, Endopore Dental, Leone Implant.
- Screw vs. Cemented crowns, splinted vs non-splinted and smoking had no significant effect on the survival rate, marginal bone loss or technical complications
- Survival rate: No significant correlation between anatomical or clinical C/I ratio and survival rate
- Marginal bone loss: no significant correlation between clinical or anatomical C/I ratio and marginal bone loss
 - Time is a significant predictor of marginal bone loss
 - Anatomical C/I ratio < 1.5 had SS more marginal bone loss compared to > 1.5 C/I ratio
- Prosthetic complications: no significant association between prosthetic complication and C/I ratio
- 6 mm short implants: no correlation with different crown lengths and the outcome of survival rate, marginal bone loss and prosthetic complications

Conclusions

- Based on this study: increased C/I ratio does not directly affect implant survival, marginal bone loss and or prosthetic complications
- Splinted vs non-splinted has no SS correlation on the effect of C/I ratio and marginal bone loss
- Need for studies to differentiate between anatomical and clinical C/I ratios
 - Clinical C/I ratio: fulcrum is at the most coronal bone to implant contact
 - Anatomical C/I ratio: fulcrum is between the crown-abutment complex and the shorted of the implant
- Prosthetic complications around implants are more likely to be related to splinting of crowns, material of prosthesis, parafunctional habits, opposite dentistry than related to the C/I ratio

- Limitations for the study: does not consider soft tissue thickness, implant position, type of connection, KT, crown contour, etc.

Topic: Splinted vs. non-splinted

Authors: Clelland N, Chaudhry J, Rashid RG, McGlumphy E

Title: Split-mouth comparison of splinted and nonsplinted prostheses on short implants:3-year results

Source: Int J Oral Maxillofac Implants. 2016;31(5):1135-1141

DOI: 10.11607/jomi.4565

Type: Prospective

Reviewer: Erin Schwoegl

Keywords: nonsplinted, radiographic bone levels, splinted

Purpose: To compare splinted vs nonsplinted implant prostheses

Material and methods:

- 5-year prospective clinical trial
- Included pts with at least 2 missing teeth in the same location bilaterally with similar bone on both sides, and bone height of 7-12mm
- All DIs placed by same surgeon using CAD/CAM surgical guides
- Uncovery/restorations after 3 months in mandible and after 5 months in maxilla
- All pts but one had screw-retained prostheses
- Pts were randomly restored with splinted on left or right and nonsplinted on the contralateral side

Results:

- 18 pts included, 15 completed study
- DI length classification: standard (11mm), short (8-9mm), very short (6mm)
- Mean bone levels
 - o Nonsplinted: mean gain of 0.09mm, 0.28mm, and 0.34mm at 12, 24, and 36 months
 - Trend of bone gain around nonsplinted
 - NSSD when all implant lengths considered
 - o Splinted: little variation from baseline
 - o Length was a significant factor; SSD between splinted and nonsplinted 6mm DIs
 - Mean bone gain significantly different from baseline for nonsplinted 6mm DIs
 - Mean bone gain NSSD from baseline for splinted 6mm DIs
- Complications
 - o Screw loosening most common prosthetic complication; limited to nonsplinted crowns
 - o Porcelain chipping occurred on 1 splinted side
- Patient preference
 - o 7 pts preferred nonsplinted, 4 pts preferred splinted, and 4 pts had no preference
 - Nonsplinted preferred due to hygiene
 - Splinted preferred in pts with screw loosening of nonsplinted implants

Conclusions:

- Bone levels around splinted vs nonsplinted were no different when implants were >6mm in length
- Nonsplinted 6mm DI had a gain in bone at 24- and 36-months vs baseline
- All screw loosening occurred only on nonsplinted side for 5/15 pts
- Implants loss occurred in 1 6mm nonsplinted DI

Topic: Vertical Platform Discrepancies

Authors: Guo-Hao Lin 1, Christine Tran 1, Karolina Brzyska 1, Joseph Y Kan 2, Hom-Lay Wang 3, Donald A Curtis 4, Richard T Kao 1

Title: The significance of vertical platform discrepancies and splinting on marginal bone levels for adjacent dental implants

Source: implants Clin Implant Dent Relat Res 2023 Apr;25(2):321-329.

DOI: 10.1111/cid.13176

Type: Retrospective Study

Reviewer: Brook Thibodeaux

Keywords: dental implants, implant- supported dental prosthesis, peri- implantitis, retrospective study, risk factors

Purpose: To examine splinted vs non splinted implant supported restorations and vertical platform differences of adjacent implants effects on radiographic marginal bone loss (RMBL)

Material and methods: Retrospective study including data from Jan 2000 to Feb 2021

- Implants with 5 types of restorations: two single adjacent crowns, two splinted adjacent crowns, three unit bridges, three single adjacent crowns and 3 splinted adjacent implant platforms.
- RMBL from bone crest to implant platform for bone crest implants, RMBL to most coronal portion of intraosseous part of implant for tissue level implants, and vertical platform discrepancies between adjacent implant platforms measured.
- Statistical analysis
- 156 patients with 337 implants included
 - o 260 bone level implants
 - 51 cement retained, 209 screw retained
 - 51 straight abutments, 209 platform switched abutments
 - o 77 tissue level implants
 - 38 cement retained, 39 screw retained
 - 77 straight abutments
- Average follow up period was 13 months

Results:

- Average RBL per resto type:
 - o two single adjacent crowns= 0.9mm
 - o two splinted adjacent crowns= 1.1mm
 - o three unit bridges= 0.8mm
 - o three single adjacent crowns = 0.7mm
 - o 3 splinted adjacent crowns = 1.2mm
- Vertical platform discrepancies:
 - o W/ vertical platform discrepancy of $\geq 0.5\text{mm}$, $\geq 1\text{mm}$ of RMBL was seen on at least one implant for: 67% of patients w/ 3 splinted crowns, 59% of patients w/ two splinted crowns, 26% of patients w/ a 3 unit bridge, 24% of patients w/ 2 single crowns, 18% of patients w/ 3 single crowns
 - o W/ vertical platform discrepancy of $\geq 1\text{mm}$, there was overall an increase in percentage of implants $\geq 1\text{mm}$ of RMBL: the highest being 70% of patients w/ 3 splinted crowns, then 61% of patients w/ two splinted crowns, 22% of patients w/ 3 single crowns, 21% of patients w/ a 3 unit bridge, 21% of patients w/ 2 single crowns
 - o The DI most apically positioned had less bone loss compared to the DI placed more coronally
 - Splinted adj implants showed RMBL $\geq 1\text{mm}$ SS more often versus non splinted adj implants
 - SS higher OR for RMBL $\geq 1\text{mm}$ w/ 3 splinted crowns vs 3 unit bridge, 3 splinted crowns vs 3 single crowns, 2 splinted crowns vs 2 single crowns.
 - o Compared to vert platform discrepancies $< 0.5\text{mm}$, vert platform discrepancies $\geq 0.5\text{mm}$ more often had SS association w/ RMBL $\geq 1\text{mm}$.
 - Splinted adj implants showed RMBL $\geq 1\text{mm}$ SS more often versus non splinted adj implants
 - SS higher OR for RMBL $\geq 1\text{mm}$ w/ 3 splinted crowns vs 3 unit bridge, 3 splinted crowns vs 3 single crowns, 2 splinted crowns vs 2 single crowns.
 - o If the vertical platform discrepancy was $\geq 1\text{mm}$ btwn adj implants, the OR for $\geq 1\text{mm}$ RMBL was SS higher for: 3 splinted crowns vs 3 unit bridge, 3 splinted crowns vs 3 single crowns, 2 splinted crowns vs 2 single crowns.

- NSS association btwn RMBL and type of implant platform (bone/tissue), platform switched vs straight, or type of restoration (cement/screw)

Conclusions: This showed that 2-3 splinted adjacent implants experience a greater amount of MBL $\geq 1\text{mm}$ when compared to implants with non splinted restorations. When there is a difference of $\geq 0.5\text{mm}$ vertical distance of implant platforms, the risk of peri-implant bone loss is increased.

Topic: adjacent implants

Authors: Vigolo P, Mutinelli S, Zaccaria M, Stellini E

Title: Clinical evaluation of marginal bone level change around multiple adjacent implants restored with splinted and nonsplinted restorations: a 10-year randomized controlled trial.

Source: Int J Oral Maxillofac Implants. 2015;30(2):411-418

DOI: 10.11607/jomi.3837

Reviewer: Amber Kreko

Type: randomized controlled trial

Keywords: bone level change, dental implants, implant-supported partial prostheses, multiple nonsplinted implants, multiple splinted implants

Purpose: To compare marginal bone level changes around adjacent splinted and nonsplinted implants, functionally loaded with cemented restoration, up to 10 years in maxillae.

Material and methods:

- Randomized controlled trial Included patients who received three adjacent implants in posterior maxilla with adequate bone width.
- Maxillary left implants were restored with splinted cemented restorations and right implants restored with nonsplinted cemented restorations.
- 4mm wide Biomet implants placed a bone crest level, 2 stage surgeries.
- Follow up was done every 3 months the first year, and every 6 months in subsequent 5 years, and every 12 months the remaining 5 years. Assessments included implant failure, any biologic or prosthetic complications, and bone levels.
- Marginal bone resorption was measured with intraoral radiographs yearly over a period of at least 10 years after placement of abutments and restorations.

Results:

- 132 implants placed in 44 patients.
- 3 implants in one patient failed at stage-two surgery. There were no prosthetic complications
- After 5 years: splinted group had 0.7mm bone loss and nonsplinted had 0.8mm bone loss
- After 10 years: splinted group had 1.2mm mean bone loss and non-splinted group had 1.3mm mean bone loss.

Conclusions: A significant difference between the two groups was found however, 0.1mm was not considered clinically meaningful 10 years after implant insertion. Multiple nonsplinted implants can be successfully included in many clinical situations.

Topic: splinted implants

Authors: Ravida A, Saleh MHA, Muriel MC, Maska B, Wang HL

Title: Biological and technical complications of splinted or nonsplinted dental implants: a decision tree for selection

Source: Implant Dent. 2018;27(1):89-94

DOI: 10.1097/ID.0000000000000721

Reviewer: Tam Vu

Type: Review

Keywords: dental implants, splinted, nonsplinted, marginal bone loss

Purpose: to review splinting vs nonsplinting restorations of adjacent implants

Discussion:

Biological complications

- **Hygiene**
 - Nonsplinted provides access for proper OH
 - If splint needed, a well-designed splinted restoration can provide adequate access for OH and preserve peri-implant health
 - More training and experience = less implant complications
- **Occlusion**
 - Occlusion and implant therapy has controversial results
 - Isidor: excessive occlusal load → loss of osseointegration
 - Berglundh et al: higher degree of bone-to-implant contact in loaded implants with no difference in marginal bone loss
 - Heitz-Mayfield et al: in presence of mucosal health, excessive occlusal loading does not cause loss of osseointegration or marginal bone loss
 - Splint implants may distribute occlusal forces and improve strain, but NSD
- **Bone loss**
 - Studies of variety of occlusal load on implants: short implants, soft tissue implants, single implant and multi-unit restorations, rough surface, and external hex showed that marginal bone loss was NSD or nonclinically significant.

Technical complications

- Classification (Pjetursson)
 - **Major:** implant fracture, loss of superstructure
 - **Medium:** abutment, veneer/framework fracture, esthetic and/or phonetic complications
 - **Minor:** abutment and screw loosening, loss of retention, loss of screw hole sealing, veneer chipping, occlusal adjustments
 - Technical complications more common in multiple, adjacent single implant crowns
 - Study found that screw loosening occurred when implants not splinted
- **Misfit prosthetic components**
 - Impression inaccuracies results in misfit
 - Splinted or nonsplinted misfits will significant effect passive seating of final restoration
 - In nonsplinted implants, interproximal contacts may be modified to seat crown fully
 - More challenging in achieving passive fit in splinted restorations

Conclusion:

- No evidence that splinting will decrease marginal bone loss
- If prosthesis is designed correctly, proper OH should be achievable in whether splinted or not
- Non-splinted restorations tend to have more passive fit
- Splinted restorations less likely to have technical complications long term

Decision tree for splinting adjacent implants

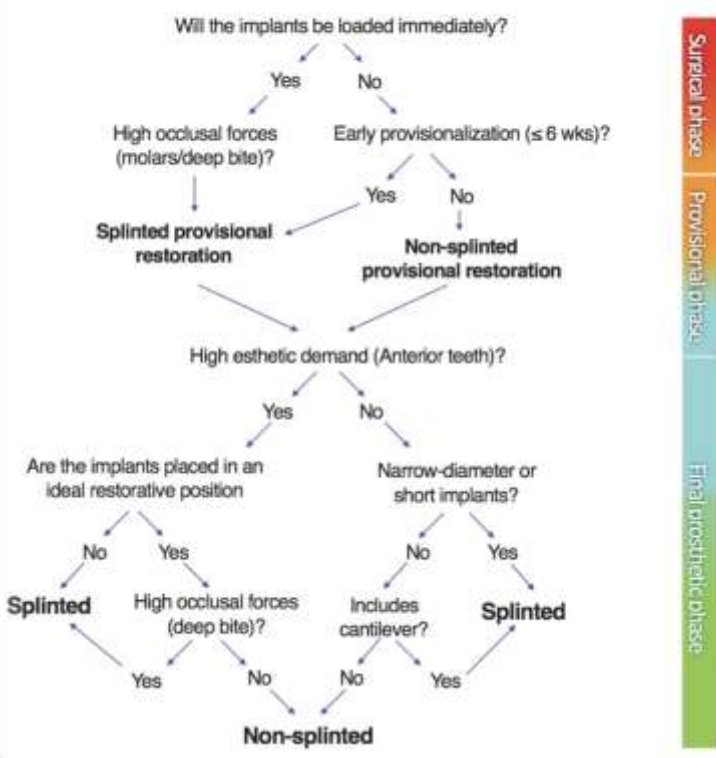


Table 1. Comparison the Most Common Biological and Technical Complications Associated With Splinted Versus Nonsplinted Implant Restoration

	Nonsplinted	Splinted
Biologic complications		
Marginal bone loss	No difference	No difference
Ease of hygiene procedures	Easier	Depends on the position of the implants and the prosthetic design
Technical complications		
Passive fit	Easier	Difficult
Porcelain chipping	No difference	No difference
Screw loosening	More	Less
Crown decementation	More	Less

Table 2. Indications for Either Splinted Implant-Supported or Nonsplinted Implant-Supported Restoration

	Nonsplinted	Splinted
Patients with decreased manual dexterity, poor oral hygiene	Recommended	—
Three or more adjacent implants	Recommended	—
History of bruxism	—	Recommended
Weaker bone/heavy force area	—	Recommended
Narrow diameter implants	—	Recommended
Short implants	—	Recommended

Wide vs. Narrow implants

Topic: Wide vs. Narrow Implant

Authors: André Barbisan de Souza 1, Flávia Sukekava 2, Livia Tolentino 3, João Batista César-Neto 2, João Garcez-Filho 4, Mauricio G Araújo 5

Title: Narrow- and regular-diameter implants in the posterior region of the jaws to support single crowns: A 3-year split-mouth randomized clinical trial

Source: Clin Oral Implants Res. 2018 Jan;29(1):100-107.

DOI: 10.1111/clr.13076

Reviewer: Daeoo Lee

Type: Randomized controlled trial

Keywords: narrow (NDI), wide (RDI), marginal bone level (MBL)

Purpose: to compare the 1) marginal bone level (MBL) 2) implant survival and success rates, and 3) prosthesis success rates of NDIs and RDIs implants placed in the posterior region of the jaws to support single crowns after 3 years of load.

Material and methods: 22 patients with at least two single-unit implant (one NDI 3.3mm and one RDI 4.1mm) in the posterior region either maxilla or mandible; alveolar ridge 5-6mm wide; patient receive Primary outcome measurement was the peri-implant MBL. Periapical radiographs taken immediately after implant placement, 1 and 3 years after loading.

Secondary outcome of implant survival was defined as the implant being still in place during re-evaluation appointments. Also, implant success was defined as absence of (i) persistent pain, foreign body sensation, and/or dysesthesia; (ii) recurrent peri-implant infection with suppuration (S); (iii) implant mobility (M); (iv) continuous radiolucency around the implant; (v) probing pocket depth (PPD) ≥ 5 mm associated with bleeding on probing (BoP).

Statistical analysis performed.

Results: 44 implants (22 RDIs and 22 NDIs) placed in 22 patients. Implants ranged from 6 to 12,mm in length. All patient completed 1 year follow up, but at the 3 year follow up two patient dropped out of the study.

At 1 year follow up period: 100% survival and success rates for both; prosthesis success rate were 95.4% for NDIs and 100% for RDIs;

At 3 year follow up period: 100% survival rate for both; success rate for RDIs was 100%, whereas for NDIs was 95%; prosthesis success rate were 90% for NDIs and 95% for RDIs

The difference of mean MBL from baseline to 1-year follow-up was 0.38mm for NDIs and 0.44mm for RDIs and between 1 and 3 years was 0.17mm for NDIs and 0.12mm for RDIs. The MBL difference between groups at 3 year follow-up was 0.05 mm.

Conclusions: Within the limitations of the study, the results depicted that (i) the MBL around NDIs seems to be comparable to RDIs without statistical difference among them; (ii) the survival and success rates of NDIs and RDIs implants placed in the posterior jaws supporting single crowns did not differ at 1- and 3-year follow-up; and (iii) the prosthesis success rates among NDIs and RDIs supporting single crowns seems to be comparable and stable along 3 years of follow-up

Topic: Narrow implants

Authors: Pieri et al.

Title: Narrow-Diameter (3.0 mm) Versus Standard-Diameter (4.0 and 4.5 mm) Implants for the Splinted Partial Fixed Restoration of Posterior Jaws: A 5-Year Retrospective Cohort Study

Source: Journal of Periodontology, 88: 338-347

DOI: 10.1902/jop.2016.160510

Reviewer: Cyrus J Mansouri

Type: Retrospective

Keywords: Implantology; Osseointegration; Clinical trial(s); Prosthodontics.

Purpose:

To compare 5-year outcomes of NDIs and SDIs supporting FPDs in posterior sites.

Material and methods:

Retrospective search for pts with at least two adjacent NDI or SDIs and a minimum follow-up of 5 year with clinical and radiograph examinations.

Outcome measurements were implant and FPD failures, biological and prosthetic complications, and marginal bone loss.

Results:

A total of 107 pts completed the study.

- 49 in the NDI (113 implants)
- 58 in the SDI group (126 implants).

Implant failure:

- Two implants in the NDI group failed in one patient.
- Four implants in the SDI group failed in four pts.

Prosthetic failure:

- One FPD failed in the NDI (framework fracture) compared to two in the SDI group (due to implant failures).

Biological complications:

- 9 biologic complications were experienced in the NDI group and 12 in the SDI group.
- Peri-implant pathology at patient level was 18.3% for NDI and 20.7% for SDI.

Prosthetic complications:

- 12 prosthetic complications occurred in the NDI group and only 2 in the SDI group (SSD).

Marginal bone loss:

- Peri-implant marginal bone loss at 5 years was 0.95 mm for the NDI group and 1.2 mm for the SDI group (No SSD).

Conclusion:

NDIs and SDIs restored with FPD in the posterior both exhibit reliable outcomes, however NDIs experienced higher risk for prosthetic complications.

Topic: Implant Diameter

Authors: Ortega-Oller I, Suárez F, Galindo-Moreno P, Torrecillas-Martínez L, Monje A, Catena A, Wang HL.

Title: The influence of implant diameter on its survival: a meta-analysis based on prospective clinical trials.

Source: J Periodontol. 2014 Apr;85(4):569-80.

DOI: 10.1902/jop.2013.130043.

Type: Clinical Study

Reviewer: Veronica Xia

Keywords: dental implant, narrow implants

Background:

- Narrow implants: 1.8-3.3mm

Purpose:

- Meta-analysis of success/survival rates of narrow implants (</> 3.3mm)

Material and methods:

- Search of electronic databases
- Included 16 studies

Results:

- Average annual implant failure: 0.68%
 - Narrow: 1.21%
 - 3.92 times more frequent failures than standard
 - Standard: 0.34%
- Survival rate at 5 years: 92%
 - Highest: >3.3mm implant, loading >3months after implant placement, titanium plasma spray

Conclusions:

- Implant survival 75% (<3mm implant) and 87% (>= 3mm implant)
 - Implants >= 3mm diameter suitable for rehabilitation of narrow edentulous spaces
 - Functional loading after at least 3 months for higher survival

Topic: Wide vs. Narrow Implants

Authors: Eik Schiegnitz , Bilal Al-Nawas

Title: Narrow-diameter implants: A systematic review and meta-analysis

Source: Clin Oral Implants Re 2018 Oct;29 Suppl 16:21-40

DOI: 10.1111/clr.13272

Type: Systematic Review + Meta- analysis

Reviewer: Trisha Nguyen-Luu

Keywords: narrow diameter, dental implants, small dental implants, survival, meta- aanalysis

Background:

Purpose: To review and compare the implant survival rates of narrow and standard diameter implants and to provide guidelines on the use of narrow diameter implants

Material and methods:

- Electronic and hand search of studies on narrow diameter implants (NDI) with at least 10 patients and a 1 year follow up period
- Klein et al. 2014 Classification:
 - NDI Category 1: <3.0 mm ("mini-implants")
 - NDI Category 2: 3.0–3.25 mm
 - NDI Category 3: 3.30–3.50 mm

Results:

- 72 studies were included in the qualitative analysis and 16 studies were included in the quantitative analysis- these studies were further divided into NDI Category 1, 2, and 3.
- Category 1: MC used is 1 piece 1.8 - 2.4 mm diameter implants
 - Mean survival rate: 94.7%
 - SSD from standard diameter implants OR: 4.54
 - Implant success rate: 92.9%
 - Mean Marginal bone loss: 0.6 mm- 1.43 mm
 - Indications: edentulous arch + single non-load bearing teeth in anterior region
 - Mainly for complete overdentures (minimum of 4-6 mini implants) + immediate loading
- Category 2:
 - Mean survival rate: 97.3%
 - NSSD from Standard diameter implant OR:1.06
 - Implant success rate: 100%
 - Mean marginal bone loss: 0.09-1.6 mm

- Indications: single tooth anterior restoration that present with limited interdental space or thin alveolar crest
- Category 3: MC is 2 piece 3.3 mm diameter
 - Mean survival rate: 97.7%
 - NSSD from Standard diameter implant OR:1.19
 - Implant success rate: 91.4- 100%.
 - Mean marginal bone loss: 0.1-2.17 mm
 - Indications: for all regions including load bearing posterior region

Conclusions

- Studies have a high risk of bias because studies show high variability and reasons for implant failures and success were not included in most of the studies
- Caution using NDI for posterior region – may cause reduced osseointegration surface, increase fracture risk and more peri-implant crestal bone resorption due to increased stress
- Higher risk of prosthetic complications: abutment + implant fracture, screw loosening or fracture, ceramic fracture
- New classification:
 - Category I “Mini-implants”: <2.5 mm diameter (mainly 1 piece implants)
 - For Higher atrophic edentulous arch and single non-load bearing teeth in frontal region
 - Category 2: 2.5 to < 3.3 mm diameter
 - Single tooth restoration in the anterior region
 - Mainly to replace maxillary lateral or mandibular incisor teeth
 - Category 3: 3.3-3.5 mm diameter
 - All regions including posterior single tooth restoration

Topic: Wide vs. narrow DIs

Authors: Dong-Woon Lee 1, Na-Hong Kim 2, Young Lee 3, Yeon-Ah Oh 1, Jae-Hong Lee 4, Hyung-Keun You.

Title: Implant fracture failure rate and potential associated risk indicators: An up to 12-year retrospective study of implants in 5,124 patients

Source: Clin Oral Implants Res . 2019 Mar;30(3):206-217

DOI: 10.1111/clr.13407.

Type: Restrospective

Reviewer: Erin Schwoegl

Keywords: cervical fracture, dental implant, implant fracture

Purpose: To evaluate fracture rate and risk indicators for fracture of dental implants with internal connections

Material and methods:

- Clinical records, photos, and radiographs were reviewed for all implants placed 2006-2015 at 1 center for veteran's health services
- A total of 19,006 implants in 5,124 patients were included
- Length categories: short (6 to <10mm), standard (10 to <13mm), and long (13mm+)
- Diameter categories: narrow (<3.75mm), regular (3.75 to <5mm), and wide (5mm+)

Results:

- Of all implants, a total of 174 fractures occurred in 135 patients
 - >1 fracture in same patient in 32 patients
- Incidence of fracture was 0.92%
- DI fractures were not affected by pt gender, DI length, cervical feature, type of implant connection, or platform switching
- History of bone graft and presence of microthreads were significantly correlated with DI fractures
- Compared to wide diameter DIs, narrow diameters had 6x increased risk of fracture and regular diameter had 2x increased risk

- When looking specifically at molar sites, narrow DIs had 4x increased risk and regular diameter showed 2x increased fracture risk
- However, diameter did not relate to greater hazard for DI fracture after 90 months
- Mandibular anterior DIs had lower fracture risk than maxillary anterior sites
 - No DI fractures occurred in anterior mandible
- Pts without history of bone grafts: DI fracture increased by 1.6x vs those with bone grafts
- Implants without microthreads were 1.5x more likely to fracture than those with microthreads

Conclusions:

- Pt age, sex, DI length, material, cervical feature, connection type, and presence of platform switching did not affect DI fractures
- DIs with wide diameter, microthreads, placed in pts with hx of bone grafting, and those in mandibular anterior sites had significant lower risk of DI fracture