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SHORT DENTAL IMPLANTS: A COMPREHENSIVE REVIEW OF BIOMECHANICAL AND CLINICAL PERSPECTIVES

Dr. R. Manasa*[1], Dr. Jagadish Konchada[2], Dr. CH. Siddesh Kumar[3], Dr. M. Vasavi[4], Dr. B.R.S.S. Pushpalatha[5], Dr. R. Jaya Chandra Kumar[6]

I Year Post Graduate Student in the Department of Prosthodontics and Crown and Bridge Sree Sai Dental College and Research Institute Srikakulam, Andhra Pradesh.

***Corresponding Author: Dr. R. Manasa**

I Year Post Graduate Student in the Department of Prosthodontics and Crown and Bridge Sree Sai Dental College and Research Institute Srikakulam, Andhra Pradesh.

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ABSTRACT

Short dental implants are a safe and effective choice for patients who do not have enough bone height for standard implants. They reduce the need for complex bone grafting, making treatment faster, less invasive, and more affordable. With proper planning, short implants show success rates similar to regular implants. While concerns like extra stress on the bone exist, modern designs and careful bite adjustment help overcome these challenges. Overall, short implants provide reliable results and high patient satisfaction.

KEYWORDS: short implant, biomechanics, implant design, surgical protocol.

INTRODUCTION

Short dental implants (SDIs) are an increasingly popular alternative to more invasive surgical techniques in areas with limited bone height.[1] Implants shorter than 8mm are typically used in atrophic alveolar ridges where vertical bone availability is reduced.[2] The biomechanical basis for SDIs lies in the fact that occlusal forces are primarily concentrated on the crestal region of the implant, and increasing implant length from 7 mm to 10 mm does not significantly enhance its anchorage.[3]

Short implants are defined as those with a length up to 8 mm, and a diameter around 3.75 mm typically used in cases with limited bone height. Ultra-short implants, measuring less than 6 mm, are used in more severely resorbed ridges where even short implants are not feasible. They offer a less invasive alternative to advanced bone grafting procedures.[4]

"Fig. 1".

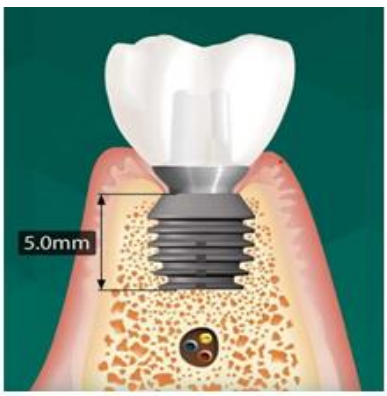
When Are Short Dental Implants Preferred?

Short dental implants are ideal for situations where there is insufficient bone height to place standard implants. They are commonly chosen in the following scenarios.

Severe bone loss: Long-term tooth loss can lead to significant bone resorption, limiting the available bone for implant placement.

Close proximity to vital structures: In the upper jaw, the maxillary sinus, and in the lower jaw, the inferior alveolar nerve, can restrict implant length.

Medical limitations: Patients with conditions like osteoporosis, diabetes, or other systemic issues may not be suitable candidates for invasive procedures like bone grafting.[5]



"Fig. 2".

Not to Be Confused: Mini Dental Implants

Before we continue, it is important to distinguish between short dental implants and mini dental implants.

Mini dental implants are standard in length but have a smaller diameter—usually less than 3 mm—and are often referred to as narrow implants. They are mainly used to replace small teeth in areas with limited bone width or to help stabilize dentures. Mini implants are also used in orthodontics as temporary anchorage devices to provide stable support for precise tooth movement.

In contrast, short dental implants have a normal diameter but a reduced length, and are used to replace full-sized teeth in areas with limited vertical bone height. While both types offer alternatives to conventional implants, they are chosen based on different anatomical needs and help minimize the need for extensive bone augmentation.[6,7]

"Fig. 3".

Advantages of Short Implants[7,8]

- Avoids the need for bone grafting.
- Reduces cost, pain, and treatment time.
- Lowers risk of surgical and post-operative complications (e.g., bleeding, nerve injury, infections).
- Simplifies osteotomy with easier access and less risk of bone overheating.
- Easier implant insertion.

Disadvantages of Short Dental Implants[7,8]

- **Biomechanical stress:** Due to their reduced length, short implants can be subjected to higher stress, making them more vulnerable to failure under heavy biting forces.
- **Increased crown-to-implant ratio:** Short implants often support longer crowns, which can lead to mechanical issues like screw loosening or implant fracture.
- **More sensitive to technique.** The success of short implants depends on precise surgical placement and careful load distribution. To achieve these optimal results, the practitioner must have specialized expertise in rehabilitating short implant

FACTORS AFFECTING SUCCESS OF SHORT DENTAL IMPLANTS FOR PROSTHODONTIC TREATMENTS

1) Length/Diameter Relationship

- Increasing the length of an implant mainly improves initial stability, but increasing the diameter provides additional benefits. A wider implant not only improves stability but also increases the surface contact with cortical bone, helping to distribute occlusal forces more effectively.[9]

2) Crown/implant ratio

- The crown-to-root ratio plays an important role in prosthetic success, especially with short implants. When this ratio is unfavorable, it can increase the risk of overloading or non-axial forces, which may lead to crestal bone loss. A higher crown-to-implant ratio is generally thought to have a negative impact on bone stability around the implant.[10,11]

3) Bone quality

- Bone quality is key to short implant success, with higher failure rates in type III and IV bone. Short implants perform better in the mandible than the maxilla due to denser bone and greater implant contact.[10,11]

4) Cantilever

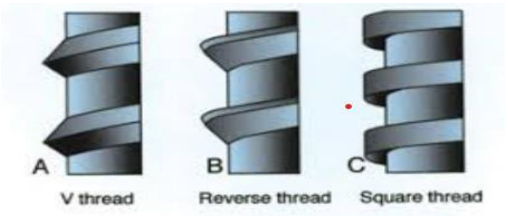
- Biomechanical impact of Cantilevers in implant prostheses act as Class I levers, increasing bone stress, but short implants in distal extensions show success rates comparable to longer ones, making them a reliable option.[12]

5) Using Short Implant in Immediate Loading

- Immediate loading lowers the success of short implants, while two-stage placement shows higher success. Moreover, studies suggest that for immediate loading, implants ≥10 mm are recommended for better outcomes.[13]

6) Implant thread shape

The square thread design has a higher bone-implant contact percent as compared to v-shape and reverse buttress thread designs.



"Fig. 4" shape of implant threads.

Surgical Protocol

S.NO	step	2-Step Surgical Protocol	Adapted Protocol for Short Implants
1	Case selection	Adequate bone & good health	Vertical bone ≥6 mm, check bone density, avoid heavy load cases
2	Planning	CBCT or radiographs	CBCT mandatory, surgical guide recommended
3	Access	Flapless or minimal flap	Flapless/minimal flap to preserve tissue
4	Prepare Site	Sequential drilling	Undersized drilling, preserve cortical bone, stop 0.5 mm short in soft bone
5	Implant Placement	Insert at recommended torque (30–45 Ncm)	Target 35–45 Ncm (25–35 Ncm in poor bone); avoid over-torquing to prevent cortical necrosis
6	Prosthetics	Standard occlusion	Narrow occlusal table, shallow cusps, splint posterior implants

- A two stage surgery is advocated for short implants as it provides good primary stability during healing phase. The time elapsed between the surgical and load stage should be 4-6months for maxilla and 2-4months for mandible.[14]

- **Prosthetics**

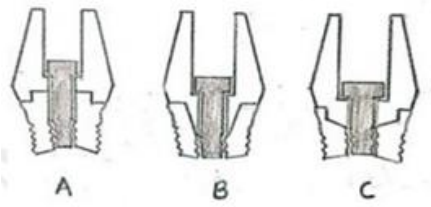
1) Implant/Abutment Connection

- Short implants face higher coronal compressive stress, but platform switching reduces this, making them a reliable choice in limited bone height.
- Platform switching shifts the stress concentration zone from the crest bone-implant interface to the axis of the implant, thus reducing stress levels at the cervical bone area.
- Short implants have reduced surface area, so connection stability is critical to minimize micromovement and screw loosening.[15]

Types of Connections

S.NO	Hex type	Features	Suitability for Short Implants
1	External Hex	Hex on top of implant, ~0.7 mm height, older design	Less stable, higher risk of micromovement and screw loosening
2	Internal Hex	Hex recess inside implant, 1.5–2.5 mm deep	Better stability and load distribution
3	Morse Taper (Conical + Hex)	Cone-in-cone friction fit + internal index	Best seal, minimal microgap, excellent for short implants

2) Occlusal table: Small occlusal table reduces the offset loads on the implant. Occlusion should be mutually protected and prostheses should be free of non axial loading.[16]



a) External hex b) Morse taper c) Internal hex

"Fig. 5".

3) Splinting implants: Splinted implants acts as a single unit and helps in better distribution of occlusal surfaces.[17]

- **Survival Outcomes of Short Dental Implants** Short implants have greater variability and lower predictability in survival rates compared with longer implants over 1–5 years of function. The mean survival rate was 96% (range: 86.7%–100%) for short implants and 98% (range: 95%–100%) for longer implants.

Based on evidence from 10 Randomized controlled trails, the use of short implants should be approached with caution, as they may carry a higher risk of failure than implants exceeding 6 mm in length.[18]

- **CONCLUSION**

Short dental implants offer a predictable and minimally invasive solution for rehabilitation in sites with limited bone height, reducing the need for complex augmentation procedures. Advances in implant design, surface treatment, and connection geometry have improved their survival rates, making them comparable to standard-length implants when placed in carefully selected cases.

REFERENCES

1. Torres-Alemany A, Fernandez-Estevan L, Agustin-Panadero R, Montiel-Company JM, Labaig-Rueda C, Manes-Ferrer JF. Clinical behavior of short dental implants: systematic review and meta-analysis. Journal of clinical medicine, 2020; 9(10): 3271.
2. Talreja Karishma, Rodrigues Shobha, Pai Umesh, Short Dental Implants – A Review Of Clinical Performance, Biomechanical Aspects And Risk Factors For Survival, June 2016; 1(1).
3. Annibali S, Cristalli MP, Dell'Aquila D, Bignozzi I,

La Monaca G, Pilloni A. Short dental implants: A Systematic Review. J Dent Res, 2012; 91(1): 25-32.
4. Misch C, Bidez MW.Contemporary Implant Dentistry, 1999.
5. Olate S, Lyrio MC, de Moraes M, Mazzonetto R, Moreira RW. Influence of diameter and length of implant on early dental implant failure. Journal of Oral and Maxillofacial surgery, 2010; 68(2): 414-9.
6. Jain N, Gulati M, Garg M, Pathak C. Short implants: new horizon in implant dentistry. Journal of clinical and diagnostic research: JCDR, 2016; 10(9): ZE14.
7. Gavali N, Chandak A, Waghmare P, Khadtare Y, Bhosale N, Verma H. Short dental implants: A systematic.NeuroQuantology, 2022; 20(8): 3649-60.
8. Misch C, Steigenga J, Barboza E, Misch-Dietsh F, Cianciola L, Kazor C. Short dental implants in posterior partial edentulism: a multicenter retrospective 6-year case series study. J Periodontol, 2006; 77(8): 1340-1347.
9. Li T, Kong L, Wang Y, Hu K, Song L et al. Selection of optimal dental implant diameter and length in type IV bone: a three dimensional finite element analysis. Int J Oral Maxillofac Surg, 2009; 38(10): 1077-10.
10. Mertens C, Meyer-Baumer A, Kappel H, Hoffmann J, Steveling H. Use of 8-mm and 9-mm Implants in atrophic alveolar rides: 10-year results. Int J Oral Maxillofac Implants, 2012; 27(6): 1501- 1508.
11. Shah AK. Short implants-When, where and how?. Journal of the International Clinical Dental Research Organization, 2015 Dec 1; 7(Suppl 1): S132-7.
12. Villarinho EA, Shinkai RS. Risk factors for single crowns supported by short (6-mm) implants in the posterior region: A prospective clinical and radiographic study. Clinical implant dentistry and related research, 2017; 19(4): 671-80.
13. Rossi, F., Ricci, E., Marchetti, D. (2010) Early loading of single crowns supported by 6-mm-long implants with a moderately rough surface: a prospective 2-year follow-up cohort study. Clinical Oral Implants Research, 21: 937–943.
14. Misch CE. Short dental implants: a literature review and rationale for use. Dentistry today. 2005; 24(8): 64-6.
15. Misch CE. Contemporary implant dentistry. Implant Dentistry, 1999 Jan 1; 8(1): 90.
16. Tawil et al. Influence of prosthetic parameters on the survival and complication rates of Short Dental Implants. Int J Oral Maxillofac Implants, 2006; 21(8): 275-282.
17. The effect of crown/implant ratio and crown height space on stress distribution in un splinted implant supporting restorations. J Oral Maxillofac Surg, 2011; 69: 1934–1939.
18. Papaspyridakos P, De Souza A, Weber HP. Survival rates of short dental implants (≤ 6 mm) compared with implants longer than 6 mm in posterior jaw areas: A meta-analysis. Clinical oral implants research, 2018; 29(10): 8-20.