

Short Implants

Are They a Viable Option in Implant Dentistry?



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KEYWORDS

• Short implant • Maxilla • Mandible • Grafting

KEY POINTS

- Short-length implants (<10 mm) can be used effectively in atrophic maxillae or mandibles even with crown/implant ratios that previously would have been considered excessive.
- Short implants can support either single or multiple units and can be used for fixed prostheses or overdentures.
- The use of short-length implants may obviate complicated bone augmentation procedures, thus allowing patients who are either unwilling or unable for financial or medical reasons to undergo these advanced grafting techniques to be adequately treated.

BRIEF HISTORY OF IMPLANTS

People's desire to replace missing teeth predates all recorded treatises on dentistry. Human osseous remains carbon dated as far back as 600 AD show the Mayan practice of using seashells carved into tooth-shaped pieces placed into empty sockets.¹

The modern era of root form endosseous implants begins with Dr P.I. Brånemark's discovery of osseointegration in 1952² and subsequent placement of the first Brånemark implants in human patients in 1965.² Dr Brånemark's presentation in 1982 at the Toronto Osseointegration Conference in Clinical Dentistry included incomparable scientific documentation going back to 1952 and data on human research from 1965. Such data in implantology had never before been collected.

The author has nothing to disclose.

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EARLY HISTORY OF IMPLANT LENGTHS

Early implants ranged in length from 7 mm to 20 mm. The most widely available implant diameter at the time was 3.75 mm with a machined or turned surface. At first, the implant length was considered paramount and the diameter not as important, even though a linear relationship between length and success had not been proved.³

WHAT ARE SHORT IMPLANTS?

There is no general consensus in dentistry as to what constitutes a short versus a long implant. Various investigators have considered various lengths of less than or equal to 7 mm up to 10 mm as short.⁴⁻⁹ For the purposes of this article, lengths less than 10 mm are considered short. Implants 10 mm or greater in length are considered long or standard length.

WHY LONG IMPLANTS WERE PREFERRED

As stated earlier, long implants were considered most desirable.⁴ Reasons for this opinion was probably 2-fold.

First there was early evidence that short Brånemark implants (6–10 mm) with traditional turned/machine surfaces had inferior success rates compared with longer fixtures.^{5,10-14}

Friberg and colleagues¹⁰ reported on 4641 consecutively placed Brånemark machined implants that were followed from implant surgery to prosthesis insertion. They concluded that, “A preponderance of failures could also be seen among the shortest fixtures (7 mm)” compared with the longer 10-mm to 20-mm fixtures.

Wyatt and colleagues¹¹ reported in 1998 on 230 machined Brånemark implants followed for up to 12 years (mean 5.4 years). Of the 7-mm implants placed, 25% failed, whereas the 10-mm fixtures had an 8% failure rate and the 13-mm and 15-mm implants had failure rates of only 5% and 2% respectively.

Bahat¹² followed a total of 660 implants placed in the posterior maxilla from 5 to 12 years. Of the 3.75-mm diameter short implant fixtures, including 7 and 8.5 mm, 17% failed.

In 2003, Attard and Zarb¹³ showed a 15% failure rate for 7-mm implants, whereas 10-mm and 13-mm implants had failure rates of 6% to 7%.

Weng and colleagues¹⁴ reported in 2003 on a multicenter prospective clinical study evaluating the success of 1179 3i machined surface implants for up to 6 years. Of the 1179 implants, 48.5% were considered short (≤ 10 mm). These short implants (7–10 mm) accounted for 60% of all failed implants, with a cumulative success rate of only 88.7%. The 10-mm long implants accounted for 10% of the failures, whereas the 8.5-mm and 7-mm implants accounted for 19% and 26% of failures respectively. The cumulative success rate for the long implants (>10 mm) was 93.1%. The overall cumulative success rate was only 89%.

Herrmann and colleagues⁵ described in 2005 a multicenter analysis of 487 Brånemark System; Nobel Biocare implants followed for 5 years in the hope of predicting implant failures based on patient and implant characteristics. They found a 10.1% failure rate for 10-mm implants and a 21.8% failure rate for the 7-mm implants.

Second, dental training in conventional fixed prosthodontics, specifically Ante's law, possibly skewed clinicians' thought processes. Ante's law states that the total periodontal membrane area of the abutment teeth must equal or exceed that of the teeth to be replaced.¹⁵ From that law, the radiographic calculation of the crown/root ratio (CRR) was used to decide a tooth's suitability as an abutment. A variety of ratios

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