

## Small-Diameter Implants

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### HISTORY AND APPROVED USES

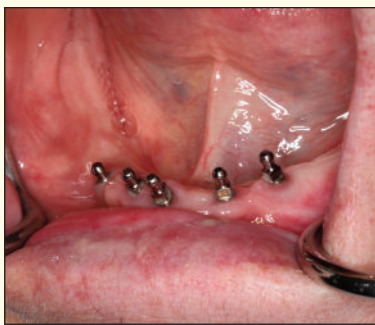
Over the past 10 years there has been a definite increase in smaller diameter dental implants on the dental market. In the early 1970's Dr. Victor Sendax first developed the "mini" implant concept. From that point various companies have evolved to further this "mini" implant market and now there is

multiple tooth replacement of mandibular incisors. The implants may be restored after a period of time or placed in immediate function. (3) for denture stabilization using multiple implants in the anterior mandible and maxilla. The implants may be restored after a period of time or placed in immediate function. It can certainly be seen that there are approved indicated uses for these sized dental implants. These FDA statements are only guidelines for the dental

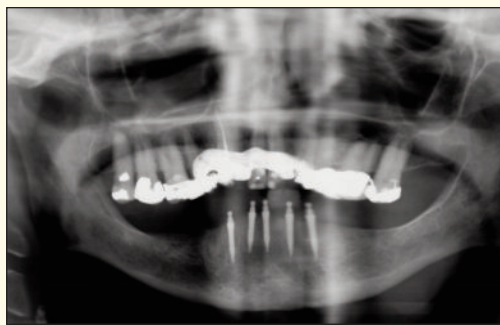
implants is the reduced cost and adaptability of the prosthesis if an implant were to fail. The literature has shown success with both immediate loading and delayed loading of these smaller sized dental implants. Various attachments are available to secure a denture to the reduced sized implants, and the literature from the available companies will explain the differences.

Some clinicians will load the implants immedi-

### Clinical Uses of Small-Diameter Implants



**Image 1.** Small-diameter implant at 1.8 mm to support a mandibular overdenture.



**Image 2.** Panograph of 1.8 mm small-diameter implant to support a mandibular overdenture.



**Image 3.** Panograph of 3 mm one piece small diameter implants in function.



**Image 4.** Periapical radiograph of 3 mm one-piece diameter implant.

really 2 groups of these smaller sized dental implants. One group can be called the "mini" implant "group" with diameters of 1.8 mm to 2.5 mm and lengths between 10mm to 18 mm. The US Food and Drug Administration (FDA) 510(k) approval for these "mini" implants can be found on the FDA website FDA.gov. According to the website the FDA has approved certain brands of dental implants of this size "for use as a self-tapping titanium screw for transitional or intra-bony longterm applications." They are also indicated according to the FDA website for "long-term maxillary and mandibular tissue-supported denture stabilization. Multiple implants should be used and may be restored after a period of time or placed in immediate function." This is according to the FDA.

Another size group of reduced sized dental implants, that are more recently available, can be called the "small diameter implants" This size group is in the 3mm range and to date are all a one piece dental implant with the abutment permanently attached. The lengths of these small diameter implants are from 12 mm to 18 mm. Dental implants of this size also have FDA 510(k) approval and according to the FDA.gov website. According to the FDA website the 510(k) clearance for 3 mm sized diameter implant is stated as: (1) as an artificial root structure for single tooth replacement of mandibular central and lateral incisors and maxillary lateral incisors. The implant may be immediately restored with a temporary prosthesis that is not in functional occlusion. (2) when splinted together as an artificial root structure for

practitioner, and a clinician must make the final decision for their patient. This final decision must be based on correct treatment planning.

### TREATMENT PLANNING FOR MINI AND SMALLER SIZED DENTAL IMPLANTS

When treatment planning for any sized dental implants, the principles of loading forces must be taken into account. If a dental implant is overloaded, there is a higher likelihood of bone loss being associated with the implant and possible failure. The best way to treatment plan for dental implants, is to plan for the placement of dental implants based on the prosthetic end result. These reduced sized dental implants can support both removable and fixed applications. Since these implants have less surface area for the bone to attach to due to their reduced size, the planning for reducing the forces on them becomes even more important.

### TREATMENT PLANNING FOR A REMOVABLE PROSTHESIS:

When utilizing both mini and small diameter implants for a removable denture treatment plan, it must be considered that the implants are not splinted and the denture will be primarily tissue supported. A clinician should treatment plan for more implants, longer implants, and find the most stable bone possible to reduce loading forces on the implants. These factors will help offset the increased instability of a tissue supported denture with non splinted implants. One advantage of non splinted

atly, while others will stage the loading of the denture. This modality of securing a denture is more cost effective than traditional sized implants and requires minimal available buccal and lingual bone. The cost benefits and the less invasive surgery involved to place these implants, often makes it ideal for the older or medically compromised patient. It is the authors belief that tissue reflection should be utilized for placement of these implants along with adequate radiographic information such as a computed tomography (CT) scan.

### TREATMENT PLANNING FOR A FIXED PROSTHESIS

Treatment planning for reduced sized implants must follow the same guidelines as treatment planning with regular sized implants (3.5 mm to 5 mm width). One advantage of the 3 mm smaller diameter implants, is the ability to place them closer to adjacent teeth than a regular size implant. The lack of a micro gap between the implant abutment and body allows for this closer proximity according to the literature. This is ideal for their intended use of replacing maxillary lateral incisors and mandibular centrals and lateral incisors. It is often in these areas that only 5 mm to 6 mm is available between a missing tooth. A CT scan is needed in these situations so that the exact spacing from an axial view can be ascertained. Another reason a CT scan is to avoid excessive angulations and the need to over prep the abutment on the one piece implants.

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**CONCLUSION**

The currently available mini dental implants (1.8 mm to 2.5 mm in width) and small diameter dental implants (3 mm in width) can be used successfully in a variety of clinical situations. It must be emphasized that the reduced surface area of these implants requires correct treatment planning so that loading forces do not cause bone loss or implant failure. The reduced costs of treatment for the pa-

tient and less invasive surgery for placement is an advantage when reduced sized implants support a denture. Another advantage is the prosthetic flexibility if an implant fails. These advantages can outweigh the benefits of the stability of a bar overdenture on traditional implants for some people. The use of 3mm sized implants are ideal for replacing maxillary lateral incisors and mandibular centrals and laterals. Due to the stringent spacing requirements a CT scan is recommended for placement.

**Before and After Views of Small-Diameter Implants**



**Before.** Image of patient with congenitally missing laterals.



**After.** Image of patient with 3mm one piece small diameter implants to replace missing laterals.

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