Astra Tech OsseoSpeed™
3.0 S Implant

Reduced-diameter implants help manage narrow edentulous spaces.

By Richard John Martin, DDS

Implant dentistry continues to impact the quality of care for patients with missing teeth. Through continued product advancements, dental implants are now a viable solution for almost all edentulous scenarios. However, clinical situations with limited or reduced horizontal space continues to be a challenge. In some cases, the interdental space can be limited due to drifting or migration of the remaining teeth; the resulting space after orthodontic tooth movement can be limited; or teeth can be congenitally missing, potentially resulting in the loss of interdental space. In cases of congenitally missing maxillary laterals or mandibular incisors, the clinical situation can be severe because these teeth already have the smallest mesio-distal width. Procedures to increase horizontal interdental space, such as orthodontic tooth movement, could be advocated before implant installation. However, this procedure is often time-consuming and costly for the patient. In cases of insufficient bone volume, procedures such as guided bone regeneration and block grafting are used to overcome the problem. However, a bone-augmentation procedure can sometimes be associated with complications, and if this procedure can be avoided it would be beneficial in many aspects; no extraoral donor site is needed, it will cost less, and less surgical and healing time is needed, at least in comparison to a two-stage augmentation procedure. With the availability of small-diameter implants less than 3.5 mm, such as the Astra Tech OsseoSpeed™ 3.0 implant (Astra Tech, www.astratechdental.com), these narrow sites can be more readily managed and aesthetic outcomes successfully achieved, often eliminating the need for bone augmentation or orthodontic tooth movement.

In most cases, missing mandibular central and lateral and maxillary lateral incisor sites require a reduced-diameter implant to accommodate the limited horizontal space available. Placement of dental implants in these sites can be challenging due to proximity of adjacent structures and/or limited availability of bone volume. Studies of the tooth-to-implant spacing have indicated that the implant-to-tooth distance needs to be at least 1.5 mm to predictably maintain the interdental papillae in anterior esthetic areas. The distance between teeth for using a 3-mm implant should be deemed by the clinician to have a bone width suitable for this type of implant. Narrow-diameter implants have been shown to be successful in these areas with no evidence of increased marginal bone loss compared to standard diameter implants. Studies indicate favorable long-term clinical results where a narrow implant is used in single-tooth applications as well as the use of narrow implants in fixed partial dentures. Satisfactory results have also been demonstrated in both full-arch fixed bridges and for overdentures in the mandible and in the maxilla.

The Astra Tech OsseoSpeed 3.0 S implant is especially designed to address limited spaces (Figure 1). While most narrow implants on the market are one-piece, the two-piece design of the OsseoSpeed 3.0 S provides added flexibility for the clinician by supporting both a one- or two-stage surgical approach. Based on individual case requirements, this two-piece concept is also ideal for either conventional temporization techniques or, in other instances, immediate temporization for optimal restorative versatility.

Despite its narrow design, the OsseoSpeed 3.0 S implant maintains the same combination of unique features as the complete Astra Tech implant line, including OsseoSpeed™ fluoride-modified surface, MicroThreads™ at the implant neck, a Conical Seal Design™ ensuring a strong and stable abutment-to-implant connection, and Connective Contour™. Known as the Astra Tech BioManagement Complex™, these four features work interdependently to ensure reliable and predictable, long-term esthetic results. The soft tissue seal on the abutment level, together with biomechanical interactions with the bone around the implant neck, create an optimal environment for the bone and soft tissue. As a result, the optimized load distribution and lack of micro-movement and microleakage between the implant and restorative components are critical for the maintenance of healthy peri-implant tissues and maintained marginal bone levels.

Case 1

A 43-year-old woman was referred for consultation and subsequent treatment of congenitally missing maxillary lateral incisors. She was initially treated with resin-bonded bridges over the last 20

LIMITED SPACES (1.) The Astra Tech OsseoSpeed 3.0 S implant is especially designed to address limited spaces. (2.) Once orthodontics was completed the implants were placed. (3.) After 8 weeks of healing, implant-level impressions were taken to fabricate custom abutments. (4.) CAD/CAM technology can be utilized to provide the optimal function and esthetics for individualized care. (5. & 6.) The case was completed by the prosthodontist with all-ceramic crowns.
years. Frustrated with the inconvenience of multiple replacements, the patient elected to accept additional orthodontic treatment with the expectation of a more reliable solution over the long-term. Before starting orthodontic treatment the surgeon, orthodontist, and prosthodontist informed the patient of the space concerns and root angulation. Orthodontic treatment was initiated to align the roots of the canine and centrals. At completion of orthodontics, 3.5 mm of space was obtained in each site. The decision to utilize the Astra Tech OsseoSpeed 3.0 S implant was made to best accommodate the limited horizontal space available for implant placement. In addition, the tapered apex of the OsseoSpeed 3.0S implant was critical in this case as the root position of tooth No. 6 was mesial and invaded the tooth No. 7 position. The orthodontist indicated, however, that further root movement was not recommended. Once orthodontics was completed (Figure 2) the implants were placed. After 8 weeks of healing, implant-level impressions were taken to fabricate custom abutments (Atlantis™ Abutments, Astra Tech) (Figure 3). CAD/CAM technology, such as Atlantis™ patient-specific abutments, can be utilized to provide the optimal function and esthetics for individualized care (Figure 4). In this case, Atlantis™ Abutments GoldHue (gold-shaded titanium) were placed in an attempt to improve the esthetic color match for the anterior jaw. The case was completed by the prosthodontist with all-ceramic crowns (Figure 5 and Figure 6).

Case 2
A 33-year-old woman presented with failing resin-bonded bridges replacing her mandibular lateral incisors. She reported being born without the central incisors. She was initially treated as a teenager with orthodontics to mesialize the mandibular laterals into the central positions. When she presented for initial consultation, the roots of the central incisors and canines were found to compromise the required space for proper implant placement (Figure 7). The patient elected to accept additional orthodontic treatment to realign the centrals and canines to develop an appropriate implant site (Figure 8). At completion, approximately 3.5 mm of space was achieved at each site, again indicating the use of a narrower implants such as the OsseoSpeed 3.0 S implant to provide optimal support of the final restoration while allowing for ideal contouring of the emergence profile. Dental implants were placed (Figure 9 and Figure 10). Implant-level impressions were taken 9 weeks later. TiDesign™ abutments (Astra Tech) were opaqued and placed with provisional crowns created to develop the gingival architecture and support the soft tissue (Figure 11 and Figure 12).

Case 3
An 18-year-old female presented with congenitally missing maxillary lateral incisors. Orthodontics was completed before initial consultation. On evaluation, 6 mm of space was measured at each site. Based on the root alignment and existing bone support (Figure 13), it was concluded that placement of Astra Tech OsseoSpeed 3.0 S implants would be optimal for the horizontal space of the implant site and to provide restorative flexibility (Figure 14). After placement of the implants, an Essix retainer was used to maintain the spaces as well as to create soft tissue contouring. After a 12-week healing period, implant-level impressions were taken. Temporary abutments were inserted and shade-matched provisional crowns were fabricated. The provisional restoring tooth No.10 was undercontoured to promote further gingival adaption using a modified technique developed by the author (Figure 15 and Figure 16).

Conclusion
The management of limited or narrow spaces in implant dentistry can be highly successful with solutions such as the Astra Tech OsseoSpeed 3.0 S implant, which is designed to address traumatic, premature, or congenitally missing teeth. Esthetic restorative outcomes can be achieved using stock abutment options, such as the TiDesign™, or patient-specific solutions, such as the Atlantis™ Abutment, for optimized function and esthetics. The utilization of the Astra Tech Implant System™ for limited spaces is a permanent and proven solution.

References
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