

Management of Compromised Intertooth Spaces Using Small-Diameter Implants

Long-term, successful alternative to a fixed or resin-bonded bridge

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Management of edentulous sites in the oral cavity with dental implants has been well documented in the dental literature for more than 25 years.¹⁻³ Patients seeking tooth replacement for partial or totally edentulous situations have been able to enjoy natural appearing and functioning prostheses that are fixed, stable, and, in some cases, so natural that it is difficult to differentiate a dental implant restoration from a tooth restoration. Using dental implants to replace the natural tooth system in the esthetic zone has also led to an increase in implant procedures and restorative treatment plans. With the advent and perfection of immediate restoration protocols initially reported in the literature,^{4,7} achieving natural soft tissue esthetics around dental implants can be predictable and successful.

However, certain clinical situations can complicate or negate the procedure. One of these complications is insufficient intertooth spacing between natural teeth, most commonly with congenitally missing lateral incisors after orthodontic treatment.⁸ Often as a resolution to this, the dentist chooses a removable partial denture or some type of resin-bonded bridge, both of which may not

be appealing to younger individuals. In extreme cases, the dentist may elect to proceed with a fixed bridge, which would cause excessive destruction to the natural teeth serving as abutments; for a young individual, this may be devastating to these teeth over a 40-to-50 year period, if not sooner.⁸

To properly form an ovate pontic type

emergence profile in the soft tissue, which is required for a fixed bridge to have a natural clinical appearance, consideration must be given to the intertooth edentulous space.⁹⁻¹² This is also very important when choosing dental implants for natural tooth replacement. Wallace, Misch, and Salama and colleagues⁹⁻¹¹ stated that for a normal two-piece implant, the



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(1.) Pretreatment clinical view. **(2.)** Preoperative periapical radiograph. **(3.)** Ovate pontic type defect created. **(4.)** Dentatus ANEW implant seated minimally invasive protocol. **(5.)** Immediate postoperative clinical view.



(6.) Immediate postoperative radiograph. (7.) Lab-processed long-term provisional restoration. (8.) 10-year postoperative clinical view. (9.) 10-year postoperative CT serial view.

implant should be placed at least 1.5 mm from the adjacent teeth. As a result of this, using a 3.5-mm diameter implant, the minimum intertooth space to support interproximal bone and natural soft tissue papillary contours should be 6.5 mm; with a 3.0-mm diameter implant, 6.0 mm is required. Often the intertooth space in these types of cases is smaller than 6.0 mm.

Taking these parameters into account, small-diameter implants (3.0 mm is the smallest from most dental implant manufacturers) should not be used in cases with less than 6.0 mm of intertooth space to prevent potential tooth root damage, crestal bone loss, and unnatural-appearing gingival tissues and papillae.

Small-diameter (mini) implants were developed more than 20 years ago, and initially their recommended use was to support temporary removable prostheses during the healing phase for advanced bone grafting procedures and/or conventional implant placement.^{12,13} Their use was later expanded into immediate conversion of full dentures into implant-supported dentures, support for partially edentulous cases, and for anchorage of single-tooth implant restorations in compromised intertooth spaces.^{14,15} Implants are available from 1.8- to 2.8-mm diameters, and offer a fixed permanent tooth replacement option for those patients that otherwise would not be able to have implants placed and restored. Their ease of use and atraumatic placement using

a flapless approach with only one coring procedure, as well as simplistic abutment transfer and provisional construction, make the use of these implants in the aforementioned sites a must for the dental implant practice. The following case report will demonstrate the use of the Dentatus ANEW[®] (Dentatus USA, www.dentatususa.com) implant for the management of the compromised, congenitally missing lateral space in a 17-year-old girl, along with a 10-year clinical follow-up.

Case Report

A 17-year-old, non-smoking female presented for tooth replacement at the congenitally missing maxillary left lateral incisor site (Figure 1). The patient had recently completed orthodontic therapy, and the orthodontist and general practitioner had agreed that this was the final obtainable result in her case regarding the remaining space between the maxillary left central incisor and maxillary left canine (Figure 2). The resultant intertooth space was less than 5 mm, and conventional two-stage implants with abutment options were ruled out. The patient and her parents ruled out conventional tooth replacement options and chose the minimally invasive procedure with a small-diameter (1.8 mm) implant, which would allow for natural papillary contours to be developed.

After administration of an appropriate local anesthetic, an ovate pontic contour was

created using a football-shaped diamond in the attached, keratinized tissue of the edentulous site (Figure 3). This scalloped type tissue contour helped in the creation of the natural appearing papillary contours.

The small-diameter implant chosen, a 1.8-mm x 14-mm Dentatus ANEW Implant was then placed after a single coring of the site with a 1.4-mm spade drill to full depth, within the sculpted tissue emergence profile previously created (Figure 4). Conversion to an esthetic provisional restoration was completed by placing an abutment coping with a Delrin retention screw (Dentatus). An ion shell provisional crown was then hollowed out and retrofitted to the abutment coping with flowable composite. The margins of the provisional were corrected, the provisional was contoured extraorally, and the restoration was polished and seated with the set screw from the palatal. The immediate postoperative clinical views are seen in Figure 5 and Figure 6. The patient then went through the 3-month healing and observation phase prior to construction of a lab-processed provisional restoration (Figure 7). One year later, the patient underwent final restoration fabrication at the left lateral incisor site. A 10-year postoperative clinical image (Figure 8) and a 10-year postoperative computed tomography scan serial view (Figure 9) illustrate the beautiful soft tissue esthetic result obtained and excellent maintenance of the crestal and lateral contours.

Conclusion

The management of compromised intertooth spaces presents a challenge for the contemporary dental implant team. These spaces have limits on how they are handled and require implants 3.0 mm wide or less, as was demonstrated in this article. The availability of small-diameter implants allows patients who normally would have to proceed with a fixed bridge or resin-bonded bridge the luxury of dental implants, along with no preparation and/or reduction to the adjacent natural dentition. Proper placement procedures and restorative techniques can lead to very esthetic results, allowing for natural tissue contours and emergence profile formation reminiscent of the natural tooth.

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