Adjacent Implants in the Anterior Maxilla

Surgical and Prosthetic Concepts

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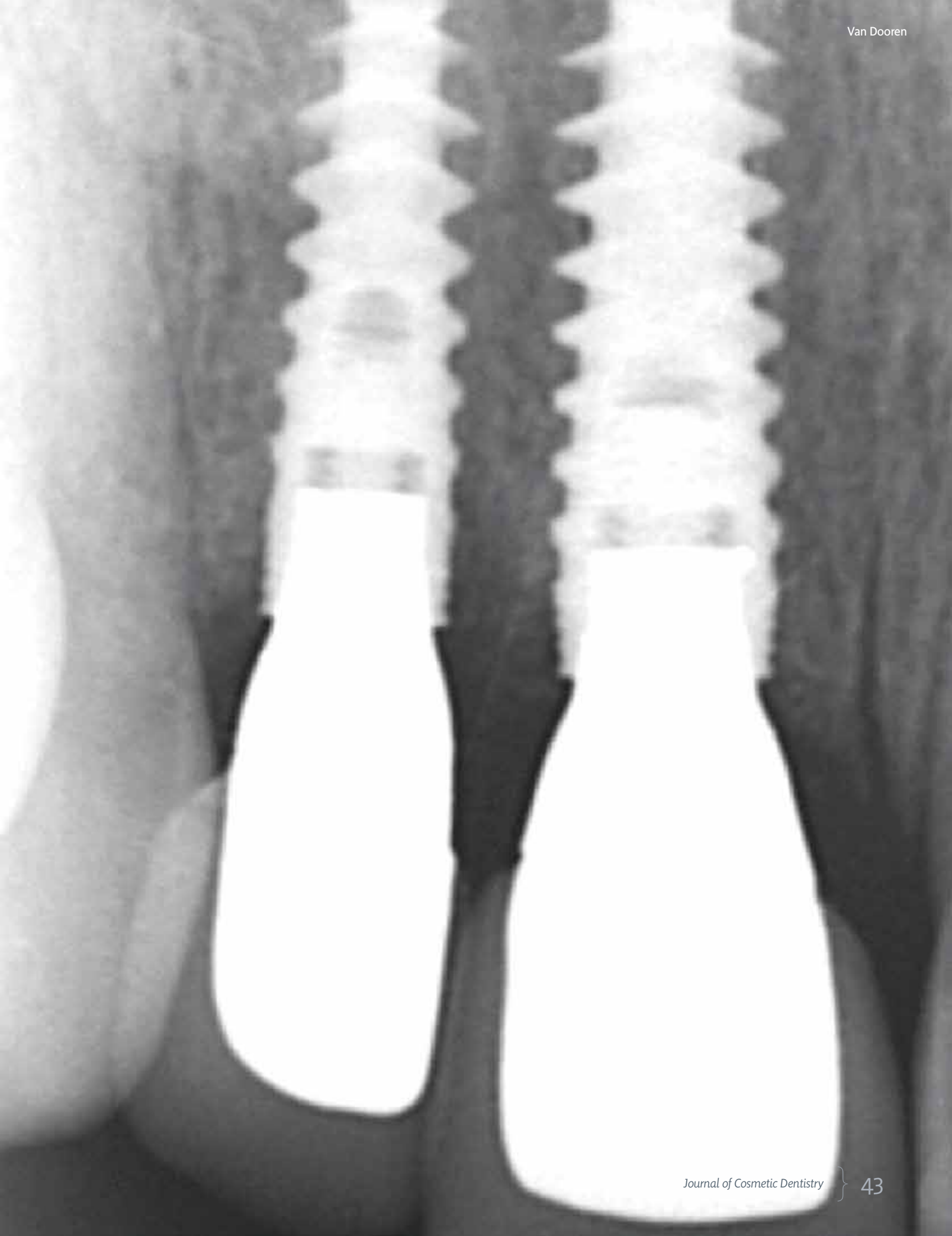
Introduction

To optimize tooth proportions and esthetic outcomes in anterior implant restorations, the challenge is really not achieving "white esthetics." Instead, the difficulty is in addressing the prosthetic-soft tissue interface. Particularly in implant dentistry, it can become quite onerous to establish a balance between pink and white at this critical junction.

Single-tooth anterior implant restorations are very predictable in most clinical situations, if certain guidelines are respected. The placement of two adjacent implants in the esthetic zone, especially while treating a unilateral defect, has always been a challenge. To achieve the longest-lasting, most esthetically pleasing restoration, a strict surgical and prosthetic protocol must be respected.

This case presentation will describe the clinical protocol and concepts for immediate implant placement when replacing adjacent lateral and central incisors with implant-borne restorations.



Figures 1 & 2: A 25-year-old woman with a very high smile line presented with a fractured right central and right lateral incisor.

Figure 3: It was not initially clear whether the left central incisor, although discolored, was fractured. The x-ray clearly revealed the fractures of #7 and #8.

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In these difficult anterior cases, cone beam x-ray technology can give us very specific additional information. Fracture lines, buccal bone levels and thickness, and available palatal bone volume for implant placement become evident.

Figure 4a: A specific, simple protocol of photography and digital dynamic documentation (a short video of the face and smile), as well as radiographic findings and precise silicone impressions, allowed us to transfer the intraoral information to the laboratory, translate it into a comprehensive wax-up, and establish a comprehensive treatment planning protocol for this case.[1]

Figures 4b: A precise impression was taken, and two models were poured. It was clearly visible that #7 and #8 were displaced after trauma; hence, it was important to reestablish the exact position on the arch and redistribute the available space.

Figure 4c: A wax-up was fabricated, establishing an ideal incisal edge position, form, and gingival root emergence. This ideal wax-up defined the final three-dimensional tooth position and would, consequently, guide us through the treatment. From this wax-up, a two-unit shell provisional and surgical guide were fabricated.

Active Clinical Treatment

Surgical Treatment

Figure 5: Atraumatic extraction of the fractured root. Aggressive curettage and debridement of the socket was performed.

Figure 6: Trying the shell provisional. A silicone index allows for optimal positioning.

Figure 7: Preparing the receptor site for the connective tissue graft. Care was taken, with a lateral and sulcular approach, to make a split thickness lateral pouch, avoiding vertical release of the incisions. It is important to augment gingival volume in the papilla area surrounding the implant restoration.

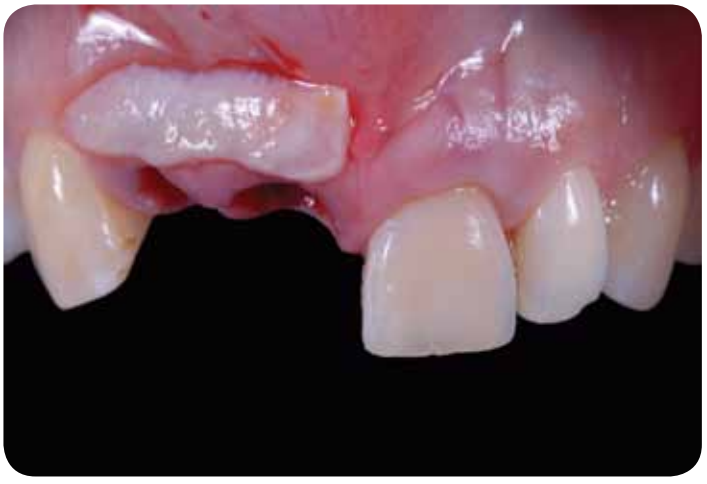

Figure 8: A connective tissue graft was harvested from the maxillary tuberosity area and inserted into the pouch. This dense, fibrous tissue will result in long-term peri-implant soft tissue stability and thickness.[2]

Figures 9a & 9b: The connective tissue graft was secured using 6/0 Seralene sutures (American Dental Systems; Vaterstetten, Germany). Flapless immediate implant placement (NobelActive NP for #7 and NobelActive RP for #8, Nobel Biocare; Kloten, Switzerland) was guided by a surgical stent designed and fabricated from the wax-up of the provisional restoration. Care was taken to leave a gap between the buccal bone and the implant. The gap was filled with a bovine filler material (Geistlich Bio-Oss, Geistlich Pharma North America, Inc.; Princeton, NJ).[3,4] Palatal implant placement, accomplished by engaging the palatal socket wall, allowed for excellent primary implant stability.

Figures 10 & 11: A prefabricated 15° zirconia abutment (Procera, Nobel Biocare) was placed immediately on both implants. In this method, the final abutment is permanently placed on the day of the surgery and is no longer removed. Using a biocompatible material promotes cellular adhesion. The abutment design (concave form) should allow for thickness and stability of connective tissue in the transmucosal zone. This will form a mechanical barrier that protects the bone from the external environment. Minor adjustments enable precise relining of the provisional bridge.

Figure 12: After final torquing of the zirconia abutments, the provisional bridge was cemented with provisional cement (TempBond, Kerr; Orange, CA). Care was taken to avoid any contact in centric relation and in excursive and protrusive movements.

Figure 13: Healing was uneventful, and initial soft tissue maturation was achieved after 12 weeks. This is the ideal time for final prosthetic treatment. At this point, nonvital bleaching was initiated on #9, and excellent results were achieved **(compare with Fig 15)**.

Figures 14 & 15: At this point, the provisional bridge was removed. The occlusal image clearly shows that the buccal contours were optimal. Furthermore, it clinically proves that using a connective tissue graft and bovine filler material compensates for the buccal and vertical bone resorption that occurs after extraction.[5] The abutments were torqued at 20-35 Ncm. The screw access hole was closed with polytetrafluoroethylene and an opaque composite material (SO Miris, Coltène/Whaledent; Cuyahoga Falls, OH). Retraction cords were placed, and final preparations were performed. From this point, the objective is to mimic the preparation of a natural tooth, with the abutment margin being positioned in the sulcus.[6]

Prosthetic Treatment

Prefabricated zirconia abutments have the advantage of being esthetic and biocompatible. However, there are also some disadvantages compared to CAD-CAM-individualized abutments, including color, fluorescence, and limited gingival contour and diameter.
A final impression was taken and final plaster casts were poured and mounted in an articulator.

Figures 16 & 17: To best match the central left incisor's high value, two Procera zirconia dentin-colored copings were fabricated. Layering was performed with Noritake CZR zirconia porcelain (Kuraray Noritake Dental; Tokyo, Japan). Special attention was given to surface texture, form, light reflection, soft tissue support, and line angle position to best mimic the natural contralateral teeth. The goal is to achieve optimal harmony and balance, not necessarily perfect symmetry.[7]

Figures 18 & 19: For final cementation, retraction cords were inserted to protect the transmucosal space. After conditioning (air abrasion and 10 MDP monomer) the internal aspect of the zirconia crowns and the zirconia abutment, both crowns were adhesively cemented with composite cement. All cement excess was removed and a minor gingival correction was performed on #9 to balance the form and zenith position.[8] Occlusion and hygiene were then checked, and the patient was placed on a six-month periodontal and restorative maintenance program.

Figures 20-22: Final clinical appearance after two years. The papillae volume and height seem to have improved with time. Coronal migration of soft tissue levels around grafted implant restorations can be observed. In many of these anterior implant restorations, after two to three years, gingivoplasty and recontouring become part of the maintenance protocol. Apparently, the placement of a connective tissue graft can trigger three-dimensional gingival expansion or growth in certain cases. Understanding of the surgical/biological and prosthetic concepts is crucial in obtaining optimal esthetic and functional results.

Figure 23: An x-ray taken two years postoperative. The inter-implant bone peak has been preserved, and satisfactory marginal bone levels can be observed.

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Figure 24: Final facial image. Striving for facial balance, harmony, and equilibrium should be the goal of every esthetic dental treatment.

Acknowledgments

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