COMMENTARY

SURGICAL PLANNING AND PROSTHESIS CONSTRUCTION USING COMPUTED TOMOGRAPHY, CAD/CAM TECH-NOLOGY, AND THE INTERNET FOR IMMEDIATE LOADING OF DENTAL IMPLANTS

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This article represents a very complete explanation of an innovative technique for a medical imaging and subsequent computer-aided design/computer-assisted manufacture (CAD/CAM)-constructed dental implant surgical template and prosthesis. The authors, being both experienced prosthodontists and implant surgeons, carefully detail the surgical protocol with its inherent limitations and possible complicating factors. They further provide pertinent information as to proper patient selection, as well as explain the shortcomings of original components and improvements in the recent generation of new components. Both this Journal article and the authors' other recent contribution to the *International Journal of Periodontics and Restorative Dentistry*¹ should be viewed together to give the interested clinician a perspective for full-arch maxillary implant cases. This technique, like all evolving dental implant techniques, will become more predictable as experienced research teams evaluate it over time.

There are several areas that will need to be addressed in future articles to clarify the existing bone levels that can actually be treated safely with this new technique. The authors discuss the issue of advanced bone atrophy from the perspective of additional zygoma and pterygomaxillary implants. These maxillary implant positions are still not widely used. The advanced bone atrophy condition would require very precise planning and excellent surgical execution with this technique. With thin bone tissue, the stabilization of the implant surgical template with the horizontal stabilizing elements could be challenging. Additionally, any change in orientation of the surgical template by overtightening the initial implants could lead to some portions of later implants being placed outside the intended bone housing. With flapless surgery, these complications would go unobserved until the implants fail with resultant prosthesis loss. It would seem that for its initial use, a patient with a fairly large volume of bone and complimenting attached tissue would be a requirement.

From a prosthodontic standpoint, the authors are specific in indicating that an excellent complete denture be a prerequisite to the scanning step. They emphasize the importance of the tissue-bearing surface. This would indicate to me that, although the authors state that the technique can be accomplished in as few as two or three appointments, in reality, much is dependent on the quality of the prosthesis with which the patient arrives. In many cases, rather than simply making a diagnostic wax-up or wax trial denture, proceeding to a well-fitting new complete denture may be indicated. This would be one of many factors that can quickly drive up the cost of this technique for some patients. In essence, a new complete denture would have to be fabricated in its entirety prior to scanning in order to have an accurate surgical template and a final prosthesis that is acceptable to the patient. This point of an acceptable final prosthesis is welldriven home by this experienced team. They, in fact, have come to the conclusion that it may be best to deliver an immediate provisional prosthesis. This accomplishes the dual objectives of allowing the patient to evaluate the new fixed esthetic arrangement as well as permitting an evaluation of the survival of the implants. Routinely then, a final implant prosthesis can be constructed months later, after all implant and esthetic factors have been evaluated.

Maxillary dental implant success, to quote the authors, "is still not 100%." Failure of an individual implant does not necessarily indicate that additional implants need to be placed or that the original final prosthesis need be altered. Dentistry, however, still faces the challenge of that clustered group of patients who have multiple or complete implant failure resulting in additional implant surgery and prosthesis replacement. In some extreme cases, these patients may even need to return to a complete denture.

In conclusion, this overall scanning and CAD/CAM technique affords great opportunity for reduced surgical time, and because the implant planning is precise, the resultant flapless surgery minimizes patient discomfort. It still, however, requires careful surgical execution. Whether or not it will ever be a panacea to permit consistent final prosthesis placement for a large number of patients at the implant placement appointment appears, at present, to be doubtful.

REFERENCES

1. Balshi SF, Wolfinger GJ, Balshi TJ. Surgical planning and prosthesis construction using computer technology and medical imaging for immediate loading of implants in the pterygomaxillary region. Int J Period Rest Dent 2006;26:238–47.

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