

Immediate or delayed loading in the fully edentulous maxilla

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Although scientific and technical advancements have been made in the field of dentistry, there are still many patients who are either partially or fully edentulous. Edentulism has a negative impact on both dental and general health, leading to physical problems like inability to eat normally and mental health issues such as a decrease in self-esteem.

Oral implantology has made tremendous progress, allowing patients to have clinical outcomes similar to natural dentition. Implant-supported prostheses provide edentulous individuals with daily satisfaction, enabling them to enjoy food and social interactions. When a single tooth or multiple teeth are lost, fixed solutions are suggested, whereas in the case of complete edentulism, the patient can choose between an overdenture or a fixed complete denture on implants.

The McGill consensus statement recommends an overdenture supported on two implants as the first choice for the edentulous mandible. Numerous protocols describe technical aspects of implant surgery and prosthetic restoration, whether in immediate or delayed loading. While the McGill consensus statement considers a conventional tissue-supported denture for the maxilla to be problem-free, some patients may wish for a more comfortable solution to improve their dental health. Can we

offer them a maxillary implant solution that is supported by scientific research? Can patient management be improved by modifying implant placement and loading protocols? These are the two questions we will aim to answer with the aid of recent scientific literature.

Surgical steps

In implant surgery, considering anatomical obstacles is crucial. Regarding the maxilla, the nasal cavity and maxillary sinuses pose challenges, while in the mandible, the inferior alveolar nerve and mental foramen can be problematic (Fig. 1). The two areas also differ regarding bone density, the maxillary bone usually being less dense than that of the mandible. To overcome anatomical obstacles like the maxillary sinus, either axial implants can be placed after sinus lift or zygomatic implants can be placed to bypass the obstacle (Fig. 2). Many implant designs have been developed to provide satisfactory primary anchorage, regardless of bone density.

Brånemark's work in oral implantology established success criteria that have become standard in implant practice. Scientific research has enabled advancements in oral implantology, such as immediate placement after extraction procedures for single or multiple teeth in both the maxilla and mandible.

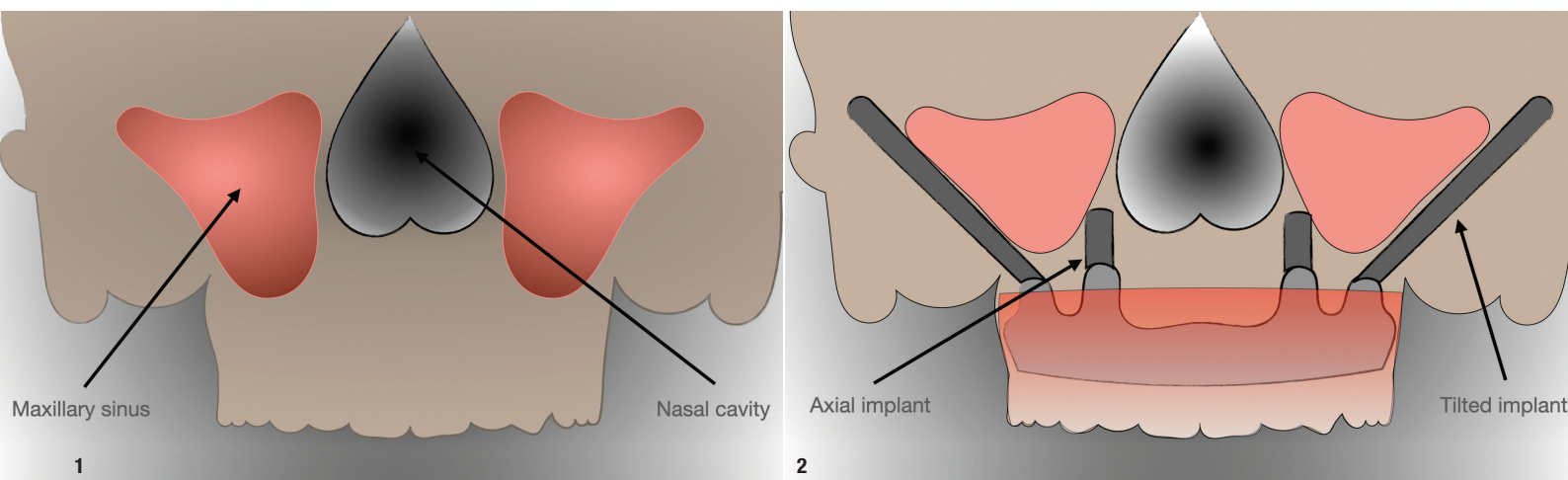


Fig. 1: Maxillary anatomical obstacles. Fig. 2: Maxillary prosthesis on axial and tilted implants.

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While the McGill consensus statement recommends an overdenture on two implants for the mandible, there is no established consensus for the maxilla. This is due to the heterogeneity of results and the difficulty of conducting systematic reviews on the subject. However, Malò et al. have pushed the clinical boundaries of maxillary implant treatment with the All-on-x procedure (Fig. 3), which is demanding but effective and satisfying for patients.

Digital workflows have also improved surgical protocols through static guides and dynamic navigation (Fig. 4). Static guides involve planning the implant position in software and reproducing it in a surgical guide, while dynamic navigation allows for real-time adjustments based on CBCT imaging during surgery, providing greater precision.

Prosthetic steps

Brånemark initially recommended allowing several months for implants to heal, but current literature supports the possibility of immediate loading, whether for a single implant or multiple implants in the maxilla or mandible (Fig. 5). Research has validated immediate loading in fully edentulous maxillae, whether using conventional or zygomatic implants, with high success rates. However, certain conditions need to be considered.

This accelerated-care approach has prevented patients from experiencing disabling edentulism and has been shown to improve their overall satisfaction and oral health-related quality of life. Studies have found that implant-supported overdentures can improve the general well-being of edentulous patients and that fixed implant prostheses are even more effective (Fig. 6).

The effectiveness of immediate loading of implants is comparable to that of delayed loading, although the evidence is not strong enough to make a definitive clinical recommendation. Studies have shown that there is no statistically significant difference in survival rates between immediate and delayed loading of implants and prostheses. However, it is worth noting that early implant failure in the maxilla is quite common, half of the failing implants being lost within the first six months. This is often attributed to poor bone quality of the mandible.

Patients may be more satisfied with a functional fixed prosthesis regardless of the time of loading, but there is limited evidence to support this. Prosthesis instability may also contribute to differences in loading times. For example, one study showed no difference in patient satisfaction between immediate and delayed loading after three

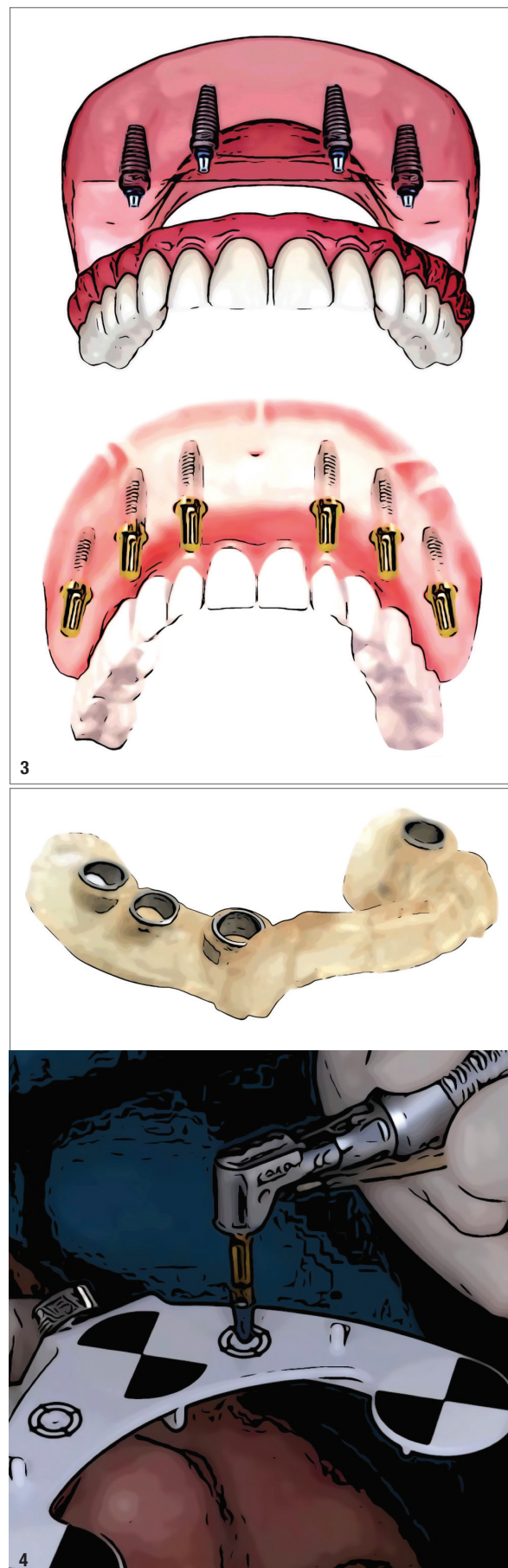


Fig. 3: All-on-4 and All-on-6 prostheses. **Fig. 4:** Surgical guide and dynamic navigation.

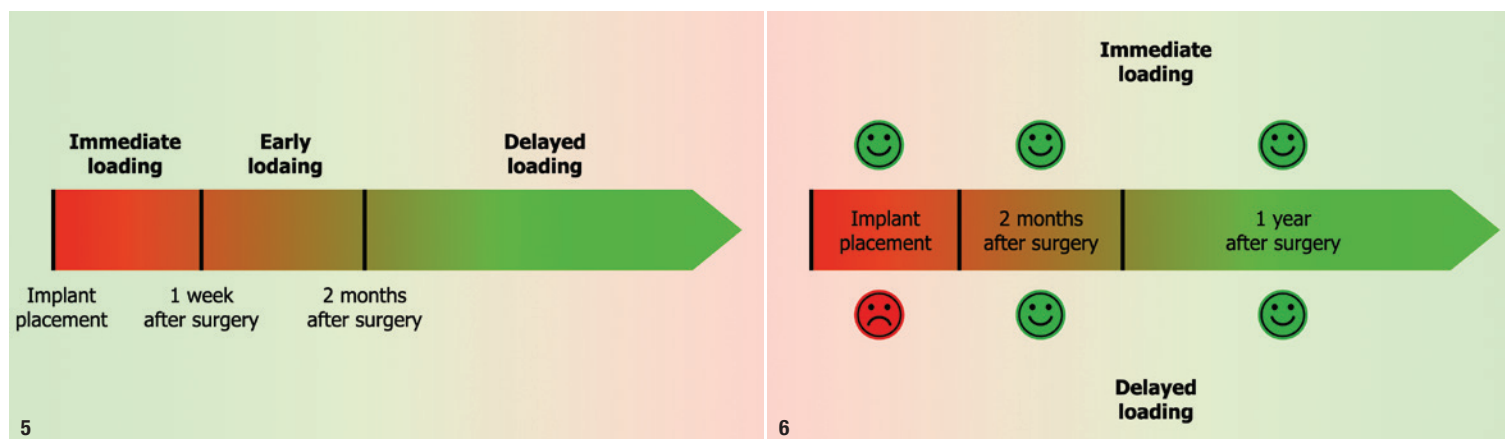


Fig. 5: Implant loading timeline. **Fig. 6:** Patient satisfaction timeline.

months, although patients in the delayed-loading group had relined provisional restorations. At 12 months, patient satisfaction levels were similar, suggesting that the perception of the prostheses does not change much over time. Studies have shown that patients have an excellent level of satisfaction with immediate loading, and the protocol is generally well tolerated with careful preoperative, perioperative and postoperative management.

Recent research has expanded the indications for zygomatic implants, which offer sufficient primary stability, but may still be susceptible to lateral forces that can cause implant fracture. This is particularly problematic in clinical cases in which the maxillary fixed prosthesis opposes natural mandibular dentition. One possible solution is to use a hybrid prosthesis on a bar.

Marginal bone loss data indicates a loss of 1.67 mm for the maxilla after ten years, regardless of the type of implant used. However, a more pronounced loss was observed around implants supporting acrylic prostheses than those supporting ceramic prostheses, beginning at the fifth year of follow-up. This underscores the importance of surface polishing to reduce plaque build-up when using acrylic prostheses.

Conclusion

Dynamic navigation is a promising technique that allows for precise implant placement in fully edentulous patients. Zygomatic implants are a reliable and predictable option for maxillary rehabilitation.

The existing literature provides limited evidence on the comparative efficacy of immediate versus delayed loading of implants. Evidence supports the effective use of immediate loading for fixed complete dentures without the need for augmentation. Immediate loading and fixed hybrid restorations are the most commonly used methods for their rehabilitation. However, delayed loading and

bar overdentures are also effective and well tolerated by patients. Patients seem to be at least as satisfied with immediate loading, and clinical complications may be comparable to those of delayed loading. The choice of immediate loading should be based on the practitioner's expertise in providing such treatment and on patient selection.



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