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Immediate Loading of Dental Implants: How Far Ee ?: A Review

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ABSTRACT

The earliest possible restoration to achieve proper form and function is a hallmark of all surgical specialties. This principle underlies the concept for immediate loading of dental implants. The concept of immediate loading was applied in the very early stages of dental implants. The failure rate of the earliest trials of dental implants was high and often occurred shortly after attempts at functional loading. In some cases the complications arising from the early loading of dental implants were more severe than the indication for treatment. Despite these setbacks, many of the early attempts at implant placement were functional for long periods and provided the support for functional prostheses. Several factors contributed to the high early failure rates: metallurgic properties of implants had not yet been improved; the dental materials utilized, although proven compatible, lacked the necessary strength to support prosthesis in function; and there was not yet a thorough understanding or the proper surgical and prosthetic techniques necessary for success.

Key words: Immediate loading, Dental Implant,occlusal loading.

INTRODUCTION

It was not until the 1940s that bothe et al.experimented with the biocompatibility of titanium. Its use was not widely accepted until the 1950s, when documented support from gottlieb and leventhal and clarke and hickman showed the corrosion resistance and inert nature of titanium.branemark et al.in the 1960s demonstrated the ability of natural bone to accept implanted titanium during its remodeling stages, leading to the concept of osseointegration. This concept was initially conceived as a two-stage system in which the titanium implant was given a length of time to osseointegrat into the native bone without the stress of function.

Dr. Alvin strock,aboston Oral and maxillofacial surgeon, placed an orthopaedic bone screw into an immediate extraction socket of a periodontallyinvolved tooth in the late 1930s. The placement of this implant became the foundation for the placement and restoration of a similar bone screw with the head prepared to receive a prosthetic crown in the following year.the implant and restoration survived for 18 years implants placed in the subsequent years varied in their sizes, shapes, materials, and placement techniques. One commonality they shared was the concept of immediate loading. These implants were placed and restored according to a one stage surgical technique allowing for impressioning and rigid splinting of the implants at the time of initial surgery. After the documented success rates of two-stage surgical techniques in the 1960s the industry began to turn away from immediate loading. However, as the materials and science of dental implants progressed, a return to the restoration of immediate

form and function was seen. Documentation of high success rates with immediately loaded dental implants then followed in the mid 1980s.

Immediate loading?

The scientific literature is rife with definitions of Immediate loading of dental implants. Misch et al., in 2004, offered several classifications of implant loading:

- Immediate occlusal loading refers to fully functional occlusal loading of an implant within 2 weeks of placement.
- Early occlusal loading refers to functional loading between 2 weeks and 3 months of implant placement.
- Non-functional immediate restoration refers to implant prostheses placed within 2 weeks of implant placement with no direct functional occlusal loading.
- Non-functional early restoration refers to implant prostheses delivered between 2 weeks and 3 months from implant placement.
- Delayed occlusal loading refers to the restoration of an implant more than 3 months after placement. These categories help to describe the timeframe of the restorative phase of implant surgery.

In 2006, wang et al.provided a definition based on a consensus from the international congress of oral implantologists (upper montclair,nj) in which immediate loading was described as a technique in which the implant supported restoration is placed into functional occlusal loading within 48 hours of implant insertion furthermore, a distinction was made between the immediate restoration for aesthetic purposes, in which the restoration was placed out of occlusal contacts, and true immediate loading.

Patient selection

Several factors determine whether a patient is a candidate for immediate loading of his or her dental implants. These factors can be divided into four categories:

1. Surgery-related factors
2. Host-related factors
3. Implant-related factors
4. Occlusion-related factors

The surgical factors pertain primarily to implant stability and surgical technique. Host factors include not only bone quality and density but also proper healing environment.implant factors are based on the structure and design of the implant system utilized, and occlusal factors relate to the importance of proper prosthetic design under occlusal forces.of the factors related to surgical technique, the establishment of primary stability has been described as the single most important variable for success of immediately loaded implants.the transmission of micromotion to an implant body after placement can result in crestal bone loss and failure of osseointegration. It has been shown that micromotion must be limited to less than 100 nm to achieve implant-to-bone contact.clinically, the torque during implant placement is a good predictor of implant stability. Studies have reported that implants placed with an insertion torque greater than 30-35 ncm resulted in higher success rates for immediate loading.additionally, to ensure adequate bone health and stability, proper implant placement technique includes copious irrigation both internally and externally to maintain temperatures less than 47 ° c for prevention of necrosis of the surrounding bone.

Host factors also contribute to the decision-making process for immediate loading of dental implants. The practitioner must take into account the patient ' s medical history in evaluating candidacy for immediate loading, including tobacco use,oral hygiene, medications, and systemic diseases such as human immunodeficiency virus(hiv)/acquired immunodeficiency syndrome (aids), diabetes mellitus, and osteoporosis. The clinical history of the tooth to be replaced at the time of extraction should also be considered. Teeth associated with a history of trauma, infection, or periodontal disease with active inflammatory response may not be candidates for immediate implant placement or immediate loading. Radiographic and physical examination are also necessary for evaluation of bone quality and quantity. The quality of bone often controls the prosthetic choices when immediate loading is considered.

The need for bone grafting at the time of implant surgery may be necessary, depending on the anatomical variances of the patient's bony anatomy. Bone quality can be described in many ways. The system proposed by lekholm and zarb places bone into four classifications based on the relative amounts of cortical and trabecular bone. In the first classification almost the entirety of bone is composed of compact cortical bone. In the second classification, compact trabecular bone is surrounded by a thick layer of cortical bone. The third classification is described as a thin layer of cortical bone encompassing high-density trabecular bone with favorable strength properties. Finally, in the fourth and least desirable bone type, a thin layer of compact bone surrounds loosely arranged trabecular bone. Higher failure rates have been reported in type iv bone for immediate loading of implants.

Immediate loading

Studies of single-tooth restoration and immediate loading have shown good success rates.various studies have been done on these single-tooth restorations placed into immediate occlusion via provisionalization with success rates similar to those implants restored with light or no occlusal forces.other

Studies of these single-tooth restorations have shown lower success rates when placed into immediate functional occlusion.clearly, more detailed studies are needed to assess the role of occlusion in these restorations.studies of implants placed in type iv bone with varying degrees of success.the soft tissue response was very favourable in these studies owing to the presence of a provisional crown throughout the healing phase,which allowed the sculpting of the interdental papilla and the attached gingiva.

comparable bone loss was seen with immediate loading versus the traditional two-stage surgeries.some studies even showed a net gain of bone over a 5-year follow-up period.given the recent advances and research in this area, long-term follow-up data are not yet available; however, the immediate loading of a single-tooth restoration is clearly a viable option for select patients.the placement of an immediate screw-

Retained temporary provisional restoration at the time of implant placement 5 shows a presurgicalguided placement of implant with final zirconia abutment and temporary crown at time of implant placement.

Research in the area of fixed or multiple-tooth replacement with immediate loading has been divided into prostheses placed in the mandible and those placed in the maxilla. In the early studies of mandibular multi-tooth restorations with immediate loading, one technique placed additional or interim implants to initially support the prosthesis while the remaining implants underwent the healing phase. The thinking behind this technique was based on the suspected high failure rates of these immediately loaded implants.

This was further investigated to reduce treatment costs to the patient and determine the minimum number of implants necessary to support an immediately loaded prosthesis. When the three implant model was tested, several drawbacks were noticed. Several systems were not flexible in their surgical technique and the failure of a single implant resulted in a 15%prosthetic failure rate. This led to the determination that a minimum of four implants should be placed in the edentulous mandible to support an immediately loaded fixed prosthesis. This method requires the implants to be a minimum of 10 mm in length. In the edentulous or partially edentulous maxilla; significantly more implants must be placed to obtain primary stability of an immediately loaded prosthesis. Although many studies have suggested a requirement of 8 to 12 implants, several studies have shown similar success rates with 5 to 8 implants.

CONCLUSION

The literature debates, with varying results, the surface morphology of implants best suited to placement in the decreased bone density of the maxilla. No standardized protocol exists to justify the selection of one implant morphology over another. Selection criteria also are more difficult to meet in the maxilla because of the anatomical presence of the maxillary sinus and its effect on residual bone heights. However, immediate loading in both the edentulous or partially edentulous

maxilla and mandible is a viable treatment option if the selection criteria are met.

REFERENCES