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REVIEW ARTICLE

IMMEDIATE IMPLANTPLACEMENT: A REVIEW

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ABSTRACT

Placement of dental implants for replacing missing teeth is a well-established treatment option. There are different approaches for placement of dental implants post extraction. The approaches are immediate implant placement, delayed immediate implant placement, lateimplantation. Immediate implant placement protocol has been challenged the last decades by reducing the time between extraction of a tooth and placing and ⁄ or loading of the implant. Immediate implants can be augmented with barrier membranes to preserve ridge width and height and to decrease treatment time. This present review article discusses immediate implant placements, riskfactors, their advantages and disadvantages.

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INTRODUCTION

Placement of dental implants for replacing missing teeth is a well-established treatment option. According to the original protocol, it was state of the art to wait several months after tooth extraction before placement of the implants to allow alveolar bone healing (Branemark, 1985). This protocol has been challenged the last decades by reducing the time between extraction of a tooth and placing and ⁄ or loading of the implant. In 1989, Lazzara placed implants at the time of tooth extraction. Immediate implants were augmented with barrier membranes to preserve ridge width and height and to decrease treatment time (Lazzara, 1989). Becker et al.reported a 93.3% 5-year implant survival rate with clinically insignificant crestal alveolar bone loss for immediate implants that were augmented with barrier membranes (Becker, 1999).

History

Pioneer phase of immediate implant placement (1975–1989): In the 1970s and early 1980s Professor Wilfried Schulte from the University of Tubingen in Germany, introduced the so-called Tubinger Immediate Implant in 1978, which was a ceramic implant made of Al2O3 (Schulte, 1978).

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Trial and error phase of immediate implant placement (1990–2003):In the 1990s, several case reports or clinical studies reported various surgical techniques of guided bone regeneration for immediate implant placement. Classification based on hard and soft tissue healing and treatment time approach were subsequently described (table 1)

RISK ASSESSMENT

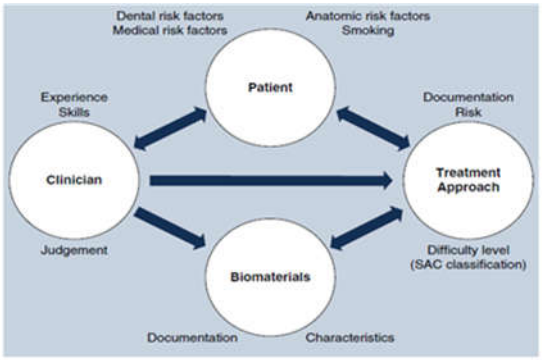
PATIENT: Involving two basic concerns: systemic risk and local risk (Dawson, 2009). Systemic risk includes the medical and physiological well-being of a patient, while local risk involves dental and anatomic-related issues.

SYSTEMIC RISK: Very high-risk (group 1) and significant risk (group 2) (Buser, 2000).Very high-risk patients are those who present with serious systemic diseases; immunocompromised patients; use of intravenous bisphosphonates; drug and alcohol abusers; and non-compliant patients.

IMPLANT DESIGN: To date, the following features remain important (Chen, 2004): Implant shape, abutment/implant connection: Prosthetic components and implant surface.

Table 1.

Author / Year	Classification	Implant placement
Hämmerle et al. (2004)	Type I	In fresh extraction sockets
	Type II	After soft tissue coverage (4- 8 weeks)
	Type III	Radiographic bone fill (12-16 weeks)
	Type IV	Healed socket (>16 weeks)
Esposito et al. (2006)	Immediate	In fresh extraction sockets
	Immediate-delayed	< 8 weeks post extraction
	Delayed	> 8 weeks post extraction



Decision tree for implant dentistry. From *ITI Treatment Guide*, vol. 3. Courtesy of Quintessence Publishing.

INDICATIONS: Trauma not affecting the alveolar bone, decay without purulence, endodonticfailure, severe periodontal bone loss, residual root and root fracture.

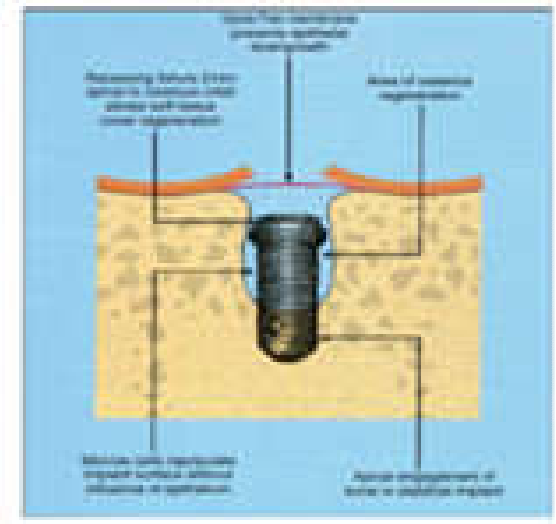


Fig 1. Original diagram of immediate placement protocol. From Lazzara 1989

PRIMARY STABILITY (Lazzara, 1989)

An implant that can be moved laterally with finger pressure following placement will have a poor chance of achieving osseointegration and should be aborted. Another frequent mishap in an effort to achieve primary stability is choosing an implant with restorative platform too large for the planned restoration, only because the larger implant diameter is able to achieve stability.

INFERIOR ALVEOLAR NERVE: At least 2 mm superior to the inferior alveolar nerve during the osteotomy and placement of the implant is needed.[10]Mandibular second premolar sites frequently have their apex near the mental foramen and also have a wide socket morphology requiring 4.8 mm implant diameter for stability.

MAXILLARY SINUS: The maxillary sinus position may pose concerns when placing an immediate implant into the second premolar or first and second molar sites .[11]At times the second premolar site is circumferentially wide and primary stability cannot be achieved using 4.8 mm diameter implant to engage the lateral walls of the socket.

SITES REQUIRING GUIDED BONE REGENERATION: Althoughprimary stability can be achieved, it is best to initiate guided bone regeneration (GBR) to reconstruct the alveolar ridge to improve success and optimize esthetics, especially in the anterior region (Branemark, 1985).

PERIODONTALLY INVOLVED TEETH: Advise the patient to extract the affected tooth/teeth while enough alveolar bone is available for implant placement without risk of injury to the inferior alveolar nerve for mandibular posterior teeth (Wagenberg, 2006; Hammerle, 2012).

CLASSIFICATION

Salama and Salama's, based on the classical definition of periodontal intrabony defects (Lazzara, 1989), divided the extraction sites into three types:

- **Type 1.** Ideal for immediate implantation because of 4- or 3-wall sockets with minimal bone resorption, sufficient bone available beyond the apex, acceptable discrepancy between the fixture head and the necks of the adjacent teeth, and manageable gingival recession or esthetics is not essential.
- **Type 2.** Requiring orthodontic extrusive augmentation in view of dehiscence >5 mm, substantial discrepancy between the fixture head and the necks of the adjacent teeth, and significant recession or esthetics is essential.
- **Type 3.** Not suitable for immediate implantation owing to inadequate vertical and buccolingual bone dimension, recession and severe loss of the labial bone plate, and severe circumferential and angular defects.

Clinical Procedure

The rule of 5 triangles

To achieve excellence when placing immediate implants there are 5 keys aspects to consider during the decision-making process, to help prevent blunders that can lead to difficult esthetic situations. The following are (I) the presence of a buccal plate, (II) primary stability, (III) implant design, (IV) filling of the gap between the buccal plate and the implant, and (V) tissue biotype (figure 2-2.5). An atraumatic extraction should be done to prevent a more pronounced bone loss. When positioning the implant in an ideal 3D position, the void should always be grafted with biomaterial. Implant design is recommended to be self tapered, so it can favor reaching primary stability (Lazzara, 1989).

TOOTH EXTRACTION: Theuse of a minisurgical blade to make the initial sulcular incision around the tooth will facilitate separating the soft tissues from the root and cutting the periodontal ligament.

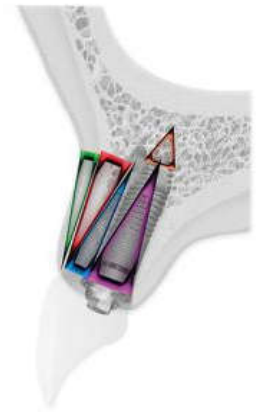


Fig 2: rule of 5 triangle

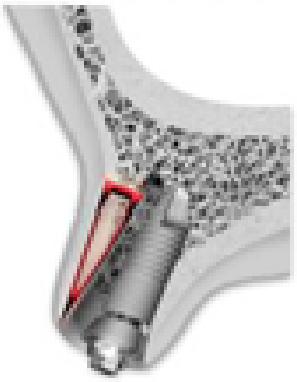


Fig 2.1. Buccal plate

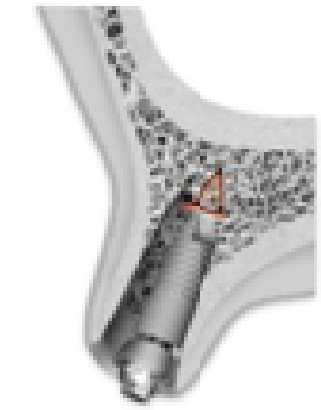


Fig 2.2. Primary stability

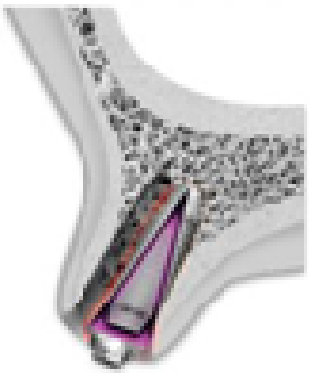


Fig 2.3: Implant design

The periodontal ligaments can be further separated from the tooth with a periotome, Once the tooth has been loosened with the periotome, if there is adequate tooth structure, the tooth can be carefully removed with extraction forceps.

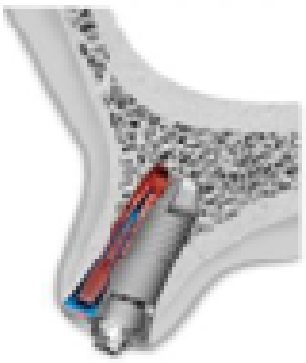


Fig 2.4 : Jumping distance

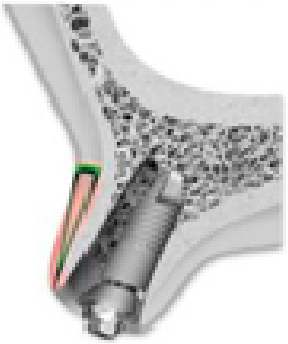


Fig 2.5. Tissue biotype

Fig 3: Diagram of round bur/pilot drill penetration location into extraction socket

IMPLANT OSTEOTOMY: The first step in the dental implant placement is the beginning of an osteotomy with a round bur or pilot drill. If the site is a maxillary anterior tooth, the osteotomy must be kept on the palatal aspect of the alveolus to prevent perforating the buccal plate.Once the osteotomy is complete to the desired depth with at least 3 to 5 mm of intimate implant to bone contact, an implant is placed. The implant must be stable within the osteotomy with no mobility. The implant may touch all of the bony walls of the extraction site but should not place undue pressure upon thin alveolar walls. pressure of the implant on the bony walls of the alveolus can result in microfractures and early crestal bone loss (Kohal et al., 1997).

The Implant to socket wall space: The space between the implant and socket wall has been an issue of concern and controversy.

Studies have shown that close adaptation of the implant to socket wall promotes greater osseointegration (Wilson, 1998; Lundgren, 1992). Additionally, in areas where there isa wide space from the implant to socket wall, better bone healing is achieved when an occlusive membrane is placed over the socket.

Complication

Nerve and blood vessel injuries, dehiscence/fenestration: defects, lack of primary stability, mucosal recession and peri-implant disease/infection.

Advantages: Improved prosthesis fabrication and/or design, consolidation of the number of procedures, reduction in time of treatment, preservation of the bony receptor site, preservation of soft tissue, easier determination of appropriate alignment and parallelism.

Disadvantages: The clinician may not be able to place the implant at the time of extraction even though time has been scheduled.

Conclusion

Dental implants that are immediately placed into carefully selected extraction sockets have high survival rates comparable to implants placed in healed sites. The immediate-placement implantsprovide significant advantages of less surgical procedures, shorter treatment time, and the facilitation of improved esthetics. There are significant areas of information that need to be clarified regarding the use of bone grafts and membranes around immediately placed implants and the size of the space between the implant and socket wall. However, the immediate implant has now become a significant part of implant therapy and provides for timely esthetic implant restorations.

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