



Immediate Dental Implants: A Review

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Abstract

The concept of implant placement in fresh extraction sockets has emerged in recent years. Since then, the practice of immediate implant placement is gaining momentum in clinical practice and can be a very rewarding way to deliver implant therapy to patients. This therapeutic option of immediate loading compensates the negative psychological effect of extraction and provides very good long-term results. Initially limited to healthy sites, the indications of this procedure are expanded even to infected sites, with reduced periodontal support though with taking special precautions. There are different approaches to placement of dental implants after tooth extraction. The approaches are immediate post extraction implant placement, delayed immediate post-extraction implant placement (two weeks to three months after extraction), late implantation (three months or more after tooth extraction). The aim of the current review to briefly discuss the immediate implant placements post-extraction and to make an update on this topic.

Keywords: Immediate implant, immediate loading, classifications

Introduction

Tooth loss in the esthetic zone most often results in negative psychological effect of extraction on patients mind and lead to the loss of bone volume in the vertical and horizontal directions. To minimize alveolar bone resorption and maintain the periodontal architecture, placement of implants immediately after tooth extraction has been advocated. On one hand, it shortens treatment time and can improve esthetics because the soft tissue envelope is preserved. Appropriate patient selection and an understanding of newly developed techniques and protocols are needed to ensure that the high rates of success seen with conventional implant therapy hold true for implants placed immediately. Immediate placement of a dental implant in an extraction socket was initially described more than 30 years ago by Schulte and Heimke1 in 1976. While gaining in popularity in recent years, immediate implant placement is technically challenging and should only be undertaken by clinicians with considerable experience in implant dentistry, both surgically and prosthetically. Nowadays advances in clinical techniques and biomaterials have facilitated a great expansion in the indications for immediate dental implant treatment options. The aim of this article is to make an update on this topic.

Classification of the Immediate Implant Placement

Several classifications have been proposed for the timing of implant placement following tooth extraction. The first classification described the timing of implant placement as mature, recent, delayed or immediate depending on soft tissue healing and predictability of Guided Bone Regeneration procedures (Wilson TG, Weber HP)². In a recent classification by Mayfield LJA³, the terms like immediate, delayed and late were used, but the interval between 10 weeks and 6 months was not addressed. To overcome these limitation further classifications based on hard and soft tissue healing and treatment time approach were subsequently described as below:

Classification of implant placement based on timing placement

According to Hämmerle et al⁴. (2004)

- Type I - implant placement in fresh extraction sockets
- Type II – implant placement after soft tissue coverage (4- 8 weeks)
- Type III – implant placement in radiographic bone fill (12-16 weeks)
- Type IV - implant placement in healed socket (>16 weeks)

According to Esposito et al⁵. (2006)

- Immediate – In fresh extraction sockets
- Immediate- delayed - < 8 weeks post extraction
- Delayed - > 8 weeks post extraction

Indications and Contraindications for Immediate Implant Placement [6,7]

Indications

- Traumatocally avulsed tooth
- Residual deciduous teeth
- Horizontal/vertical fracture of teeth
- Failing endodontically treated teeth
- Non-restorable teeth.

Contraindications

- Inability to establish mechanical stability
- Inadequate width and/or height of available bone
- Proximity to adjacent teeth
- Placement of implant outside alveolar envelop
- Presence of infection

Diagnosis and treatment planning [8,9,10,11]

Diagnosis and treatment planning are key factors in achieving successful outcomes after placing and restoring implants placed immediately after tooth extraction. Factors to be taken into consideration, depending on individual circumstances, when evaluating a patient for dental implants are as follows:

- Detailed medical and dental history
- Clinical photographs
- Study casts
- Periapical and panoramic radiographs
- Linear or computed tomography of proposed site

Factors to be taken in consideration while oral examination of the proposed site for immediate implant placement.

- Crown to root ratio
- Remaining root length
- Periodontal attachment level
- Furcation involvement
- Periodontal health status of teeth adjacent to the proposed implant site
- Non restorable caries lesions
- Root fractures with large endodontic posts.

In the aesthetic zone bone morphology, scallop of the periodontium, level of crestal and interproximal bone, smile line, morphology of the gingival tissues must be considered before initiating treatment¹². The most important step in treatment planning is determining the prognosis of the dentition, and in

particular the prognosis of the tooth in question. Implants to replace teeth with non vital pulp, fractured at the gingival margin with roots shorter than 13 mm, is often considered as the treatment of choice.

Radiographic evaluation

Radiographic evaluation should consider availability of native bone, bone shape, quality, quantity, bone width and height. A minimum of 4-5 mm of bone width at the crest and 10 mm or greater from the alveolar crest to a safe distance above the mandibular canal is recommended¹³. Sufficient distance must be available coronal to the maxillary sinus and floor of nose. For a satisfactory aesthetic result in the aesthetic zone, the interproximal bone height should be 5 mm or less when measured from the contact point of the adjacent tooth.

The Rule of 5 Triangles [14]:

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. These are as follows:

1. The presence of a buccal plate.
2. Primary stability
3. Implant design
4. Filling of the gap between the buccal plate and the implant
5. Tissue biotype

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. Provisional crowns can be used in immediately placed implants to maintain soft tissue contours. Implant design is recommended to be self- tapered, so it can favor reaching primary stability.

Implant placement procedure and techniques

Once the decision has been confirmed that the patient is a candidate for immediate implant placement, a surgical guide should be used to assure proper implant placement. A provisional appliance with an ovate pontic should be available for insertion after implant placement.

Procedure[9,10]

- The patient is anaesthetised and various flap procedures can be used to gain access for tooth extraction.
- After tooth removal, a curette is used to explore the location of the buccal plate and confirm that it is intact.
- Osteotomy site is prepared in extraction site.

- The surgical guide is placed over the surgical site. Guided pin insertion to evaluate surgical guide.
- A direction indicator should be used to verify the correct angulation and trajectory of the proposed implant.
- Standard drilling procedures are performed according to the manufacturer's instructions.
- Implant insertion. The implant of an adequate diameter is selected according to the anatomical and prosthetic requirements.
- A healing abutment or cover screw is placed in the implant. The healing abutment should be even with or slightly apical to the adjacent marginal tissues.
- Filling the gap between mucosal tissue and abutment
- Tissues sutured.
- The provisional is then inserted, and evaluated, making certain the pontic is clear of the healing abutment. The provisional restoration should have an ovate pontic to support the adjacent tissues and help preserve soft tissue anatomy.

Techniques indicated for immediate implant placement [15,16,17].

Round bur technique

It is indicated in cases of immediate implantation without or with minimal tissue loss. The drilling is initiated with a small round bur about 1/3 of the apex on the palatal wall of the socket. The drilling is then carried out keeping a palatal direction with respect to the tooth axis.

The trepan technique

It allows better axis implant control with recovery of the bone for further filling. During implant site preparation, the drilling should extend beyond the socket to optimize the implant primary stability. In the cases of an apical lesion, drilling should be performed beyond this lesion in order to remove infected tissue and to achieve a reliable anchorage in the healthy tissue.

The implant axis rarely follows the socket axis:

- At the upper-anterior region, the implant is placed more palatal than the extraction socket, for the upper molars and premolars with 2 roots, it is placed at the level of the septum.
- At the lower molars region, the implant is placed at the inter-radicular septum.
- For the lower-anterior region, implants are as parallel as possible.

Socket preservation techniques [16,17]

When intact or nearly intact extraction sockets are present, an immediate implant placement technique offers the advantages of the socket preservation technique and reduces the time required to achieve a

final restoration. Socket shield technique is a method which meets the demands of minimal invasion, tissue preservation, and no need of bone substitute materials.

The application of socket shield technique combined with immediate implant placement for replacing a failing tooth will maintain the ridge shape. The implant-supported prosthesis will function well and healthy peri-implant soft tissue is maintained.

Flapless technique [18,19]

The flapless technique provides a minimally invasive approach to extraction with socket grafting or immediate implant placement. Because the interdental papilla remains intact, there is less disruption of blood supply. As a result, there is a greater potential for maintenance of soft tissue volume.

The dual zone technique

The dual zone is described as the tissue zone and bone zone. The tissue zone is the labial-palatal dimension change of the vertical region of tissue defined as ranging from free gingival margin to the labial crest of bone mid-facially. The bone zone is the tissue apical to the osseous crest. After tooth removal, implant placement, bone grafting and provisional restoration, the contour of the ridge can change. Dual zone technique can minimise the contour change associated with immediate implant especially in the anterior region. This technique allows the indirect removal of excess cement around the final crown to avoid the potential for peri-implantitis caused because of excess cement flow in gingival sulcus.

Advantages and Disadvantages of Immediate Implant Placement

Advantages [20,21,22]

- Reductions in the number of surgical interventions and in the treatment time required i.e elimination of second-stage surgery
- Ideal orientation of the implant
- Preservation of the bone at the extraction site
- Optimal soft tissue esthetics.
- More acceptable to patients

Limitations [23,24,25]

It has been reported that immediate implant placement may be adversely affected by the

- Presence of infection
- Lack of soft tissue closure
- Flap dehiscence over the extraction site, particularly when barrier membranes have been used for guided bone regeneration.

- Treatment outcomes for both submerged and non-submerged immediate implant placements may be affected by lack of tissue volume and thin tissue biotypes
- Incongruity between the shape of the implant body and that of the socket wall may sometimes lead to gaps between the bone and the implant.

Evaluation of initial stability and crestal bone level in immediate implant and immediate loading [26]

Stability is the most important factor for the loading of an implant with prosthesis and for its success. In immediate implant cases, there is a customized socket wall for attaining good initial stability. To attain good initial stability/primary stability, implants 2 mm longer than the socket length are selected and excess preparation of 2 mm beyond the socket is performed, with initial drilling followed by sequential drilling. Therefore, the initial stability attained is primarily due to the contact of the implant–bone interface, only in the apical one-third. Selection of the implant body contour is very important to attain good initial stability. Evaluation of the crestal bone level can be performed using standardized digital periapical radiographs with the long-cone paralleling technique.

Clinical Indications

Although esthetics are frequently cited as a reason for immediate implant placement, data are lacking on esthetic outcomes following immediate implant placement. However, adjunctive techniques to mobilize flaps and to augment soft tissue volume for wound closure at immediate implant sites may be beneficial in achieving acceptable esthetic results. Novel techniques, including non-submerged immediate implant placement and flapless procedures need further evaluation with respect to esthetic outcomes.

Conclusion

There is not enough reliable evidence proving higher success of immediate implant placement over delayed placement. Post-extraction implants have survival rates similar to implants placed on healed sites. Based on this review, immediate implant placement following tooth extraction might be a viable alternative to delayed implant placement. However, it requires a careful case selection and a specific treatment protocol because it is a very sensitive technique and more difficult to execute than a conventional protocol.

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