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IMMEDIATE IMPLANTS: A BRIEF REVIEW

Dental Science

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KEYWORDS

The goal of modern dentistry is to restore patients" teeth to normal contour, function, comfort, aesthetics, speech and health, whether by removing caries from a tooth or replacing several teeth. Missing teeth can be replaced with a fixed partial denture, removable partial denture or a dental implant. Dental implants have changed the face of the restorative procedures in dentistry; they provide a realistic treatment alternative for rehabilitation of patients with lost teeth.[1]

In this article an attempt has been made to briefly review the immediate implant system, its classification, advantages, disadvantages, indications, contraindications and surgical considerations.

Several classifications have been proposed for the timing of implant placement following tooth extraction. In the classification of Wilson and Weber, the terms *immediate, recent, delayed,* and *mature* are used to describe the timing of implant placement in relation to the receptor zone to the required therapeutic approach:

- Immediate implantation, when implant is placed in the course of surgical extraction of the tooth to be replaced (primary immediate implants)
- Recent implantation, when approximately 6-8 weeks have elapsed from extraction to implantation, a time during which the soft tissues heal, allowing adequate mucogingival covering of the alveolus (secondary immediate implants)
- Delayed implantation, when the receptor zone is not optimum for either immediate or recent implantation. Bone promotion is first carried out with bone grafts and/or barrier membranes, followed approximately 6 months later by implant positioning (delayed implants)
- Mature implantation, when over 9 months have elapsed from extraction to implantation. Mature bone is found in such situations.[2,3]

Immediate implant placement may be defined as implant placement immediately following tooth extraction and as a part of the same surgical procedure, or as implant placement immediately following extraction of a tooth which must be combined in most patients with a bone grafting technique to eliminate peri-implant bone defects. [4] Since the first report of the placement of a dental implant into a fresh extraction socket by Schulte and Heimke [5] in 1976, there has been increasing interest in this technique for implant treatment. Placement of implants immediately following extraction has now become an increasingly common strategy.

Advantages of immediate implant placement:
- To preserve bone, reduce treatment time.
- Improve esthetics because the soft tissue envelope is preserved.
- Reductions in the number of surgical interventions.
- Results in ideal orientation of the implant.
- Helps in preservation of the bone at the extraction site.
- Optimal soft tissue esthetics6 may be achieved.[3,6,7,8]

Various disadvantages of immediate implants:
Treatment outcomes for both submerged and nonsubmerged placements may be affected by:

- The presence of infection.
- Lack of soft tissue closure and flap dehiscence over the extraction site, particularly when barrier membranes have been used for guided bone regeneration.
- Lack of tissue volume and thin tissue biotypes.
- Incongruity between the shape of the implant body and that of the socket wall may lead to gaps between the bone and the implant. [3,6,7,8]

Indications:
- Retained deciduous teeth
- Non-restorable carious teeth
- Vertical/Horizontal root fracture
- Periodontally involved teeth
- Chronic periapical/ periodontal infection
- Fenestration defects [8,10]

Contraindications:
- Acute periapical/periodontal infections
- Proximity to vital anatomic structures
- Sites requiring guided bone regeneration
- Patients with high lip line
- Tissue phenotype
- Dehiscence defects [8,10]

Surgical considerations:
To achieve excellence when placing immediate implants, there are 5 keys aspects[11] to consider during the decision making process, to help prevent blunders that can lead to difficult esthetic situations. The aspects are (a) the presence of a buccal plate, (b) primary stability, (c) implant design, (d) filling of the gap between the buccal plate and the implant and (e) tissue biotype. The surgical criteria which apply to immediate implantation include the following:

- Ensure that extraction is as least traumatic as possible, to maximize bone integrity.
- In teeth with multiple roots, dental sectioning is indicated.
- The socket walls are to be preserved during extraction, particularly the vestibular wall, the level of which should be harmonized with that of neighboring teeth, to ensure esthetic emergence of prosthetic post. [2,9] Socket preservation techniques involve minimally traumatic extraction followed by immediate grafting of the extraction sockets using particulate bone graft materials with or without membranes. Although socket preservation techniques are beneficial, soft tissue closure and graft containment can be difficulties encountered with these techniques. 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.[12]
- Before positioning the immediate implant, careful curettage and alveolar cleaning is required to remove any trace of infected or inflamed tissue, together with remains of the periodontal ligament.
- The implant must possess sufficient primary stability. This is

generally ensured by exceeding the apex by 3-5 mm, or by using an implant of greater diameter than the socket.[1,2,9,13]

Implant placement:

A) Esthetic zone

- The anterior region of the maxilla is frequently termed the aesthetic zone due to its high visibility and influence on facial appearance. Meticulous planning is necessary for immediate implant placement in this region.
- Tooth extraction in this region can be done with or without elevating the flap. Elevating a flap may cause alveolar bone resorption, specially if gingiva has a thin biotype.
- Flapless technique reduces patients discomfort, alveolar crest dimensional alterations and the vascular supply is maintained because the periosteum is maintained.
- Implant must be placed considering positional parameters, these are buccolingual, mesiodistal and apicocoronal positions relative to implant platform as well as the angulation of implant.
- Placement of the implant can be either submerged (bone level) or non-submerged (tissue level). Usually in the maxiallary anterior region submerged implants are prefered to achieve esthetics.
- The implant head should be a minimum of 3 mm apical to an imaginary line connecting the cemento–enamel junctions of the adjacent teeth and apical to the interproximal and crestal bone.
- Bucco-lingually the implant should be placed more palatally. It is important to engage the palatal wall of the extraction socket and engage the bone 2-3 mm apically. If this guideline is not followed, implant will be placed too close to the labial crest which may result in poor aesthetic outcome due to loss of crestal bone loss and marginal tissue recession.
- Mesio-distally a minimum of 1.5mm of distance should be maintained from the adjacent teeth. Placement of a wide diameter or a wide platform implants should be avoided in the aesthetic zone sites.
- Usually, maxillary central incisors and cuspids and premolars and also mandibular cuspids and premolars are treated with implants having a diameter of approximately 4 mm. Lateral incisors and mandibular incisors not to exceed a diameter of 3.5 mm.[14]

B) In the posterior region

- In the molar region, implant placement in the root socket can lead to a non-ideal restorative position. This may result in mechanical overload of the implant. Furthermore, the resulting shape of the restoration may render oral hygiene more difficult, which enhances the risk for peri-implantitis.
- To avoid these potential problems, studies have suggested placing the implant into the inter-radicular bone and augmenting the remaining socket with graft material and a membrane.
- Implants in the posterior must engage the bone 2 mm apically beyond the extraction socket to achieve primary stability.[14,15]

Horizontal defect dimension (hdd)/ vertical defect dimension (vdd):

- Placement of an immediate dental implant can invariably result in either HDD or VDD gap between the implant surface and alveolar socket.
- The distance between immediate implant and the adjacent bone is called the „Jumping Distance." Mostly, this gap is treated using a hard or soft tissue graft. But if the gap is <2mm, no augmentation of the defect is required and it can be left untreated but covered with a mucoperiosteal flap, as spontaneous bone healing and osseointegration take place if the implant has a rough surface.
- The untreated gaps success usually depends upon maintaining bone viability, stabilization of the blood clot, prevention of inflammation, soft tissue collapse and epithelial down growth.
- In cases where the defects are quite complex both hard tissue grafting as well as barrier membranes are used. Care should be taken in such cases as the barrier membranes can become prematurely exposed and subsequently infected.[14,15]

Healing of immediate implant sites:

- The majority of studies reported that periimplant defects associated with immediate implants healed with significant bone fill, irrespective of the placement protocol (submerged versus nonsubmerged) and augmentation method used.
- However, significantly better bone fill (5.7 mm versus 3.2 mm) and less crestal bone resorption were reported at immediate implant sites treated with demineralized freeze-dried bone combined with nonresorbable barrier membranes, versus sites treated with a nonresorbable barrier membrane alone.
- premature exposure of nonresorbable membranes was reported to be associated with reduced volumes of regenerated bone in the peri-implant defects. However, lower incidences of premature membrane exposure were observed using collagen membranes.
- Localized pathologic processes may lead to damage of one or more walls of the extraction socket, with the formation of dehiscence defects. Sockets with dehiscence defects may lack the potential for complete bone regeneration, and the risk of long-term complications may be increased with immediate implants placed at these sites.[16,17]

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