TIMING OF IMPLANT PLACEMENT AFTER TOOTH EXTRACTION - A REVIEW

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ABSTRACT:

Teeth may be lost due to disease or trauma, or may be congenitally absent. To replace missing teeth, dental implants offer an excellent treatment option with demonstrated short- and long-term predictable outcomes. In recent years, immediate or early implant placement after tooth extraction has becoming more common. The present review focuses on the clinical outcome of implant placement after tooth extraction. Understanding the hard and soft tissue changes of post-extraction sockets and the condition of the anatomy of the future implant site is essential for clinicians in deciding when and where future implants should be placed. Four different implant placement protocols have been defined based on the bone remodelling process: Immediate, when the implants are placed in the same surgical intervention as the dental extraction. early implant placement with soft tissue healing, when implants are placed in the early stages of healing from four to eight weeks and early implant placement with partial bone healing from 12 weeks to 16 weeks late implant placement, when the extraction socket is fully healed after 16 weeks.

Keywords: Extraction, Missing teeth, Dental implants, bone remodelling, surgical intervention.

INTRODUCTION:

Implant Dentistry is one of the most dynamic and rapidly developing areas within oral health care.[1]Teeth may be lost due to disease or trauma, or may be congenitally absent. To replace missing teeth, dental implants offer an excellent treatment option with demonstrated short- and long-term predictable outcomes. The perfect planning for the placement of implant after dental extraction has been widely discussed about it in the literature, with its favorable circumstances and hindrances that have been ascribed to the diverse conventions [2].Both animal experiments and clinical studies have revealed that the alveolar ridge undergoes dimensional alterations in both horizontal and vertical directions after tooth extraction. The extraction of multiple teeth results in an overall diminution of the size of the edentulous ridge.[3-8] Even the extraction of a single tooth leads to marked hard and soft tissue alterations.

The installation of implants in extraction sockets was advocated as a means to

(i) reduce the number of surgical procedures;

(ii) to preserve the dimensions of the alveolar ridge; and

(iii) to reduce the interval between the removal of the tooth and the insertion of the implant supported restoration.

Sufficient alveolar bone volume and favorable architecture of the alveolar ridge are essential to obtain ideal functional and aesthetic prosthetic reconstruction following implant therapy.[9] Knowledge about the heal- ing process at extraction sites, including contour changes caused by bone resorption and remodeling, is essential. Loss of alveolar bone may occur prior to tooth extraction because of periodontal disease, periapical pathology, or trauma to teeth and bone. Damage of the bone tissues during tooth extraction procedures may also result in bone loss. Finally, alveolar bone atrophy after tooth extraction is a well-known phenomenon.[10,11] Preservation of alveolar bone volume following tooth extraction facilitates subsequent placement of dental implants and leads to an improved aesthetic and functional prosthodontic result.

IMPLANT TIMING AND PLACEMENT PROTOCOLS:

A dental implant which is also known as an endosseous implant or fixture is a surgical part that interfaces with the bone of the jaw or skull to support a dental prosthesis such as a crown, facial prosthesis, bridge, denture or to act as an orthodontic anchor. The present day dental implants is a biologic process called osseointegration, in which materials for example, titanium form an intimate bond to bone. The implant fixture is placed first so that it is likely to osseointegrate, then a dental prosthetic is added. For an osseointegration to take place a variable measure of healing time is required before either the dental prosthetic (a tooth, bridge or denture) is attached to the implant or an abutment is placed which will hold a dental prosthetic.

The success to the long-term health of the prosthetic is to plan the position and number of implants since biomechanical forces created during chewing can be significant. With helps of computed tomography with CAD/CAM simulations and surgical aides called stents the position of implants is dictated by the position and angle of adjacent teeth, Healthy bone and gingiva are essential for long-term achievement of osseointegrated dental implants.After tooth extraction both healthy bone and gingival undergo atrophy, to recreate ideal bone and gingiva pre-prosthetic procedures such as sinus lifts or gingival grafts are sometimes required.

The implant therapy has risks and complication that are divided into those that occur during surgery (such as excessive bleeding or nerve injury), those that occur in the first six months (such as infection and failure to osseointegrate) and those that occur long-term (such as peri-implantitis and mechanical failures).

Five basic steps for placement of each implant:[8]

1.Soft tissue reflection: An incision point is made over the crest of bone, the thicker atttached gingiva is spit generally down the middle so the final implant will have a thick band of tissue around it. The edges of tissue, each alluded to as a fold are pushed back to uncover the bone. Flapless surgery is an other procedure, where a little punch of tissue (the measurement of the embed) is expelled for implant position as opposed to raising folds.

2. Drilling at high speed: After reflecting the soft tissue, and utilizing a surgical guide or stent as vital, pilot openings are set with accuracy drills at profoundly controlled speed to avert burning or pressure necrosis of the bone.

3. Drilling at low speed: The pilot opening is extended by utilizing continuously more extensive drills (regularly in the vicinity of three and seven progressive drilling steps, contingent upon implant width and length). Care is taken not to harm the osteoblast or bone cells by overheating. A cooling saline or water shower keeps the temperature low.

4. Placement of the implant : The implant screw is placed and can act self-tapping,[20]otherwise the readied site is tapped with an implant simple analog. It is then screwed into place with a torque controlled wrench[21] at an exact torque so as not to over-burden the encompassing bone (over-burden bone can die, a condition called osteonecrosis, which may prompt disappointment of the implant to completely coordinate or bond with the jawbone).

5. Tissue adjustment: The gingiva is adapted around the whole implant to give a thick band of healthy tissue around the recuperating abutment. Conversely, an implant can be "buried", where the highest point of the implant is fixed with a cover screw and the tissue is closed to totally cover it. A moment system would then be required to reveal the implant at a later date.

TOOTH EXTRACTION AND IMPLANT TIMELINE:

A dental extraction which is also referred to as tooth extraction, exodontia, or sometimes informally called as tooth pulling is the removal of teeth from the dental alveolus (socket) in the alveolar bone. Extractions are performed for a wide variety of reasons, but most commonly to remove teeth which have become unrestorable through tooth decay, periodontal disease or dental trauma, especially when they are associated with toothache.

After extraction of tooth, the socket required to heal for a period of around 6 weeks to three months before a dental implant can be placed. In cases of large root sockets or where infections have caused cysts, it can take longer. The healing time varies from case to case.

- Immediately loaded implant are implant where the tooth is placed at the time of appointment given for extraction typically for an incisor, canine or premolar.
- Immediately loaded implants are only possible when conditions allow it – which is when there is good gum and bone support
- A dental 3D CBCT scan in the clinical assessment will determine whether this procedure can be done or not.
- After extracting the tooth or teeth, a socket preservation (a small bone augmentation) is sometimes necessary to safely and securely place the implant.
- A temporary acrylic crown is also placed in the same appointment.
- Once the implant is integrated – 3-6 months duration – the temporary crown is replaced with the final porcelain crown.
- Multiple extraction is possible and multiple implants are placed at the same appointment – with the goal of creating an implant supported bridge.
- Sometimes it may be possible to extract an entire jaw of teeth and place multiple implants in the same appointment – this is called teeth in day.

The installation of implants in extraction sockets was advocated as a means to (i) reduce the number of surgical procedures; (ii) to preserve the dimensions of the alveolar ridge; and (iii) to reduce the interval between the removal of the tooth and the insertion of the implant supported restoration.In most of the studies referred to in the reviews, bone substitutes were used to fill the marginal void between the implant and the bone, and barrier membranes were placed to protect the site during healing.

BEFORE EXTRACTION OF TOOTH CONSIDER A DENTAL IMPLANT:

The time to consider having a dental implant is before it is ever extracted. The bone will begin to shrink as soon as tooth is extracted. We cannot stop this from happening. For some it happens faster than others, but for most it only takes a couple of months to lose a

lot of bone. Generally, the bone loss can not be seen because it happens under the gum . The tooth can be extracted and an implant placed at the same time if the situation is ideal or very soon after the extraction. The old age "if you don't use it, you will lose it" applies to the bone in your mouth too! For example, If you stopped using your left arm entirely for a few weeks, it would shrink and become less functional. To regenerate its strength and function you may have to undergo physical therapy. Once a tooth is extracted, the bone that once surrounded that tooth is no longer stimulated by the force put on it when you chew. The bone shrinks due to absence of force and daily stimulation. Until an implant is placed, the bone shrinks very quickly and will continue to do so. Bone loss cannot be prevented by a bridge . A denture or partial accelerates bone loss.

The bone loss may be prevent prior evaluating the implant before extraction . By preventing bone loss, you will have saved your self money, reduced the need for a bone or gum graft, and decrease the treatment time considerably. The most esthetic results is also possible when preventing from bone loss. To make matters worse, even after removal of just one molar most of the time the other teeth will move and shift to its place. The teeth will initially start to tilt on top of each other which leads to opening up gaps and spaces.

TIME BETWEEN IMPLANT PLACEMENT AND TOOTH EXTRACTION:

The perfect timing for implant placement after dental extraction has been widely discussed in the literature, along with its advantages and disadvantages have been attributed to the different protocols, even though there is an increasing interest for shortening the overall treatment time and minimizing the number of surgical interventions. Late implant placement post extraction, which has a healing period of 6–12 months prior to implant placement has been traditionally considered the standard of care, because a fully healed ridge will ensure implant insertion in a stable ridge dimension, but the availability of the bone for implant placement may have been hampered by the resorptive changes occurring in the ridge after tooth extraction.

these potential drawbacks can be overecome, with distinctive alternative approaches which has been proposed, such as immediate implant placement at the time of extraction or early implant placement following a few weeks of soft tissue healing prior to implant insertion. At a recent consensus workshop, three different protocols were defined:

(i) Type 1 or immediate when the implant are placed in the same surgical intervention as the dental extraction;
(ii) Type 2 or early implant placement when implants are placed in the inital stages of healing (from 4 to 8 weeks); and
(iii) Type 3 or delayed implant placement when implants are placed when the ridge has healed (from 3 to 6 months).

IMMEDIATE IMPLANT PLACEMENT:

The placement of implants into fresh extraction sockets was introduced in the late 1970s.(13) This approach has been reviewed extensively during the last decade(14,15,16,17). The immediate implant placement protocol obviously results in shorter treatment time, utilizes all available existing bone in the ridge and may avoid the need for raising a flap. There are few probable disadvantages with immediately placed implants, such as:

(i) an increased risk of infection and associated failures if the socket is infected;
(ii) presence of a discrepancy between the surface of the implant and the socket wall with a need to combine with bone augmentation procedures;
(iii) the need to advance the flap to cover the implants in situations aiming for a submerged implant healing; and
(iv) an increased risk for compromised aesthetic outcomes.

To overcome some of these potential risks, the early implant placement protocol (type 2) has been proposed, as it may share some of the advantages of immediate placement, mainly by utilizing the socket walls before they become fully resorbed, but at the same time allowing primary healing after tooth extraction and thus achieving enough soft tissues in case of need for flap closure and reducing the risks for infection during implant placement. Moreover, to compensate the ridge alterations that always occur after tooth extraction which are mostly in the aesthetically relevant areas, tissue augmentation procedures with the use of either soft tissue grafts ,bone grafts and/or barrier membranes are usually required.

EARLY IMPLANT PLACEMENT:

Early implant placement is one treatment option for implant therapy following single-tooth extraction in the anterior maxilla. A simple surgical technique during early implant placement is characterized by extraction of tooth without flap elevation, soft tissue healing period of 4- to 8-week, a correct three dimensional position for implant placement, simultaneous contour augmentation on the facial aspect with guided bone regeneration using a bioabsorbable collagen membrane combined with autogenous bone chips and a low substitution bone filler, and tension-free primary wound closure. A case report should be presented with a step by step procedure. Along with this, the biologic rationale is discussed.

Another type of early implant placement protocol characterized by a 12 to 16 week delay of the treatment after tooth extraction; that facilitates implant placement and flap management by providing substantial bone fill of the socket and mature soft tissues respectively. The early implant placement protocols have been proven to have a low risk for mucosal recession, successful esthetic outcomes and good long-term stability of the established facial bone wall.[18,19]

The early implant placement protocol is specifically suitable mainly for augmentation techniques, as the soft tissue healing after tooth extraction has occurred and there is usually enough soft tissue coverage allowing for primary healing without the need of advancing the flaps. Whenever there is a need for bone augmentation, this protocol therefore has been advocated either because there are defects in one or more of the socket walls or to close the gap between the implant surface and the socket bone walls in

case of extensive discrepancies. In these situations, various types of bone regenerative technologies have been utilized such as autologous bone grafts, bone substitutes or guided bone regeneration (GBR) with resorbable and non/ resorbable barriers.

DELAYED IMPLANT PLACEMENT:

Post-extraction healing period of four to twelve months before implant placement was considered the standard of care in the late 80s because a fully healed ridge ensures implant insertion in a stable ridge dimension. Primary stability of an implant cannot be achieved, in cases where pathology has completely affected the socket integrity, or limiting anatomical structures are difficult to avoid, waiting for complete healing of the site may still be the treatment of choice. However, in many of these cases due to the resorptive changes after tooth extraction; the bone availability for an implant to be placed in an optimal 3D implant position may not always be ideal, therefore regenerative procedures may be required.

DELAYED VS IMMEDIATE IMPLANT PLACEMENT:

Deciding between immediate versus delayed implant placement hinges on establishing whether ideal peri-implant tissue architecture currently exists and can be maintained or whether tissue deficiency indicates a need to first optimize tissue architecture.

The aim to preserve favorable tissue architecture and prevent tissue collapse have following approach that include atraumatic extraction, immediate implant placement, flapless surgical approaches, and immediate support of facial and interproximal architecture. Grafting thin gingival biotypes, helps in preserving existing architecture which are prone to recession, at the time of implant placement. Injectable fillers show promise in helping to further preserve the contours of the interdental papillae during the transitional phases of reconstruction. Neither implant size nor position should encroach on the buccal or interproximal osseous architecture, as encroachment can lead to bone loss and subsequent soft-tissue loss. Exaggerated prosthetic contours must also be avoided, as they can negatively impact soft-tissue contours.

Increased challenges in preserving osseous and tissue architecture is possessed when more than two adjacent teeth is lost Use of an alternative approach to extraction, implant placement, and reconstruction that avoids simultaneous extraction of adjacent teeth can provide greater control. With such an alternative approach, tooth extraction, implant placement, and provisionalization are completed on one site before proceeding with similar procedures on an adjacent site. Treatment approaches should strive to reestablish ideal tissue contours prior to implant placement, when the preoperative gingival or osseous architecture is suboptimal. orthodontic extrusion and hard- and soft-tissue grafting is included in treatment approaches. Delayed implant placement is preferable where osseous augmentation is required. . Collapsed tissue architectures best approached prior to implant placement but it remains challenging to recreate.Ultimately, clinicians must strive to preserve tissue architecture with proven techniques and employ augmentation procedures as required. When approaching the replacement of failing teeth with implant-supported restorations, Pre-surgical planning and meticulous execution of treatment protocols remain paramount importance.

TIMING OF IMPLANT PLACEMENT AFTER EXTRACTION :

Evaluation of patient fulfillment has turned into a vital issue in implant dentistry, as it decides general implant achievement. In the present examination, an altogether higher subjective patient fulfillment rate following .IIP was affirmed contrasted and all other embed conventions. This isn't astonishing, as a more extended mending time before prosthetic reclamation of the implant is viewed as a noteworthy disadvantage by patients.[20]A correlation of patients' mentalities towards right on time and deferred implant conventions supported the previous regarding tolerant satis-group with the general implant treatment. Be that as it may, this distinction couldn't be affirmed after 5 years.[21] Patients inclination for IIP may be clarified by the mental desire of quick tooth Replacement with prompt aesthetics,[22,23] and additionally diminishment of dreariness and surgical interventions.[24] Despite every one of the benefits of this implant convention, it conveys an expanded danger of implant disappointment in the event of quick stacking, particularly in the maxilla.[25,26] Although patients seem to acknowledge an implant disappointment rate of 10% if there should be an occurrence of constant temporisation,[27] it is basic to have earlier dialogs that cover every single potential hazard, for example, implant disappointment, hindered papilla nearness, midfacial retreat, and staining. On the off chance that patients are furnished with practical desires, this will bring about enhanced subjective satisfaction.[28,29]

SAME DAY DENTAL IMPLANT:

There are three sections to the methodology that the dental specialist needs to consider in making this treatment effective, which incorporates how you will look with your new tooth in the early mending stage. They are:

•Removal of the current tooth or root;

•Simultaneous arrangement of the embed, which will end up being the root some portion of the new tooth;

•Placement of a crown, which will end up being the piece of the new tooth you find in your mouth that sits on and associates with the embed.

There are various issues and ventures to consider. Above all else, it is very important that your broken tooth is evacuated painstakingly with the goal that the tooth attachment — the bone that backings the tooth — isn't harmed. It will end up being the receptor site for the dental embed. On the off chance that any bone from the dividers of the attachment is harmed or lost, it could prompt unattractive gum subsidence or the likelihood of ending the technique as opposed to hazard a poor outcome.

Furthermore, it is basic to put the embed so it is steady and non-versatile in the bone. The bone around an embed mends by intertwining to the embed's particular titanium surface by a procedure called osseointegration. The tooth attachment of an upper front tooth is cone-molded, and for the most part the best way to balance out an embed is to enter the peak of the attachment and

append it deep down here. It's relatively similar to setting a screw into a formerly penetrated wooden gap that is too extensive; the best way to settle the screw is by drawing in the wood past the screw's unique length and width. Be that as it may, when the embed is legitimately and painstakingly put, the bone will develop, crossing the rest of the hole, and recuperate by melding to the embed. Picking the right-sized embed for this circumstance and ensuring that it is put in precisely the correct position are both basic to success.[30]

The position of the embed is additionally critical keeping in mind the end goal to enable a crown to be connected to it so it will look similar, and will give a legitimate shape and format around which gum tissues can recuperate without contracting. The embed must be put with the goal that it is covered precisely the appropriate sum underneath the gum tissues and beneath the surface of the bone for legitimate development of the crown through the gum tissues so it will resemble a consummately characteristic tooth.

The crown will be appended to the embed in one of two ways: either specifically, or in a roundabout way by means of a projection a go-between part to which the crown is established. The projection can likewise be utilized to make a difference in angulation for the crown to rise through the gum tissue with a more characteristic appearance. To keep the promptly set embed extremely steady, it is important that the recently joined transitory crown is free from gnawing powers, which could dislodge the embed. Indeed, even small scale development amid the initial two months of arrangement can bring about non-combination and disappointment of the embed to connect to the encompassing bone. The crown is normally temporary in nature and made of a composite tar, which can without much of a stretch be changed or altered to guarantee that it is both useful and corrective. Once the embed is completely combined and incorporated with the bone, the brief crown can be expelled and supplanted with a lasting one.

CONCLUSION:

The perfect timing for implant placement after dental extraction has been widely discussed in the literature, along with its advantages and disadvantages have been attributed to the different protocols, even though there is an increasing interest for shortening the overall treatment time and minimizing the number of surgical interventions. The aim to preserve favorable tissue architecture and prevent tissue collapse have following approach that include atraumatic extraction, immediate implant placement, flapless surgical approaches, and immediate support of facial and interproximal architecture. Sufficient alveolar bone volume and favorable architecture of the alveolar ridge are essential to obtain ideal functional and aesthetic prosthetic reconstruction following implant therapy.

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