



Comparison between Immediate and Traditional Dental Implantation Methods: an Overview on Surgical Success and Failures."

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Abstract

Background: An immediate dental implementation proved to be beneficial on the classic method, however, immediate this method may also lead to a higher implant failure. **Objective:** to compare the negative and positive between immediate and traditional dental implantation methods. **Methods:** a systematic search was conducted peer reviewed publications of any research of immediate and traditional dental implantation methods via Medline, PubMed and Google scholar. Studies were included in the overview based on study characteristics, design and findings. **Results:** the negative and positive between immediate and traditional dental implantation methods were presented including the indications, contraindications, and limitations. **Conclusion:** evidence available indicates that the immediate dental implantation method has been studied extensively and proved as a successful procedure that may benefit patients. However, careful considerations are needed to ensure implant success and final esthetic outcomes. **Recommendations:** further researches should investigate the predicted factors that make both immediate and traditional dental implantation methods fail or success.

Keywords: *Immediate dental implant, traditional dental implant, comparison, success.*

I. INTRODUCTION

Dental implants are a common treatment for teeth loss. Over the past three decades, there has been a rise in the utilisation of dental implants for the purpose of tooth rehabilitation [1]. Implants need stringent inclusion criteria and intricate, interdisciplinary treatment planning, despite their growing popularity [2]. Immediate dental implementation procedures appear to require a high degree of primary implant stability (high value of insertion torque). According to the most recent RCTs, immediate implantation can be a predictable operation with good survival rates. The two main benefits of immediate dental implant are eliminate the number of operations required and a shorter total treatment duration [3]. Furthermore, immediate loading of implants inserted at the time of tooth extraction may increase patient satisfaction. However, there is still debate over the clinical and aesthetic results of immediate planting in comparison to alternative methods. When compared to traditional implant placements, immediate dental implantation is becoming more appealing because it requires fewer surgical procedures and enables quicker delivery of the finished restoration [4].

A classic 3-unit, cantilevered, resin-bonded fixed partial denture or a detachable partial denture are examples of traditional restorative solutions that may be too damaging or difficult for the patient. In these cases,

implants are an appealing therapeutic option for single tooth replacement [4]. Immediate planting become a more attractive alternative for patients and dentists due to the rapid planting that requires fewer surgical operations and therefore shorter treatment times. However, successful immediate dental planting is not always guaranteed [5]. Unsuccessful immediate dental planting can be classified into four main reasons: mechanical, biological, iatrogenic, or poor patient adaption requiring implant removal. Osseointegration-related biological problems fall into two categories: early and late loss, based on whether the loss occurred prior to or following implant loading [6]. There is limited research on which implant method more successful; the immediate or the traditional dental implants that might affected by different independent predicted factors. Since there is no consensus definition of "success, it is challenging to compare the success of various implant insertion techniques.

II. Methods

2.1 Search Strategy

A systematic search was conducted peer reviewed publications of any research of immediate and traditional dental implantation methods via Medline, PubMed and Google scholar. Studies were included in the overview based on study characteristics, design and findings. Studies were then reviewed carefully with an attempt to offer suggestions that clinicians could use as guidelines. For additional inclusions into this study, the reference list from the included studies was additionally screened. To choose the studies that would be included in this review, the PICO strategy that follows was designed. Participants: Individuals needing a single implant in the maxillary and mandibular regions. Intervention: Using the immediate and the traditional implantation approach. Comparison: Single maxillary and mandibular tooth replacement using delayed implant treatment protocols. Outcomes: Implant survival, implant failure, and the reasons for failure.

2.2 Study Selection

After the initial electronic search of titles, the abstracts of all the studies identified through online searches and were independently scanned. Next, the selected abstracts were reviewed to determine selection of full-text manuscripts when applying the inclusion criteria. Thereafter, the full texts of all studies of possible relevance were obtained for independent reviewed and assessed. Disagreements among researcher were resolved by discussion. All studies meeting the inclusion criteria were underwent for data extraction.

2.3 Data Extraction

The data were independently extracted by authors and any discrepancies between the authors opinions were resolved by discussing the articles and consensus after consultation with other researchers. The implants in the included studies were grouped into 2 categories based on implant placement and loading protocol: immediate implanting and traditional implanting, the immediate implanting divided into four groups included "immediate placement and immediate loading; immediate placement and immediate restoration with a non-occluding provisional crown; immediate placement and delayed restoration", which includes both early and conventional loading, and delayed placement, regardless of loading technique.

III. RESULTS

3.1 Types of dental implant

3.1.1 Trans-osteal

Another name for these implant kinds is mandibular staples. When a patient has extensive resorption, it is utilised to support a mandibular denture. It's a lengthy and intricate surgical process. Both intraoral and extraoral incisions are necessary for the implantation and stabilisation of this kind of implant. A metal plate is affixed to the mandible using screws that pass through the jawbone and become implanted in the gingival tissue to complete the treatment [7]. This type very rarely used because it conducted as invasive.

3.1.2 Subperiosteal

Implants of this kind are positioned in mouths that have undergone significant bone resorption or atrophied jaw tissue. Overlying the bony cortex, it is positioned beneath the periosteum. The metal framework allows the metal posts, which are required, to protrude over the gingiva. These implants have a low success rate and need a time-consuming operation. Post-surgical scarring could also be the outcome. [8].

3.1.3 Endosteal

These implant kinds engage the endo-cortex by fixation and are fixed into the bone. This kind enters the jawbone through the alveolar or basal bone and replaces the root with blades, screws, or cylinders, indicating that the implant is fully buried deep below the gingiva in the jawbone. [7]. Usually constructed of titanium, they are inserted into the mandible's alveolar and basal bones as well as the maxilla. Additionally, it is the most widely utilised kind of implant [9].

3.2 Comparison between immediate and traditional dental implantation

Each of the immediate and traditional implanting methods have advantages as well as disadvantages. Many factors including implant surface, performance of the dental implant, bone quality and quantity, medical status of the patient should therefore be assessed after implant placement. In terms of aesthetics and patient satisfaction and maintaining alveolar height, immediate implantation was better than delayed implantation. On the other hand, studies related to immediate implants, especially if followed by immediate loading had more failure rate [10]. The difference that the mentioned studies considered immediate implant and immediate loading more successful in the anterior of the mandible, but in the studies included in this meta-analysis, this method was also evaluated as successful in the posterior the mandible and maxilla. Different views were previously expressed on placement of implants after tooth extraction, which means that immediate implantation is a more complex treatment and delayed implants allow for better primary stability and better prosthesis placement. However, around 30% of immediate implants cases are aesthetically pleasing to patients, and survival rate of immediate implants are high and comparable to those in a recovered ridge [11]. For implant aesthetics, a critical assessment of the levels of hard and soft tissue, the smile line, and the bone and gingival architecture are crucial [12].

Despite the clinical benefits of the implant method for tooth replacement, the long-time-interval between tooth extraction and the implant is considered a disadvantage and may influence the decision to choose this treatment modality. In addition, immediate dental implant resulting in higher rate of implant failure, an inability to forecast future soft and hard tissue levels, and challenges with instability of the implant. [12]. Immediate loading of dental implants can be problematic due to the presence of infection at the implant site, and the treatment protocol needs further and more detailed investigation in these cases. Besides, achieving primary stability in immediate loading of dental implant is the most important success factor. Immediate loading procedure also should not be done, especially in cases where the buccal bone defect has reached the crest area (**Table 1**). Because in these cases it is necessary to use a bone graft with a membrane on the surface of the ridge and the prosthesis can no longer be placed on the surface of the implant. Another concern is the placement of the prosthesis in the occlusion. It is recommended that in an immediate implant, all the effort should be made to keep the temporary prosthesis out of the occlusion in all movements [13].

The use of immediate loading of implants to reduce post-implantation recovery time has been suggested in many studies; thus, if initial stability is provided, the success rate of this treatment modality is comparable to the standard method of implant placement (**Table 2**). Immediate loading can be defined as the process whereby a prosthesis is attached to the implant within 24 hours after its placement. It is a one-stage surgery procedure meaning the patient would not need to wear a removable prosthesis during the initial healing phase [14]. This therefore allows the patient increased comfort, improved speech, faster masticatory function, and better aesthetics, which may then be restored earlier especially when it involves the anterior or aesthetic region [14]. The remarkable results of these studies led to further research on reducing treatment time in multi-unit and then single-unit implants restorations in the maxillary sites, and finally led to the introduction of immediate loading using a temporary prosthesis in a single maxillary implant. In addition to reducing treatment time, another

important advantage of immediate loading of dental implants is the preservation of soft and hard tissue, because the surgery and loading process is done in one session.

Table 1 The advantages and disadvantages of immediate dental implant.

No.	Advantages	Disadvantages
1	Avoid additional surgery	Risk for higher implant failure
2	Shortened treatment time	Unpredictable hard and soft tissue levels
3	Reduce period of edentulism	Difficult implant stability
4	Preserve hard and soft tissues	Bone graft/membrane often needed
5	Psychological benefit	

Table 2. Comparative between immediate and traditional dental implant.

	Time	Number of surgeries	Using antibiotics	The level of Implant stability	Bone resorption	Soft tissue profile
Immediate implant	At extraction	2	Required	Challenged	Less	Less residual
Traditional implant	4-6 months after extraction	3	Not needed	Without problem	More	More residual

IV. DISCUSSION

It can be problematic to place dental implants immediately into a chronically infected socket and considered as a contraindicated [15]. However, an implants that are placed immediately in areas with persistent periapical lesions can still be successful and lead to an uninfected site [16]. According to current consensus, as long as the infection is eradicated and implant primary stability is attained, implants can be successfully positioned at the time of extraction at peri-apical lesion sites [17]. Furthermore, there are Four classifications based on the soft tissue profile and buccal bone features indicating or restricting immediate dental implantation [18]. The guidelines for prompt dental implantation and the interval between extraction and implant implantation were supplied by this four-class classification [19]. This classification system bolsters the notion that hard and soft tissue factors play a significant role in the decision-making process when deciding whether to contemplate immediate implant implantation [20]. Class 1 has intact buccal bone with thick bio- type and indicated to have optimal results with immediate placement without flap reflection. Class 2 has intact buccal bone with thin biotype and indicated to have good results with immediate placement with connective tissue graft procedure. Class 3 has deficient buccal bone within the alveolar housing and indicated to have limited and acceptable result with im- mediate placement with guided bone regeneration plus connective tissue graft. Class 4 has deficient buccal bone deviating from alveolar housing and not indicated and unacceptable for immediate placement, delayed approach is recommended [20]. It is generally acknowledged that the uncertain nature of hard and soft tissue healing makes immediate implant placement challenging (**Table 1**). In order to prevent treatment failures and aesthetic issues, careful case selection is essential. Therefore, in order to prevent misunderstandings in the future, it is crucial to clarify with patients the risks, benefits, and restrictions of quick implant installation.

Traditional implant can be defined as the loading time when a prosthesis is attached after a healing period of 3-6 months [21]. Moreover, the original Branemark dental implant placement protocol called for six to eight months of healing after extraction, sterile conditions using a muco-buccal flap, and the placement of machined titanium

implants in two stages (**Table 2**). It also called for three to six months of stress-free healing for osseointegration to occur and the prolonged use of a temporary removable prosthesis [22]. This could be deemed as a

disadvantage, as treatment time is extended, and patient discomfort is prolonged. It is usually a two-stage technique and the rationale for conventional loading is to ensure that the implant remains in an undisturbed environment throughout the healing phase [23]. However, in the traditional method, 2 to 3 sessions of surgery are required, which causes additional trauma to the soft and hard tissues (**Table 2**). Traditionally dental implants were placed into healed sites with a two stage approach; conventional implant placement, however this came at the cost of increased length in treatment time and multiple surgical procedures to patients [24].

There are many factors, which has been recognized for the successful performance of dental implants one of which includes biocompatibility [25]. This does not involve the compatibility of the material with the tissue only but also the ability to perform a specific function. This therefore means that biocompatibility is not only dependent on the physical, chemical, and mechanical properties of the material but also on the application in which it is used [26].

When placing implants in extraction sockets immediately, there are five diagnostic factors for predictable single tooth peri-implant aesthetics: tooth position relative to the free gingival margin; form of the periodontium; biotype of the periodontium; tooth shape; and position of the osseous crest prior to tooth extraction. Three of the five factors involved hard and soft tissue components [27]. Therefore, when considering immediate implant placement, a careful analysis of the aforementioned factors is critical to determine if the patient has the right diagnostic factors to allow for predictable success. The surgical approach for an immediate implant approach is nearly identical to the delayed approach, with the exception of the immediate implant placement and consideration of implant shift. In line with earlier studies, the majority of them indicated implant failure prior to the placement of the ultimate prosthesis, with osseointegration failure being the primary cause. A metal device tapping an immediate or traditional implants can equally produce sound, radiolucency between the implant and bone, and clinical mobility of the implant are common indicators of osseointegration failure. The most common causes of osseointegration failures include overloading, micromotion, trauma and contamination from surgery, overheating, and lack of primary stability. This has also been linked to iatrogenic complications, mobility following initial loading, and infection abscess. All in all, it is preferable to provide a non-occlusive temporary restoration on the same day as implant insertion so that the patient doesn't have to go without a tooth during the healing process and the implants aren't overloaded.

V. CONCLUSION

Immediate implant failure did not differ between surgical techniques that were guided and those that were not. Immediate implant failure was not impacted by the location of maxillary or mandibular implants. While there were higher differences in the failure rates of the tested implant methods, the differences were not evident.

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