

Fabrication of a Fixed Provisional Implant Restoration A Report of Three Cases

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Abstract - A clinical problem for patients with posterior partial edentulism who are going to be treated with dental implants is provisionalization during the period of soft and hard tissues preparation, the period of osseointegration and construction of the final restoration. Up to now, the available solutions were either the construction of a removable prosthesis or immediate loading of implants. The purpose of this article is to present an alternative technique for fabricating a fixed provisional restoration in patients with posterior partial edentulism. It is referred to as a teeth-tissue supported restoration which retention and support is provided from prepared or unprepared teeth while support also is gained from the maxillary tubercles or the retromolar pads of the upper and lower jaws.

KEY WORDS: posterior edentulism, transitional prosthesis, implants, maxillary tubercle, retromolar pads

INTRODUCTION

Implant-supported fixed restorations have been a popular and predictable treatment option for edentulism, since long term studies have demonstrated that dental implants can be used successfully for the rehabilitation of partial or fully edentulous jaws¹⁻⁵. For several years, submerging dental implants during the healing period was a prerequisite to obtain implant osseointegration. It was believed that micro-movement of implants at the bone-implant interface, due to functional forces, could affect healing and induce the formation of fibrous tissue rather than bone. This leads to a clinical failure^{6,7}. In addition, submerging an implant was thought to be necessary in order to prevent infection and epithelial down-growth^{6,8}. A 3 to 6 month healing period was usually recommended for dental implants to achieve osseointegration before the second surgical procedure and prosthetic rehabilitation.

Recent studies showed that non-submerging dental implants did not cause any problem to the soft tissues or to the bone-implant interface when the patient had an optimal oral hygiene and that submerged and non submerged implants could osseointegrate with similar success under certain loading protocols^{9,10,11,12}.

One of the most problematic and time consuming issues in implant dentistry, however, remains the provisionalization of patients during the healing phase¹³⁻¹⁶. In case of small edentulous areas a resin bonded fixed partial denture is the treatment of choice or even a classical fixed partial denture when the adjacent teeth are or have to be prepared¹⁷⁻¹⁹. The problem becomes greater in cases of patients who are treated with implants for posterior partial or full edentulism. In such situations, in order to restore the functional and aesthetic demands one of the following modalities can be used.

- 1) Placing more implants than optimal and using some of them as abutments for the transitional prosthesis while allowing the others to heal undisturbed^{1, 20-24}.
- 2) Immediately loading of all implants^{1,20-24}.
- 3) Constructing of a removable partial denture.

However this solution is questionable when a regenerative technique such as bone grafting is necessary. In such cases, especially when membranes are used it is essential for the surgical field to be completely free of any pressure or movement for prolonged periods of time. This is close to impossible when a removable prosthesis is used.

The aim of this study is to describe a provisional restoration for patients with posterior partial edentulism that does not load implants and/or soft tissues. It concerns a tooth-tissue supported restoration for which support is gained from prepared or unprepared teeth and the maxillary tubercles or the retromolar pads of the upper and lower jaw. This kind of restoration consists of a metal framework, which is luted on the remaining teeth on the lingual or palatal surface when these are unprepared or by covering them in cases when they are already prepared. In the posterior areas it lies on soft tissue either of the maxillary tubercles or of the retromolar pads. Heat or light cured acrylic resin is added to the framework in order to fabricate the restoration^{25,26}.

Uses of provisional prosthesis

The predictability of endosseous implants in the oral cavity has been well documented^{27,28}. If the implants are allowed to heal in an undisturbed fashion, bone will attach to the titanium surface achieving osseointegration. Animal studies and patient case series have revealed that under certain circumstances implants can be placed into function immediately at the time of insertion before osseointegration starts in order to minimize the delay between surgical and prosthetic phases^{1,6, 20-24,29,30-32}.

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The need for immediate loading of dental implants rose from the demands of patients who wanted a fixed restoration at the time of implant placement in order to have optimal function, stability, aesthetics and comfort^{29,33,34}. These assumptions are covered by the provisional restoration that will be described, making it an excellent alternative in cases when immediate loading is not advisable.

Such a restoration can be used in the following cases:

Case A. When there is a number of anterior teeth that are not to be extracted and have to be prepared.

Case B. When there is a number of anterior teeth that are to be extracted, do not occupy ideal positions for implant placement and can be used for a short period of time.

Case C. When there is a number of anterior teeth that are not to be extracted and do not have to be prepared. These teeth will be utilized through bonding lingually in order to offer retention to the rehabilitation.

Provisional technique

To all patients that are candidates to receive this type of provisional, full arch impressions of the maxillary and mandibular jaws are made and casts poured in die stone. Face bow and centric relation records are made and the initial casts are mounted on the articulator. Wax up of the missing teeth is done or denture teeth are set up. Then, an occlusal and labial index from silicone material is fabricated from the cast where the final restoration will be constructed²⁶.

In **case A**, the teeth are prepared and final impression is made taking care to compress the soft tissues of the maxillary tubercles or the retro molar pads. For the impression, a custom tray is used with polyvinyl siloxane or polyether impression material. The master cast is mounted using centric relation records and the silicone index is secured on it. The metal framework follows the lingual or palatal side of the prosthesis²⁶, leaving adequate space for the acrylic resin facially, in order to accommodate relines, as tissues heal subsequent to surgical procedures. Care is taken so after second stage surgery placement of healing abutments does not interfere with the metal framework. Additionally, the metal framework surrounds the prepared teeth like a ring, leaving a space at the cervical area, which is relined with autopolymerising resin intraorally. As mentioned, it should cover the maxillary tubercle or the retro molar pads. Resin is processed on the framework with the aid of the silicone index. (Figure 1, 2, 3)

In **case B** the teeth with questionable prognosis are prepared. The design of the metal framework and prosthesis does not differ from the first case but the abutment teeth are extracted before final restoration is fabricated. (Figure 4, 5, 6)

Finally, in **case C** the only difference is that the metal framework lies to the lingual or palatal part of the remaining anterior teeth like a Maryland type fixed partial denture and of course on the maxillary tubercles or the retro molar pads. This cast metal framework has to be cemented with dual polymerizing resin cement and can be either perforated or not³³. The perforations allow for easier removal of the framework when needed. (Figure 7, 8, 9, 10, 11)

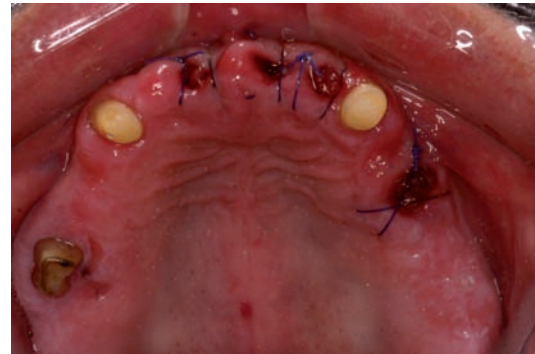


Figure 1. After extractions of several teeth. The two canines are not to be extracted



Figure 2. (Provisional prosthesis before cementation)



Figure 3. Provisional prosthesis in the mouth



Figure 4. Provisional prosthesis before cementation. The two canines are to be extracted



Figure 8. Working cast



Figure 5. (Working cast)



Figure 9. Intraoral situation before cementation of prosthesis



Figure 6. Provisional prosthesis in the mouth



Figure 10. Silicone is used to check if there is any pressure to soft tissues



Figure 7. (Provisional prosthesis before cementation)



Figure 11. (Provisional prosthesis in the mouth)

DISCUSSION

These teeth-tissue supported restorations are a very good solution and provide significant advantages. First as mentioned above, dental implants are not loaded because the gingival surface of the prosthesis does not put pressure on the soft tissues where the surgical procedure took place. This is more important in cases that a regenerative technique was used as mentioned. So, this kind of restoration leaves the soft and hard tissues to heal undisturbed, minimizing postoperative problems and increasing survival rates of the implants³⁵. Another advantage is that the patient does not have to use a removable provisional restoration, thus increasing prosthesis acceptance. The patient's psychology improves, as both function and esthetics are at least maintained^{34,36}. Finally the time spent for repairs of the restoration as a result of fracture is minimum because of the metal framework.

On the other hand there are certain drawbacks, as well. Mechanically, the provisional prosthesis may act as a cantilever, causing irreversible damage to the retaining teeth. To avoid such problems precautions should be taken. Bonding of the restoration is done with the patient occluding firmly, so the metal plates are pressed against the soft tissue. This reduces the inherent difference in mobility among teeth and periodontal tissues. Occlusion is adjusted in such a way, so in centric occlusion teeth are contacting up to the second premolar and in lateral movements there are no posterior contacts. Rotation due to cantilevers is minimized and teeth anterior to the last bonded tooth provide adequate antirotation. If these actions are not successfully achieved debonding may be frequent so care should be taken in readjusting the provisional, thus the patient should be recalled often^{16-19,33}. Finally, the laboratory procedures are more complicated. So far our team with very promising clinical performance has placed more than 100 such temporary restorations. Clinical studies are also on the way in order to analyze the performance variables of these provisionals.

CONCLUSION

This article presents a technique for fabricating a fixed provisional restoration with a metal framework. Nowadays, successful treatment with dental implants requires the use of a functional and esthetic provisional prosthesis that protects the surgical outcome as well. This kind of restoration can easily be transformed into a fixed provisional implant restoration using temporary implant abutments or big healing abutments when osseointegration is completed. Initial in vivo outcomes show promising clinical performance and minimum problems as these prostheses do not seem to be involved in an increasing mobility of the teeth as a result of higher load that these have to face to. In contrast, in a healthy periodontium, splinting of the teeth in such restorations can improve the mobility under a suitable occlusal scheme.

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