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Provisional Restorations - A Key to Aesthetic and Functional Perfection in Implant Dentistry - An Overview.

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ABSTRACT

The phase of provisionalisation can be the most challenging aspect of implant dentistry. The techniques available today include various options ranging from removable, tooth-supported provisionals, to implant-retained provisional restorations. The selection of the type of provisional prosthesis should be based on esthetic demands, functional requirements, duration, and ease of fabrication. This article gives an insight into the various options available for implant provisional fabrication and discusses the merits and demerits of each of them.

Keywords: implant, dentistry, aesthetic, functional

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INTRODUCTION

One of the most important yet overlooked aspects of implant dentistry is the provisionalisation phase. Unlike their use in conventional tooth supported fixed prosthetics, provisional restorations during implant therapy have been underutilised [1]. A well fabricated temporary acts as a prototype and blue print for the final prosthesis [2]. It acts as a key link for the functional and esthetic outcome of the final restorations.

By definition a provisional restoration is prosthesis designed to enhance esthetics, provide stabilisation and /or function for a limited period of time, and should be replaced by a definitive prosthesis after a period of time [3].

A removable prosthesis consisting of an existing or newly constructed removable partial denture is the most commonly employed provisional restoration. However, wherever possible a fixed option having no contact to the soft tissues may be more beneficial for implant integration and soft tissue maintenance [1].

The purpose of this article is to focus on the importance of provisional restorations and to review the various options for provisional restorations available in literature presently.

Requirements of an implant provisional [1]

A provisional restoration should

- Not interfere with the healing process which is very critical in implant success and Osseo integration.
- Not lead to any micro movement of the implant and grafted site.
- Restore and enhance esthetics
- Provide stable occlusal contacts and maintain arch integrity.
- Allow for satisfactory phonetics
- Act as a blue print for the final restoration
- Act as a diagnostic aid in planning the position of the implants prior to surgery
- Preserve the soft tissue morphology
- Act as a communication tool regarding the shade, shape and contours of the crown between the clinician and the laboratory
- Act as a guide for the patient to visualise the end result and thus assist in acceptance and/or guidance in modifications needed in the definitive restorations.

Classification of Implant Provisionals

Implant provisionals can be classified based on various criteria:

1. Based on the type of prosthesis

a. Removable – using a pre-existing prosthesis

- Existing acrylic partial dentures

b. Removable- Newly fabricated

- Acrylic partial dentures
- Essix appliance

c. Fixed tooth supported

- Bonded extracted teeth
- Bonded acrylic/Porcelain tooth
- Resin bonded prosthesis
- Arch wire supported

d. Fixed implant supported with and without transitional implants

2. Implant supported provisionals are further classified based on various criteria

Based on the time of fabrication

a. Immediate provisionalisation
b. Delayed provisionalization

Based on the method of fabrication

a. Chair side
b. Laboratory fabricated

Based on mode of retention

a. Cement retained
b. Screw retained

Based on replacement

a. Single tooth provisionals
b. Provisionals for short span fixed partial dentures
c. Full arch provisionals

Based on use

a. Long term provisionals
b. Short term provisionals

Based on loading protocol

a. Functional provisionals
b. Non- functional provisionals

Based on the type of prosthesis

Removable implant Provisionals

Removable partial dentures are routinely used to act as implant provisionals. Simplicity of fabrication, less cost are the most obvious advantages for choosing this type of provisional restoration. However, they may place undesirable pressure on the graft sites endangering healing process [4-6].

Using an existing prosthesis offers the advantage of being a transitional solution which is already aesthetically and functionally acceptable to the patient. However if the prosthesis is ill fitting and unstable, it may not only compromise with function, but also impinge on to the soft tissues applying undesired pressure onto the surgical site. This may prove detrimental to the final implant survival [7].

Fabricating a new partial denture may overcome the problems caused due to instability, however if the support is being provided by the underlying soft tissues, the problem of interference with healing continues to persist. Moreover, the use of a removable partial denture is not readily accepted by the patients due to its bulky nature, interference with speech and impingement onto the soft tissue. (Fig 1 and Fig 2)

Trying to fabricate an interim removable partial denture with passive or no tissue contact may necessitate an unsightly gap between the ridge and the neck of the teeth compromising esthetics.[4] The removable partial dentures fail to facilitate soft tissue contouring, except in rare cases where ovate pontics were incorporated to provide soft tissue healing [5,8].

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Figure 1: Partial Denture being inserted intra-orally

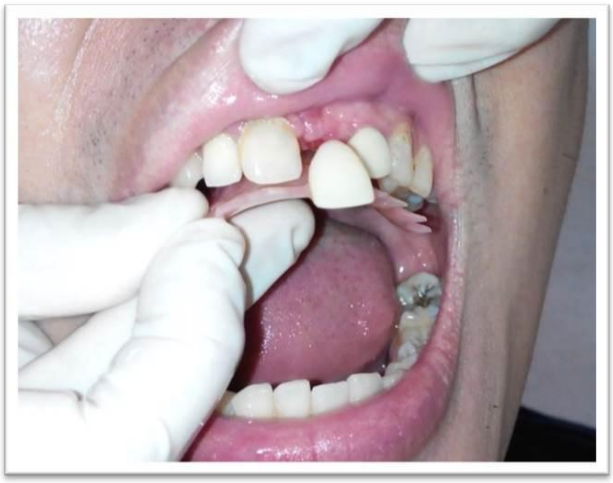

Figure 2: Partial denture as implant provisional

Essix appliance [9,10] is an alternative to the removable partial denture and is made from clear thermoplastic sheet bonded to acrylic teeth acting as pontics, on the cast of the diagnostic wax up. The advantage of this appliance over the interim acrylic partial denture is that it is tooth borne and exerts no pressure on the surgical site. It is indicated in cases where there is limited inter occlusal space or deep anterior overbite [1] (Fig 3, Fig 4 and Fig 5).

Figure 3: Essix appliance made with thermoplastic sheet

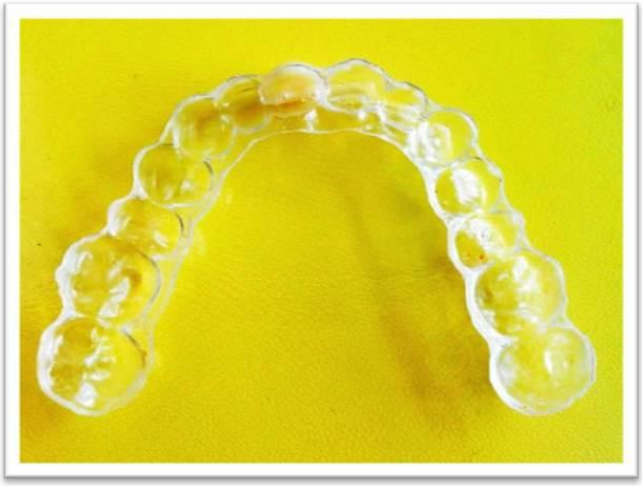

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Figure 4: Essix appliance being inserted intra-orally

Figure 5: Essix appliance as implant provisional

This type of provisional restoration is not indicated for a prolonged use as it may exhibit wear and also may be uncomfortable to the patient owing to the coverage of the remaining teeth [7].

Fixed Implant Provisionals

Tooth supported Provisionals

Extracted natural teeth and denture teeth may be bonded to the adjacent etched tooth surfaces using composite resin, which can be satisfactory implant provisionals [11]. Arch wire and brackets can also be used to attach a pontic and serve as a temporary restoration. The arch wire can be removed and reattached between the different surgical and prosthetic phases [1].

Cast metal reinforced resin bonded fixed prosthesis can be used to serve as a provisional in certain cases [6,12]. However, poor esthetics, frequent de-bonding and preparation of the adjacent teeth make it an unreliable procedure. If teeth adjacent to the surgical site require complete coverage restorations, fixed partial dentures seem to offer a more predictable outcome without interfering with the surgical site [7].

Sang choon cho [7] quoted Perel [13] who suggested retaining periodontally involved hopeless teeth to support a provisional FPD during healing phases of the implant. These abutments with poor prognosis can be extracted after the integration of the implants and the prosthesis can be converted from a teeth supported provisional to an implant supported provisional restoration. This technique is often used in a full arch situation, where patient's dentition is periodontally weak and has poor prognosis [1].

Transitional implant supported provisional [14-16]

In cases where tooth support is in adequate and extended edentulous areas are present, to avoid trans-mucosal loading of the implant site, transitional implants are placed to serve as a support for provisional prosthesis. These implants are also used to retain complete mandibular dentures during the healing phase. The major advantage of these implants is that they can be immediately loaded. Once the integration of the implants is complete the transitional implants are removed and the prosthesis is converted into implant supported prosthesis. The major disadvantage of using transitional implants is that they cannot be used if the available bone is less than 14mm or the cortical bone is not sufficient enough to provide stabilisation. Also excessive loading may lead to fracture of these implants. They may also interfere with normal integration of the actual implants when placed in close proximity to them.

Implant Retained Provisional Restorations

Based on the time of fabrication

Though the traditional branemark protocol suggests an adequate healing period before fabrication of a provisional,(delayed provisionalization) the present literature aims at immediately restoring the edentulous span using immediate provisionals. However, certain indications and contraindications should be followed to decide the same.

Michael Block el al have suggested certain diagnostic criteria for selecting immediate provisionalisation for a patient [17].

- Sufficient bone height, width and density for stability of the implant at the time of placement.
- Minimum of 20N-cm implant insertion torque needed for immediate provisionalisation.
- Sufficient mesio-distal, bucco-lingual and inter occlusal space for placement of an anatomic restoration. If space is less than 6mm, or the opposing dentition interferes with the provisional, immediate provisional is not indicated.
- Patients with heavy biting force or Para functional habits are not ideal candidates for immediate provisional restorations.

The advantages of placing an immediate provisional are

- Patients prefer to have as few surgeries and dental appointments as possible which can be achieved by giving immediate provisionals.
- Chair side time for time for the dentist and the patient is less when the provisional is fabricated prior to implant placement.
- Helps to establish an adequate soft tissue profile

Based on method of fabrication

Depending on whether the provisional is fabricated by the direct or indirect technique, the techniques are classified as chair side or laboratory methods. Robert David[2] reported a chair side technique using an acrylic denture tooth fixed to a screw retained temporary cylinder with auto polymerising acrylic resin.

Based on the mode of retention [18,19]

The decision whether to screw retain or cement retain a provisional depends on the clinicians preference and the clinical situation. Most often the manufacturer provides with a pre fabricated abutments

for cement retained restorations. Care should be taken not to leave any residual cement which can lead to peri-implant inflammation. A screw retained provisional eliminates this possibility [1].

Based on loading protocol

Depending on whether the provisional is fabricated with or without occlusal contacts they are classified as functional and non-functional restorations respectively. Functional loading immediately after implant placement is ideally limited to cases having good primary fixation and bone quality to ensure favourable load distribution.

Based on duration of use

Implant provisionals can be more challenging than normal crown and bridge provisionals as they often need to be used for an extended period of time. Amsterdam et al [20] and Emtiaz et al [21] reported different techniques of strengthening provisional restorations by adding metal reinforcing structures.

Guidelines for selection of a provisional

Cho S C [7] et al has studied 118 articles from peer reviewed journals and suggested certain guidelines for selecting an implant provisional based on various criteria.

Aesthetic criteria

Fixed restorations including tooth and transitional implant supported provisionals and the removable acrylic partial denture reported good esthetics. Essix appliance was the least esthetic.

Functional criteria

Fixed provisionals showed better functional efficacy compared to the removable provisionals. Phonetics and patient comfort were also higher for patients with fixed provisionals.

Trans mucosal loading

The removable acrylic partial dentures, due to their tissue contact lead to soft tissue inflammatory response and trans mucosal loading. Fixed provisionals and the essix appliance overcome the same as they are tooth supported.

Soft tissue contouring

Fixed restorations, especially advocating an ovate pontic have excellent soft tissue contouring potential which is lacking in the removable provisionals.

Edentulous span

The author suggested the following span length protocol:
Removable partial denture: 1-6units
Essix appliance: 1-4units
Bonded teeth- single tooth replacements
Bonded bridge- 1-6units
Fixed partial dentures (tooth and transitional implant supported): Full arch

Duration of use

Fixed provisionals have been reported for a long term use.(until final restoration) A removable acrylic partial denture can be used for 6 months, Essix appliance for 1 month after which they need to be replaced.

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CONCLUSION

The provisional phase of implant therapy is the most challenging yet under looked aspect. The need for provisionalisation should be considered during the treatment planning stage and reassessed continually throughout implant therapy [1]. It has to be understood that provisionalisation is a key factor and a link between esthetic and functional success in implant dentistry. Though there are various techniques available today for fabricating implant provisionals the selection should be based on clinical condition dictated by esthetic and functional requirements, patient's preference, financial constraints, and the duration of use [7].

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