

Immediate Complete Denture: Treatment Option for Unobstructed Smile and Function – Case Report & A Literature Review on Techniques of Cast Preparation

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Abstract

Immediate complete dentures are gaining more utility in current times as today’s patients insist on a least edentulous period due to various social and functional reason. To satisfy such demands, immediate dentures serve the best as they are fabricated before all the teeth are extracted. There are various laboratory techniques to fabricate the immediate complete dentures. This article aims to present an immediate denture case, treated to have minimal post-operative discomfort, usually associated with immediate denture treatment. The case report presents the technique to manage a clinical challenge of anterior open bite with fixed partial denture. The article gives a review on various cast preparation techniques for immediate complete denture fabrication, that is sparse in the existing database.

Keywords: Immediate complete denture, anterior open-bite, maintaining vertical dimension

Introduction

Immediate denture is defined as any fixed or removable dental prosthesis fabricated for placement immediately following the removal of a natural tooth/teeth¹. The immediate dentures are classified into two types: Conventional Immediate Dentures (CID) and Interim immediate dentures (IID). The technique of CID construction involves the extraction of remaining posterior dentition six to eight weeks before extraction of the anterior dentition, followed by immediate placement of a prosthesis. IID, also referred to as provisional, intermediate, transitional or treatment dentures, involve extraction of both anterior and posterior teeth simultaneously and an interim denture is inserted immediately.²

The IID has certain advantages over CID: 1) they reduce the psychologic apprehensions of the patient as it has a single surgical appointment; 2) valuable aspects of maxillomandibular relations like the vertical dimension, position of occlusal plane, centric occlusion and

buccolingual position of posterior teeth can be preserved in IID construction; 3) the interim denture technique allows for less alteration of the oral and peri-oral musculature, a more even healing of sockets, and, a better distribution of occlusal forces; and 4) practical advantage of using an IID as a second or spare denture.² After the extraction sockets are healed, relining/ rebasing/ remaking a new denture has to be done three to six months after insertion of immediate denture.³

The immediate dentures are preferred for the advantages: 1) maintains appearance; 2) duplicates the existing teeth and jaw relations; 3) maintains functions; 4) prevents enlargement of tongue; 5) reduces the rate of resorption of alveolar bone; and 6) protects the extracted tooth socket. They do have a few disadvantages: 1) extracting multiple teeth in a single appointment and immediate placement of a hard surfaced denture that comes in contact with the newly extracted sockets caused some amount of discomfort to the patient, that has to be taken care, planned and managed properly; 2) construction of an immediate denture is time-consuming – both at the chair-side and in the laboratory and its associated additional expenses for relining/ rebasing/ remaking a new denture; and 3) in immediate dentures, the teeth are extracted on the day of denture insertion and this prevents the assessment of aesthetics at try-in stage.⁴

Several techniques have been advocated in literature for immediate denture construction. This paper presents the management of a case indicated for immediate denture construction with a clinical challenge of anterior open-bite and a long-span fixed partial denture in relation to the maxillary anterior teeth. The paper also presents a review of various techniques of immediate denture fabrication as there is sparse literature in this aspect.

Case report

A 48-year-old female patient reported with the chief complaint of loose upper anterior teeth and difficulty to chew and speak. On examination, in the maxillary arch, patient had missed second premolars and all the molars bilaterally. A grade II mobile fixed partial denture spanning from maxillary right canine to left canine, with gingival recession and severe cervical abrasion in the canines was noted and they were indicated for extraction (Fig 1). In the mandibular arch, patient had a removable partial denture replacing all the mandibular incisors, that lacked retention due to mobile abutment teeth i.e. canines were noted and the canines were indicated for extraction. Also, left second premolar, right first premolar and all the molars bilaterally were missing. The left second premolar was grossly decayed and was indicated for extraction (Fig 1). The occlusal examination revealed an anterior open-bite with contacts present between the maxillary and mandibular premolars bilaterally. On detailed dental history, the cause for posterior tooth loss was revealed to be periodontal breakdown. Although, the full complement of existing teeth was indicated for extraction, as the patient was highly inclined towards aesthetics and had major concerns on social interactions, the patient agreed to the treatment of immediate complete dentures after explaining the entire treatment plan, procedure and follow-up regime. A detailed case-history was taken and the medical history did not reveal condition that contradicts the treatment with immediate denture.

- a. Primary impression was made with irreversible hydrocolloid impression material and cast was poured with type III gypsum product (Fig 2).
- b. A customized special tray with additional block-out in the dentulous region was fabricated and used for

border-moulding the edentulous area. After border-moulding, a final impression was made with medium-body polyvinyl siloxane impression material (Fig 3).

- c. The final impression was poured with type III gypsum product (Fig 4) and denture base with wax rims for bite-registration was fabricated on this master cast.
- d. Bite-registration was done using the occluding premolars as reference bilaterally (Fig 5). Dye to anterior open-bite, face-bow transfer could not be achieved.
- e. Posterior and mandibular anterior teeth were arranged on the mounted bite-registration record. Try-in was done and posterior occlusion was evaluated (Fig 6). For anterior open bite, composite resin was used and built on the maxillary anterior teeth intraorally and evaluated for correction of open-bite after placing the mandibular try-in denture.
- f. Then, the teeth were scored on the master cast in the laboratory and a surgical template was fabricated using clear, auto-polymerizing acrylic resin (Fig 7) and it was disinfected. Following this, the remaining teeth were arranged on the denture base and the denture was processed using heat-polymerizing acrylic resin by conventional method.
- g. On the day of denture insertion, the remaining complement of teeth were extracted as traumatically as possible (Fig 8).
- h. Immediately, the surgical template was placed intraorally and observed for uneven bony prominences that was visible as blanched spot through the clear surgical template (Fig 9). All such bony unevenness was contoured surgically and

verified using the surgical template. The sockets were compressed and allowed to form blood clot.

- i. Then, the patient was asked to wait for 1 hour to ensure an immediate uneventful surgical phase and for a proper clot formation. This was followed by the insertion of complete denture (Fig 9).
- j. Patient was advised not to remove the denture for 24 hours and was followed-up after 24 hours; 48 hours; 1 week and 1 month for sore-spots and occlusal discrepancies. After 6 months, patient was again followed-up; the immediate denture was relined as there was a compromise in denture retention due to healing of sockets and ridge resorption.



Figure 1: Pre-operative intra-oral view



Figure 2: Primary cast of maxillary and mandibular arch



Figure 3: Secondary impression of maxillary and mandibular arch



Figure 4: Secondary cast of maxillary and mandibular arch



Figure 5: Jaw relation



Figure 6: Try- in

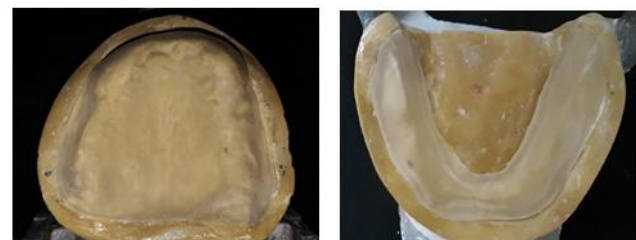


Figure 7: Fabrication of clear acrylic template on corrected maxillary and mandibular casts

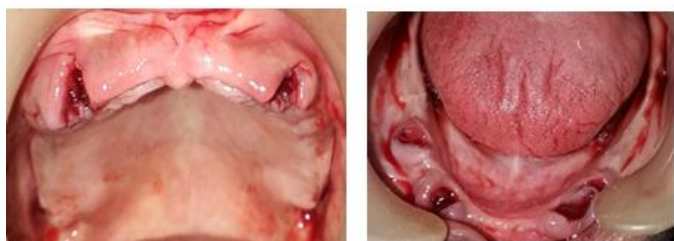


Figure 8: Extraction of remaining maxillary and mandibular teeth



Figure 9: Evaluation of high spots using acrylic template



Figure 10: Immediate denture insertion



Figure 11: Post operative extra oral view

Various techniques in the cast preparation for immediate complete dentures

1. Kelly had suggested the “rule of thirds”, who recommended, dividing the labial aspect of the ridge into three equal bands of space between the gingival line and the depth of the vestibular space. Accordingly, trimming of the labial portion of the cast begins at the labio-to-lingual center of the ridge and is confined to the gingival and middle thirds, with most of the trimming done in the gingival third. The lingual portion of the cast is contoured and smoothed by again starting at the labio-to-lingual center of the ridge.⁵

2. Frank C. Jerbi proposed a 6-step technique, which is a modification of Kelly's "rule of thirds" technique. Accordingly, the first step in trimming the cast is to cut away the part that is visible above the gingival line. The second step is recessing the ridge to the depth of the anatomic crown length. The third step is to make a flat cut across the face of the ridge that extends from the labial depth of the length of the crown labial surface of the ridge upto the junction of the gingival and middle thirds. The fourth step is another flat cut across the ridge that extends from the center of the ridge to the mid-width point of the cut made in step three. The fifth step is to trim that part of the cast which is lingual to the teeth and for this, the guide is the roll of gingival tissue that lies on the lingual surfaces of the teeth. The last step is to shape and smooth the surfaces of the cast that have been trimmed in the previous steps.⁵
3. George Goldfarb advocated a technique for the construction of transitional immediate denture using silicone rubber molds, that consisted of steps of: obtaining a master cast; waxing the casts; investing in silicone; using auto-polymerizing (cold-curing) tooth-coloured acrylic resin for the artificial teeth and using auto-polymerizing acrylic resin for the denture base.⁶
4. To guide the surgical preparation according to the laboratory cast trimming, Swenson advocated that the root portion should be excavated to a depth of 2mm on the labial side and on the lingual side, it should flush with the gingival margin.⁷ According to Heartwell, this labial line should be 3 mm above gingival margin and palatal line should be 2 mm above gingival margin.⁸ According to Rudd & Morrow, the labial surfaces of lower anterior teeth should be at 2mm below the gingival margin labially and at the level of the gingival margin lingually.⁹
5. To give a natural appearance and to maintain the relation of the denture similar to that which was present with the natural teeth, Zafrulla Khan presented a technique of constructing immediate denture. According to that technique, irreversible hydrocolloid impression is made and tooth-colour self-curing resin is poured in tooth imprints of impression. Then, the remainder of cast is poured in vacuum-mixed dental stone. The cast will be mounted on articulator and all the required occlusal corrections will be performed. After lubricating the cast, visible light cure resin is applied to the cast and cured to simulate the gingival and palatal tissues.¹⁰
6. Ilan Gilboa presented a technique where; immediate complete overdenture was fabricated by retaining several teeth that hold an interim fixed partial denture (FPD) until the complete denture is finished. Nonessential posterior teeth were first extracted. An interim fixed restoration was fitted to five strategic teeth, and the four maxillary incisors were reduced to the gingival margin, which were subsequently extracted. Following extraction, sockets were allowed to heal and an immediate prosthesis was fabricated using the interim restoration as a guide. The prosthesis was completed following try-in of the artificial teeth in mouth and patient's consent. The insertion of the prosthesis was in a clean, bloodless field as no extractions were performed. The remaining five strategic teeth received dome-shaped metal copings. However, this technique has the disadvantage that, it cannot be applied for fabricating an immediate conventional complete denture.¹¹

7. Ali Gooya et al. described a technique of fabricating immediate denture using existing long-span FPD in one-appointment. Occlusion, OVD, and facial support are maintained during the healing period in this procedure. Here, the existing FPD was removed and pick-up along with the impression. The abutment teeth retaining the FPD were extracted. The impression with the FPD was poured, denture base fabricated with self-cure acrylic resin and clasps were given on the un-prepared natural teeth in the arch. Following this, the denture was re-lined in the patient mouth.¹²
8. Jofle EH proposed a technique of fabricating an interim denture using a vacuum forming machine, called as the Jiffy Denture. Here, existing FPD was stabilized, impression was made, tooth moulding acrylic resin of proper shade was poured into the teeth imprints, a thermoform sheet was adapted to the cast, the space between the template and the acrylic teeth is filled with self-cure acrylic resin.¹³
9. Phoenix RD and Fleigel JD explained a technique of cast preparation called spatial modelling for immediate denture fabrication using the values available in the dental literature. Accordingly, bone levels superimposed upon cross-section of a representative posterior segment. Then, the coronal segment is removed using saw or laboratory engine. Then two lines are placed on the surface of the cast: one line arcing from mesio-facial line angle to disto-facial line angle and will be located 2mm lingual to the midfacial surface; the second is marked parallel to and 4mm from the gingival margin. These two lines are connected using a sharp blade or laboratory engine. Two lines also guide the lingual reduction: one-line arcs from mesio-lingual line angle to

distolingual line angle and will be located 2mm facial to mid-lingual surface; the second line is drawn parallel to and 2mm from gingival margin and then these two lines are also joined using a sharp blade. All the sharp lines and angles are eliminated, creating a gently rounded faciolingual contour.¹⁴

Discussion

An immediate complete denture is fabricated prior to extraction of teeth and will be placed in the patient's mouth immediately following extraction. These dentures are gaining extensive popularity mainly for the aesthetic and psychological benefits they render. The success of immediate dentures depends on correct indication and precise execution of clinical and laboratory fabrication procedures.¹⁵

Indications for immediate denture:¹⁶

Physical reasons

1. Disuse atrophy of the bony base,
2. Unfavourable trabeculation of the repairing bone,
3. Damage of the temporomandibular joints,

Physiologic reasons

1. Abnormal functioning of the mouth and mandible
2. Impaired enunciation,
3. Abnormal deglutition,

Psychologic reasons

1. Humiliation,
2. Adverse subjective reactions,
3. Serving the indifferent patient

Contraindications for immediate denture¹⁷

1. Debilitating diseases like post irradiation of the head and neck regions, systemic conditions affecting healing or blood clot formation, cardiac or endocrine gland disturbances, and psychological disorders
2. Occlusal abnormalities like extreme deep overbites make balanced occlusion impossible

3. Multiple extractions might be unwise because of systemic conditions.
4. Emotionally disturbed individuals
5. Mental incapacities
6. Indifferent unappreciative patients
7. Acute periapical or periodontal pathosis
8. Extensive bone loss adjacent to remaining teeth.

Apart from considering the indications, the meticulous performance of laboratory procedures also plays a very crucial role as for patients undergoing immediate denture treatment, anterior try-in cannot be performed. The current paper presented a clinical challenge of fabricating an immediate complete denture for a patient with anterior open-bite in the natural dentition. The case was handled with care using composite in the try-in procedure to correct anterior open-bite in the final denture. The laboratory steps, mainly the teeth knock-out procedure from the master cast was performed with utmost care so as to avoid any untoward consequences during extraction and denture insertion. The paper also presents a review of various techniques of knocking out the teeth from the cast.

Conclusion

In a scenario where an aesthetics and social status plays an inevitable part of life, resorting to the conventional complete denture treatment can be traumatizing to the patient psychologically. In such situations, an immediate denture plays a vital role in restoring the form and function for the patient, along with providing a psychological support. This will further improve the patient's quality of life.

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