



(CASE REPORT)



Closed mouth impression method for immediate complete denture fabrication on maxillary and mandibular flat ridges in medically compromised patient: A case report

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Abstract

Immediate complete denture is a full arch prosthetic, inserted immediately following the extraction of all remaining teeth to replace the missing dentition and associated structures. Female patient, 74 years old, came to make a new set of denture but didn't want the remaining mobile teeth get extracted before the new denture ready because it was still needed for her old partial denture retention. Upon clinical examination, she has flat maxillary and mandibular ridge which will make the immediate denture fabrication more elaborate. She has also been taking antiplatelet drugs regularly after a heart valve surgery 10 years ago. The treatment of choice was immediate complete denture which will be fabricated using closed mouth impression method, and conscientiously planned to prevent post-extraction hemorrhage complication. It is considered that immediate complete denture will also help controlling post-extraction hemorrhage and promote healing on the extraction socket, as it aids as a surgical splint. This paper was aimed to report an immediate complete denture fabrication using closed mouth impression method on a flat maxillary and mandibular ridge in a medically compromised patient.

Keywords: Closed Mouth Impression Method; Immediate Complete Denture; Flat Ridge; Medically Compromised; Medicine

1. Introduction

An immediate complete denture is a full arch prosthetic, inserted immediately following the extraction of all remaining teeth to replace the missing dentition and associated structures. It is able to maintain patient's esthetic and masticatory function without a phase of complete edentulism. As well as conventional complete denture, immediate complete denture success is determined by the fulfillment of retention, support, and stability of the denture. Particularly, patients with a well-formed maxillary and mandibular ridge, often show satisfaction with their denture as it perform pleasantly. Nevertheless, in severe ridge resorption cases that require immediate denture fabrication upon several reasons, it is elaborate and difficult to fulfill the success criteria [1, 2].

Residual ridge resorption is a progressive, biophysically complex, and irreversible process, that occurs after the tooth being extracted [2] Within a year following tooth loss, residual ridge will undergo a series of changes in shape, height, and the resorption rate as it is getting more progressive thereafter. The resorption rate of mandible is twice more pronounced than in the maxilla. Determined by the remaining amount of alveolar bone, residual ridge is classified into three different classes. In class III, it is defined that the alveolar ridge is almost or completely resorbed and considered as a flat ridge [3].

Closed mouth impression method, first described by Jiro Abe D.D.S. in 2011, is a dynamic functional impression technique that requires the dentist to insert maxillary tray and mandibular tray altogether so the impression possibly

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taken in a closed mouth position and appropriate vertical dimension. It focuses on sealing the entire border of oral mucosa to obtain a tight contact between mucosa and the denture base which will establish a negative pressure during swallowing. With this impression method, it was stated that a suction-effective denture can be delivered even in a case with severe ridge resorption [4].

In a medically compromised patient that had undergone a heart valve surgery to insert an annuloplasty ring, antithrombotic drugs (both anticoagulants and antiplatelet) is often prescribed as a regular medication to prevent thrombus formation. Patients who are consuming this type of drugs are at risk of bleeding complications after tooth extraction. Therefore, immediate complete denture fabrication in this case must be properly planned to avoid further matters. Atraumatic extraction procedure, hemostatic gelatin absorbable sponge, and resorbable suture material are conscientiously prepared prior tooth extraction. Moreover, it is considered that immediate complete denture will help controlling post extraction hemorrhage and promote healing on the extraction socket, as it aids as a surgical splint [5]. This paper was aimed to report an immediate complete denture fabrication using closed mouth impression method on a flat maxillary and mandibular ridge in a medically compromised patient.

2. Case Report

A 74-year-old female patient visited Prosthodontic Clinic of Universitas Airlangga Dental Hospital to make a new set of denture. Her chief complaint was the mobility of her remaining upper and lower teeth, therefore her old denture which has been used for two years does not fit quite well. Patient didn't want to have her teeth extracted before the new set of denture ready because it was still needed for the old denture retention. Clinical examination revealed four remaining teeth (#18, #15, #43, and #44) with °3 mobility based on Miller tooth mobility classification, generalized severe chronic periodontitis and caries, as well as flat maxillary and mandibular ridge (Figure 1). Patient had undergone a heart valve surgery to insert an annuloplasty ring 10 years ago and has been taking Aspirin, Isosorbide dinitrate, and Ibesartan as medication regularly. The treatment plan for this patient was immediate maxillary and mandibular complete denture, fabricated using closed mouth impression method and mounted on semi-adjustable articulator to achieve better result. Referral letter was sent to her cardiologist for medical consultation, related to the medication she was taking, prior to the extraction.



Figure 1 Clinical examination showed four remaining teeth (#18, #15, #43, and #44) with periodontal problems and flat maxillary and mandibular ridge

2.1. Case Management

The initial step in this case management was making a diagnostic model by taking maxillary and mandibular primary impressions using thermoplastic tray (AccudentXD dentate impression tray, Ivoclar Viv dent) and irreversible hydrocolloid impression material (AccudentXD impression materials, Ivoclar Viv dent). The thermoplastic tray was reshaped according to the patient's arch shape and peripheral border by dipping the tray in hot water at 70°C for 20 seconds, and molded to desired shape until hardened. Undercut around the cervical area of the mobile teeth was covered with temporary filling material (Cavit™, 3M™) to avoid inadvertent tooth extraction. The temporary filling material was later removed once the impression taking procedure completed. Subsequently, occlusal vertical dimension was measured using Niswonger method and centric tray (Centric Tray, Ivoclar Viv dent) with heavy body impression material was used to record the vertical dimension. In this case, the utilization of centric tray was possible by removing one supporting wing around the remaining teeth (Figure 2).

In this case, Universal Transfer bow System 3D (UTS 3D, Ivoclar Viv dent) was used for model orientation in semi-adjustable articulator (Stratos 300, Ivoclar Viv dent) by first registration the 3D registration joint according to the

patient's condition with the centric tray attached to it. After the data was recorded, remove the device and mount the diagnostic model on a semi-adjustable articulator as guided by the centric tray and 3D registration joint (Figure 2).



Figure 2 Centric tray impression and face bow transfer using UTS 3D System (A,B); Centric tray guided the maxillary diagnostic model position (C); Centric tray assembly without one supporting wing (D); 3D registration joint with the centric tray (E); Maxillary and mandibular diagnostic cast mounted on semi-adjustable articulator (F)

Individual tray was made by the dental laboratory technician using self-cure acrylic material on the diagnostic model and was combined with wax bite rim as corresponded with the vertical occlusal dimension height, to enable final impression taking in a correct closed mouth position later on.

On the second visit, maxillary and mandibular individual trays were inserted in the patient's mouth and vertical occlusal dimension was re-examined using Venus Apollo Gauge denture calipers (Beaden©) & measuring calipers (Ivoclar Viv dent) to ensure correct position. Midline, caninus line, and smile line were drawn on the maxillary and mandibular wax bite rims (Figure 3).

Overextended tray flange was grinded with fraser bur and polyvinylsiloxane heavy body material was injected using dispensing gun on the flange for border molding. Functional impression was taken using closed mouth impression method with polyvinylsiloxane light body material in centric relation (Figure 3). Bite registration was made using polyvinylsiloxane medium body in a closed mouth position. Individual trays were then removed from the patient's mouth, disinfected, and poured with dental stone for master cast fabrication. Master cast was mounted on semi-adjustable articulator in the same position as diagnostic model. Patient's neutral zone was recorded using impression compound (Hoffmann, GmbH) and later used for acrylic teeth arrangement guidance.



Figure 3 Vertical occlusal dimension was re-examined while the individual tray with wax bite rim was inserted in the mouth, using Venus Apollo gauge (A,B); using measuring calipers (C); Midline, caninus line, and smile line were drawn on the maxillary and mandibular wax bite rims (D) Maxillary and mandibular final impressions (E,F)

Non-immediate acrylic teeth were arranged in bilateral balanced occlusion position, the color and size were matched with patient's skin tone and face shape. Upon patient's third visit, non-immediate teeth arrangement was tried and examined. Patient showed satisfaction with the shape, color, and non-immediate tooth arrangement (Figure 4). In the laboratory, the remaining teeth in master cast were grinded 1-2mm apically resembling a post extraction socket. Immediate acrylic teeth were then arranged on the cast, gingival area was contoured, and complete denture was processed using heat-cure resin acrylic (Figure 4).



Figure 4 Non-immediate tooth arrangement try in. Right side (A); Left side (B) Remaining teeth were grinded resembling post extraction socket (C, D); Arrangement of immediate acrylic teeth and gingival contouring (E)

On insertion day, patient's blood pressure was checked (110/65mmHg). She stopped taking antiplatelet (aspirin) medication 3 days prior tooth extraction as referred by her cardiologist. However, Isosorbide dinitrate and Ibesartan were still prescribed. Patient was given prophylaxis antibiotic (Amoxicillin 2 g) 1 hour in advance to prevent bacterial infection. Plaque and calculus were removed with ultrasonic scaler thoroughly. Haemostatic gelatin sponge and resorbable suture material were prepared. Atraumatic extraction procedure for tooth #18, #43, and #44 were proceeded (fourteen days prior to insertion, tooth #15 was felt out by itself). After extraction, gelatin sponges were inserted into extraction socket and detained with simple interrupted suture (Figure 5). Maxillary and mandibular complete denture were immediately inserted as they served as a surgical splint to help controlling post extraction hemorrhage (Figure 5). Patient was instructed to use the denture for 24 hours and contacted the dentist if there was any problem after the extraction or with the denture.



Figure 5 Extraction, gelatin sponge insertion, and suturing on tooth #18, #43, #44 (A, B, C, D) Maxillary and mandibular denture were immediately inserted as a surgical splint. Right side (E); Front side (F); Left side (G)

On the next day, patient visited for the first follow-up and any discomfort regarding the denture flange and occlusion was checked then selectively grinded. Second follow-up was scheduled 1 week after extraction. Post extraction socket and immediate complete denture were examined, then the second selective grinding procedure was conducted. Third follow-up was scheduled 2 weeks after extraction and denture intaglio surface was directly relined with self-cure chairside soft denture reliner (Sofreliner Tough, Tokuyama). Patient showed satisfaction with her new immediate complete denture as they have a tight contact and suction-effect when used or removed. Patient was scheduled for her forth appointment 3 months later for indirect relining procedure, due to post-extraction ridge resorption possibility.

3. Discussion

Immediate complete denture in particular is challenging to make since it is not possible for a try-in appointment before their completion. Fortunately in this case, it was possible to have the patient tried the non-immediate teeth arrangement to check the esthetic and occlusal relationship because her upper and lower remaining teeth didn't occlude. Advantages of immediate denture treatment are the avoidance of edentulous period, less postoperative pain since the extraction sites are protected by the immediate denture which acts as a surgical splint, and patients will gradually adapt to denture while healing is progressing. In this case, immediate complete denture was made because the patient still needed the remaining teeth as an abutment for her old partial denture. If they were extracted in advance before the new denture ready, she won't be able to eat. The disadvantage of immediate dentures are more challenging execution of routine clinical steps because the presence of teeth can make the registration and impression of maxillomandibular position more inconvenient, the presence of teeth frequently leads to incorrect centric relation position or proper determination of occlusal vertical dimension [6]. In this case, Venus Apollo Gauge and measuring calipers were used to ensure correct measurement of occlusal vertical dimension.

Severe ridge resorption will make the immediate complete denture fabrication more elaborate. According to Jiro Abe (2012), closed mouth impression method enables the sealing of entire border of oral mucosa which will establish a suction-effective denture that has a tight contact between mucosa and denture base, even in a severe ridge resorption cases. One of the area that is difficult to manage while making an impression is the retro molar pad. It easily changes its form during open and close motion. If the denture was fabricated with the impression taken at opened mouth position, the denture at retro molar pad area will not fit properly when used in closed mouth condition. Invasion of the air due to contraction of retro molar pad when the mouth is closed will destruct the seal. Therefore, in this case, the impression was taken at a closed mouth condition. The main point of creating a suction-effective denture is completely sealing the entire border of oral mucosa to prevent air invasion so negative pressure will be established [4]. In this case, semi-adjustable articulator was also used because it is known as an effective tool for complete denture fabrication that will allow in achieving full balanced occlusion during mandibular excursion.

In this case, patient has been taking regular medication (Aspirin, Isosorbide dinitrate, and Ibesartan) post heart valve surgery. Aspirin is an antiplatelet drugs, aimed to prevent thrombus formation. To prevent the risk of bleeding complication after tooth extraction, it was necessary to do a consultation with her cardiologist regarding the medication, carry out an atraumatic tooth extraction procedure, using hemostatic gelatin sponge, suturing post extraction socket, and immediately insert the complete denture which will act as a surgical splint to control hemorrhage. According to Verma (2014), aspirin should be discontinued for 3 days only so the new platelets which are not affected by aspirin will act as an effective hemostasis [7]. According to Saputra (2020), the use of local hemostatic agent is recommended. The regio and the number of teeth that will be extracted in one session should be considered. To prevent bleeding complication, it shouldn't exceed 3 teeth and should be in the same dental arch regio. In accordance with the literature, immediate teeth extraction in this case is safe and possible [5].

4. Conclusion

Immediate complete denture is possible to fabricate in flat ridge case with closed mouth impression method. Dental extraction can also be performed safely in patients on aspirin therapy as long as the procedure and treatment plans were done conscientiously.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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