Altered cast impression technique in the fabrication of metal frame partial dentures with distal extension: A case report

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ABSTRACT
Metal frame denture is a more ideal treatment than the conventional acrylic denture for its narrower, thinner, rigid, and harder material, so that the design can be made ideally. The aim of this case report is to demonstrate the treatment of an edentulous case using altered cast technique to improve support for a partial denture with distal extention. A 48-year-old female patient came to the Halima Dg.Sikati Makassar with complaints of chewing difficulty and lacking of confidence due to the loss of all her maxillary teeth and part of her mandibular teeth. The patient had never worn any denture and had no history of systemic disease. The patient wanted to have a denture made to restore the appearance and mastication. Then a panoramic x-ray was performed on the patient. Radiological images appear to be missing all teeth in the maxilla, available teeth: 33, 32, 31, 41, 42 and 43, no impacted teeth, no foreign bodies, no inflammation or neoplastic tissue, good bone density, residual the roots of teeth 15 and 28. The pre-prosthetic treatment plan was carried out by scaling and extracting the remaining roots on teeth 15 and 28. The prosthodontic treatment plan was the manufacture of partial metal frame dentures using the altered case molding technique. Altered cast is a molding technique used in the saddle free end of removable partial dentures. This impression technique can produce master case with maximum tissue support, within the limits of physiological tolerance and can accurately record the relationship between the tooth and the residual ridge. It is concluded that metal frame partial denture with Alter cast impression technique provides better and stable denture.
Keywords: metal frame partial denture, altered cast technique, distal extension

INTRODUCTION

Metal frame partial denture is a removable denture that uses metal, although its use is not as popular as acrylic dentures because the price is relatively expensive. Metal frame partial dentures are basically more ideal than acrylic dentures because they can be made narrower, thinner, and more rigid. The material allows the transfer of heat and mastication forces better. Metal frame partial denture also have excellent mechanical qualities and maintain the health of the periodontal tissues of the abutment teeth.

One of the factors that stabilize a removable partial denture while functioning is the use of an impression procedure that can accommodate the resilience difference between hard and soft tissue. The altered cast printing technique can produce impressions with maximum tissue support, within the limits of physiological tolerance and can record the relationship between the teeth and the residual ridge accurately.

Free-end saddle dentures or free end/distal extensions have more problems than other removable dentures because they only have abutments on one side and require special handling. In addition, this denture is unstable and tilt easily, which can cause the resorption of the alveolar ridge to run more quickly. A tipped denture during function can cause periodontal abnormalities in the abutment teeth. This is due to differences in the compressibility of the support, both between posterior mucosa and the anterior mucosa of the free-end saddle and between the mucosa and the periodontal tissue of the abutment teeth with occlusal support. When the denture is exposed to the chewing load, denture saddle rotates or is tilted or unstable. The absence of abutment teeth distal to the saddle that can be used as a backrest or retainer also causes the distal end of the saddle to move more freely compared to the mesial end of the saddle.

This article reports the handling of an edentulous case using the *changed cast* to improve support for metal frame partial dentures with distal extension.

CASE

A 48-year-old female came to the Dental Hospital of Halimah Dg.Sikati Makassar with chief complaint of difficulty chewing and lacking of confidence due to the loss of all of the maxillary teeth and some of the mandibular teeth. The patient had never used dentures and had no systemic disease. The patient wanted to make dentures to restore appearance and mastication (Fig.1).

Radiographically, all maxillary teeth are missing. Remaining teeth: 33, 32, 31, 41, 42 and 43. No

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Figure 1 Intra-oral photo of maxillary total edentulous and mandible with bilateral free end

Figure 2 panoramic photo

impacted teeth, no foreign bodies, no inflammation or neoplastic tissue, good bone density, residual roots of teeth 15 and 28, left condyle position and right side looks balanced, mandibular bone resorption based on Wical and Swoope is Class I (Fig.2).

The patient's diagnosis based on tooth loss was total edentulous in the maxilla and Class I Kennedy in the mandible. Preliminary impressions were made with an irreversible hydrocolloid (alginate) to obtain a diagnostic model (Fig.3). Next, the diagnostic model is placed on top of the surveyor for inspection and design of the metal frame.

Figure 3 Maxillary and mandibular diagnostic models

MANAGEMENT

Pre-prosthetic treatment was carried out by scaling and extracting the remaining roots. Making individual print trays for the upper and lower jaws with self-curing acrylic, then border molding with greenstick compound. Physiological printing was carried out using hydrophilic polyvinyl siloxane and beading and boxing were done (Fig.4).

The metal frame of the mandible is tested on the patient (Fig.5). Custom acrylic resin tray attached to

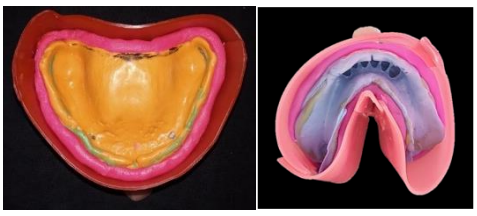

Figure 4 Beading and boxing

Figure 5 Try in metal frame lower jaw

Figure 6 Custom acrylic resin tray lower jaw metal frame, border molding and molding using hydrophilic PVS.

Figure 7A Cutting the mold, **B** the metal frame denture is placed over the grooved mold, **C** the altered-cast.

the metal frame of the lower jaw and border molded using a greenstick compound (Fig.6). Furthermore, an examiination of the suitability of the metal framework on the teeth and soft tissues was carried out. Impression was performed using hydrophilic PVS. During the final physiological impression, finger pressure was only given on the part of the metal framework that was in direct contact with the tooth, so there was no pressure on the edentulous mucosal area.

An additional procedure in the laboratory for the altered cast technique was performed by splitting the master cast using a saw. The first cut was made distal to the tip of the tooth and perpendicular to the edentulous ridge to the medial part of the lingual vestibule. The second section is made parallel and medial to the edentulous ridge, which extends from the most posterior aspect to the most medial aspect of the first section (Fig.7).

On the cut surface of the mold that has been split, grooves or hollows are made to assist the retention of the plaster to be mixed. The metal frame denture is placed over the grooved mold. The final physiological impression was then made with beading and boxing before being cast with plaster so that an altered cast was obtained.

Making the bite rim of the upper and lower jaws and determining the alignment (Fig.8A), vertical dimensions, with the bite rim made from the last impression, then face-bow transfer and installation on the articulator. At this stage, don't forget to determine the color of your teeth using the VITA 3D-Master shade guide (Fig.8B).

Try-in arrangement of teeth, starting from the anterior teeth and continued to the posterior. Acry-

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Figure 8 Alignment, and determination of color.

Figure 9 Arrangement of teeth

Figure 10 Denture insertion

lic processing (packing, curing, finishing and polishing), selective remounting and sharpening (Fig.9).

The denture was inserted and controlled, the denture was checked again for occlusion, articulation, retention and stability. The patient was instructed to use the denture to chew soft foods first, remove the denture before going to bed, clean the denture under running water, store the denture in a container with damp conditions and perform routine dental check-up, at least every 6 months (Fig. 10).

DISCUSSION

Teeth loss will have an impact on masticatory function, phonetics, lower self-confidence and interfere with social interactions. Removable denture is an alternative treatment for tooth loss that serves to replace one or several teeth and surrounding tissues so that impaired function can be restored and prevent further damage.

Free-ended removable partial dentures are common cases. Rehabilitation for cases like this is a challenge for the prosthodontist. This is because the free-ended denture has more problems. The main problem with free-ended dentures is unstable dentures, i.e. they are easy to shift and tip. This is because there is a difference in support compression between the posterior part of the free-toed saddle and the anterior part. Unstable dentures can cause faster alveolar bone resorption in the patient.

The advantages of using a metal frame as a denture frame are that it is more comfortable to wear because it can be made thinner, narrower but still rigid, the design of the parts of the denture can be made optimally and ideally, the forces caused by mastication can be channeled properly. As for the disadvantages of using this denture the metal part can still be seen, causing the appearance to be less aesthetic.

Special impressions such as alter cast can reduce the pressure on the ridge during mastication. The benefit of the altered cast printing technique is to get maximum support for the edentulous area. The principle used in the altered cast impression technique is the impression of edentulous tissue in a condition that allows for the expansion of the denture base and maximum support is obtained without causing tissue movement or excessive tissue compression.

The procedures were altered cast impression technique must be preceded by adjustment of the position of the metal frame. The goal is to make sure all the rests fit into place so that there is no movement in the metal frame. The area of contact between the tooth and the metal frame, i.e. at the minor connector to the occlusal rest, is very important. If there is excessive contact in this area while the denture is worn during mastication, it will cause a force that can damage the tooth.

The first procedure was that the initial impression was made using irreversible hydrocolloid and the study model was obtained. The study model is then placed on the surveyor for inspection and design of the metal frame. The teeth were prepared and imprinted using an elastomeric impression material. The second mold is placed on the surveyor for inspection and design of the frame mold.[6]

The finished frame is checked for fit with the study model. Then tested into the patient's oral cavity. After that, a modified acrylic impression spoon was applied to the metal frame of the mandible. This spoon is then molded around the edges according to the desired extension. The final impression was made using a zinc oxide impression paste and finger pressure was applied to only one part of the metal frame in contact with the teeth. The model was then modified in the laboratory. Two pieces are made next to each other. The cut surface is then threaded to aid retention of the newly poured stone. Full adaptation of the frame to the essential model before fixation with sticky wax. The final mold is closed and boxed and then

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cast a plaster cast. Carry out the packing process. After that, it is inserted into the patient.

It is concluded that in free-end dentures, the main problem is the pressure difference between the supporting tissues of the posterior part of the free-end saddle and its anterior. This situation causes the dentures to be unstable. The expanded base will put pressure on the underlying bone and can distribute the pressure force evenly. Several suitable methods can be chosen to reduce the leverage of free-ended dentures using the altered cast technique.

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