UDC: 616.314–77

FABRICATING COMPLETE DENTURES WITH THE COPY-DENTURE TECHNIQUE – A CASE REPORT

ИЗРАБОТКА НА ТОТАЛНИ ПРОТЕЗИ СО ТЕХНИКА НА КОПИРАЊЕ – ПРИКАЗ НА СЛУЧАЈ

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Abstract

The copy-denture technique is a method for replacing complete dentures as a therapeutic solution for elderly patients, where there are imposed requirements for a specific approach in rehabilitation. Copy dentures are most advantageous for physically-frail elderly patients, as their adaptive potential and neuromuscular coordination decrease with age. Replicating the polished surfaces and contours of the existing denture is the favorable aspect of this technique, facilitating adaptation and contributing to an easier transition to the new dentures. This technique aims to replicate the positive characteristics of the existing dentures and to improve deficiencies, usually in occlusal and fitting surfaces. The clinical evaluation of the existing dentures and the degree of required alterations that have to be incorporated in the new dentures is crucial in deciding to utilize the copy-denture technique, and in treatment planning. Over the past 60 years, various techniques for replicating complete dentures have been developed, leading to methods based on CAD/CAM technology. This case report presents a method of the copy-denture technique, along with its clinical and laboratory steps. The outcome was a new set of dentures, where the teeth position, contours and the polished surfaces of the old dentures were copied, and changes of the vertical dimension and the dentures' fitting surfaces were made. **Key words:** complete dentures, replica dentures, copy dentures, copy-denture technique.

Апстракт

Техниката на копирање на тотални протези е метод на изработка на нови протези, како терапевтско решение кај возрасни пациенти, каде постои потреба од специфичен пристап во рехабилитацијата. Копираните протези носат поволности за повозрасните пациенти, поради тоа што во напреднатата возраст потенцијалот за адаптација и невромускуларната координација се намалуваат. Репликацијата на полираните површини и контури на постоечките протези е поволниот аспект од оваа техника, со што се олеснува процесот на адаптација и доприносува до полесно прифаќање на новите протези. Целта на оваа техника е при изработка на новите протези да се реплицираат и задржат добрите карактеристики на постоечките протези и да се коригираат негативните, најчесто базата на протезата или оклузалните површини на забите. Проценката на постојните протези и степенот на потребни промени кои треба да бидат инкорпорирани во новите протези е од круцијално значење во одлуката за употреба на техниката на копирање и планирање на начинот на изработка на тоталните протези. Во изминатите 60 години развиени се различни техники на реплицирање на протезите, сé до најновите методи кои се темелат на CAD/CAM технологијата. Овој приказ на случај презентира метод на копирање на тотални протези, со сите клинички и лабораториски фази. При изработка на новите протези беа копирани позицијата на забите, контурите и полираните површини на постоечките протези, а беа коригирани гингивалните површини и беше зголемена вертикалната димензија на меѓувиличниот однос. **Клучни зборови:** тотални протези, реплика протези, техника на копирање протези.

Introduction

The extension of the lifespan of the population in developed countries proportionally increases the need for prosthodontic treatments in edentulous patients. Despite the advancements in treatment possibilities, complete dentures remain the primary choice for edentulism. Providing complete dentures to elderly patients is very challenging for the clinician, and imposes the need for a specific approach during the rehabilitation.

As a common problem in approximately 25% of complete denture wearers, dissatisfaction with complete dentures is emphasized in the elderly population. According to Makila, even 71% of the elderly (aged 65 years and over) had adaptation problems after one year of wearing the new dentures[1,2]. The rationale for the difficulty in adapting to new dentures is based on the evidence that learned reflexes are harder to be adopted with age[3,4]. Due to muscular control developed over years of wearing dentures, patients with old and even inadequate existing dentures will continue to persevere with them, rather than take on new and improved dentures[5]. In this context, replacing the existing complete dentures with the copy-denture technique for elderly patients is very

advantageous since it overcomes the problem of them adapting to new dentures. Replicating the polished surfaces and contours of the existing denture is the favorable aspect of this technique, facilitating adaptation and contributing to an easier acceptance of the new dentures[6,7].

Although the term "copy-denture technique" is used in our literature, it is not the appropriate term because this technique aims to replicate the positive features of existing dentures and make minor alterations to the negative ones, usually occlusal and fitting surfaces. The decision to advocate this method should be based on the clinician's perception that the patient might not be able or willing to adapt to new dentures, as well as on the assessment of the existing dentures. Evaluation of the three denture surfaces (occlusal, polished, and fitting surface), and the degree of required alterations that have to be incorporated in the new dentures is essential information for treatment planning. If the existing dentures have many errors and require a significant change in vertical and horizontal jaw relationship, and in the base extension, the new dentures cannot be considered to be copy dentures[4].

Since their first introduction in the 1960s, a variety of methods and procedures of the copy-denture techniques have been published[8-12]. Nowadays, there is no standard procedure for replicating the dentures, and various materials and methods are employed.

This case report presents a method of fabricating complete dentures with the copy-denture technique to a patient who has been wearing old dentures for a long time and is satisfied with them.

Clinical report

A 72-year-old female patient has reported to the Department of Prosthodontics at the University Clinic for Prosthodontics in Skopje to receive a new pair of dentures. The patient had been using her existing dentures for 14 years, satisfied with their aesthetics and function (Figure 1).

Figure 1. *Intraoral view of the patient's existing dentures*

The main complaint was poor retention of the upper denture, and the patient wanted a replacement set of dentures without other changes. Her medical history revealed depression, treated with prescribed medications. The extraoral evaluation revealed a decrease of occlusal vertical dimension (OVD). The dentures showed a lack of retention and stability during the intraoral examination, reduced OVD through teeth wear, and noted midline discrepancy. There was no intraoral pathology. The upper and the lower arch were evenly and highly resorbed.

Taking into consideration all the mentioned circumstances, the treatment plan was to fabricate new upper and lower dentures using the copy-denture technique. The objective was to replicate polished surfaces and tooth position, make minor changes in tooth arrangement, increase OVD, and improve the fit in all areas.

Treatment

First clinical visit

A two-part impression of the existing dentures was taken extraorally to form stable moulds to fabricate the upper and the lower copy dentures. Initially, the polished and occlusal surfaces of the dentures were embedded in silicone putty impression material (Zetaplus, Zhermack SpA) filled in stock trays; once the silicone was set, the impression's borders were trimmed 3-4 mm below the denture border, and triangle notches were made so that the other part of the mould would be able to assemble in it; the borders of the silicone impression were smeared with petroleum jelly. (Fig: 2a, 2b) Subsequently, the dentures' fitting surface was recorded; the first impression with the denture was pressed into the second mix of silicone putty. (Fig. 3,4) After setting the material, the mould's silicone halves were separated, and the dentures were removed, cleaned, and returned to the patient unmodified.

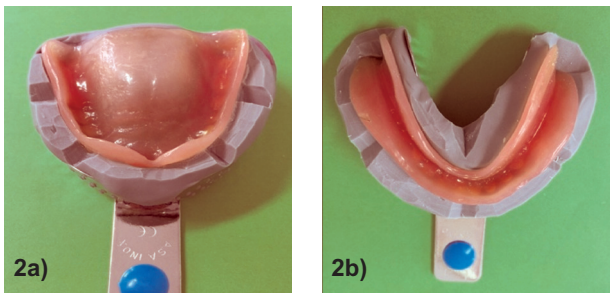

Figure 2. *Impressions of the polished and occlusal surfaces; a) upper denture; b) lower denture*

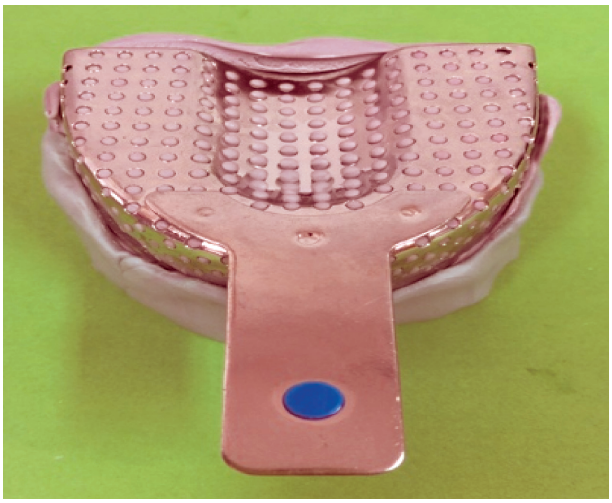

Figure 3. *An impression of the fit surface of the upper denture*

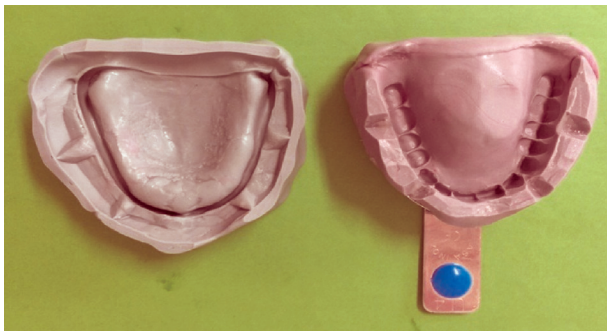

Figure 4. *The two halves of the mould of the upper denture*

First laboratory stage

Replica dentures were constructed with a rigid denture base and wax teeth. First, the technician adapted a light-cured base plate material (Hoffmann Ultra Violet Base Plates, Hoffmann Dental Manufaktur GmbH) over the fit surface into the mould; the mould was closed and the excess material removed; when the light-cured base plate was set, sprue channels were made at the posterior border behind the teeth, and molten wax was poured into impressions of the teeth; the moulds were closed, and secured with a rubber band, so as not to open during the cooling of the wax. After cooling, the template replica dentures were removed from the moulds, and the excess wax was trimmed. (Fig. 5, 6)

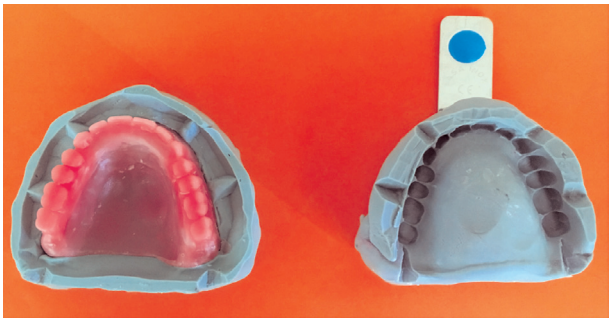

Figure 5. *Upper replica denture in the silicone mould*

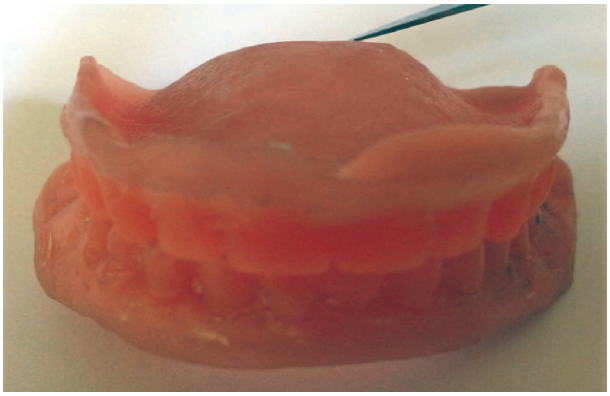

Figure 6. *Upper and lower replica denture*

Second clinical visit

Wash impressions and occlusal records were made using the replica dentures, which served as special trays and a registration block. (Fig. 7) Wash impressions were taken with a low-viscosity wash elastomeric material (Xantopren L blue, Heraeus Kulzer GmbH) due to its long-term stability since it will be retained in the denture bases in the next steps of the fabrication process. The conventional jaw relationship record was taken after the impressions were made (modified protocol because of the existing dentures' instability). In the initial analysis, it was defined to increase the OVD by 2 mm; the position of the occlusal plane, the OVD, horizontal jaw relationship, and the midline were checked; a necessary thickness of 2 mm

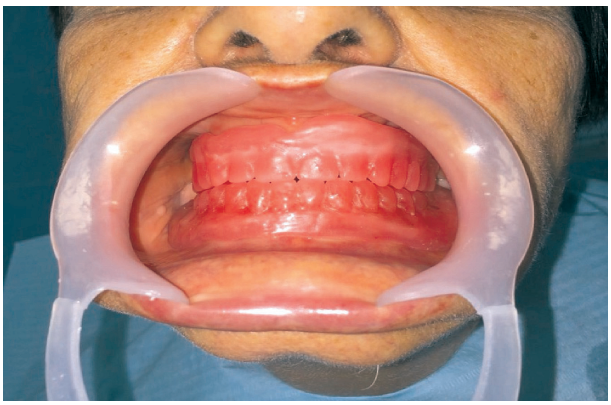

Figure 7. *Replica dentures in situ*

wax was added to the lower occlusal surfaces to achieve a pre-determined increase in OVD. (Fig. 8) The patient requested one shade lighter teeth from her existing dentures.

Figure 8. *Jaw registration with wash impression*

Second laboratory stage

The wash impressions were cast, and the casts were mounted on the articulator; the lower cast was mounted using the jaw relationship record; excess wash material from the polished surfaces of the replicas was trimmed with scissors. The teeth were set up by removing the wax teeth from the replicas, one by one, and replaced with acrylic teeth.

Third clinical visit

Trial placement procedures were carried out on replica dentures with acrylic teeth and still retained wash material; maxillomandibular relationship and occlusion were assessed, and the esthetics was discussed with the patient.

Third laboratory stage

The trial placement dentures were invested in flasks with the impression material (it is removed along with the wax at the boil-out stage); packed, processed, and finished conventionally, and the new dentures were ready for insertion.

Fourth clinical visit

Clinical evaluation of the fit, retention, stability, and the occlusal relationship of the new complete dentures was carried out, which showed satisfactory results. After minor adjustments, the dentures were delivered to the patient, and routine follow-up visits were scheduled after one day and after one week.

The patient was pleased with the esthetics, function, and comfort of the outcome.

Figure 9. *New dentures in situ*

Discussion

The set aim for the replacement of dentures with improved characteristics of the old ones was achieved. The outcome was retentive complete dentures with increased OVD, improved aesthetics, mildly corrected midline discrepancy, better chewing efficiency, and fabricated with reduced clinical chair time and number of visits.

Since there is no standardized method for the copy-denture technique, the presented method proved appropriate. The common starting point for all methods is forming a mould from the dentures to be copied, the only difference being the materials used[13]. For clinical chair-side use, when the patient is not willing/cannot leave their dentures, the most suitable and precise material is the heavy-bodied silicon putty, for which flasks or rigid containers are not needed. After mould formation, in a laboratory, the replica dentures can be made by auto-polymerizing acrylic resin, shellac or, as in this case, with a base of photopolymerizing acrylic resin and waxed teeth. In the present method, first, the impressions were taken with the replica dentures with wash elastomeric material. Consequently, the jaw relationship was recorded, because of the insufficient retention of the upper denture and the possibility of faults while recording the jaw relationship. As suggested by Duthie and Yemm, the impressions may be taken just before the final adjustment and recording of the horizontal jaw relationship only if the existing dentures' retention and stability are acceptable[10]. This copy-denture method excludes the usage of conventional wash material ZnOE

since the wash material has to remain retained on the replica dentures during the next laboratory stage and clinical try-in stage.

The copy-denture technique is only one approach in the treatment of edentulism in elderly patients, where the ability to re-learn developed neuromuscular control and adaptation is decreased. Grant et al. suggests this procedure for replacing dentures with the provision of new impression surfaces, or new occlusal surfaces, or slight modification to the OVD. The technique is also suitable for replicating dentures for a "spare set", when the denture base material has deteriorated, and for the fabrication of temporary dentures that can be progressively modified if the patient's capacity to adapt is in doubt[14]. This technique should not be considered a shortcut for the fabrication of complete dentures. For the clinical and technical procedures to result in successful complete dentures, the decision to utilize this technique must be based on accurate diagnosis[15]. When major changes in tooth position, that will alter denture contour, or corrections of vertical dimension greater than 3mm, are needed, this technique should not be used[14,15].

Conclusion

The present copy-denture technique was used to make new complete dentures, an improved version of the old ones. The teeth position, contours, and polished surfaces of the old dentures were copied, and changes of the vertical dimension and the dentures' fitting surfaces were incorporated into the new set of complete dentures.

Proper application of the copy-denture technique, based on the exact diagnosis of the problem and understanding the advantage of copying dentures' contours, is a useful approach for elderly patients.

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