A copy-denture technique: Laboratory and clinical procedures

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The advantages of copying some features of the old denture during fabrication of replacement dentures have long been recognized.[1-12] Fish[13] was among the first to draw attention to the problem of adaptability for the complete-denture patient.[13] The habituation of the oral sensory receptors and the acquisition of new muscular skills are slowly developed qualities with drastic effect on the acceptance and successful manipulation of dentures. The successful muscular control of dentures is closely associated with their overall size and the shape of the polished surfaces. With advancing age, because of progressive atrophy of the cerebral cortex, the learning process deteriorates, resulting in subsequent diminution in the ability to develop new muscular behavior. Therefore the objective of the various copying methods described over the last 40 years is the provision of new dentures by copying the satisfactory features of the existing dentures and eliminating the unsatisfactory features. Following this procedure reduces not only the number of visits needed to fabricate the dentures but also the number of postinsertion follow-ups.

Depending on the materials used for the fabrication of the denture templates (replicas) and the molds, the many techniques reported can be classified into two main categories: *(1)* all–autopolymerizing acrylic resin templates using alginate or silicon putty molds supported in modified denture processing flasks, disposable impression trays, or a plastic denture duplicator, and *(2)* wax teeth on a rigid baseplate made of shellac or autopolymerizing acrylic resin using silicon putty or alginate molds as described above. The use of wax teeth on an autopolymerizing acrylic resin baseplate with alginate as investing medium not only provides fairly accurate denture templates[14] but also facilitates modifications during the maxillomandibular registration procedures and setup of the stock teeth.

The purpose of this article is to describe an easy and inexpensive copy-denture technique that can be carried out by the practitioner using normally available equipment and materials. This technique was based on a method previously described by Davenport and Heath[6] and has been successfully used by the authors for many years.

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The example described here shows many of the typical problems of long-term use of well-tolerated dentures: moderate occlusal wear of the acrylic resin teeth, deterioration of the tissue adaptation resulting from resorption of the residual ridges, and slight reduction of the vertical dimension of occlusion. There was also a midline fracture on the mandibular denture, which, although repaired, made the patient insecure and in desire of a "spare set."

The intraoral examination revealed slight underextension of the borders and reduced physical retention in both dentures, but correct buccolingual position of the mandibular posterior teeth. It also revealed normal tongue position, with the apex lying against the lingual surface of the mandibular anterior teeth and the dorsum resting over the lingual aspects of the occlusal table, the latter being slightly lower than its normal position. An additional complaint of the patient was her discontent with her esthetic appearance, mainly due to the insufficient support of the upper lip.

After thorough clinical investigation, the decision was made to increase the vertical dimension of occlusion by raising the mandibular occlusal table about 2 mm, to improve esthetics and upper lip support by setting the maxillary anterior teeth more labially and in a more favorable arch form, and finally to improve the fitting surfaces of both dentures by making wash impressions at the trial stage.

For the fabrication of the maxillary and mandibular denture templates, a modified plastic soap box and a plastic duplicator were utilized, respectively. To compensate for the more pronounced bone loss and to produce a stable and well-functioning template, the fitting surface of the mandibular denture was temporarily corrected before the copy procedure, by making a wash impression with a low-viscosity silicone rubber and a closed-mouth technique.

■ Technique

Both dentures are rinsed and blown dry. Three measures of alginate are mixed, per manufacturer's instructions, for the deep half of the flask (or five measures for the deep half of a soap box), and the dentures are seated with the teeth down. Excess alginate is trimmed level with the borders of the denture and the flask (Figs 1 and 2). The trimmed surfaces of the set alginate are lubricated with a thin coat of petroleum jelly. Two measures of alginate are mixed for the shallow half of the flask (or four for the shallow half of the soap box). To prevent trapping of air bubbles, fresh alginate is packed into the tissue surface of the denture, the shallow half is loaded, and the box is closed. When the alginate has set, the halves are carefully separated and the denture is removed. Silicone rubber is removed from the mandibular denture, and the dentures are cleaned and returned unaltered to the patient (Fig 3).

The teeth are duplicated by pouring molten baseplate wax into the tooth impressions. To provide sufficient space for the tooth setup later, wax should cover the gingival margins (Fig 4). Pour-ways are cut in the polished-surface half of the mold adjacent to the maxillary tuberosities and retromolar pads (Fig 5). The two halves of the flasks are reassembled and secured with tight elastic bands. A sufficient quantity of a fluid mix of autopolymerizing acrylic resin (Simplex Rapid, Austenal Dental, Chicago, IL) is prepared and injected into the duplication mold with a disposable syringe (Fig 6). The acrylic resin is allowed to set or, if possible, the flasks are placed with the sprue-holes upright in a pressure pot with warm water and processed for 15 minutes at 20 lb of air pressure. The two halves of the flask are gently separated, the denture templates are removed, the sprues are cut off, the excess material extruded from the mold is trimmed, and the borders are smoothed. Polishing is not necessary at this stage and may damage the wax teeth. Any irregularities in the tissue surfaces resulting from entrapped air bubbles should be removed (Figs 7 and 8).

The denture templates are tried in the mouth and modified according to the individualized treatment plan. Support of the upper lip is improved by placing a layer of warm baseplate wax over the labial surface of the maxillary

Fig 1 Impression of the polished surface of the maxillary denture, taken in the deep half of a modified soap box.

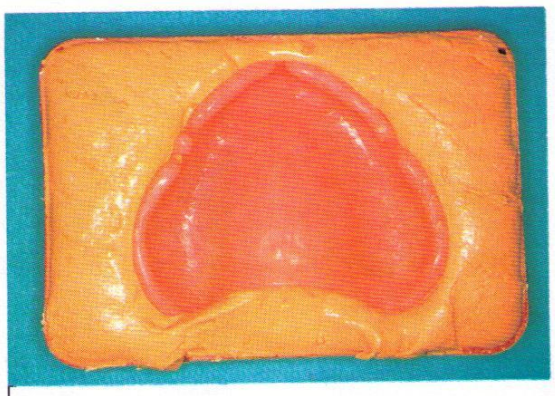

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Fig 2 Impression of the polished surface of the mandibular denture, taken in a plastic duplicator.

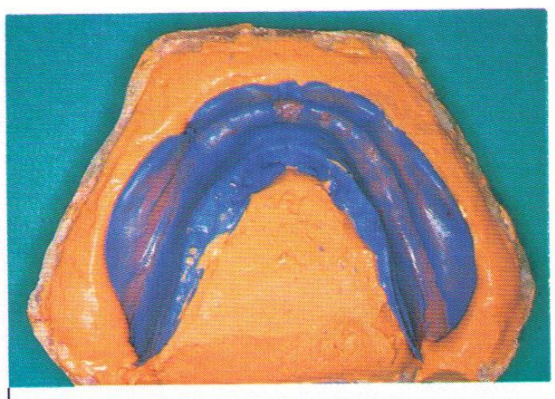

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Fig 3 Dismantled alginate mold after removal of the maxillary denture.

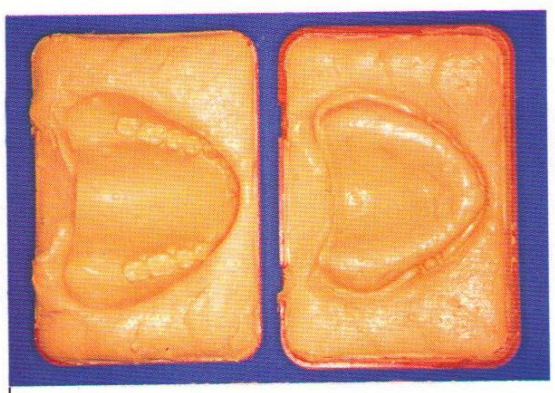

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Fig 4 Pouring of molten wax into the tooth impressions above the level of the gingival margins.

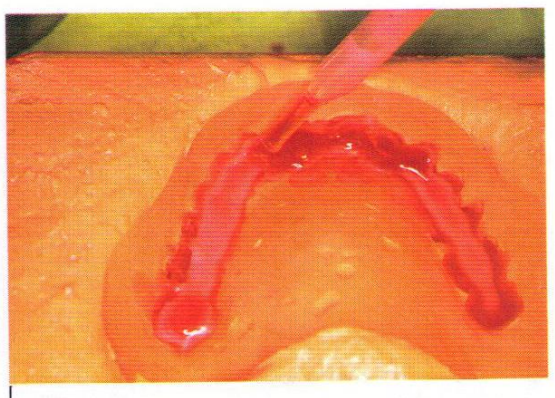

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Fig 5 Polished surfaces of the maxillary and mandibular dentures after duplication of the teeth with molten wax and preparation of the pour-ways.

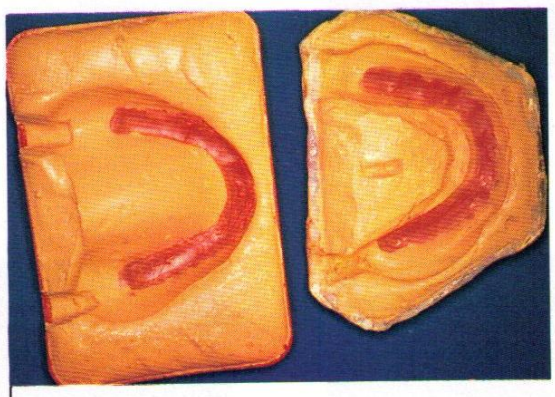

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Fig 6 Injection of the fluid mix of the autopolymerizing acrylic resin into the duplication mold with a disposable syringe. Perforation of the plastic soap box enables adequate retention of the investment material.

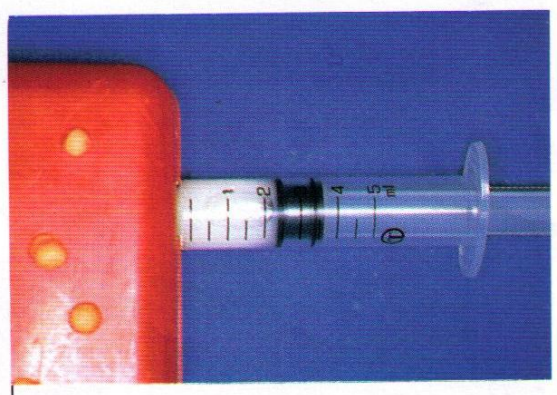

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Fig 7 Deep half of the maxillary denture mold, after separation and before the removal of the template. Note the acrylic resin sprues and the limited extrusion of the acrylic resin from the borders, because of the accurate and tight fit of the two halves of the mold. Because of the proper coverage of the gingival margins with wax, only a thin layer of acrylic resin baseplate is left in this area.

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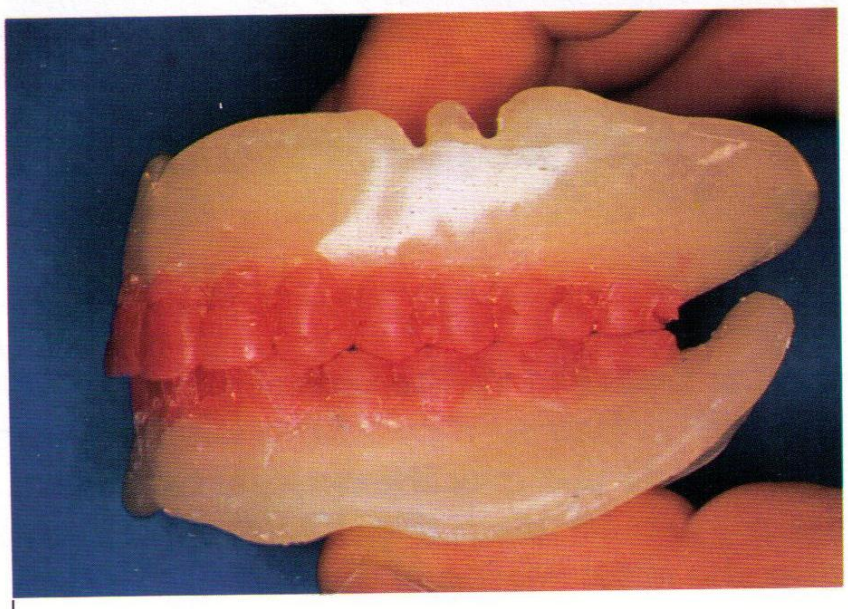
Fig 8 Completed wax-teeth–acrylic resin baseplate denture replicas.



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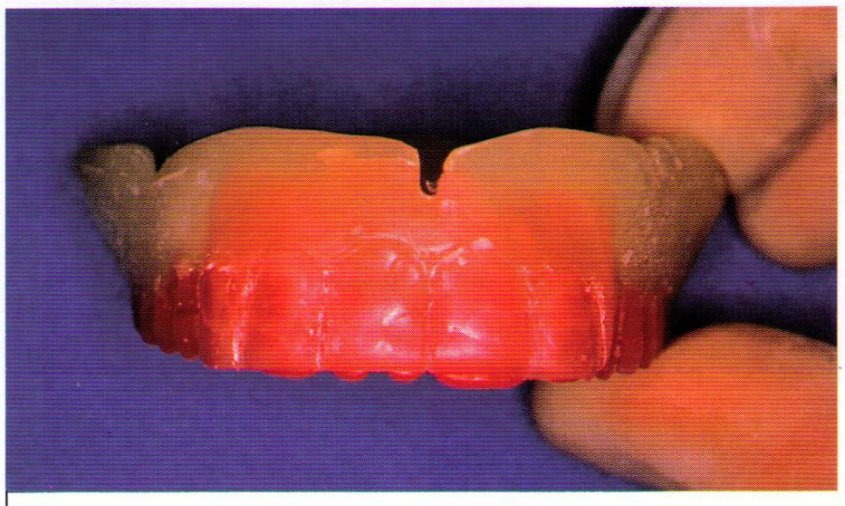

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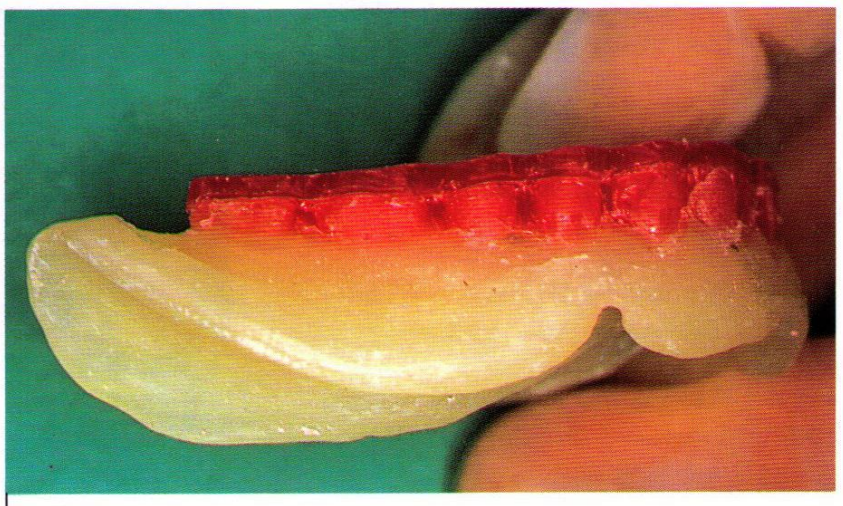

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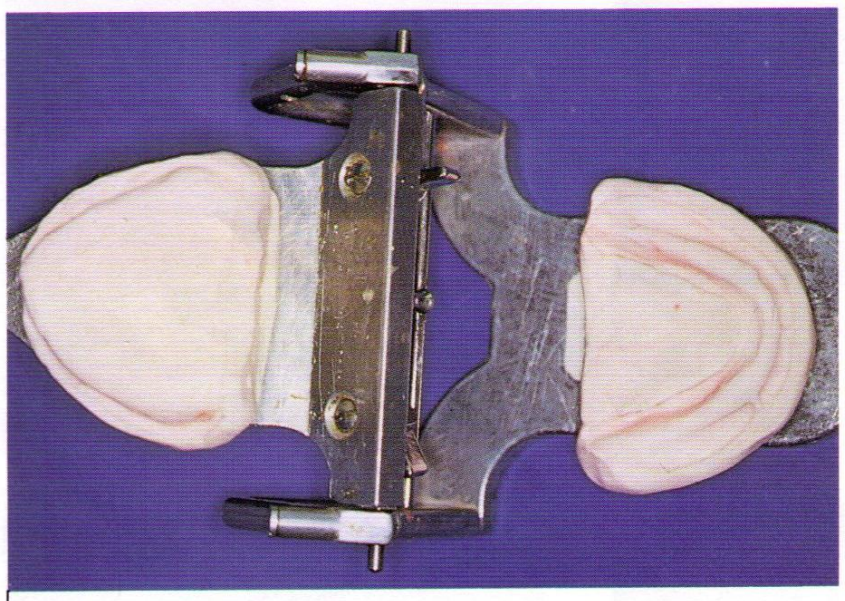

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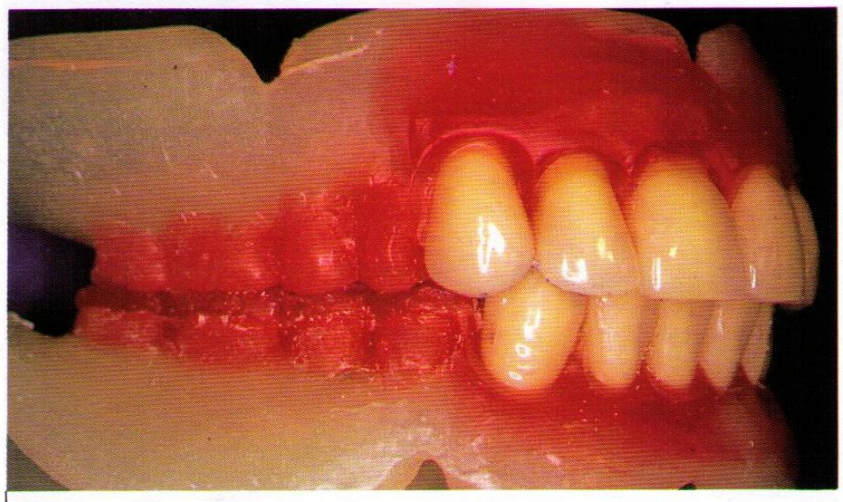
Fig 9 Maxillary denture template after restoration of lip support by addition of wax.

Fig 10 Mandibular denture template after correction of the occlusal facial height by the addition of a layer of baseplate wax over the occlusal surfaces.

Fig 11 Silicone putty casts mounted with stone onto a plane line articulator.

Fig 12 Denture templates with anterior teeth waxed in place.

Fig 13 Completed tooth setup.



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anterior teeth (Fig 9). The vertical dimension of occlusion is increased by adding a 2-mm layer of baseplate wax over the occlusal surfaces of the mandibular teeth (Fig 10). In the present case, the initial relining of the mandibular denture compensated to some degree for the reduction in the vertical dimension of occlusion. Finally, the centric relation is recorded and tooth shape and shade are selected.

Silicone putty casts are made and mounted with stone onto a plane line articulator. This technique not only requires less time, but also, because of the flexible nature of the silicone putty casts, allows acrylic resin

Fig 14 Trial dentures after wash impressions with a silicone rubber material.

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Fig 15 Completed boxing of the wash impressions with round beading and boxing wax, indicating the width and depth of the sulcus around the entire periphery.

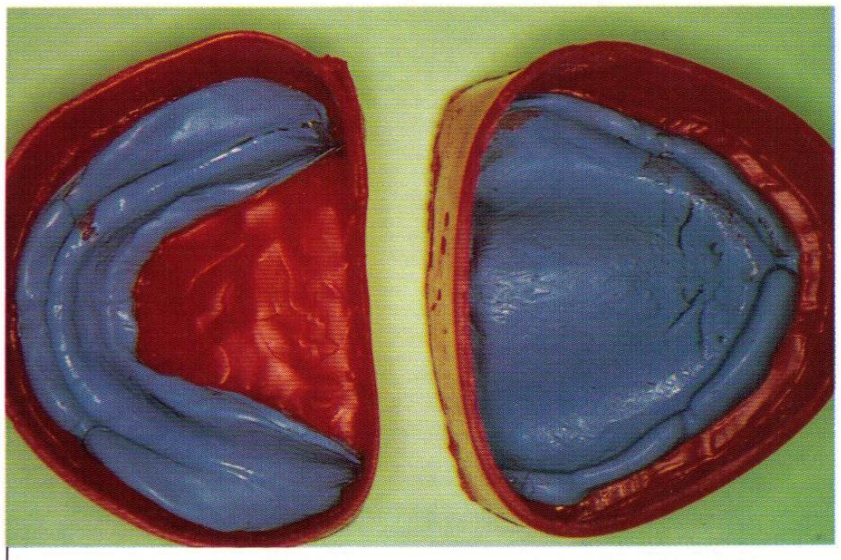

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Fig 16 Wash impressions poured in stone.

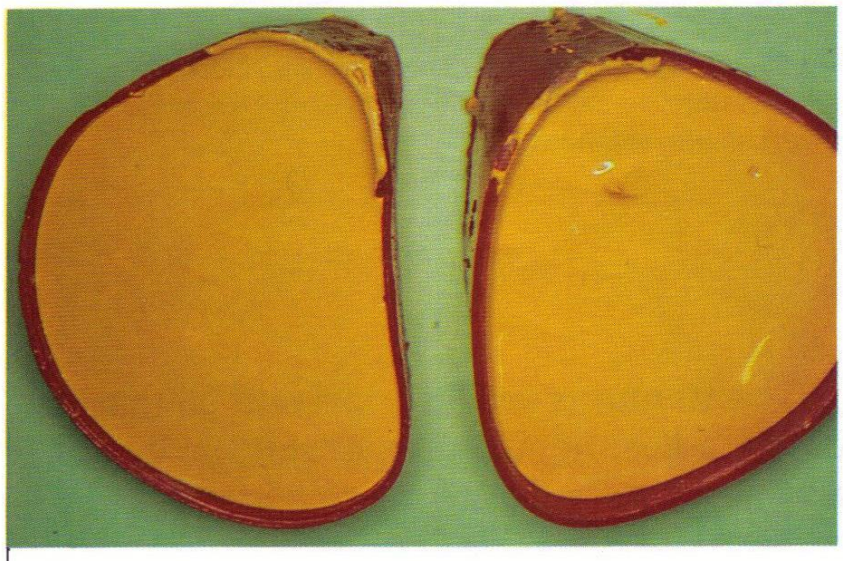

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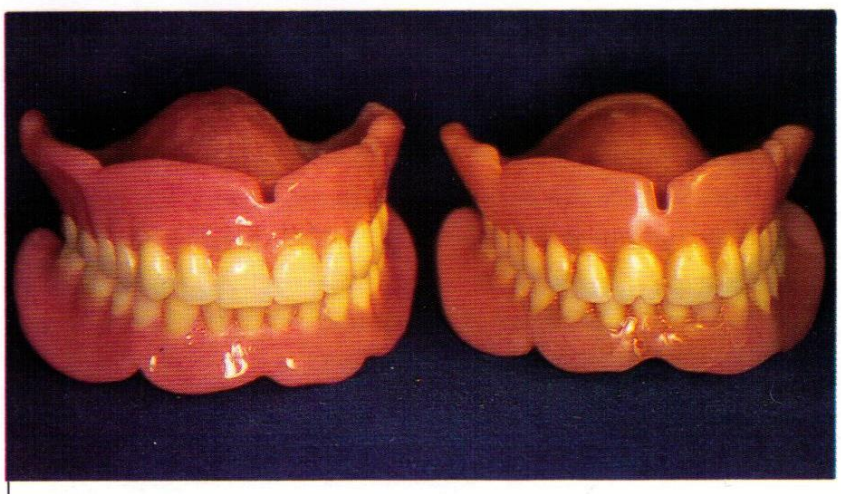
Fig 17 Original dentures *(right)* and copy dentures *(left)*. Note the marked similarities between the two sets of dentures.



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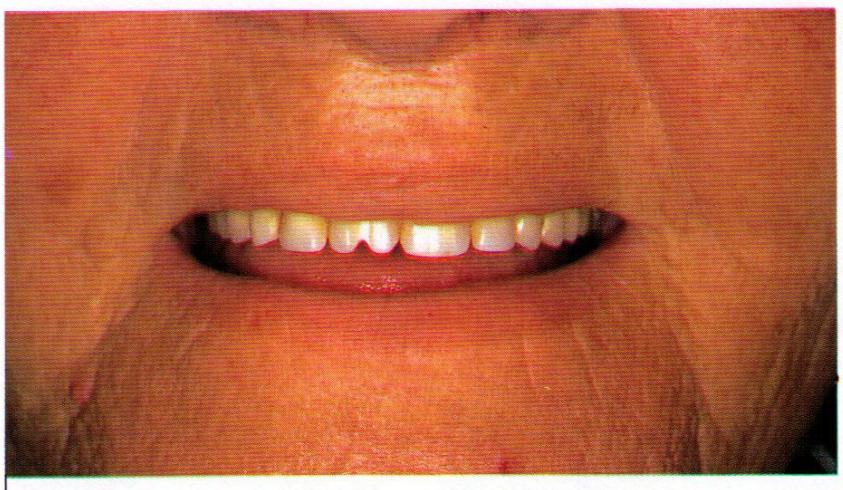
templates to be removed and replaced easily, quickly, and accurately[15] (Fig 11). The wax teeth are sectioned one by one, the new acrylic resin teeth are placed, and the waxup is completed in the usual manner. Normally the waxup is limited, because the morphology of the polished surfaces is defined in the denture templates (Figs 12 and 13). The templates are tried in and any additional corrections are made.

Wash impressions are made with a low-viscosity silicone rubber, after the acrylic resin baseplates are fully coated with adhesive. To minimize unwanted increase of the vertical dimension of occlusion or displacement of the templates during manipulation, a closed-mouth technique in which one impression is made at a time, is preferred (Fig 14). Border molding is not needed at this stage, because major modifications and corrections have been carried out at the first clinical session. Impressions are rinsed and disinfected and then boxed with beading and boxing wax around the entire periphery. The casts are poured in dental stone (Figs 15 and 16). The denture is flasked, the wax is washed away with boiling water, the acrylic resin baseplates are discarded, and the dentures are processed and finished in the usual manner (Fig 17).



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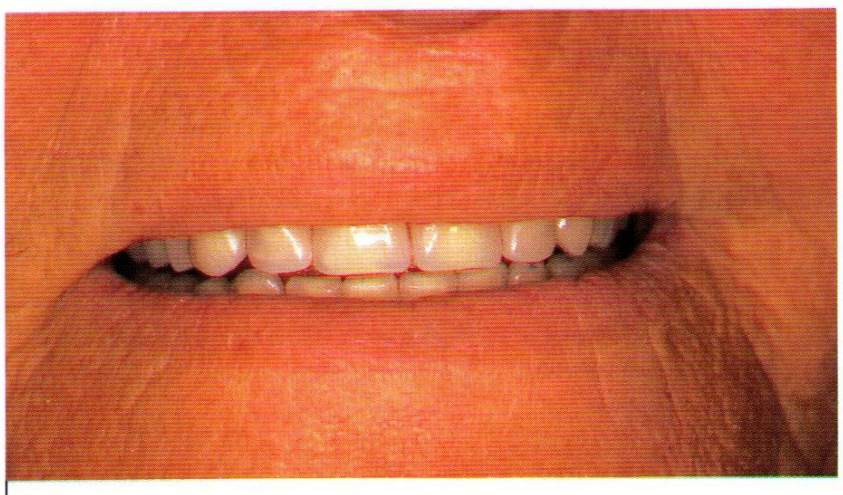

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Fig 18 Appearance of the previous dentures.

Fig 19 Copy replacement dentures in situ. Note the esthetically pleasant dental composition involving proper tooth shape, shade, and position.

The dentures are inserted and all the necessary adjustments in the occlusion, borders, and tissue surfaces are made (Figs 18 and 19).

■ Discussion

The technique described here has been developed as an alternative for geriatric patients wearing well-tolerated complete dentures and has been found to be particularly instructive for undergraduate students in removable prosthodontics. This technique can be completed within four clinical sessions, does not require special materials or equipment, and does not compromise the patient's existing dentures.

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