

Clinical outcome of the altered cast impression procedure compared with use of a one-piece cast

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Statement of the problem. An altered cast impression procedure to improve the support of distal extension removable partial dentures is widely taught, but not often used in dental practice.

Purpose. The purpose of this study was to determine the efficacy of an altered cast compared to a one-piece cast with regard to base support, abutment health, and patient comfort over time.

Material and methods. Seventy-two patients receiving a mandibular bilateral distal extension removable partial denture were assigned randomly for treatment using either a one-piece or an altered cast. All impressions and associated laboratory procedures were made by one investigator. A second investigator evaluated extension, support, and adaptation of the denture bases by observation of border length and lifting of the indirect retainer from its seat. The space between the soft tissues and the base when the framework was related to the teeth was measured cross-sectionally at half the length of the denture base. Mobility, gingival index, and sulcus depths at 6 locations around each abutment tooth were recorded at insertion and again 1 year later. Chi-square tests were used to evaluate differences between the treatment groups ($\alpha=.05$).

Results. There was 0.15 mm less space between the ridge crest and base in the altered cast group ($P<.01$), and underextension of the base occurred only in the one-piece cast group ($P=.01$). At insertion, no tissue-ward movement was observed in 85% of the prostheses when anterior-posterior rotation was attempted. Fifteen subjects (21%) were lost to recall at 1 year, but they were distributed equally between the 2 groups. Of the remaining 57 prostheses, 42% exhibited decreased base support and 33% had increased gingival inflammation; the deepest probing depth decreased in 61%, mobility decreased or remained the same in 80% of the direct abutments, and 88% of the subjects were satisfied. None of these findings were related to the impression procedure.

Conclusion. The altered cast impression procedure does not offer significant advantages over the one-piece cast, provided the standards used in this study are met. These include a completely extended impression, use of magnification to adjust and ensure complete seating of the framework, and coverage of the retromolar pad and buccal shelf by the base. (J Prosthet Dent 2004;91:468-76.)

CLINICAL IMPLICATIONS

A one-piece definitive cast for removable partial denture fabrication can offer base support equal to that of an altered cast impression procedure. This result depends on the quality of the definitive impression, the fit of the framework, and extension of the bases onto anatomic landmarks.

Mandibular distal extension removable partial dentures (RPDs) usually require the altered cast impression procedure (ACIP) during fabrication or a relining procedure at insertion to improve the stability and support of the prosthesis.¹ Several studies have demonstrated the advantages of the ACIP when compared with use of a one-piece cast (OPC).²⁻⁵ The

advantages include increased support for the base²⁻⁴ and decreased forces on the abutment tooth.⁵ The RPDs fabricated using an ACIP are believed to promote patient comfort and preserve oral health. However, none of the studies involved more than 7 subjects, and 2 studies^{2,4} evaluated base support in a manner not used in clinical practice.

The ACIP is taught at 48 of 50 schools,⁶ but only 6.2% of laboratory technicians report that this technique is used frequently.⁷ A survey of dentists showed that 95% either never, or only sometimes, use an ACIP.⁸ The ACIP may be avoided by many practitioners because of the added time, expense, potential for technical errors, and a perceived lack of benefit. For example, no relation has been found between the degree of base support and

Presented at the Academy of Prosthodontics Niagara, Canada, May, 2004.

This study was supported by a grant from the Regional Clinical Dental Research Center, Seattle, Wash (NIDR 5P30DE09743).

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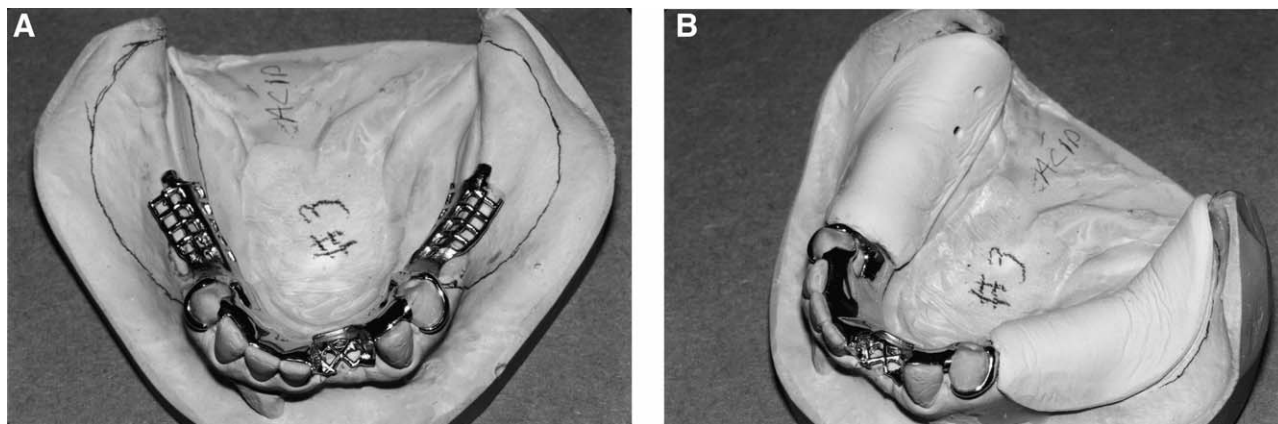


Fig. 1. Tray for ACIP was underextended approximately 0.5 mm from base outline (A, B). Additional adjustment of tray was made if necessary after intraoral evaluation.

patient satisfaction.⁹ Loss of base support occurs over time¹⁰ and, if evaluated annually and treated when required, results in no significant deterioration of the periodontal status of the remaining teeth.¹¹ No study has compared the ACIP with OPC using common clinical measures on a large number of patients over time. Such a comparison could offer more data on which to base a decision about whether or not to use the ACIP.

The purpose of this investigation was to compare RPDs made on OPC with those made with an ACIP relative to clinical outcomes at insertion and 1 year later. It was hypothesized that there would be no difference between the 2 groups relative to these variables: border extension, frequency or amount of base adjustment needed, base movement, base adaptation, need for reline, changes in direct abutment mobility, gingival index, sulcus depth, quality of posterior occlusion, health of tissue beneath the RPDs, patient satisfaction, time worn, and soreness reported by the patient.

MATERIAL AND METHODS

Patient selection

Patients undergoing routine prosthodontic treatment were drawn from the predoctoral patient pool at the University of Washington, Seattle, Wash. Only patients receiving a mandibular Kennedy Class I RPD with at least one indirect retainer on a premolar or canine were invited to participate. Inducement for participation was that no fee would be charged for the examination and prophylaxis provided at the 1-year recall. Procedures for patient contact and treatment were approved by the University of Washington's Human Subject Review Committee. Patients were assigned randomly by computer program to a treatment group after the definitive cast and framework had been made.

Data from a previous study⁹ suggested 37% of 1-year old RPDs made with OPC required relining. A chart

review of 20 patients selected at random from the dental school population who had received an ACIP revealed none with need for relining after 1 year. Sample-size calculations were computed based on testing the difference in percentage of subjects in each of these groups whose RPD needed relining after 1 year. The hypothesis test used was the Pearson chi-square test ($\alpha=.05$). For the conservative estimate of the true rates, 5% ACIP and 30% OPC, a sample size of 35 subjects in each group would yield 80% power for the chi-square test to detect a significant difference between the treatments.

Clinical Procedures

One investigator made and poured all impressions, using prepackaged irreversible hydrocolloid (Jeltrate; Dentsply Caulk, Milford, Del) in a stock metal tray. An impression was accepted only if it extended to the buccal and lingual vestibules and included the retromolar pad of each distal extension base. The same investigator evaluated all frameworks intraorally under $\times 2.5$ magnification to assure the fit was comparable among subjects, constructed the custom trays, made all definitive impressions, and drew the outline for the bases on the nonaltered casts to include the appropriate anatomic landmarks. After blocking out undercuts in the edentulous ridge, autopolymerizing acrylic resin (Formatray; Sybron/Kerr Co, Romulus, Mich) was placed over the plastic retention of the framework and adapted directly to the cast. Tray relief was provided with a bur to an estimated depth of 0.5 mm over the buccal shelf and 1.0 mm over the ridge crest and lingual tissues. No stops were placed since the framework was to be seated firmly only on the teeth.¹² The trays were underextended approximately 0.5 mm from the anticipated extension of the base (Fig. 1). All secondary impressions were made with a mixture of equal parts medium- and light-bodied polyether

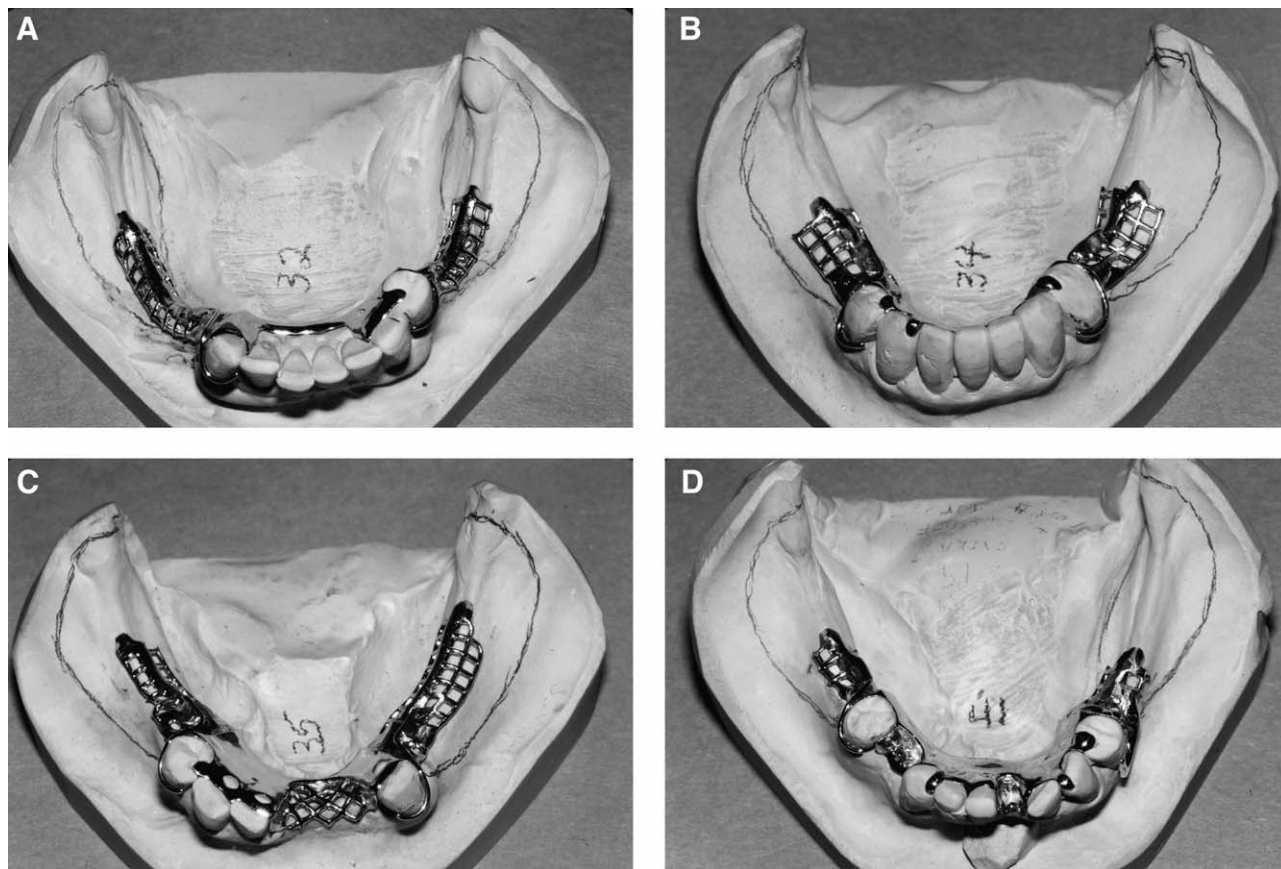


Fig. 2. A–D, Typical base extension of 4 casts using crest of external oblique ridge and at least one half of retromolar pad as landmarks.

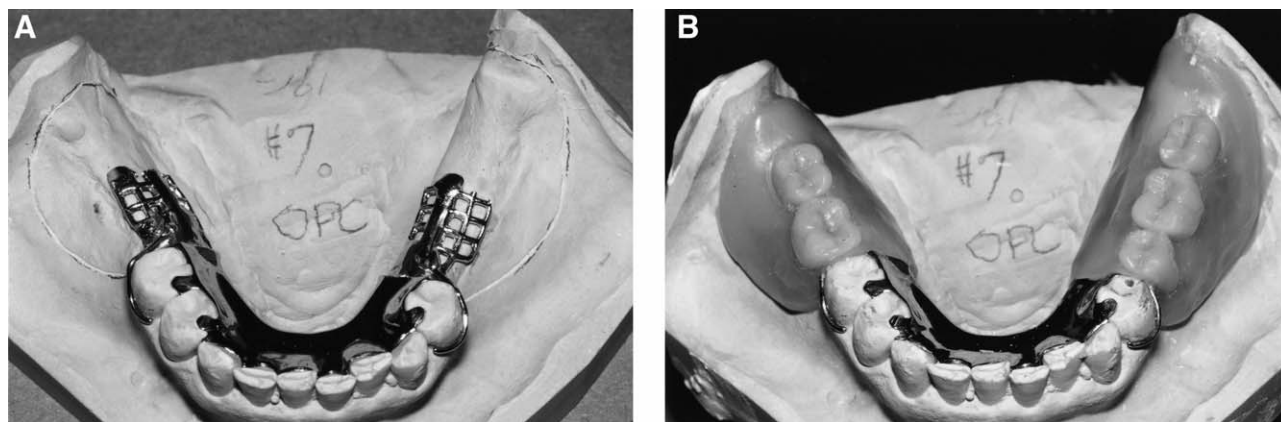


Fig. 3. A, OPC was lightly grooved at desired extension. **B,** OPC was slightly overwaxed. Processed bases were trimmed to raised groove.

material (Impregum F and Permadyne LV; ESPE America Inc, Plymouth Meeting, Pa). Polyether materials have been used successfully for more than 20 years at the University of Washington for both border molding and final impressions of edentulous arches.¹³ The light- and medium-bodied materials can be com-

bined in various ratios depending on impression objectives, but the mix was standardized to avoid any effect from different viscosities.

The landmarks used were as follows: buccally, the most prominent aspect of the external oblique ridge; distally, at least one half of the retromolar pad was

covered (3-4 mm or more distal to the retromolar papilla); lingually, the base was extended into the retromylohyoid fossa and to the reflection of the lingual mucosa from the ridge (Fig. 2). The borders of the OPC bases were lightly scribed to aid in maintaining the desired border length during waxing and finishing of the bases (Fig. 3).

Boxing and pouring the secondary impressions, fabricating the occlusion rims, and completing the final tooth arrangement and waxing for all the RPDs was accomplished by the same clinician. A predoctoral student made interocclusal records, completed tooth arrangement, and completed trial insertion with faculty supervision. Since the ACIP often results in a lack of contact of the metal tissue rest with the ridge, the metal tissue rests of all RPDs were removed and replaced by autopolymerizing acrylic resin (Perm; The Hygienic Corp, Akron, Ohio) to disguise the treatment group (Fig. 4). Processing, finishing (to the scribed line on OPCs), and polishing the resin bases was done by an experienced dental technician.

Data collection: baseline

An evaluator, blind to the fabrication method, assessed border extensions by visual inspection and adjusted the borders. Underextension was rated as "none" (extended to the buccal vestibule and covered at least one half of the retromolar pad); "some" (1-2 mm short of the buccal vestibule or only extended to the retromolar pad); or "extensive" (if greater underextension was found). Similarly, overextension was rated as "none," "some" (requiring 1-2 mm of reduction), or "extensive," (requiring the borders to be shortened by 3 mm or more). The intaglio of the bases was adjusted with the aid of pressure-indicating paste (2 parts Crisco; J.M. Smucker Co, Orrville, Ohio, and 3 parts zinc oxide powder, U.S.P.) and, based on the examiner's experience with RPDs, the amount of adjustment was noted as "none or slight," "moderate," or "extensive" in amount.

The amount of base movement was identified by evaluating the amount of movement of the indirect retainer away from its rest seat preparation when the most posterior tooth on the distal extension base was loaded with firm finger pressure, as is normally done when evaluating a distal extension RPD for possible relines. The vertical movement of the indirect retainer was visualized under 4× binocular lenses (Design for Vision, Inc, Ronkonkoma, NY). The distance the rest moved away from its seat was categorized as either "none," "less than 1/2 mm," "1/2 to 1 mm," or "more than 1 mm." Clinical judgment was used to determine whether or not significantly better base support could be obtained by relining the prosthesis.

Base adaptation was measured by placing a small amount of silicone material (Fit Checker; GC America Inc, Alsip, Ill) over a pencil line drawn on the tissue surface from the buccal to the lingual, and perpendicular to the edentulous ridge crest half the distance from the terminal abutment to the distal end of the right denture base. The RPD was seated and held in place by finger pressure on the casting so that no rotation of the base could occur. After the silicone polymerized (no longer than 30 seconds), the RPD was removed from the mouth and the silicone cut with a sharp scalpel blade on the pencil line. The distal portion of the silicone was removed and a small amount of fast-setting gypsum (Snapstone; Whip Mix Co, Louisville, Ky) was placed over the exposed cross section of the remaining silicone. When the gypsum was set, the core was removed and marked with a pencil to indicate the center of the ridge and the buccal extension. The patient's number was recorded on the stone surface as well. The thickness of the step formed in the stone by the cut surface of the silicone was measured to the nearest 0.1 mm using a reticle and a comparator (Mitutoyo Corp, Kanagawa, Japan) at ×8 magnification and recorded by the principle investigator. Repeated measurement of a machined steel rectangle measuring 10 mm × 1.2 mm with the comparator and an electronic caliper (Mitutoyo Corp) revealed a difference of only 0.05 mm.

Sulcus depth at the mesio-buccal, disto-buccal, mesio-lingual, and disto-lingual line angles, and the mid-buccal and mid-lingual aspects of each direct abutment tooth were recorded. Sulcus depth was recorded with a probe (Florida Probe Corp, Gainesville, Fla), which provided a constant 25-gm probing force and precise electronic measurement to 0.1 mm. The standard deviation of repeated sulcus depth measurement was found to be less than that of a common probe (0.58 mm vs 0.82 mm).¹⁴ An investigation of repeated measurements with the probe, including a 4-week interval between each probing, showed the maximum probing error standard deviation to be approximately 0.3 mm.¹⁵

Mobility of the direct abutments was assessed by pushing against each tooth with a metal instrument in a buccal and lingual direction and observing the movement under 4× magnification. A score of "0" was given to normal mobility (0.0-0.5 mm of buccal-lingual movement), "1" represented 0.5-1 mm of movement, "2" indicated 1 to 2 mm of movement, and "3" was given to teeth with either more than 2 mm of buccal-lingual movement or with vertical movement.

A gingival index was recorded for each direct abutment and was scored as "0" if the tissue was healthy, "1" if there was increased redness but no bleeding on probing, "2" if the tissue bled on probing, and "3" if there was spontaneous bleeding. Resorption of the edentulous ridge was classified as "little" or "none" if the ridge height was at the same level as that of the

Table I. OPC and ACIP compared at baseline

		Number of Patients		P value
		OPC	ACIP	
Intaglio adjustment	None	26	29	.61
	Some	7	4	
	Extensive	3	3	
Border overextension	None	21	22	.84
	Some	13	13	
	Extensive	2	1	
Border underextension	None	28	36	.01
	Some	6	0	
	Extensive	2	0	
Base movement	None	29	32	.29
	<1/2 mm	6	2	
	1/2-1 mm	1	2	
Base adaptation	Ridge Crest	0.36 (0.26)	0.21 (0.19)	.01
	$\bar{x}$ mm (SD)			
	Buccal Shelf	0.32 (0.13)	0.28 (0.12)	.22
	$\bar{x}$ mm (SD)			

Table II. OPC and ACIP compared at 1 year

		Number of Patients		P value
		OPC	ACIP	
Base movement	None	13	17	.45
	<1/2 mm	10	6	
	$\geq$ 1/2 mm	5	6	
Movement change	Increased	13	11	.55
Baseline-1 year	Same	14	15	
	Decreased	1	3	
Base adaptation	Ridge crest	0.30 (0.15)	0.19 (0.15)	.01
	$\bar{x}$ mm (SD)			
	Buccal shelf	0.32 (0.15)	0.29 (0.13)	.41
	$\bar{x}$ mm (SD)			

dentate portion of the mandible. "Severe" resorption indicated the absence of any vertical component in the edentulous ridge; "moderate" resorption described a normal loss of contour in-between the two extremes.

Tissue quality was also divided into 3 options as is done normally in an oral examination. "Nondisplaceable" tissue was defined as firmly attached mucosa showing little or no displacement when firm finger pressure was applied. "Easily displaceable" tissues were those offering little or no resistance to finger pressure directed either vertically or horizontally. "Normal" tissue fell between these 2 extremes and indicated tissue that was supported by bone but contained enough compressible tissue to be evident with finger pressure. The type of opposing dentition was listed as a complete denture, an RPD, or natural teeth, including fixed partial denture(s). Follow-up care, including occlusal adjustment, was provided by the student under faculty supervision. All adjustments of the RPD required by the patient were recorded in the chart.

Data collection: 1 year

The same evaluator, still blind to the fabrication method and without reference to the baseline data, assessed the RPD and the abutment teeth in the same manner as was done 1 year earlier. In addition, the number of base adjustments recorded in the chart was counted, and patients were asked whether other adjustments had been made outside of the dental school. The presence or lack of occlusal contact between the opposing posterior teeth was evaluated with Mylar strips (Artus Corp, Englewood, NJ). The tissue beneath the framework and bases was assessed visually for inflammation and/or impingement by the RPD. The subject completed a questionnaire concerning satisfaction, time worn, soreness, use of the RPD for eating, and 2 open-ended questions concerning the best and least-liked features of the RPD.

The baseline and 1-year data were analyzed with statistical software (SAS, version 8.2; SAS Institute, Cary, NC) twice and the entries compared to identify input error. Items were reentered if discrepancies were found. Descriptive statistical analyses were performed to summarize the responses to each of the examination items. Chi-square tests were used to determine the statistical significance ($\alpha=.05$) of differences between the 2 treatment groups for each of the variables.

RESULTS

Baseline

The age of the subjects ranged from 35 to 88 with a mean of 61 years. Fifty-seven percent of the patients were women, 51% had no previous experience with a mandibular removable prosthesis, and 47% wore a maxillary complete denture. The distal extension residual ridges exhibited little or no resorption in 25% of the subjects, moderate resorption in 68%, and severe resorption in 7%. Nearly all the residual ridges were covered with normal tissue, 4 had nondisplaceable tissue, and none exhibited easily displaceable tissue.

Sixty-two percent of the direct abutment teeth exhibited no mobility, 28% had less than 1 mm buccal-lingual movement, and 10% had 1 to 2 mm of buccal-lingual movement. The gingiva was healthy in 65% of the direct abutments, but bled on probing in 33% and had spontaneous bleeding in 2%. Ninety-one percent of the sulcus depth measurements were 3 mm or less; 6% were 3.1 to 4.0 mm, 2% were 4.1 to 5.0 mm, and 1% were greater than 5.0.

Chi-square tests were used to examine whether either of the 2 groups had a disproportionate number of subjects in any of the 9 variable groups stated above. There were no statistically significant differences between the subjects who had been assigned randomly to the OPC or ACIP groups. In addition, a *t* test was used to compare

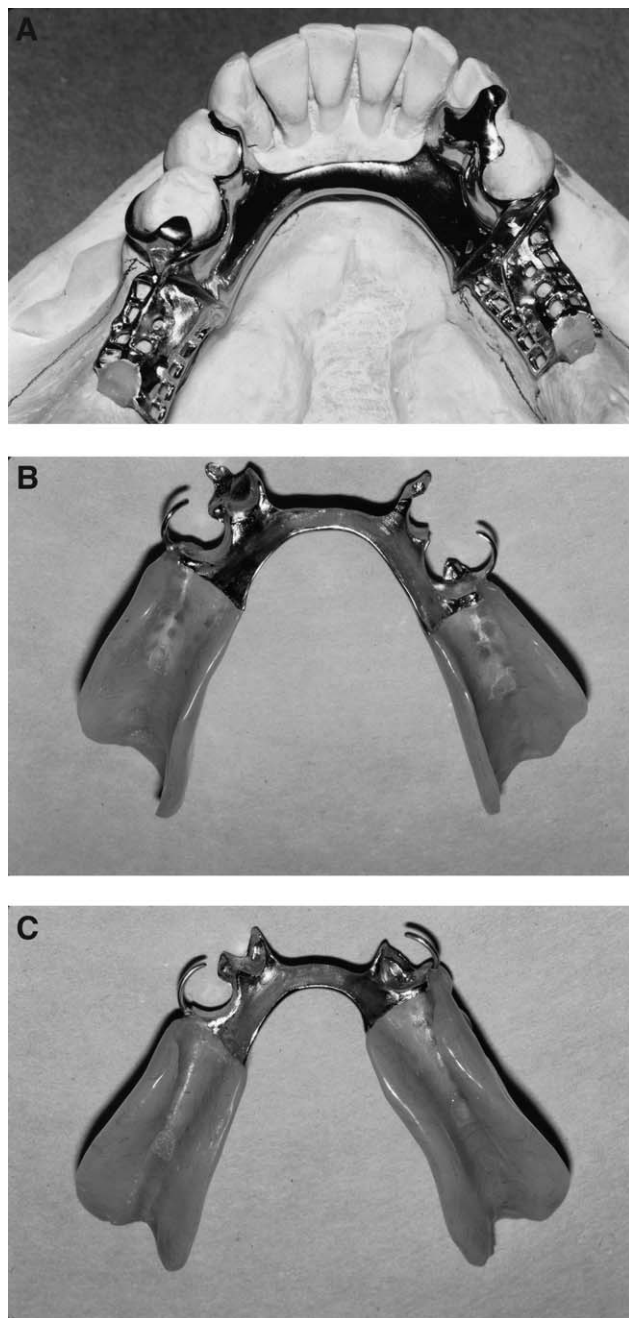


Fig. 4. A, Metal tissue rest was removed and replaced with autopolymerizing resin to disguise treatment group. B, Base from OPC. C, Base from ACIP.

the mean maximum sulcus depth measurement in the 2 groups, and no significant difference was found (OPC $\bar{x} = 3.53 \pm 1.48$ mm; ACIP $\bar{x} = 3.27 \pm 0.93$ mm; $P=.38$).

A few (8.3%) RPDs required extensive adjustment of the intaglio of the base at insertion because of severe undercuts in the edentulous residual ridges, but most needed only moderate (15.3%) or none/slight (76.4%) relief. No reduction of the border length was necessary in 59.7%, although some adjustment was done in 36.1%,

Table III. Direct abutment health changes, baseline to 1 year

		Number of Patients		
		OPC	ACIP	<i>P</i> value
Mobility				
Right abutment	Decrease	6	4	.14
	Same	19	15	
	Increase	3	9	
Left abutment	Decrease	3	7	.30
	Same	20	15	
	Increase	5	6	
Gingival index				
Right abutment	Decrease	3	2	.89
	Same	14	14	
	Increase	11	12	
Left abutment	Decrease	4	4	.95
	Same	17	16	
	Increase	7	8	
Deepest sulcular depth	Decrease $\geq .5$ mm	14	19	.21
	Less Than $\pm .5$ mm	12	6	
	Increase $\geq .5$ mm	1	2	

and an extensive amount in 4.2%. There were no statistically significant differences between OPC and ACIP groups for these adjustments. Only 8 RPDs were judged to be underextended; all were in the OPC group, and this occurrence was significant ($P=.01$). No gingival movement of the bases was observed in 85% of the RPDs when anterior-posterior rotation of the RPD was attempted. Less than 0.5 mm of movement was noted in 11%, and 0.5 to 1 mm occurred in 4%; there was no significant difference between the groups. None of the RPDs was judged to require a relin at insertion.

There was a significant difference ($P<.01$) when base support was evaluated by its adaptation to the ridge crest. The OPC group had an average space of 0.36 mm versus 0.21 mm for the ACIP when the framework was seated against the teeth. However, there was no difference between the groups in the adaptation of the bases in the buccal shelf area (0.32 mm vs 0.28 mm). A summary of baseline results is shown in Table I.

One-year evaluation

The subjects were re-examined by the same evaluator 12 to 13 months after insertion of the RPD. The evaluator remained blind to all data. Fifty-seven (79%) of the RPDs were evaluated, and 53 (74%) of the subjects provided complete follow-up data. These were evenly divided between the OPC and ACIP groups (27 and 26 subjects, respectively). Of the remaining subjects, investigators were unable to contact 3, 4 refused to return, 6 did not wear the RPD, 2 lost the RPD, 2 lost an abutment tooth (but were wearing the repaired RPD), and 2 did not permit gingival probing due to

sensitivity (but were using the RPD). The subjects who refused to return, did not wear the RPD, or who had lost it were distributed equally between OPC and ACIP groups.

The mean number of follow-up appointments for base adjustment was 1.8, with no difference between the OPC and ACIP groups. The most common tissue health problem after 1 year was inflammation of gingiva covered by the RPD (50%), although 5 subjects (9%) exhibited impingement by the framework. Tissue health was not affected by the type of impression procedure used ($P=.89$).

There was even contact between the opposing posterior teeth in 74% of the subjects. Loss of contact occurred in half of the subjects who had opposing natural teeth or RPD, but it was not related to the impression procedure ($P=.41$). None of the subjects with maxillary complete dentures lost occlusal contact.

No tissue-ward movement of the bases could be detected in 53%, less than 0.5 mm in 28%, and more than 0.5 mm in 19% of subjects. Greater movement was not related to severity of ridge resorption, nor was it related to OPC or ACIP. Forty-two percent (24/57) of the RPDs exhibited decreased base support compared to baseline, but only 2 of these required a reline—both in the ACIP group. The average space between the base and soft tissues when the framework was related to the teeth remained nearly the same as at baseline. The lack of adaptation over the ridge crest was greater with OPC (0.30 mm versus 0.19 mm, $P<.01$), but lack of adaptation in the buccal shelf area was almost identical (0.32 mm versus 0.29 mm, $P=.41$) (Table II).

After 1 year, 18% of the direct abutments decreased in mobility, 62% remained the same, and 20% exhibited increased mobility. The gingival index in approximately half the direct abutments was unchanged, while one third showed increased inflammation. None of these changes were related to use of OPC or ACIP.

Mean maximum sulcus depth measurements at the 1-year evaluation were examined as was done at baseline; there were no significant differences related to treatment group. Each of the 12 measurement sites were also categorized as increasing or decreasing in depth by 0.5 mm or more, or changing less than 0.5 mm compared to baseline. Again, there was no difference between OPC and ACIP. The deepest sulcular depth in each subject at baseline was compared to the same sulcus 1 year later: 61% decreased by 0.5 mm or more, 33% were relatively unchanged, and only 6% (3 subjects) exhibited increased depth of 0.5 mm or more. There was no statistically significant difference between the OPC and ACIP groups (Table III).

Eighty-eight percent (50/57) of the returning subjects were moderately to completely satisfied with the RPD; satisfaction was not related to impression procedure ($P=1.00$). Similar results were found when

comparing the treatment groups for amount of time worn, frequency of soreness, and use of the prosthesis for eating. Overall, the most liked features of the RPD were “fits well” and “helps with eating.” Most replied “nothing” when asked about the least liked feature of the RPD (42%), but others wrote “food under the RPD” (18%), “loose” (12%), and the remainder gave a variety of answers.

Treatment required by the natural teeth in the arch with the RPD during the year after insertion was tabulated. Eleven patients were involved: 3 lost pre-existing crowns and the roots were converted to overdenture support; 2 required extraction of a direct abutment with subsequent RPD repair; 2 required extraction of a nonabutment with subsequent RPD repair; and 4 subjects needed repair of composite material supporting a rest on 4 direct abutments and 1 indirect abutment. Composite (TPH; Dentsply/Caulk, Milford, Del) had been used to support a cingulum rest on 58 mandibular canines; 9 were direct abutments and 49 were indirect abutments. No difference in occurrence of these problems was attributable to the impression procedure ($P=.35$), and in all instances, the RPD could remain in service.

DISCUSSION

The hypothesis that there was no difference between ACIP and OPC was accepted for all the criteria except border extension and adaptation of the base to the ridge crest. Underextension was noted in 22% of the OPC and in none of the ACIP. The underextension of the denture bases noted in this study was primarily the buccal extension near the direct abutment and did not involve the distal or distal-buccal extension. This may account for the lack of difference in rotational movement. However, an evaluation of distal extension RPDs made in private dental practice showed that 65% failed to cover any portion of the retromolar pad and that this underextension was clearly related to lack of dental health.⁹ Underextension can be due to difficulty in recognizing anatomical landmarks, underextended impressions, underwaxed or overfinished bases, aggressive base adjustment, lack of space, or, occasionally, patient demand. Greater attention should be given by both dentist and technician to identifying the appropriate landmarks. Marking the buccal and distal extensions intraorally with an indelible pencil just prior to the impression, with subsequent transfer to the definitive cast, may be helpful and is essential when unusual anatomy is observed. Identification of landmarks cannot be too strongly emphasized in the prosthodontic curriculum of dental schools.

Although there was a statistically significant difference between OPC and ACIP in adaptation of the base to the ridge crest, the difference of 0.15 mm was

undetectable by evaluating rotational movement of the base. Since the buccal shelf is considered the primary bearing area,¹⁶ a difference between the techniques could have had a measurable effect, but no difference in adaptation was found there. Adaptation of the base to the alveolar ridge after one year was nearly identical to that found at baseline, but loss of occlusal contact in half of the patients who had opposing natural teeth suggests changes occurred. Similar changes undoubtedly occurred in subjects with complete maxillary dentures, but rotation of the denture likely maintained occlusal contact with the RPD.

Other advantages associated with use of an ACIP did not materialize as the same number of base adjustments was required, and no difference in satisfaction or frequency of soreness was noted in the 2 groups. Although there is some clinical evidence that the ACIP decreases the load on the direct abutments,⁵ it does not appear that such difference has any detrimental effect. For example, no changes in mobility, gingival index, or sulcus depth could be attributable to the type of impression used. However, the increase in inflammation around the direct abutments underscores the importance of periodic reinforcement of oral hygiene instructions.¹¹

Because no substantial difference between the techniques could be detected, it may be concluded that the ACIP is unnecessary. However, a similar outcome may be expected only if the framework exhibits complete seating as seen under magnification $\times 2.5$, the impression records all applicable landmarks, and the base extension is neither underextended nor overfinished. If these 3 conditions cannot be accomplished, then the practitioner should either use the ACIP,¹ a custom impression tray,⁴ or evaluate base movement during framework evaluation with an attached occlusion rim. If movement is noted, an ACIP may be performed.¹⁶

The ACIP should not be abandoned in dental curricula. First, some impressions and fit of frameworks may not meet the standards used in this study and result in a different outcome. Second, decisions regarding the need for ACIP may not be consistent among faculty and could lower a student's understanding of adequate base support. Third, few students receive clinical experience in relining an RPD, but principles learned in the ACIP are readily applied when the need for a reline arises. Fourth, if a student has not done an ACIP under supervision, the procedure is unlikely to be applied in practice due to fear of ruining the definitive cast.

The experience level of the clinician fabricating the dentures might be considered a factor in the outcome, because the quality of the 1-piece impressions may have been better than those made by the average clinician. It is equally likely that the potential problems in making an accurate altered cast impression were avoided by this level of experience. Further studies are needed to determine whether similar results can be obtained when

the clinician has less experience in RPD fabrication. Based on a review of RPDs made in private practice,⁹ the standard least likely to be met is proper base extension. Unfortunately, this will also impact ACIP tray extension. It would be useful to include the effect of the dental technician since decisions about the final base extension may occur primarily in the laboratory.

One year was chosen as the time frame for comparison since it is likely that the patient would be returning for an annual appointment at that time, and because any differences in tissue health or RPD quality that could be related to the impression technique may have manifested by that time. After 1 year, other factors are likely to influence the comparison.

CONCLUSIONS

The ACIP does not offer significant advantages over the OPC, provided the standards used in this study are met. The standards include a completely extended impression, use of magnification to adjust and ensure complete seating of the framework, and coverage of the retromolar pad and buccal shelf by the base.

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0022-3913/\$30.00

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doi:10.1016/j.prosdent.2004.02.013

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