Influence of Two Functional Complete-Denture Impression Techniques on Patient Satisfaction: Dentist-Manipulated Versus Patient-Manipulated

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This preliminary clinical study aimed to identify the impact of two border-molding techniques (dentist-manipulated and patient-manipulated) on patient satisfaction, the occlusal force at denture dislodgment, and number of pressure sores. Salivary flow rate and residual ridge resorption were analyzed as covariates. Thirty-six edentulous patients in need of a relining of their existing maxillary denture were included. After relining, no significant influence of the border-molding technique on any of the variables investigated could be identified. It can be concluded that the impact of the border-molding technique on patient satisfaction and denture function probably has been overestimated in the past. *Int J Prosthodont 2011;24:540–543.*

Different border-molding techniques (BMTs) have been described for complete denture relining.[1] In summary, these techniques can be classified as patient-manipulated, if muscular movements are accomplished by the patient, or dentist-manipulated, if the dentist simulates the functional movements.[2] Although a major impact of the BMT on patient satisfaction (analyzed using the Oral Health Impact Profile [OHIP]), occlusal force at denture dislodgment, and the development of pressure sores has been advocated,[3] scientific evidence is lacking. This preliminary study tested the following null hypothesis: patient satisfaction, occlusal force at dislodgment, and the number of pressure sores are not affected by the selected BMT under otherwise constant conditions. Additionally, salivary flow rate and jaw atrophy were analyzed as covariates since they are considered to be relevant for denture function.[4,5]

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Materials and Methods

Thirty-six edentulous patients (mean age: 66.2 ± 10.2 years) in need of a reline of their maxillary complete dentures were allocated at random to two BMT groups: group 1 = patient-manipulated (n = 20) and group 2 = dentist-manipulated (n = 16). Inclusion criteria were as follows: patients wearing maxillary complete dentures with insufficient congruence between the denture base and oral tissue or with inappropriate base extension. Patients addicted to medication, alcohol, or drugs and those with malignant tumors or allergies were excluded. Figure 1 depicts the patient inclusion flowchart.

This study was approved by the ethics committee of the Justus-Liebig University, Giessen, Germany, and was registered in the DRKS (German Clinical Trials Register, register no. 00000149).

The same clinician prepared all dentures by reducing their borders and roughening the bases. Afterward, a functional impression was performed (Table 1). Dentures were relined with PalaXpress (Heraeus Kulzer) and subjected to a Gothic arch registration before reinsertion. They were then remounted in an articulator, and a bilateral balanced occlusion was established.

Before and 1 week after treatment, patient satisfaction was assessed by the German version of the original OHIP questionnaire. Occlusal force at dislodgment was gauged with a blend-a-dent gnathometer

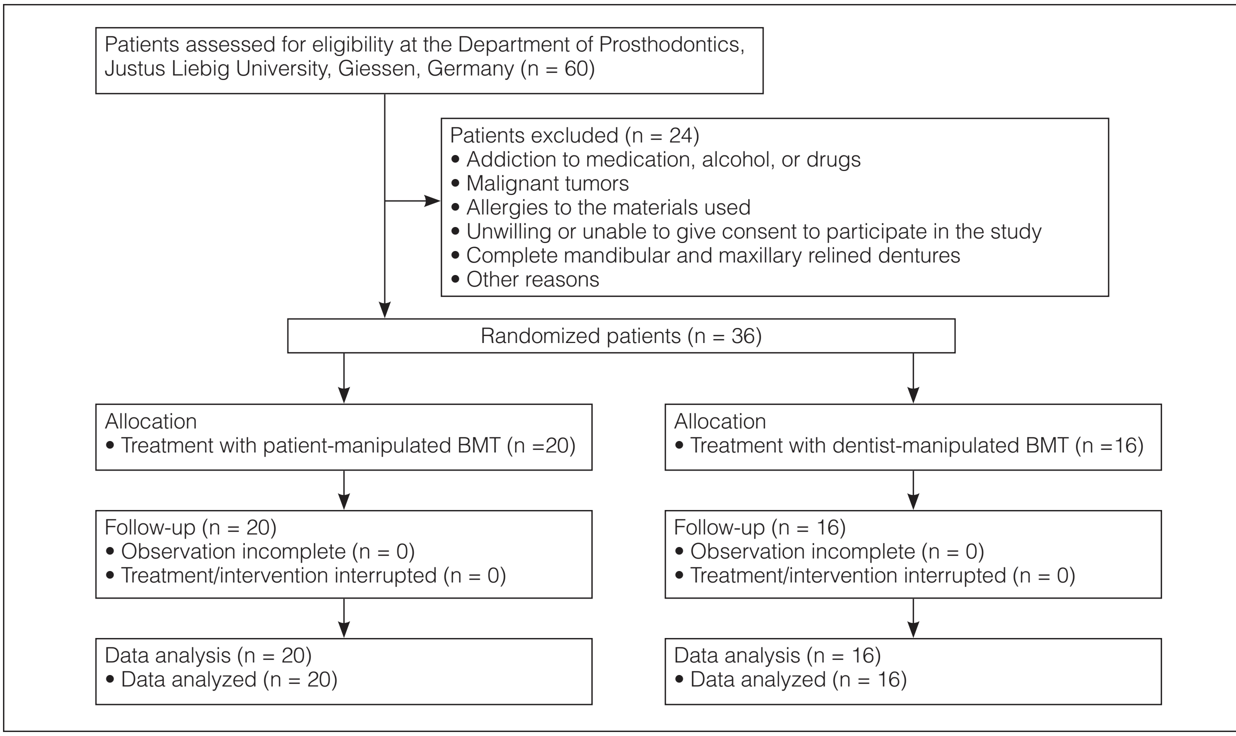

Fig 1 Patient flowchart of the clinical trial.

Table 1 Impression Phases with the Corresponding Impression Materials and Application Area*

Impression phase	Material†	Application area
1. Border molding a) Dentist-manipulated: Functional movements (twisting the cheek, raising the lip vertically) were simulated by the investigator b) Patient-manipulated: Functional movements (contour the lips as in smiling, purse the lips, speak, swallow) were carried out by the patient	Xantopren function	Borders of the denture apart from the posterior palatal rim
2. Seal molding Oral mucosa dried with gauze and the denture reinserted; pressure applied for 15 s to allow the impression material to flow out	Xantopren function light	Basal surface of the denture
3. Post dam	Xantopren function	Posterior border

*Each functional impression consisted of three phases; phases 1 and 2 differed only between the two BMT groups.
†All materials: Heraeus Kulzer.

using a scale between 0 and 10 (Procter & Gamble). To determine the number of pressure sores, an intraoral examination of the soft tissues was conducted; pressure sores reported by the patient within 4 weeks of relining were added to the count. Jaw atrophy was measured using plaster casts of the patients' edentulous maxillae.[6] For statistical analysis, results were summarized into two groups (no/slight atrophy and medium/severe atrophy). Salivary flow rate was assessed by spitting into a beaker for 10 minutes.

Since data were distributed normally, the Student *t* test and analysis of variance were used. For statistical evaluation of the salivary flow rate, the coefficient of correlation (Pearson) was calculated; Spearman rho was calculated to assess jaw atrophy.

Results

Table 2 shows the results of the independent variables and their influence on patient satisfaction, occlusal force at dislodgment, and the number of pressure sores before and after relining. Patient satisfaction increased significantly after relining in both BMT groups ($P \leq .05$, paired t test; Table 2). Though there was a slight advantage for the patient-manipulated technique with regard to change in patient satisfaction, occlusal force at dislodgment, and the number of pressure sores, no significant differences could be observed between the two BMT groups after relining (analysis of variance; Table 2). There was a low negative, though significant, correlation between

Table 2 Independent Variables and Their Influence on Patient Satisfaction, OFD, and Overall Pressure Sores

	Mean patient satisfaction ± SD*			Mean OFD ± SD (N)	Mean no. of pressure sores ± SD
	Before relining	After relining	Difference		
Impression technique					
Group 1: Patient-manipulated (n = 20)	† 3.9 ± 0.9[a]	4.2 ± 0.7[a]	0.3 ± 0.9	71.2 ± 21.4	1.5 ± 0.5
Group 2: Dentist-manipulated (n = 16)	4.1 ± 0.5[a]	4.3 ± 0.5[a]	0.2 ± 0.4	66.9 ± 22.4	1.4 ± 0.5
Jaw atrophy[b]					
None/slight (n = 12)	4.1 ± 0.7	4.1 ± 0.7	0.02 ± 0.7	77.8 ± 21.8	1.5 ± 0.5
Medium/severe (n = 24)	3.9 ± 0.8	4.4 ± 0.5	0.4 ± 0.7	65.0 ± 20.7	1.5 ± 0.5
Salivary flow rate (mL/min)[c]					
≥ 0.4 (n = 24)	4.0 ± 0.7	† 4.4 ± 0.5	0.3 ± 0.6	‡ 74.6 ± 19.8	1.5 ± 0.5
< 0.4 (n = 12)	3.8 ± 0.9	4.0 ± 0.7	0.1 ± 0.9	58.5 ± 22.1	1.4 ± 0.5

OFD = occlusal force at dislodgment; SD = standard deviation.
*OHIP questionnaire scores range from 1 to 5 (1 = very often, 2 = fairly often, 3 = occasionally, 4 = hardly ever, 5 = never).
†Unpaired *t* test, significant ($P \leq .05$).
‡Pearson correlation, significant ($P \leq .05$).
[a]Paired *t* test, significant ($P \leq .001$).
[b]Spearman rho correlation, not significant ($P > .05$).
[c]Pearson correlation, not significant ($P > .05$).

Table 3 Coefficients of Correlation of Jaw Atrophy and Salivary Flow Rate

	Patient satisfaction		Occlusal force at dislodgement	No. of pressure sores per patient
	Before relining	After relining		
Jaw atrophy*	−0.149	0.128	−0.310	−0.039
Salivary flow rate†	−0.057	−0.281	−0.356‡	−0.079

*Spearman rho correlation.
†Pearson correlation.
‡Significant, $P \leq .05$.

salivary flow rate and occlusal force at dislodgment ($P \leq .05$, Pearson correlation), whereas jaw atrophy was not influential (Table 3).

Since neither patient satisfaction nor occlusal force at dislodgment or the number of pressure sores were significantly influenced by the BMT, none of the three components of the null hypothesis could be rejected.

Discussion

The data do not reflect a high impact for the BMT on change in patient satisfaction, occlusal force at dislodgment, and the number of pressure sores, which was clearly not anticipated. Thus, patient satisfaction seems to be much more influenced by other factors than the BMTs investigated.

When planning this preliminary study, the authors intended to record occlusal force at dislodgment prior to relining as well. However, since this was impossible in many patients because of poor denture stability, they refrained from recording these data. Therefore, results for occlusal force at dislodgment must be interpreted carefully, since they are clearly influenced by denture adaptation, residual ridge resorption, and the innate masticatory strength of the individual. This may also explain the low negative correlation between occlusal force at dislodgment and salivary flow rate ($P \leq .05$), which primarily may be related to other factors and is contradictory to the observation that patient satisfaction increased more in patients with a higher salivary flow rate.[4] In good agreement with the literature, the results indicate that jaw atrophy affects denture stability and demonstrate that a certain height of the alveolar ridge is important for denture stability and function.[5]

Conclusion

The inherent shortcomings of this research design preclude robust conclusions. However, it does appear that the impact of diverse border molding protocols may have been overestimated in the literature. Better comparitive studies are necessary to judge the impact of border molding on patient satisfaction.

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