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PROSTHODONTICS™

NEWSLETTER

SUMMER 2008

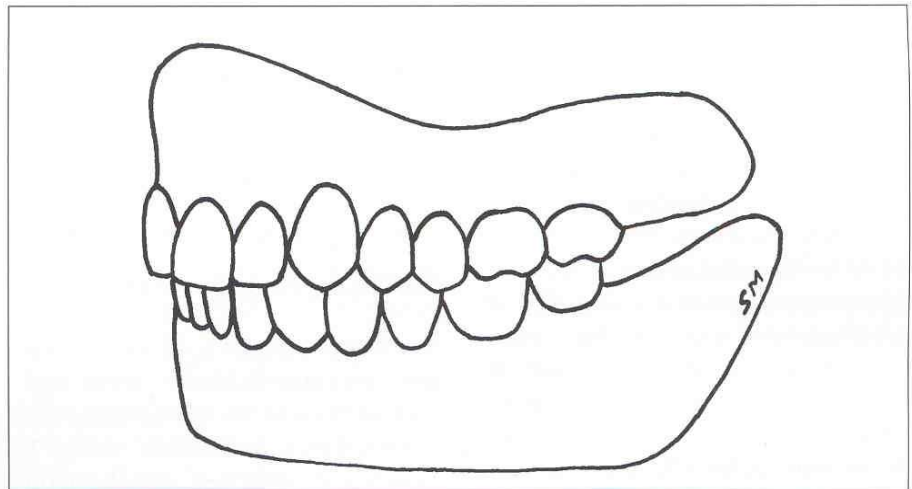
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A study of canine-guided complete dentures found that they could potentially produce denture instability. See *Occlusal Schemes for Complete Dentures* inside.

Complete Denture Prosthodontics for The Totally Edentulous Patient

The fastest growing cohort in American society is the elderly population. Although a lower percentage of elderly patients is edentulous compared with several decades ago, the sheer number of elderly adults has resulted in an increase in the number of edentulous patients in the U.S. population. A recent projection on edentulism in the United States has predicted 37.9 million adults in need of 1 or 2 complete dentures by 2020, compared with only 33.6 million in 1991. Therefore, the need for complete denture treatment will be an important part of prosthodontic practice for decades to come. This issue of *Prosthodontics Newsletter* reviews a series of articles related to conventional complete dentures, implant-supported overdentures and implant-supported fixed dentures.

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Processing Complete Dentures

Poly(methyl methacrylate), commonly referred to as acrylic resin, is the most widely used denture base material. This material can be polymerized in a traditional polymerization tank in water or in a domestic microwave oven. Pero et al from São Paulo State University, Brazil, evaluated the influence of polymerization cycles and thicknesses of maxillary complete denture bases on the porosity of processed acrylic resin bases.

Three different thicknesses were used: 2 mm, 3.5 mm and 5 mm. Two heat-activated denture base resins, a conventional acrylic resin (Clássico) and a resin designed for use in a microwave oven (Onda-Cryl), were used. Three microwave cycles were used: 500 W for 3 minutes (group A); 90 W for 13 minutes plus 500 W for 90 seconds (group B); and 320 W for 3 minutes plus 0 W for 4 minutes plus 720 W for 3 minutes (group C). For the traditional polymerization cycle (group T), the bases were polymerized in water at 74°C for 9 hours. A total of 120 specimens were fabricated, 40 for each thickness.

After polymerization, porosity was evaluated. For the microwave-processed bases, the combination of different cycles and thicknesses influenced the porosity percentage, but the influence of the microwave polymerization cycle on porosity was only evident for the thinnest (2 mm) specimens. Generally, there was less porosity with the thickest specimens. For specimens in group T, there was no difference in mean porosity values among the 3 thicknesses.

Comment

Porosity in a denture base is inevitable; however, it is undesirable. Therefore, it is important to use techniques that will minimize porosity. Microwave processing of complete dentures is much less time consuming and requires minimal equipment (a domestic microwave oven) when compared with the traditional polymerization tank method. This study reported similar percentages of porosity with all cycles, except for the 2-mm specimens. Cycles A and B produced fewer pores than cycles C and T for these thin specimens.

Pero AC, Barbosa DB, Marra J, et al. Influence of microwave polymerization method and thickness on porosity of acrylic resin. J Prosthodont 2008; 17:125-129.

Occlusal Schemes for Complete Dentures

With bilateral balance in a lateral occlusal position, teeth contact uniformly on the working and nonworking (balancing) sides. In protrusion, there is simultaneous contact of the posterior teeth. When natural teeth are restored with fixed prostheses, canine guidance is commonly used, avoiding

contact of all posterior teeth in lateral and protrusive occlusal positions.

A clinical study by Rehmann et al from Justus-Liebig-University, Germany, compared the effect of patient satisfaction with dentures made with bilaterally balanced articulation and those made with canine guidance. The study design was a single-blinded, crossover clinical trial.

A total of 38 edentulous patients were included. All patients were wearing complete dentures that required remaking and had inadequate occlusion. Patients with existing dentures with adequate occlusal relationships were excluded from the study.

Maxillary and mandibular dentures were made for each patient. Patients received 2 mandibular dentures. One denture was fabricated with bilaterally balanced occlusion (Figure 1), and 1 denture was fabricated with canine-guided occlusion (Figure 2). The dentures were labeled so that the patients could distinguish between the 2 dentures, but patients were not informed about the differences between them.

After delivery, the patients were asked to alternate the use of the 2 dentures each day. After a 2-week trial, patients were asked to indicate their preference between the 2 dentures on a standardized questionnaire. Then the investigators adjusted

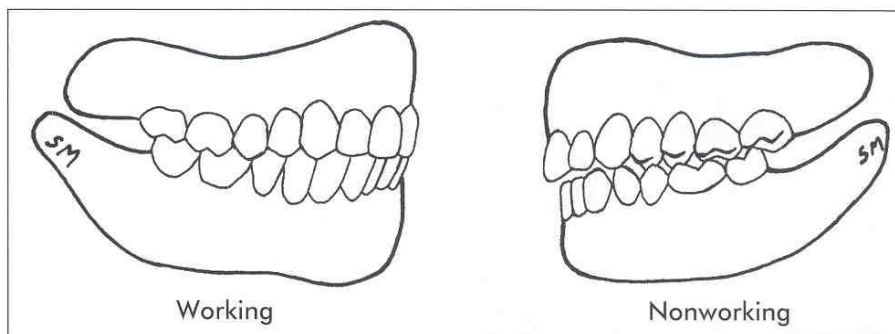


Figure 1. With bilaterally balanced articulation, there is simultaneous contact of the posterior teeth in a lateral occlusal position on the working and nonworking sides.

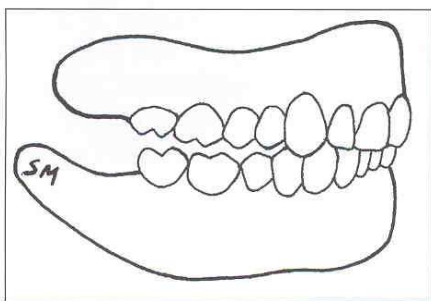


Figure 2. With canine guidance, the maxillary and mandibular canines prevent contact of the posterior teeth in a lateral occlusal position.

the occlusal relationships of each denture so that the denture with balanced articulation had canine guidance and the denture with canine guidance was balanced.

The patients were asked to alternately use the 2 mandibular dentures for another 2 weeks. At the end of the fourth week, the patients were again asked about their preferences.

After the first 2 weeks, 63% preferred balanced articulation, and only 5% preferred canine guidance. The rest had no particular preference. After 4 weeks, 11% preferred canine guidance, and 47% preferred balanced articulation.

Comment

The results of this study suggest that balanced articulation is especially beneficial when dentures are first inserted. The simultaneous posterior contacts in eccentric positions can make the adaptation phase with new dentures more comfortable. The authors suggested that balanced articulation appears less important as time goes by; after 4 weeks, 11% of the patients preferred canine guidance. Canine guidance is effective when restoring natural teeth with fixed prosthodontics. The tactile sensation and tactile memory from the periodontal ligaments of the natural canines guide the mandible during the

chewing strokes. Edentulous patients have no periodontal ligaments to provide this guidance. Results of this study suggest that canine-guided dentures can produce denture instability, which is bothersome to patients.

Rehmann P, Balkenhol M, Ferger P, Wöstmann B. Influence of the occlusal concept of complete dentures on patient satisfaction in the initial phase after fitting: bilateral balanced occlusion vs canine guidance. Int J Prosthodont 2008;21:60-61.

Masticatory Performance with Implant-supported Dentures

Implant-supported or retained overdentures are commonly prescribed for edentulous patients. Dentists and patients expect that implant-supported or retained overdentures will result in improved masticatory function when compared with conventional complete dentures. A systematic review of the literature by Fueki et al from Tokyo Medical and Dental University, Japan, evaluated the critical factors that are likely to influence masticatory performance following fabrication of new implant-supported or retained dentures.

Articles were located by using PubMed and Cochrane Library databases. All articles related to masticatory performance of patients with implant-supported or retained dentures from 1966 to June 2007 were retrieved and screened. A total of 281 articles were located, and 18 articles met the investigators' inclusion criteria.

One article compared masticatory function of patients with Kennedy Class I and II removable partial dentures with those with implant-supported fixed partial dentures. The results of the trial indicated no difference in masticatory performance between the 2 groups.

The remaining 17 articles were devoted to complete dentures. Studies that evaluated implant-supported fixed complete dentures, in general, found an improvement in masticatory performance when compared with the performance achieved with conventional complete dentures. Mandibular implant-supported fixed complete dentures provided significant improvement in masticatory performance for patients who were dissatisfied with their conventional mandibular complete dentures.

When implant-supported overdentures were compared with conventional complete dentures, results varied, depending on the study design and the patient population. A mandibular implant-supported or retained overdenture occluding with a maxillary conventional complete denture provided significant improvement in masticatory function when compared with conventional complete dentures in both arches for patients with severely resorbed mandibular edentulous ridges and for patients experiencing chronic problems with their mandibular complete dentures.

Benefits of implant-supported or retained overdentures were less dramatic for patients who did not fall into these 2 categories. Studies on the types of implants and types of attachments for implant-supported or retained overdentures found no clear evidence of the superiority of any implant type or attachment system.

Comment

This review is a welcome addition to the dental literature. Results suggest that implant-supported or retained dentures are likely to improve the quality of life for patients who are experiencing difficulty adapting to conventional complete dentures. Dentists can, therefore, prescribe with confidence implant-supported prostheses for patients who are maladaptive to their conventional dentures. The authors indicated that there is currently no compelling evidence to suggest that implant-supported prostheses will improve mastication for patients who are not encountering problems with conventional dentures.

Fueki K, Kimoto K, Ogawa T, Garrett NR. Effect of implant-supported or retained dentures on masticatory performance: a systematic review. J Prosthet Dent 2007;98:470-477.

Remounting Complete Dentures

Occlusal errors with complete dentures produce shifting of the denture bases during function and uncontrolled pressure on the underlying mucosa. Because the occlusal relationship causes the dentures to move away from the occlusal interferences, it is difficult to adjust these interferences intraorally with accuracy.

Shigli et al from Modern Dental College, India, conducted a clinical

study on remounting complete dentures. Thirty patients were included in the study, and they were randomly divided into 3 groups. One group (control) received both a laboratory and a clinical remount (LCRO). One group received a laboratory remount only (LRO). The third group received intraoral occlusal adjustments only (OOC), without any remounting procedures.

After 7 days, the patients were surveyed by a written questionnaire regarding comfort, pain, masticatory ability, swallowing and occlusal contacts of the dentures. At that time, a blinded investigator examined the patients for tissue irritation. Also, the number of required postinsertion visits to adjust the dentures to alleviate sore spots was tallied.

Results indicated that the remount procedures significantly reduced postinsertion visits. All 10 patients in the LCRO group required only 1 postinsertion visit to obtain comfort. Three of the patients in the LRO group required 2 visits, while the rest required only 1 visit. Eight patients in the OOC group required 3 postinsertion visits, and 2 patients required 2 visits. There were significantly fewer sore spots for the LCRO group, compared with the other groups. Comfort during mastication was significantly better for the 2 remount groups compared with the OOC group.

Comment

Occlusal discrepancies with complete dentures can be the result

of poorly fitting trial bases, errors in the recording of the maxillo-mandibular relationships, mounting errors and processing errors. The laboratory remount can only correct processing errors. A clinical remount corrects all errors. Because the record for the clinical remount is made on the processed dentures, rather than on trial bases, this record, which is made under better conditions, is likely to be more accurate than the original record. Thus, it appears that the clinical remount is the most important step for refining the occlusal relationships of complete dentures.

All dentures were fabricated using the same techniques. The only difference was the method of occlusal refinement. It is interesting to note that the group without a remount procedure required more postinsertion visits to adjust the dentures to relieve sore spots. Also, all groups felt that their dentures possessed simultaneous bilateral occlusal contacts.

These results suggest that patients cannot discern occlusal errors and that occlusal errors manifest themselves as pain. If pain is the result of occlusal interferences, adjusting the fitted surface of the denture is not likely to resolve the problem.

Shigli K, Angadi GS, Hegde P. The effect of remount procedures on patient comfort for complete denture treatment. J Prosthet Dent 2008;99:66-72.

NEXT:

- Postspace preparation for maxillary first premolars
- Accuracy of impression techniques for fixed prosthodontics
- Clinical performance of lithia disilicate core ceramics

Our next report features a discussion of these issues and the studies that analyze them, as well as other articles exploring topics of vital interest to you as a practitioner.