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Determining the Wear Resistance of Occlusal Splints in a Prospective Clinical Study

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Date/Event/Venue:

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50th Annual Meeting of the "Deutsche Gesellschaft für Zahnärztliche Prothetik und Werkstoffkunde"
Bad Homburg, Germany

Poster Award

Best Poster of Conference

Objective

To determine quantitatively the wear resistance of a newly developed light-curing splint resin over a period in situ of six months.

Materials and Methods

- **Patients:**

n=20 consecutive patients (mean age: 34.7 years; 12 F, 8 M)

- **Inclusion criteria:**

- Natural dentition/fixed denture
- Complete dentition to at least the 1st molar

and

for the **stabilization splint sample:**

- Insufficient occlusal support
- Increased occlusal loss of dental hard tissue

for the **distraction splint sample:**

- TMJ pain **and**
- Complete anterior dislocation of the disk without reduction/with terminal reduction
- TMJ osteoarthritis



Fig. 1: Stabilization splint in situ

- **Resin splint material (Fig. 1):**

- Light-curing (400-500 nm) resin made of high-molecular dimethacrylates with organic and inorganic fillers
- Does not contain methyl methacrylate

- **Study design:**

- **Duration:** 6 months
- **Types of splints** (maxilla, n=10 each):
stabilization splints, distraction splints
- **Splint wear mode:** 24 hours
- **Examinations:**
before insertion (BI), at 4 weeks (4W), at 3 months (3M), at 6 months (6M)

- **Occlusal adjustments** were restricted to the time before 4W.

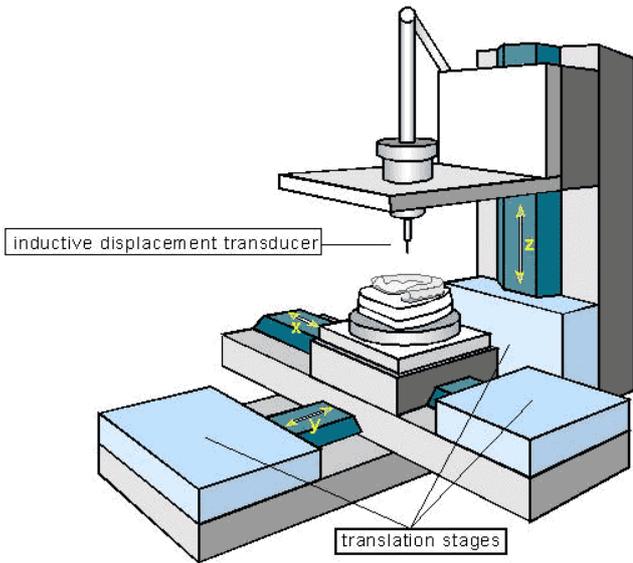


Fig. 2: Test setup

• **Measuring Technology (Fig. 2)**

- Vibration-isolated table framework
- 3 translation stages (for directions x, y, and z) (DC-Motor) (PI, Waldbronn)
- DV 4 stereomicroscope (Zeiss, Oberkochen)
- WA 20 inductive displacement transducer/ Spider8 digital 8-channel measurement unit/ Catman 32 software V2.1 (HBM, Darmstadt)
- Local coordinate storage for occlusal contacts during baseline measurements
- Ten measurements each in regions 13, 23, 16, 26 (BI, 4W, 3M, 6M)
- Splint repositioned on remount cast

Results

- The medians of the occlusal vertical gains/losses (wear, resin torsion, water sorption, etc.) are shown in **Fig. 3** (stabilization splints) and **Fig. 4** (distraction splints).

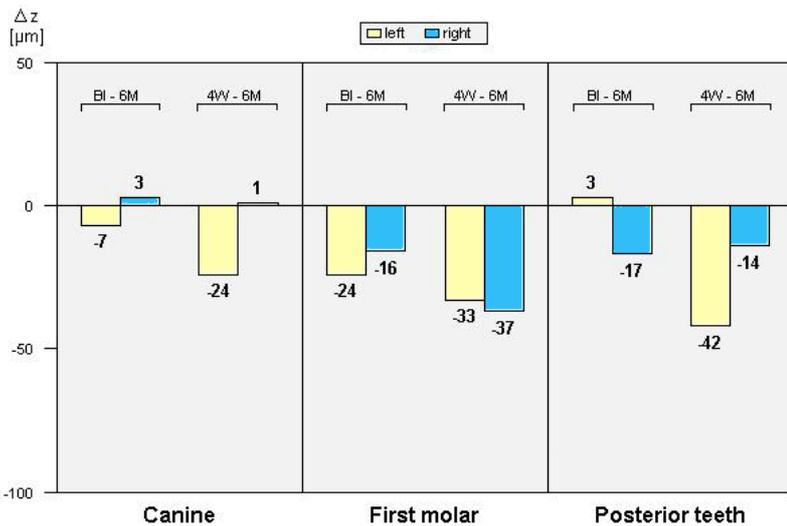


Fig. 3: Occlusal vertical gains/losses (medians) of the resin in vivo over a period in situ of six months (n=10 stabilization splints)

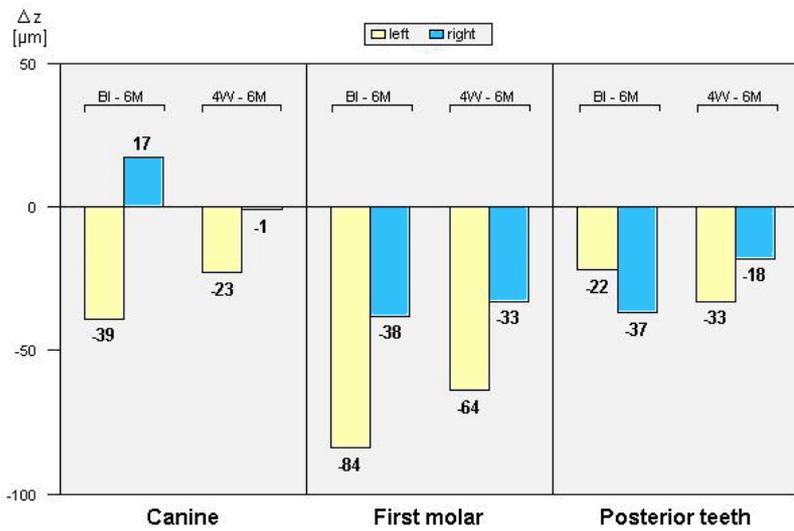
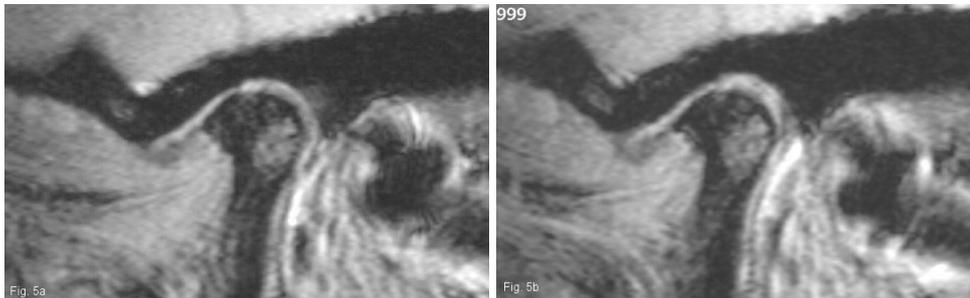


Fig. 4: Occlusal vertical gains/losses (medians) of the resin in vivo over a period in situ of six months (n=10 distraction splints)

- **Statistical analysis** (Mann-Whitney U-test, $p < 0.05$) showed no significant differences when comparing the corresponding results of stabilization and distraction splints.



Figs. 5a and b: Sagittal oblique images (MRI) of the condyle/fossa relationship without splint (Fig. 5a) and with distraction splint inserted (Fig. 5b) following six months of wearing

Conclusions

- The present study *clinically* confirms the good wear resistance results of the new resin splint material obtained in a previous *in-vitro* study [OTTL et al., Dtsch Zahnärztl Z 52, 342 (1997)].
- Good wear resistance is of great importance for maintaining the therapeutic mandibular position during the treatment period (Figs. 5a and b).

This poster was submitted by *Dr. Peter Ottl*.

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Objective

- To determine quantitatively the wear resistance of a newly developed light-curing splint resin over a period in situ of six months.

Materials and Methods

Patients

n = 20 consecutive patients
(mean age: 34.7 years; 12 F, 8 M)

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- Complete dentition to at least the 1st molar and

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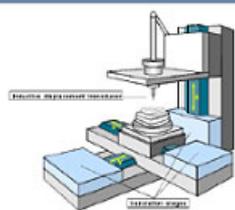


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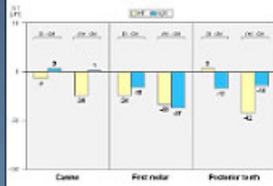


Fig. 3: Occlusal vertical gains/losses (mm) of the teeth in situ over a period in situ of six months (n = 10 stabilization splints)

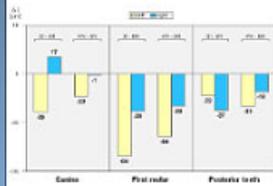


Fig. 4: Occlusal vertical gains/losses (mm) of the teeth in situ over a period in situ of six months (n = 10 distraction splints)

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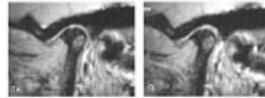


Fig. 5a and b: Sagittal oblique images (MRI) of the condyle base relationship with the splint (Fig. 5a) and with the distraction splint (Fig. 5b) following six months of wearing

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