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

Language: English

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Date/Event/Venue:
May 17-19, 2001
50th Annual Meeting of the "Deutsche Gesellschaft für Zahnärztliche Prothetik und Werkstoffkunde"
Bad Homburg, Germany

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
  - Insufficient occlusal support
  - Increased occlusal loss of dental hard tissue
  - TMJ pain and Complete anterior dislocation of the disk without reduction/with terminal reduction
  - TMJ osteoarthrosis

- **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 Zahnärztli 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 newly developed functional occlusal splints over a period of six months.

Materials and Methods

- Patients
  - n = 20 consecutive patients
  - mean age: 37.7 years (13.7 ± 11.9)
- Inclusion criteria
  - Clinical examination.
  - Complete dentition at least the 1st molars and
    For the splint, 2nd molar.
  - Insufficient occlusal support
    Increased occlusal level of anterior teeth
    In the distribution splint sample:
    - TMA (postag)
    - Complete anterior dentition of the
    - TMA (postag)

- Measuring technology (Fig. 2)
  - Using indirect methods:
  - A combination of colorimetric techniques, x-ray and x-length
    (D-Scanner), Wafer X-ray
  - DN4 image scanning device (Orion, Oberkochen)
  - WAX-40 indirect displacement measurement
    for the 2nd molar of the test splint and
    CaproC 34 software 8.3.1 (Interadent)
  - Load and movement for each
    - Test measurements with the markers
    - Test measurements with the markers
    - 11, 13, 15, 17, 19, 19, 19, 19
    - Splint resistance under normal load

- Results
  - The results of the mechanical properties of the test occlusal splint
    material obtained in a previous in-vitro study
    (ENF, 1997).

- Conclusions
  - The present study clinically confirms the good
    wear resistance results of the test occlusal splint
    material obtained in a previous in-vitro study
    (ENF, 1997).
  - Good wear resistance is of great importance
    for maintaining the functional occlusal
    relation during the treatment period (Fig. 3, 4a).