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Influence of rubberdam on proximal contact strengths

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Introduction

The proximal contact plays an important role in the stomatognathic system and, therefore, has to be preserved during treatment. In order to do so, all factors affecting the proximal contact should be known.
The aim of the study was to test the hypothesis that the application of rubberdam influences the reconstruction of proximal contacts by increasing the contact strengths between the dried teeth, while the corresponding contra-lateral teeth are not affected.

Material and Methods

Participants

- 74 healthy subjects between 18 and 65 years of age in need of a direct posterior composite restoration
- The dental arch was not supposed to have any gaps
- The presence of bridges and splinted teeth was a exclusion criteria
- Participants were excluded in the case of any need of periodontal treatment

Course of the Study

The proximal contact strengths (PCS) were electronically evaluated by measuring the frictional forces during the removal of a 50.0±5.0µm thick straigth metal band (Dörfer et al., 2000). PCS were measured at both contacts next to the restoration (mesial: R^1; distal: R^2) and the corresponding contacts of the contra-lateral quadrant (C^1;C^2) which were taken as control.

Measurements were taken 6 times during treatment,
- at baseline (R^10;R^20 / C^10;C^20)
- immediately after the application of the rubberdam (R^11;R^21 / C^11;C^21)
- right after wedging (R^12;R^22 / C^12;C^22)
- shortly before the removal of the rubberdam (R^13;R^23 / C^13;C^23)
- immediately after the removal of the rubberdam (R^14;R^24 / C^14;C^24)
- as soon as the complete treatment was finished (R^15;R^25 / C^15;C^25)

Data Management and Statistics

- Double data entry and plausibility check (SPSS Inc., V 11.0 Chicago, USA)
- Normal distribution tested by the Kolmogoroff-Smirnov/Liljefors test - Differences over time were tested by ANOVA (= analysis of variance) followed by the post hoc Bonferroni test for multiple testing
- Differences between examined and control side were tested for statistical significance by the t-test for paired samples
- The significance level was set at $p < 0.05$

Results

PCS rose from 2.26±1.45N at baseline to 3.83±2.34N after the application of the rubberdam ($p < 0.001$). This related to a relative increase of 69.5%.
At the corresponding contact of the contra-lateral quadrant, variation of the PCS remained within the intra-examiner variance of ±0.2N during the application of the rubberdam, from 2.46±1.20N before to 2.61±1.21N after After the removal of the rubberdam PCS dropped from 3.54±1.87N to 2.31±1.35N ($p < 0.001$), a decrease of 34.7%.
The control PCS of the contra-lateral quadrant showed a slight decrease from 2.44±1.07N to 2.26±0.97N after the removal of the rubberdam.

Tab. 1 Proximal contact strenghts in [N] at examined sites during treatment

Site	Baseline	After the application of rubberdam	Before removing the rubberdam	After removing the rubberdam	At the end of the treatment
R^1	2.26±1.45	3.83±2.34	3.54±1.87	2.31±1.35	2.08±1.26
R^2	2.27±1.43	3.83±2.37	3.14±1.83	1.99±1.21	1.77±1.12
C^1	2.46±1.20	2.61±1.21	2.43±1.07	2.28±1.01	2.26±0.97
C^2	2.41±1.55	2.56±1.60	2.41±1.53	2.34±1.50	2.32±1.4

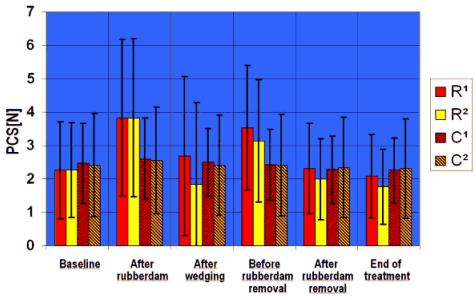

Fig. 1 Development of PCS at both contacts next to the restoration and at the corresponding sites in the contra-lateral quadrant in [N]

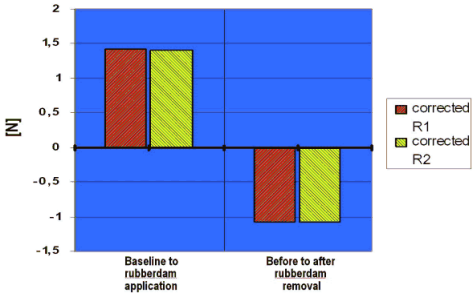

Fig. 2 Effective increase / decrease of PCS at R1 and R2 in [N]. The corrected R1 and R2 were corrected by substracting C1 / C2 off R1 / R2

Discussion and conclusions

The application of rubberdam significantly increased PCS. This effect had been reversed after the removal of the rubberdam.
In the contra-lateral quadrant, which was taken as control, a slight decrease of the PCS was measured during the course of the treatment. This decrease was already described by Southard et al. and can not be related to the application of rubberdam (Southard et al., 1990).

Literature

Dörfer CE, von Bethlenfalvy ER, Stähle HJ, Pioch T: Factors influencing proximal dental contact strengths. Eur J Oral Sci 2000, 5: 368-377
Southard TE, Southard KA, Tolley EA: Variation of approximal tooth contact tightness with postural change. J Dent Res 1990, 69/11: 1776-1779

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