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Cleaning efficacy of interdental brushes in different interdental space types

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Introduction

One concern of interdental brushes is that they might not reach the complete interdental tooth surfaces due to discrepancies between the cross sectional shape of the interdental spaces and that of the interdental brushes (Fig. 6). The aim of this study was to evaluate in vitro the cleaning efficacy of interdental brushes in different types of interdental spaces being approximately equilateral or isosceles (Fig. 1).

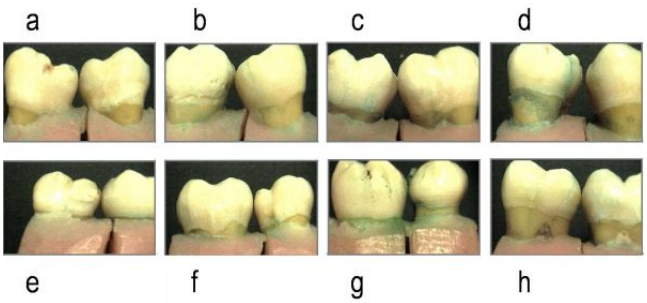
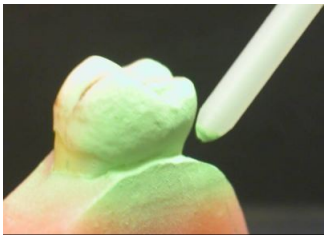


Fig. 1: Photographs of the different experimental interdental spaces with the teeth in the position as used during the cleaning process. The interdental spaces are approximately equilateral (a - d) in cross section, or isosceles (e - h). They increase in size from left to right. The sizes were graded as x-small (a, e), small (b, f), medium (c, g) and large (d, h).

Interdental space before it was coated with a plaque simulator showing the position used during the cleaning process

The proximal surface was coated with a dye to simulate plaque



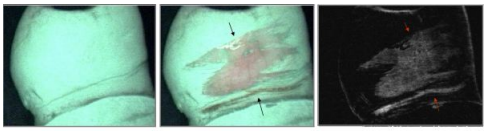
The teeth were repositioned and the proximal tooth surface was cleaned in a reproducible manner

Image of the proximal tooth surface after brushing with an interdental brush

Fig. 2: Procedure of the cleaning process

Material and Methods

Interdental brushes with diameters of 2, 3, 4 and 5 mm (Curaden AG; Fig. 5) were tested in 8 pairs of extracted human molars combined to simulate two types (isosceles and equilateral) of interdental spaces with 4 sizes each. The size increased from extra small over small and medium to large as shown in figure 1. After coating the teeth with a dye to simulate plaque, digital images were taken from the proximal surfaces in a highly standardized setup. The teeth were repositioned and the proximal surfaces were cleaned in a reproducible manner. Post-brushing images were taken as before(Fig. 2). After digital subtraction, the cleaned area was measured by pixel count (Fig. 7). Percentage of cleaned surface area was taken as cleaning efficacy.



a b c

Fig. 3: Digital images of the one proximal toothsurface covered with the plaque simulator before (a) and after (b) brushing with an interdental brush. The digital subtraction shows clearly the cleaned area (c) with improved cleaning at the contact area and the "gingival margin"

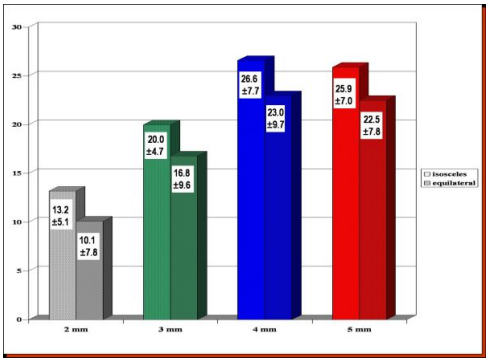


Fig 4

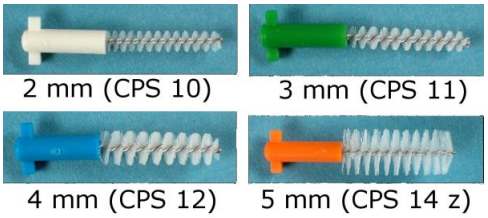
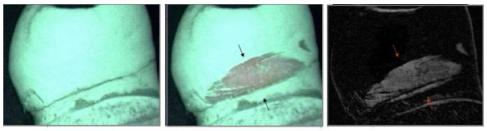


Fig. 5: Photographs of the interdental brushes (Curaden AG) with diameters of 2, 3, 4 and 5 mm.

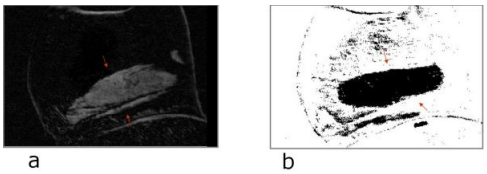
Results

The cleaning efficacy was 10.1 ± 7.8 % (2mm), 16.8 ± 9.6 % (3mm), 23.0 ± 9.7 % (4mm) and 22.5 ± 7.8% (5mm) in equilateral interdental spaces. In isosceles the cleaning efficacy was 13.2 ± 5.1 % (2mm), 20.0 ± 4.7 % (3mm), 26.6 ± 7.7 % (4mm) and 25.9 ± 7.0 % (5mm), respectively. The differences between the different types of interdental spaces were statistically significant (Wilcoxon test for paired samples, $p < 0.05$) for the 2mm brush but not for the larger brushes (Fig. 4).



a b c

Fig. 6: Digital images of the proximal toothsurface covered with the plaque simulator before (a) and after (b) brushing with an interdental brush. The digital subtraction shows clearly the cleaned area (c), which is concentrated on the central part of the interdental aspect of the tooth, not reaching neither the contact area nor the "gingival margin" due to discrepancies between the cross sectional shape of the interdental space and that of the interdental brush.



a b

Fig. 7: Image of the proximal tooth surface after digital subtraction (a). The cleaned area was measured by pixel count (b)

Conclusions

Smaller interdental brushes are more sensitive with respect to the cross sectional shape of the interdental space than larger brushes in terms of cleaning efficacy.

This Poster was submitted by Dr. Daniela Joerss.

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Poster Faksimile:

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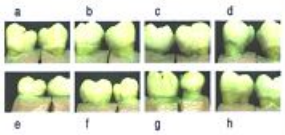

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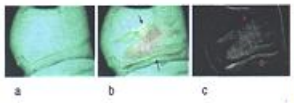

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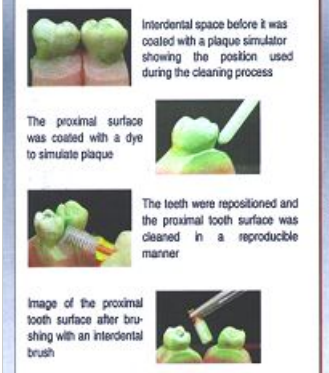

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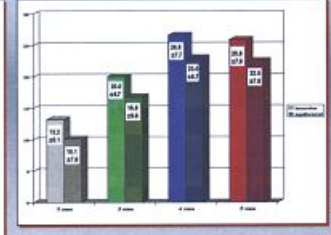

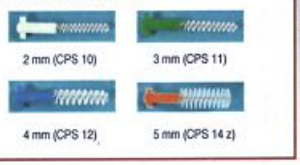

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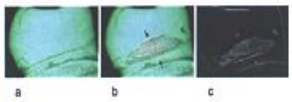

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