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A comparison of the surface quality of provisional crowns after chairside polish

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Introduction

Poor surface quality of provisional crowns affect plaque adhesion and contributes to gingival inflammation. Polishing temporary restorations in the dental lab is the gold standard and gives excellent surface quality but is time consuming and has the risk of cross contamination due to contaminated pumice.

Objectives

Aim of this study was to describe the surface quality of four resins for provisional crowns after chairside polish with four recently developed polishing devices. The results are compared with the surface quality after polish using dental lab technology.

Material and Methods

One hundred specimens of three self curing isobutyl-methacrylate materials (Dentalon Plus, Heraeus Kulzer Ltd.-Germany; Trim, H. J. Bosworth Company_USA; Snap, Roeko Ltd-Germany) and of one bis-acryl composite material (ProTempGarant, 3MEspe Dental Corporation-Germany) were made according to the manufacturer's instructions. After polymerization they were ground with a diamond disk to produce a uniform and standardised initial surface quality. The specimens were then polished chairside as recommended by the manufacturers using a standardized procedure. By polishing in the dental lab a rag wheel with pumice and polishing compound was used. Three polishing devices including several combinations of rubber polishers (Bredent Dental Products-Germany, Hager und Meisinger Ltd.-Germany, Busch und Co. Ltd.-Germany) and one polishing device including different diamond rotary instruments, which were developed for the polish and finish of direct composite restorations (Intensiv Ltd.-Switzerland) were tested (Fig 1). The surfaces before and after treatment were investigated using contact stylus technique (mean roughness average - Ra) and SEM (Fig 2,3). Three measurings on each specimen were made. Differences were statistically tested for significance by Kruskal-Wallace-Test and Man-Whitney-Test ($p<0.05$) with a Bonferroni-adjustment.

Fig 1 Tested polishing devices

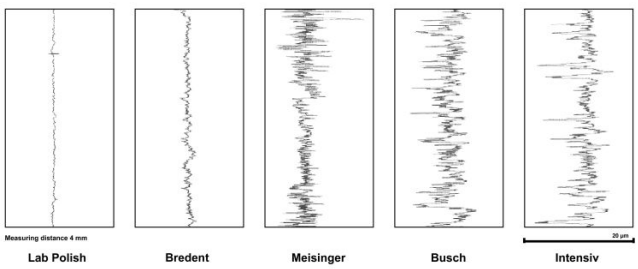

Fig 2 Surface roughness profile (Ra): Dentalon Plus

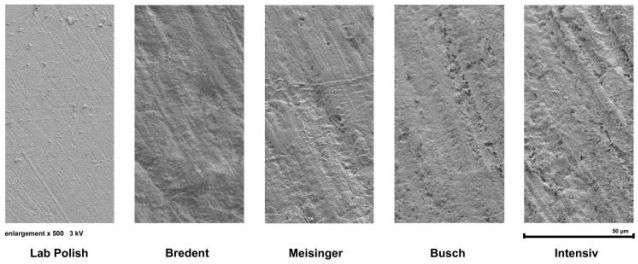

Fig 3 SEM: Dentalon Plus (enlargement x 500, 3 kv)

Results

Chairside polish improved the surface quality in all specimens (Bredent: DeltaRa 2.2-1.5 µm; Meisinger DeltaRa 1.66-1.3 µm; Busch DeltaRa 1.59-1.07 µm; Intensiv DeltaRa 1.12-0.86 µm). There were important differences between the surface qualities of dental lab polish and chairside devices in all acrylic materials (Fig 4-6) which could not be found so obviously in the tested composite material (Fig 7). Dental lab polish provided by far the best results. The differences within the three rubber devices were not so obvious, but there was a slight tendence to better results with the Bredent- equipment. Surprisingly, in one resin (TrimTM) rubber polisher produced similar improvements as polishing in the dental lab. Further investigations about this finding are necessary. The diamond rotary device produced the roughest surface in nearly all materials.

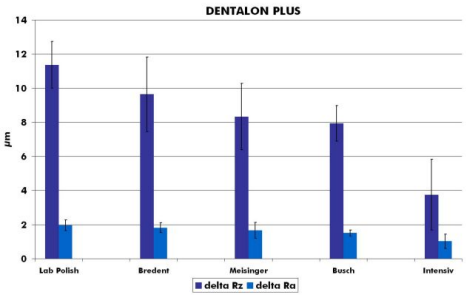

Fig 4 Improvement of the surface quality after polishing: Dentalon Plus

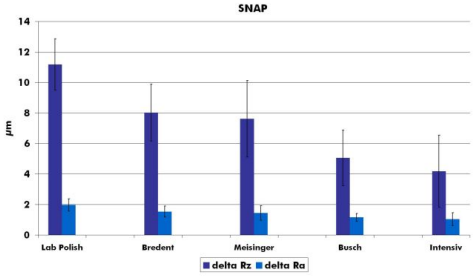

Fig 5 Improvement of the surface quality after polishing: Snap

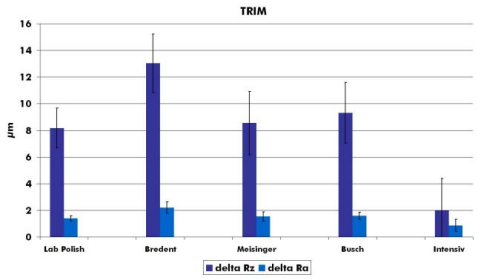

Fig 6 Improvement of the surface quality after polishing: Trim

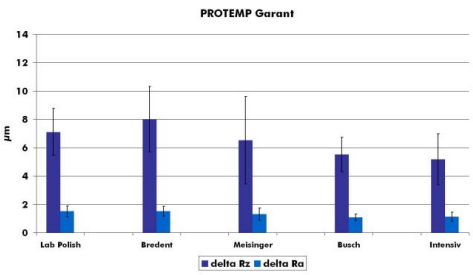

Fig 7 Improvement of the surface quality after polishing: ProTemp Garant

Conclusions

Dental lab polish still gives the best surface quality in fairly all materials. There are differences between several chairside devices. However, the rubber polishing devices produce an acceptable surface quality for short term applications of provisional crowns. Diamond rotary instruments developed for composite finishing produced inferior surface qualities with the tested acrylic materials.

This Poster was submitted by Dr. Arne F. Boeckler.

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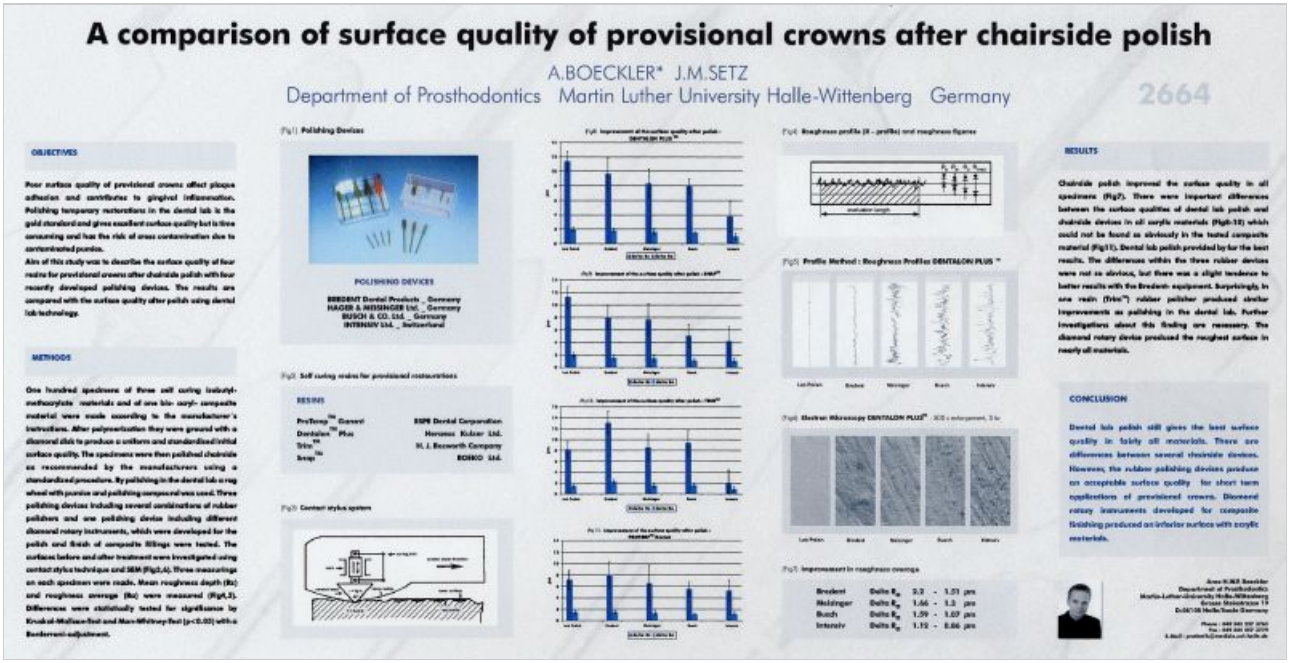

A comparison of surface quality of provisional crowns after chairside polish

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2664

OBJECTIVES

Poor surface quality of provisional crowns affect plaque adhesion and contributes to gingival inflammation. Polishing temporary restorations in the dental lab is the gold standard and gives excellent surface quality but is time consuming and has the risk of cross contamination due to contaminated pumice.
Aim of this study was to describe the surface quality of four resins for provisional crowns after chairside polish with four recently developed polishing devices. The results are compared with the surface quality after polish using dental lab technology.

METHODS

One hundred specimens of three self curing trisbutyl-methacrylate materials and of one bis- acryl- composite material were made according to the manufacturer's instructions. After polymerization they were ground with a diamond disk to produce a uniform and standardized initial surface quality. The specimens were then polished chairside as recommended by the manufacturers using a standardized procedure. By polishing in the dental lab a rag wheel with pumice and polishing compound was used. Three polishing devices including several combinations of rubber polishers and one polishing device including different diamond rotary instruments, which were developed for the polish and finish of composite fillings were tested. The surfaces before and after treatment were investigated using contact stylus technique and SEM (Fig2,6). Three measurings on each specimen were made. Mean roughness depth (R_z) and roughness average (R_a) were measured (Fig4,5). Differences were statistically tested for significance by Kruskal-Wallace-Test and Mann-Whitney-Test ($p<0.05$) with a Bonferroni-adjustment.

Fig1: Polishing Devices

POLISHING DEVICES

BREDENT Dental Products _ Germany
HAGER & MESINGER Ltd. _ Germany
BUSCH & CO. Ltd. _ Germany
INTENSIV Ltd. _ Switzerland

Fig2: Self curing resins for provisional restorations

RESINS

ProTemp™ Garant	ESPE Dental Corporation
Dentalon™ Plus	Heraeus Kulzer Ltd.
Trim™	H. J. Bosworth Company
Integ™	BOSKO Ltd.

Fig3: Contact stylus system

Fig4: Roughness profile (R_z - profile) and roughness figures

Fig5: Profile Method : Roughness Profiles DENTALON PLUS ™

Fig6: Electron Microscopy DENTALON PLUS™ 300 x enlargement, 3 kv

Fig7: Improvement in roughness average

Bredent	Delta R_a	2.2 - 1.51	µm
Meisinger	Delta R_a	1.66 - 1.3	µm
Busch	Delta R_a	1.59 - 1.07	µm
Intensiv	Delta R_a	1.12 - 0.86	µm

RESULTS

Chairside polish improved the surface quality in all specimens (Fig7). There were important differences between the surface qualities of dental lab polish and chairside devices in all acrylic materials (Fig6-12) which could not be found as obviously in the tested composite material (Fig11). Dental lab polish provided by far the best results. The differences within the three rubber devices were not so obvious, but there was a slight tendence to better results with the Bredent- equipment. Surprisingly, in one resin (Trim™) rubber polisher produced similar improvements as polishing in the dental lab. Further investigations about this finding are necessary. The diamond rotary device produced the roughest surface in nearly all materials.

CONCLUSION

Dental lab polish still gives the best surface quality in fairly all materials. There are differences between several chairside devices. However, the rubber polishing devices produce an acceptable surface quality for short term applications of provisional crowns. Diamond rotary instruments developed for composite finishing produced an inferior surface with acrylic materials.

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