

Effect of polishing systems on surface loss of composite resins.

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Introduction:

Finishing of composite restorations provides benefits such as oral health, function, biocompatibility, mechanical properties and esthetics. However, some of these procedures might cause severe surface loss.

The objective of this study was to determine the surface loss of twelve composite resin composites polished with three different finishing systems: two based on silicon carbide-impregnated rubbers and other based on aluminum oxide flexible disks.

Materials and methods:

33 samples for each group with thickness 2x2x2 mm

3x3 samples for each finishing system

3x3 samples for each finishing system

- 12 Filtek Z350® (3M/ESPE), G2 TPH3® (Dentsply Caulk), G3 Tetric N Ceram® (Ivoclar/Vivadent), G4 Amelogen® (Ultradent), G5 EsthetXHD® (Dentsply Caulk), G6 Heliomolar® (Ivoclar/Vivadent), G7 ICE® (SDI), G8 Filtek Z100® (3M/ESPE), G9 Brilliant® (Coltène Whaledent), G10 Point 4® (Kerr SDS), G11 Premisa® (Kerr SDS), G12 Grandio® (VOCO).
- Silicon impregnated rubber Jiffy Polisher® (Ivoclar).
- Aluminum oxide flexible disk Super Snap® (Shofu).
- Silicon impregnated rubber Astropol® (Astropol) (Ivoclar/Vivadent).
- The samples were stored in distilled water 24hs at 37°C.
- Height (mm) for each sample was measured in three points before polishing using a digital micrometer (Mitutoyo Corporation/Japan).
- Samples were polished for 30 seconds (10 sec per grit), using constant speed and pressure under water refrigeration.
- Height (mm) in each sample was measured at the same three points after polishing using a digital micrometer (Mitutoyo Corporation/Japan).
- Surface height measurements used for determine the differences after polishing.
- Two-way ANOVA at two levels (resin composite and polishing system) and HSD Tukey 3rd for Multiple Comparisons.

Composites + Stainless steel mould

Handling and curing mode

Finish and Polish systems

Grinding with 320 grit abrasive paper.

Three points measures before polishing

Three points measures after polishing

Polished with each system

Results:

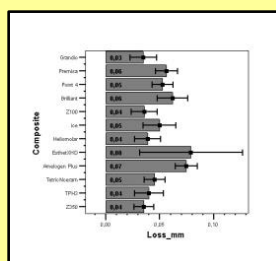
Tests of Between-Subjects Effects.
Dependent Variable: Loss_mm

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.078(a)	35,00	0,00	2,40	0,00
Intercept	0,46	1,00	0,46	492,32	0,00
Composite	0,04	11,00	0,00	3,71	0,00
Polished Composite	0,01	2,00	0,00	5,04	0,01
* Polished	0,03	22,00	0,00	1,51	0,08
Error	0,13	144,00	0,00		
Total	0,67	180,00			
Corrected Total	0,21	179,00			

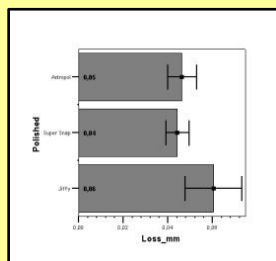
a. R Squared = ,369 (Adjusted R Squared = ,216)

Descriptive Statistics and Multiple Comparisons (Tukey HSD):

Composite	N	Mean (mm)	SD (mm)	CV %	Tukey HSD. p=.05
Z350	15	0,0355	0,0164	46	A
TPH3	15	0,0400	0,0243	61	AB
TetricNceram	15	0,0454	0,0175	38	ABC
Amelogen Plus	15	0,0746	0,0185	25	BC
EsthetXHD	15	0,0789	0,0862	109	C
Heliomolar	15	0,0388	0,0219	56	AB
Ice	15	0,0499	0,0276	55	ABC
Z100	15	0,0357	0,0215	60	A
Brilliant	15	0,0620	0,0254	41	ABC
Point 4	15	0,0528	0,0176	33	ABC
Premisa	15	0,0562	0,0184	33	ABC
Grandio	15	0,0347	0,0220	64	A



Group	Polished	N	Mean (mm)	SD	CV %	Tukey HSD. p=.05
J	Jiffy	60	0,0605	0,0491	81	B
SS	Super Snap	60	0,0442	0,0200	45	A
A	Astropol	60	0,0464	0,0248	54	A



Abstract:

Objectives: The aim of this study was to determine the surface loss of twelve composite resins polished with three different finishing systems: one based on silicon-impregnated rubber and two based on silicon rubber and aluminum oxide. Methods: Fifteen samples, 25 x 2 x 2 mm, A2 shade, were prepared for each material as follow: G1 Filtek Z350® (3M/ESPE), G2 TPH3® (Dentsply Caulk), G3 Tetric N Ceram® (Ivoclar/Vivadent), G4 Amelogen® (Ultradent), G5 EsthetXHD® (Dentsply Caulk), G6 Heliomolar® (Ivoclar/Vivadent), G7 ICE® (SDI), G8 Filtek Z100® (3M/ESPE), G9 Brilliant® (Coltène Whaledent), G10 Point 4® (Kerr SDS), G11 Premisa® (Kerr SDS), G12 Grandio® (VOCO). They were prepared using incremental technique and lightcuring each increment for 40 seconds (Curing Light XL3000 (3M) at 550 mW/cm²). Each group was randomly divided into three subgroups of 5 samples depending on the finishing system: J: Jiffy Polisher® (Ultradent), S: Super Snap® (Shofu) and A: Astropol® (Astropol) (Ivoclar/Vivadent). Samples were stored in distilled water 24 hs at 37°C. Height in each sample was measured in three points before and after polish using a digital micrometer (Mitutoyo Corporation/Japan). Samples were polished for 30 seconds (10 sec per grit), using constant speed and pressure and refrigeration. Results were statistically analyzed using two-way ANOVA at two levels: resin and polishing system, and Tukey test. Results: both resin and polishing system had significant effect (p<0,01). Surface loss obtained (mm) was: G1: 0,035(0,0164), G2: 0,040(0,0243), G3: 0,0454(0,0175), G4: 0,075(0,0185), G5: 0,079(0,0861), G6: 0,04(0,022), G7: 0,036(0,0164), G8: 0,036(0,022), G9: 0,062(0,0254), G10: 0,0528(0,0176), G11: 0,0562(0,0184), G12: 0,0347(0,022). Loss (mm) for each finishing system was: S: 0,0442(0,0199), A: 0,0464(0,0225), J: 0,0605(0,0491). Conclusions: under the experimental conditions of this study, it can be concluded that resins have a different behavior when polished with the evaluated systems. Besides, Jiffy produced the highest surface loss regardless the type of resin.

Conclusion:

Under the conditions of this research, the composite wore differently depending on the polishing system tested. It could be attributed to the diversity in quantity, geometry, mechanical properties, manufacturing process of the filler and chemistry of the matrix. However, Jiffy® polishing system produced greater loss regardless of the composite used.

References:

•Barbosa SH., Zanata RL., Navarro MF., Nunes OB.: Effect of different finishing and polishing techniques on the surface roughness of microfilled, hybrid and packable composite resins. *Braz Dent J.* (2005);16(1):39-44. Epub 2005 Aug 17.

•Marigo L., Rizzi M., La Torre G., Rumi G.: 3-D surface profile analysis: Different finishing methods for resin composites. *Oper Dent.* (2001);26:562-568.

•Koh R., Neiva G., Dennson J., Yaman P.: Finishing Systems on the Final Surface Roughness of Composites. *The Journal of Contemporary Dental Practice.*(2008);Volume 9, No. 2, February 1.

•Anusavice KJ.: *Science of Dental Materials.* Eleventh Edition, St. Louis, Missouri 63146, SAUNDERS,(2003).

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