Scanning Electron Microscopic Evaluation of Surface Roughness of Porcelain By using Different Glazing and Polishing Technique

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Abstract

Background:
ceramic material is the most easthitic material used in dentistry because it has many physiacal properties of high compatibility with oral tissue.
Methods & Materials:
thirty porcelain(ceramic)specimens resembling flat back facing(porcelain buttons)were fabricated. The samples were randomly divided into five groups according to the types of finishing and polishing, each group consist of six specimens.
Results:
Group I:no glazing and polishing is rough
Group II: applied glaze: smooth and shiny.
Group III: polishing porcelain by sand paper disc followed by rubber cups and polishing paste give polished surface.
Group IV: polishing by sand paper disc and rubber weel.
Group V:polishing by sand paper disc; rubber wheel and polishing paste give satisfactory results with shorter time and cheaper material.
conclusion:
SEM evaluation found overglazing (applied glaze)produce a better smooth surface.
Aim of the study:
To get a good and smooth surface of ceramic material as an aesthetic material used in dentistry by using different smoothing and polishing material.

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Introduction:

The surface roughness of crown and bridge materials should be minimized to obtain optimal biocompatibility. This study used scanning electron microscopy to evaluate the effect of polishing procedures. Porcelain remains the esthetic material of choice for the restoration of anterior and posterior teeth. Unglazed or unpolished porcelain is prone to plaque accumulation and therefore, poorly tolerated by underlying gingiva [2,3], and it will be anesthetic an easily stained and it is highly, abrasive, causing greater wear on opposing surface than result from glazed or polished porcelain[4].

The ultimate goal of surface finishing is the attainment of a well- polished surface, which can substitute for the glazed porcelain, to save time for patient and dentist by utilizing different types of polishing materials to circumvent the re-glazing process in the laboratory.

Materials and Methods:

Research has indicated that polishing ground porcelain is essential to control the wear of opposing occlusal surfaces and reduce the inflammation of contacted soft tissue. Five popular methods for polishing porcelain were evaluated. Thirty porcelain specimens resembling flat – black facing, (porcelain buttons) of ivoclar ceramics were fabricated according to manufacturer's instructions, all the specimens were baked in computerized ivoclar program at furnace all the specimens were finished with 50 u.m diamond wheel. The samples were randomly divided into five groups according to the type of finishing and polishing. Each group consisted of six specimens:

Group I: (control) no glazing or polishing.

Group II: applied glaze.

Group III; polishing unglazed porcelain using sand paper discs followed by rubber cups and polishing paste.

Group IV: polishing unglazed porcelain using sand paper discs and rubber wheel.

Group V: polishing unglazed porcelain using sand paper discs, porcelain rubber wheels and polishing paste.

The surface of each group was carefully studied with scanning electron microscope. Photographs taken at magnification of 200 were used for subjective comparison in surface smoothness and incidence of surface imperfections.

Results:

The surface smoothness which produced the various specimen treatment is shown by group in figs 1 to 5.

I: (control) No glazing and polishing is the rough and porous surface. (Fig.I)

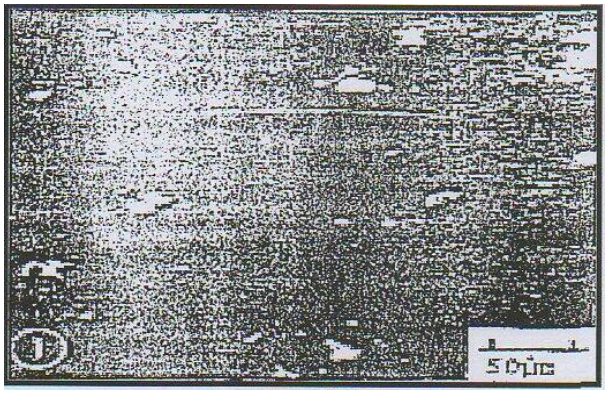

Fig 1

Group II: applied glaze.

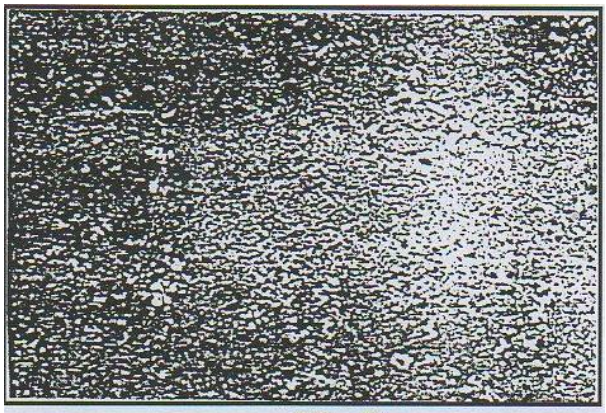

Fig 2

Group III: polishing unglazed porcelain using sand paper discs followed by rubber cups and polishing paste. (fig 3)

Fig 3

Group IV: polishing unglazed porcelain using sand paper discs and rubber wheel.
(fig 4)

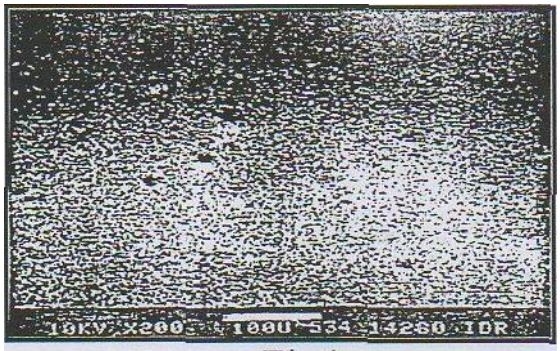

Fig4

Group V: Polishing unglazed porcelain using sand paper discs followed by rubber cups and polishing paste produce satisfactory results with shorter time and cheaper material. (Fig5)

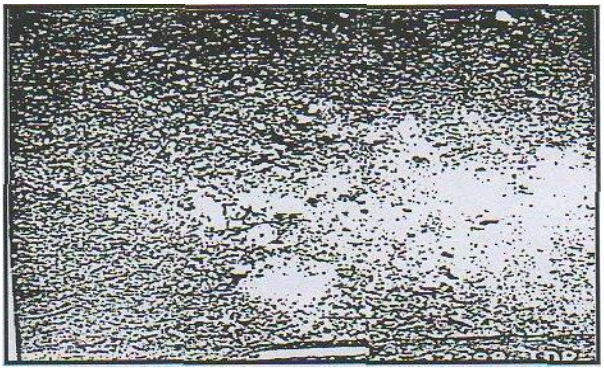

Fig 5

Discussion:

The surface roughness of polished porcelain was investigated and there was evident that a high significant difference between all the groups when compared to group I (control). Group II (applied glaze) showed a highly significant difference in smoothness and shiny texture when compared to all groups except group V, which is treated with sand paper discs porcelain rubber wheel and polishing paste and it showed a highly significantly improvement in surface texture if compared with group (I and II) and a significant improvement with groups III. These results support the work of many others[5,6,7,8].
Advantages of polishing of porcelain are clear since it affords greater control of the surface luster and distribution than does glazing[9,10] .

Conclusions and Suggestions:

Scanning electron microscopy evaluation found over glazing produced a better surface than other polishing methods. On the basis of the profilometric examination, the best roughness average value was obtained using diamond instruments with progressively smaller particle sizes (30, 15, and 8 microns).

Scanning electron microscopy analysis showed that all the treatments left the surfaces partially porous and cracked; however, the glazed surface yielded the best result.

Although high significant differences were detected for the different treatments. This study suggests that several procedures may be used to effectively finish ceramic surfaces.

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