



Clinical Assessment and Comparison of Esthetic Outcomes and Acceptability of Open Faced Stainless Steel Crowns and Pre-Veneered Stainless Steel Crowns: An (In Vivo) Original Research Study

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ABSTRACT:

Background & Aim: Pulp therapy is one of the most practiced treatments in the pedodontics. Stainless steel crowns are advised since decades for managing these situations. Several advanced options of Stainless steel crowns are available these days to strengthen these teeth including open faced stainless steel crowns and pre-veneered stainless steel crowns. Hence, this in-vivo study was conducted to assess and compare the esthetic outcomes and acceptability of open faced stainless steel crowns and pre-veneered stainless steel crowns.

Materials and Methods: The study included total 20 pediatric patients who had undergone pulp therapy and or other restorative procedures and advised for stainless steel crowns. Only one tooth per patient was included for the study. Group 1 had 10 patients in which Open Faced Stainless Steel Crowns was given. Similarly in group 2 had 10 patients in which pre-veneered stainless steel crowns were given. Patients were recalled after one and two week timings to record the responses by Visual analog scale at different scale scorings. Statistical analysis was implemented to formulate the outcomes and results. P value less than 0.05 was taken as significant.

Statistical Analysis and Results: For Group 1, after 1 week of crown cementation most acceptable VAS score 0-2 was noticed in 7 patients. Here p value was exceedingly significant (0.01). VAS score 3-7 was noticed in 2 patients and it was not statistically significant. VAS score 8-10 was noticed in 1 patients and it was not statistically significant. For Group 2, after 1 week of crown cementation most acceptable and appropriate VAS score 0-2 was noticed in 6 patients. Here p value was not significant (0.09). VAS score 3-7 was noticed in 3 patients and it was statistically significant (0.02).

Conclusion: Authors concluded that both Open Faced Stainless Steel Crowns and Pre-Veneered Stainless Steel Crowns are clinically useful however; VAS results were more positive for Open Faced Stainless Steel Crowns. Therefore, Open Faced Stainless Steel Crowns are appearing more esthetically acceptable than Pre-Veneered Stainless Steel Crowns.



Introduction

Literature has well evidenced about the significant usage of Stainless steel crowns in pediatric dentistry. Stainless steel crowns can be made more esthetically beautiful in anterior region by grinding the buccal side of the crown. This actually makes the crown esthetically acceptable with an open facing.¹⁻³ To overcome the problems in the window region, composite resin is then placed in the window after final cementation. With the latest advancements in the field of pediatric dentistry, esthetic crowns are now available.⁴⁻⁸ These crowns are supplied with prefabricated tooth colored buccal and occlusal facings which makes it more lifelike and life sized. Open faced stainless steel crowns with a resin window always offers enriched esthetics over old-fashioned stainless steel crowns.⁹⁻¹¹ This is primarily achieved by chair side veneering procedure which is very simple and easy to attempt. Pre-veneered stainless steel crowns offer full coverage restoration which is strong and esthetic. Pre-veneered stainless steel crowns are usually stainless steel or nickel chromes crown which were introduced in the early 1990s.¹²⁻¹³ Therefore, keeping all these interesting facts in mind this in-vivo study was conducted to assess and compare the esthetic outcomes and acceptability of open faced stainless steel crowns and pre-veneered stainless steel crowns.

Materials and Methods

The study included total 20 pediatric patients of both genders in the age range of 10-12 years. The target population was the pediatric patients under treatment for decayed teeth and other issues. Stratified random sampling was used for sample collection. Randomization was also attempted to give equal opportunity of selection. Randomization process perfectly represents the target population. It also removes any potential bias and unwanted variables. Inclusion criteria were 1) pediatric patients wherein pulp therapy has been done and stainless steel crowns are advised 2) patients selected in the age range of 10-12 years 3) patients with extensive caries 4) malformed or hypoplastic teeth 5) fractured teeth 6) severe bruxism 7) handicapped kids. Exclusion criteria were 1) Teeth with severe mobility 2) partially erupted teeth 3) nickel allergy 4) clinical or radiographic confirmation of root related pathology 5) when exfoliation is nearing within

6-12 months 6) non-restorable teeth. Parents were informed about the study and signed consent was obtained from them as a clearance of study execution. Initially all 20 pediatric patients had undergone pulp therapy and or other restorative procedures. Then all of them advised for stainless steel crowns. Only one tooth per patient was included for the study. All teeth indicated for stainless steel crowns were included purposefully. For the ease of categorization, all 20 patients or 20 crowns samples were divided into 2 groups. Group 1 had 10 patients in which Open Faced Stainless Steel Crowns was given. Similarly in group 2 had 10 patients in which pre-veneered stainless steel crowns were given. Open faced with luting Glass Inomer Cement (Aqua Meron, Voco, Germany) with flowable resin composite in window area (Tetric Flow). Pre-Veneered Stainless Steel Crowns were cemented with luting Glass Inomer Cement. Patients were recalled after one and two week timings to record the responses. Visual analog scale was used to quantify the responses. Responses were tabulated under three categories. Score 0-2 was most satisfied and acceptable as per esthetics. Score 3-7 was only moderately satisfied and acceptable as per esthetics. Score 8-10 was not satisfied and not acceptable as per esthetics. Privacy of the patients was kept completely confidential. Data purity and quality was assures by excluding any possible confounders. Human rights and other legal rights of patients were regarded truthfully. Statistical analysis was implemented to formulate the outcomes and results. P value less than 0.05 was taken as significant.

Statistical Analysis and Results

All the applicable data were inspected at early stages for any apparent incorporated confounders. Post hoc analysis was not attempted. Data was sent for elementary statistical analysis with SPSS statistical package for the Social Sciences version 22 for Windows. Nonparametric test, namely, chi-square test, was used for further data analysis; p-value. Out of 20 pediatric patients, 12 were males and 8 were females [Table 1, Graph 1]. P-value was highly significant for age group 10 years. Here p value was interestingly 0.02. All the other age groups presented non-significant p values. Maximum 9 pediatric patients were observed in age group 10. Table 2 illustrated about the basic statistical explanation with level of significance



evaluation using “Pearson Chi-Square” test. This was for Group 1; n=10 pediatric patients in which Open Faced Stainless Steel Crowns were given. All responses were interpreted as scorings of VAS scale after 1 week and 2 weeks of crown cementation procedures. Most acceptable and suitable VAS score 0-2 was noticed in 7 patients. Here p value was exceedingly significant (0.01). VAS score 3-7 was noticed in 2 patients and it was not statistically significant. VAS score 8-10 was noticed in 1 patients and it was not statistically significant. These observations were seen and noticed after 1 week of stainless steel crown cementation. After 2 week of stainless steel crown cementation, most acceptable and suitable VAS score 0-2 was noticed in 8 patients. Here p value was exceptionally significant (0.02). VAS score 3-7 was noticed in 1 patient and it was not statistically significant. VAS score 8-10 was noticed in 1 patients and it was not statistically significant. Table 3 demonstrated about the basic statistical explanation with level of significance evaluation using “Pearson Chi-Square” test. This was for Group 2; n=10 pediatric patients in which pre-

veneered stainless steel crowns were given. All responses were interpreted as scorings of VAS scale after 1 week and 2 weeks of crown cementation procedures. Most acceptable and appropriate VAS score 0-2 was noticed in 6 patients. Here p value was not significant (0.09). VAS score 3-7 was noticed in 3 patients and it was statistically significant (0.02). VAS score 8-10 was noticed in 1 patients and it was not statistically significant. These findings were seen and noticed after 1 week of pre-veneered stainless steel crowns cementation. After 2 week of pre-veneered stainless steel crowns cementations, most acceptable and suitable VAS score 0-2 was noticed in 6 patients. Here p value was exceptionally significant (0.01). VAS score 3-7 was noticed in 2 patients and it was not statistically significant. VAS score 8-10 was noticed in 2 patients and it was not statistically significant. Table 4 explains about the evaluation amongst all studied Groups using one-way ANOVA. Here, ANOVA analysis confirmed highly significant p value for Between Groups (0.004).

Table 1: Age & Gender based statistical description of contributing patients

Age Group (Yrs)	Male	Female	Total	P value
10	5	4	9	0.02*
11	5	2	7	0.60
12	2	2	4	0.20
Total	12	8	20	*p<0.05 Significant

Graph 1: Patients demographic assortment and related details

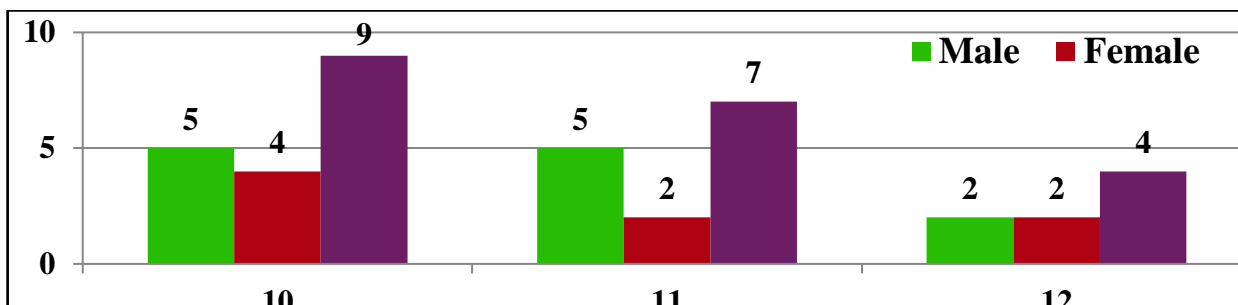


Table 2: Elementary statistical explanation with level of significance evaluation using “Pearson Chi-Square” test (Group 1; n=10 pediatric patients in which Open Faced Stainless Steel Crowns were given) and interpreted as scorings of VAS scale after 1 week and 2 weeks of crown cementation procedures



VAS Scores	n	Stat. Mean	Std. Dev.	Std. Error	95% CI	Pearson Chi-Square	df	p value
After 1 Week								
0-2	7	1.91	0.940	0.376	1.96	1.549	1.0	0.01*
3-7	2	1.08	0.230	0.940	1.12	1.904	2.0	0.08
8-10	1	1.02	0.695	0.042	1.23	1.131	1.0	0.10
After 2 Weeks								
0-2	8	1.93	0.390	0.436	1.66	1.349	1.0	0.02*
3-7	1	1.02	0.695	0.042	1.23	1.131	1.0	0.10
8-10	1	1.02	0.695	0.042	1.23	1.131	1.0	0.10
*p<0.05 significant								

Table 3: Elementary statistical explanation with level of significance evaluation using “Pearson Chi-Square” test (Group 2; n=10 pediatric patients in which pre-veneered stainless steel crowns were given) and interpreted as scorings of VAS scale after 1 week and 2 weeks of crown cementation procedures

VAS Scores	n	Stat. Mean	Std. Dev.	Std. Error	95% CI	Pearson Chi-Square	df	p value
After 1 Week								
0-2	6	1.96	0.039	0.930	1.96	1.940	1.0	0.09
3-7	3	1.02	0.230	0.524	1.12	1.921	2.0	0.02*
8-10	1	1.01	0.645	0.934	1.43	1.032	1.0	0.10
After 2 Weeks								
0-2	6	1.84	0.840	0.392	1.91	1.368	1.0	0.01*
3-7	2	1.08	0.230	0.940	1.12	1.904	2.0	0.08
8-10	2	1.01	0.745	0.973	1.83	1.526	1.0	0.50
*p<0.05 significant								

Table 4: Evaluation amongst all studied Groups using one-way ANOVA

Variables	Degree of Freedom	Sum of Squares Σ	Mean Sum of Squares $m\Sigma$	F	Level of Sig. (p)
Between Groups	3	2.054	1.238	1.1	0.004*
Within Groups	18	2.039	0.125	-	-
Cumulative	121.42	12.577	*p<0.05 significant		



Discussion

Innes and other stated and explored about preformed crowns for decayed primary molar teeth. They were among the initial workers who described use preformed crowns for pediatric situations. Their recommendations were highly imperative.¹⁴ Full and other colleagues studied in detail about the Stainless steel crowns for deciduous molars. They studied north American population and demonstrated successful usage of Stainless steel crowns for deciduous molars.¹⁵ Their results were highly predictable and crucial. Somewhat similar study was performed by Mink and coworkers who studied about the stainless steel crown. Many of the latest advancements and modifications of Stainless steel crowns is based on the basic criteria as described by Mink and coworkers.¹⁶ Their study results were in agreement with our outcomes. In August 2020, Society of Pediatric Dentistry has proposed few crucial guidelines on operation of stainless steel crown for deciduous teeth restoration. Their technique and norms have been extensively tested and triad by several clinicians across the globe.¹⁷ Ayedun and other pioneer workers compared the treatment results of the predictable stainless steel crown restorations and the hall method in the management of caries of deciduous molars. They also confirmed the significant role of stainless steel crown in deciduous teeth restoration.¹⁸ Fathima and other researchers compared the gingival health among children with stainless steel crowns and stainless steel bands. Their study was Split-Mouth Randomized Controlled Trial in which they showed the role of these crowns in successful management of caries in primary teeth.¹⁹ Huang and associates evaluated the 3D printing and CAD/CAM resin crowns to replace stainless steel crowns in pediatric dentistry. They recommended the use of CAD/CAM resin crowns in place of traditional stainless steel crowns since CAD/CAM resin crowns offer enhanced esthetic and excellent patients acceptability.²⁰

Conclusion

Within the limitations of the study authors concluded extremely useful clinical inferences and recommendations. They stated that Open Faced Stainless Steel Crowns and Pre-Veneered Stainless Steel Crowns are clinically useful and accepted in their indicated conditions. However, VAS results about

esthetics were more positively inclined towards the Open Faced Stainless Steel Crowns. These elucidations were seen at both of the tested timings i.e.; 1 month & 2 months. Moreover, Open Faced Stainless Steel Crowns and Pre-Veneered Stainless Steel Crowns have their own restrictions and shortcomings which need to be considered before applying clinically.

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