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Original Research

Comparison between zirconia, luxa, strip crowns: A randomised controlled trial

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ABSTRACT:

Background: To evaluate the zirconia, luxa and strip crowns. **Materials & methods:** A total of 30 subjects were enrolled. Age of patients was 4 to 8 years. 30 deciduous teeth were included. The crowns were divided into 3 groups with 10 in each group. Group 1: zirconia, group 2: luxa crowns and group 3: strip crowns. Patients were recalled after 3, 6 and 9 months to evaluate the gingival health and secondary caries. Data was collected and result was analysed using chi- square test and SPSS software. **Results:** A total of 30 deciduous crowns were included. Gingival health as measured by bleeding with probing was recorded. It can be seen that at the 3-months follow-up significantly more teeth in the strip crown group were bleeding compared to the zirconia group. At the 6-months follow-up also more teeth in the strip crown group were bleeding. However, at the last follow-up visit at 9 months all the groups showed no bleeding. **Conclusion:** Zirconia and luxa crowns were the best esthetic crowns for primary anteriors.

Keywords: zirconia, luxa crowns, strip crowns.

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INTRODUCTION

Early childhood caries (ECC) is a chronic multifactorial disorder which continues to be dominant in children, especially in families of low socioeconomic status. [1] Early childhood caries is defined as "the existence of one or more tooth decays (non-cavitated or cavitated lesions), missing (due to caries), or filled tooth surfaces in any primary dentition of children under the age of six years". Severe early childhood caries (S-ECC) is a progressive carious form in children, categorized in accordance to the number of affected teeth and the age of patient. The presence of smooth surface caries is considered to be an indication of S-ECC in patients below three years of age. [2,3] In children between three to five, S-ECC is defined as "one or more cavitated, missing (due to caries), or filled smooth surfaces in primary maxillary anterior teeth or a decayed, missing, or filled score of greater than or equal to four (age three), greater than or equal to five (age four), or greater than or equal to six (age five) surfaces". [4]

Full-coronal esthetic restorations are advocated for restoration of primary anterior teeth, such as resin composite strip crowns, [5] ready-made crowns like preveneered stainless steel crowns (PVSSC),[6] and the recently introduced prefabricated primary zirconia crowns. [7] Stainless steel crowns were the choice of full coronal restoration, as they were easily available as preformed, pretrimmed and precontoured crowns with wide range of sizes and with proven clinical efficiency. [8] Stainless steel crowns, introduced by "Rocky Mountain" company were later improved by various manufacturers. The only disadvantage of SSC was its unesthetic appearance. [9] More recently, zirconia aesthetic crowns for pediatric patients appeared in the market. Zirconia is a crystal-like dioxide of zirconium that possess a metal like mechanical properties and a tooth like color, and the ready to use zirconia crowns are available for primary teeth. Although there is high acceptance of zirconia crowns, the literature lacks solid proof for their pediatric clinical performance.[10]

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MATERIALS & METHODS

A total of 30 subjects were enrolled. Age of patients was 4 to 8 years. 30 deciduous teeth were included. The crowns were divided into 3 groups with 10 in each group. Group 1: zirconia, group 2: luxa crowns and group 3: strip crowns. Medical and dental history was taken. Patients were recalled after 3,6 and 9 months to evaluate the gingival health and secondary caries. Data was collected and result was analysed using chi- square test and SPSS software.

RESULTS

A total of 30 deciduous crowns were included. Gingival health as measured by bleeding with probing was recorded. It can be seen that at the 3-months follow-up significantly more teeth in the strip crown group were bleeding compared to the zirconia group. At the 6-months follow-up also more teeth in the strip crown group were bleeding. However, at the last follow-up visit at 9 months all the groups showed no bleeding.

Table 1: Gingival health (bleeding on probing)

Gingival health (bleeding on probing)	Zirconia crown	Strip crown	Luxa crown
At 3 months	3 (30%)	4 (40%)	3 (30%)
6 months	0 (100%)	1 (10%)	0 (100%)
9 months	0 (100%)	0 (100%)	0 (100%)

Table 2: secondary caries

Groups	3 month	6 months	9 months	
	No caries	No caries	No caries	Caries present
Strip crown	10 (100%)	10 (100%)	7 (70%)	3 (30%)
Zirconia	10 (100%)	10 (100%)	10 (100%)	-
Luxa crowns	10 (100%)	10 (100%)	10 (100%)	-

Secondary caries of zirconia crowns, luxa crowns and resin strip crowns were compared. Statistically significant difference was found between them at 9 months. No secondary caries was seen in zirconia crown, and luxa at 3, 6-, and 9-month intervals. But resin strip crowns showed 30% of cases with secondary caries.

DISCUSSION

Zirconia crowns were introduced in 2008 as an alternative restorative treatment. Zirconia has an extensive history of being an excellent biocompatible material. [11] One of the main advantages of zirconia crowns are their esthetically excellent appearance alongside their durability. In addition, zirconia crowns have shown less plaque accumulation in comparison to other materials due to their highly polished surface. [12] Hence, this study was conducted to evaluate the zirconia, luxa and strip crowns.

In our study, a total of 30 deciduous crowns were included. Gingival health as measured by bleeding with probing was recorded. It can be seen that at the 3-months follow-up significantly more teeth in the strip crown group were bleeding compared to the zirconia group. At the 6-months follow-up also more teeth in the strip crown group were bleeding. However, at the last follow-up visit at 9 months all the groups showed no bleeding.

A study by Nischal M et al, evaluated the surface texture, anatomical form, marginal integrity, marginal discoloration, and secondary caries of three different types of crowns in primary anterior teeth at different time intervals of 3, 6, and 9 months. Total 45 primary maxillary incisors were randomly selected and divided into three groups of 15 each: group I—strip crowns (Pedoform strip crowns, 3M, United States), group II—zirconia crown (kids-e-crown, India), and group III—luxa crown (DMG, Germany). Statistically non-significant difference was observed for most of the parameters except marginal integrity and secondary caries. Resin strip crowns showed maximum cases with distorted marginal integrity and secondary caries. [13]

In the present study, secondary caries of zirconia crowns, luxa crowns and resin strip crowns were compared. Statistically significant difference was found between them at 9 months. No secondary caries was seen in zirconia crown, and luxa at 3-, 6-, and 9-month intervals. But resin strip crowns showed 30% of cases with secondary caries. Another study by Alaki SM et al, compared prefabricated primary zirconia with resin composite strip crowns on primary maxillary central and lateral incisors with regards to gingival health, plaque accumulation, recurrent caries, restoration failure, and opposing teeth wear over a period of 3, 6 and 12 months. A total of 120 teeth were treated; 60 with zirconia and 60 with strip crowns. Level of significance was set at ($\alpha = 0.05$) and level of confidence at (95%). Zirconia crowns showed significantly less gingival bleeding at the 3- and 6-months follow up periods ($p < 0.006$, $p < 0.001$; respectively), less plaque accumulation at all follow up visits ($p < 0.001$), no restoration failure ($p < 0.001$), but more wear to opposing teeth ($p < 0.02$). No significant difference was found between the two crowns with regards to recurrent caries ($p < 0.135$).[14]

A systematic review was to summarize the literature regarding the clinical performance of zirconia crowns for primary teeth. Studies that assessed the performance of zirconia crowns for primary teeth using outcomes such as gingival and periodontal health, parental satisfaction, color stability, crown retention, contour, fracture resistance, marginal integrity, surface roughness, and recurrent caries were included. The included studies reported that zirconia crowns for primary teeth were associated with better gingival and periodontal health, good retention, high fracture resistance, color stability, high parental acceptance, good marginal adaptation, smooth cosmetic surface, and no recurrent caries. Zirconia crowns are promising alternative to other restorative materials and crowns in the field of pediatric dentistry. They showed higher properties and performance in different clinical aspects and great parental satisfaction. [15]

CONCLUSION

Zirconia and luxa crowns were the best esthetic crowns for primary anteriors.

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