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Original Research

Comparative evaluation of stainless-steel crowns, zirconia and strip crowns

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ABSTRACT:
Background: To evaluate and compare the effectiveness of stainless steel crowns, zirconia and strip crowns. **Materials & methods:** A total of 30 pediatric subjects within the age group of 5 to 8 years were enrolled. Only those subjects were enrolled which had fully erupted mandibular deciduous molar needing crown. The crowns were divided into 3 groups with 10 in each group. Group A: Stainless steel crowns, Group B: zirconia and Group C: strip crowns. Patients were recalled after 3 months and 6 months to evaluate the gingival health and secondary caries. Data was collected and result was analysed using SPSS software. **Results:** A total of 40 deciduous crowns were included. Gingival health as measured by bleeding with probing was recorded. 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. Secondary caries of zirconia crowns, luxa crowns, resin strip crowns and stainless steel crowns were compared. Statistically significant difference was found between them at 9 months. No secondary caries was seen in zirconia crown, luxa and stainless steel crown at 3-, 6-, and 9-month intervals. **Conclusion:** Outcome of Zirconia crowns was better.
Keywords: zirconia, strip crowns.

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INTRODUCTION

Early childhood caries is a global epidemic problem affecting majority of preschool children, if left untreated leads to degenerating condition in primary dentition even at very young age. The mutilated teeth can be restored with full coronal restoration in order to preserve the integrity of primary dentition until their natural exfoliation. Till date, various preformed crowns have been tried as full coronal restorations for both therapeutic and preventive treatment.[1- 3] Stainless steel crowns (SSC) 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.[4] Stainless steel crowns, introduced by "Rocky Mountain" company were later improved by various manufacturers. The only disadvantage of SSC was its unesthetic appearance.[5, 6]

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. There are limited clinical studies that are currently ongoing, however until the outcomes of adequate number of prospective clinical trials with enough long-term follow-up periods is available evidence to ensure clinical success and durability of these crowns are leftover uncertain.[5- 7] Hence; the present study was conducted for evaluating and comparing the effectiveness of stainless-steel crowns, zirconia and strip crowns.

MATERIALS & METHODS

The present study was conducted for evaluating and comparing the effectiveness of stainless steel crowns, zirconia and strip crowns. A total of 30 pediatric subjects within the age group of 5 to 8 years were enrolled. Only those subjects were enrolled which had fully erupted mandibular deciduous molar needing crown. The crowns were divided into 3 groups with 10

in each group. Group A: Stainless steel crowns, Group B: zirconia and Group C: strip crowns. Patients were recalled after 3 months and 6 months to evaluate the gingival health and secondary caries. Data was collected and result was analysed using SPSS software.

RESULTS

A total of 30 pediatric subjects within the age group of 5 to 8 years were enrolled. The crowns were divided into 3 groups with 10 in each group. Group A: Stainless steel crowns, Group B: zirconia and Group C: strip crowns. On evaluating the gingival health in terms of bleeding on probing 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.

Table 1: Gingival health (bleeding on probing)

Gingival health (bleeding on probing)	Zirconia crown	Strip crown	Stainless steel crown
At 3 months	1 (10%)	3 (30%)	1 (10%)
6 months	0 (0%)	2 (20%)	1 (10%)

DISCUSSION

Dental caries is considered the most common infectious disease globally. Internationally, 60–90% of children suffer from this disease. When left untreated, caries could severely damage the tooth structure which will require restoration to one or more of the tooth surfaces. If it progresses further, the tooths pulp will be affected, and inflammation may result. At this stage, the tooth may require pulp therapy, and most probably the remaining tooth structure will need to be covered with a crown. This may be necessary to maintain the integrity of the treated tooth until the eruption of its permanent successor. Primary teeth play an important role in preserving space in the arch for the permanent teeth beside their important functions in speech and mastication. For this reason, it is best to treat primary molars with extensive and large carious lesions, multiple affected surfaces or that have undergone pulp therapy with full coverage restorations or crowns. Full coverage is essential to provide long-term protection and durability and prevent recurrent decay. The most widely recognized full coverage restoration method used in pediatric dentistry is the use of stainless steel crowns. Stainless steel crowns are pre-formed metal crowns that have shown significant clinical success and are considered a favorable restoration method for multiple surfaces and larger carious lesions on primary molars. Studies have evaluated the performance of stainless steel crowns in comparison to other restoration methods and found that stainless steel crowns showed a higher lifespan and durability. The stainless steel crowns have reasonable costs and are less technique sensitive during placement.[5- 9] Hence; the present study was conducted for evaluating and comparing the effectiveness of stainless-steel crowns, zirconia and strip crowns.

A total of 30 pediatric subjects within the age group of 5 to 8 years were enrolled. The crowns were divided into 3 groups with 10 in each group. Group A: Stainless steel crowns, Group B: zirconia and Group C: strip crowns. On evaluating the gingival health in terms of bleeding on probing 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. Mathew, Mebin George et al compared the clinical success, parental satisfaction, and child satisfaction of stainless steel and zirconia crowns in primary molars. Thirty healthy patients aged 6–8 years bilateral pulp therapy treated primary molars were randomly divided into two equal groups of stainless steel and zirconia crowns. Tooth preparation was done according to the manufacturers' recommendations depending upon the crown each patient would receive. All crowns were cemented with Type I GIC luting cement. Patients were evaluated at 6 months, 12 months, 18 months, 24 months, and 36 months. Clinical success for stainless steel crowns and zirconia crowns were similar with no statistical difference between them. Zirconia accumulated less plaque than stainless steel crowns ($P = 0.047$). The parental satisfaction was high with both crowns. A highly significant statistical difference existed between the 2 groups in relation to the acceptance of color ($P < 0.001$) and child's satisfaction ($P < 0.001$).[10] Ram, D et al assessed retrospectively the longevity of resin-bonded composite strip crowns placed in primary maxillary incisors. Records for 200 out of 387 children, aged 22-48 months, treated in a private paediatric dental practice and who presented for follow-up after at least 24 months were included in the study. The parameters recorded at baseline and/or at follow-up were: habits, the number and location of the decayed surfaces, colour, texture, and chipping of the restoration. Radiographic evaluation of the restorations, the quality of the margins, and the presence of pulpal and/or periapical pathoses were recorded. More than 80% of the restorations were judged to be successful at the final follow-up examination. Only the number of carious surfaces of the tooth at baseline influenced the treatment outcome. The failure rate was higher in central incisors with four affected surfaces ($P = 0.005$), and in lateral incisors with four carious surfaces ($P = 0.0003$), than in those presenting one or two carious surfaces in both central and lateral incisors ($P = 0.002$). The high success rate of resin-bonded composite strip crowns with a 2-year follow-up seen in this study suggests that this treatment modality is an aesthetic and satisfactory means of restoring carious primary incisors in young children.[11]

CONCLUSION

Outcome of Zirconia crowns was better.

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