

Esthetics in Pediatric Dentistry—BioFlx Crowns: Case Series

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ABSTRACT

Background: The crown is considered the most effective restoration for the management of dental caries. It reproduces the morphology and contour of the damaged coronal portion of the tooth while maintaining its function. The esthetic needs of children and the demands of parents bring advancement in dentistry toward a new era of esthetic crowns. In this era of esthetic crowns, the newly introduced preformed BioFlx crown seems to be an effective esthetic treatment option.

Case description: In the present case series, full coverage restoration for the management of carious and pulp therapy-treated primary molars was done by esthetic and flexible BioFlx crown (Kids-e-Dental, LLP, Mumbai, India). Over a 6 months period, the crowns have demonstrated good retention and esthetic results.

Conclusion: Dealing with the esthetic needs of children and managing primary molars using BioFlx crowns would be practical and successful.

Clinical significance: The treatment described in the case series is a new advancement in pediatric dentistry with promising esthetic alternatives.

Keywords: Case report, Crowns, Dental caries, Esthetics, Pediatric dentistry.

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INTRODUCTION

Dental caries in infants and children is one of the most prevalent dental problems.¹ The World Health Organization (WHO) Global Oral Health Status Report (2022) estimated that globally, 514 million children suffer from caries of primary teeth.² If dental caries are not treated, it will advance and cause pain, infection, unnecessary suffering, and missed school days.³ Untreated dental caries also affect children's ability to grow and thrive.⁴ It is also difficult for children to cope with dental procedures to manage tooth decay and developmental abnormalities and for pediatric dentists to manage them successfully.⁵

The traditional method in the past has been the removal of dental caries followed by appropriate restorative materials; either a direct restoration or indirect restoration can be carried out. However, it might be challenging to restore the original shape of teeth using a direct restorative material, especially in multisurface cavities. As a result, full-coverage restorations were created for pediatric patients to avoid the problems associated with multisurface restoration.⁶

The most reliable restorative material for primary molars has been demonstrated to be the most popular stainless-steel crowns (SSCs). SSC has a high level of cost-effectiveness, durability, and placement technique sensitivity. However, SSCs have limited esthetic appeal, which is a significant negative impression despite their great attributes.⁷

The drawbacks of SSCs have been addressed with a number of revisions and newer, more attractive esthetic crowns. These esthetic crowns were developed to satisfy the growing esthetic requirements of patients and their guardians. These crowns are available for both the anterior and posterior primary teeth and preserve the functions of teeth until their exfoliation.^{8,9}

In the series of esthetic crowns, preformed BioFlx crowns are the newly introduced crowns for primary teeth that have been designed with the esthetic needs of the pediatric population in mind. These are the first flexible, durable, self-adaptable, and

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esthetic preformed pediatric crowns that offer properties of both SSCs and zirconia crowns.¹⁰ This present case series demonstrates the use of prefabricated BioFlx crowns to restore decayed primary teeth in pediatric patients and is a step towards giving functional restoration with esthetics in children. The uniqueness of this case series is that BioFlx crowns were delivered on primary molars for different clinical situations and were proven to be an effective esthetic alternative for presently available tooth-colored preformed crowns.

BIOFLX CROWN

BioFlx crowns (Kids-e-Dental, LLP, Mumbai, India) are the first pediatric crowns that are flexible, durable, self-adaptable, and esthetic in appearance, as shown in [Table 1](#). These are made of high-impact hybrid radioopaque polymer resin, which is employed in medical equipment when great strength, flexibility, and durability are required. They are metal and bisphenol A-glycidyl methacrylate-free monochromatic tooth-colored crowns made of a completely biocompatible material that can

Table 1: Properties of BioFlx crowns¹⁰

Serial number	Properties of BioFlx crowns
1	Crimping is not recommended
2	Slight contouring may be done with Howe pliers
3	Trimming can be done with scissors and then smoothing the margins (football diamond bur)
4	Wear resistance of flexible crowns is similar to or better than traditional SSC
5	Crown may self-adapt in areas of slightly high occlusion
6	Autoclave likely to be recommended for sterilization as similar to SSC
7	Self-setting resin-modified glass ionomer (RMGI) and GIC are recommended for cementation
8	Sandblasted intaglio surface for enhanced retention with self-setting RMGI and GIC

mask the discoloration of arrested caries. According to the manufacturers, these crowns can be adapted easily and have a snug/active fit. They may be readily altered if they are high in occlusion place by adding a dimple on that area. They have a radioopacity of 1 mm that permits evaluation of the crown margins and pulp capping materials. When compared to SSCs, these crowns require fewer adjustments.

CASE DESCRIPTION

This case series features three cases in which preformed BioFlx crowns were delivered on primary molars. In each case, a detailed case history along with demographic details was recorded. Both clinical and radiographic records were made. Following informed consent from their parents and informed assent, necessary treatment was carried out in each case. The use of BioFlx crowns for the restoration of carious primary teeth was planned with the child’s and parents’ esthetic preferences in mind.

The selection process for the BioFlx crown was the same as for the SSCs. The crown size was selected by measuring the mesiodistal width with calipers. In each case, the closely fitted crown was chosen. Similar to SSCs, the teeth were prepared for the BioFlx crown. The occlusal reduction was done with a No. 330 diamond bur of approximately 1–1.5 mm, and mesial and distal reduction of no >1 mm was done with a No. 169L diamond bur. In accordance with the needs of the tooth anatomy, either no buccal and lingual reduction was made or very little reduction was made. The preparation’s line angles and sharp corners were all smoothed off and decreased. The crown was checked with try-in; it was made to extend 1 mm below the gingiva as desired. If the gingival blanching was evident, the necessary correction was made by further trimming and polishing of crowns with a football diamond bur. Using crown scissors or an abrasive wheel, the crown was trimmed. The margins were polished and finished properly. The BioFlx crowns were cemented using luting glass ionomer cement (GIC) (GC Gold Label Luting and lining GIC) and were held with firm, constant pressure at the right location on the teeth until the initial set after the marginal fit was assessed. The occlusion was examined, and interferences were removed as necessary.

Table 2: Case descriptions with treatment

Serial number	Gender	Age in years	Tooth number	Treatment done	Final restoration
1	Female (Fig. 1)	6	75	Pulpectomy	BioFlx crown 75
2	Male (Fig. 2)	7	55	Indirect pulp therapy (dycal as the indirect pulp capping medication, followed by GIC restoration)	BioFlx crown 55
3	Female (Fig. 3)	6	54, 54	Indirect pulp therapy (indirect pulp capping was performed with SDF followed by GIC restoration)	BioFlx crown 54, 55

They have a radioopacity of 1 mm that permits evaluation of the crown margins and pulp capping materials while using radiovisiography (RVG). At follow-up visits, the crowns were examined for any discoloration or dislodgment, and the soft tissue was examined for gingival health.

The case description is tabulated in Table 2.

DISCUSSION

The WHO has represented early childhood caries as a worldwide problem with a prevalence of 60–90%.¹¹ For carious primary teeth, a number of restorative alternatives are available, including glass ionomer cement, composite resin, or compomers.⁴

Crowns are considered to be the most effective restoration for grossly decayed teeth, fractured teeth, and hypoplastic teeth.¹² It restores the tooth after pulp therapy, teeth affected by developmental disturbances, and restores carious deciduous teeth under general anesthesia. The primary purpose of a crown is to allow sealed restoration, with a long-term positive outcome and no major failures.¹³ Innes et al. concluded in their systematic review that the use of crowns is associated with a reduced risk of major failure, pain, and formation of abscess in the long term as compared to conventional restorations.¹⁴ For the restoration of primary teeth, a number of esthetic crowns are available in both the anterior and posterior regions.

For restoration of posterior teeth, open-faced SSCs, preveneered SSCs (PVSCCs), preveneered aluminum, polycarbonate crowns, acrylic crowns, strip crowns, zirconia crowns, and most recent figaro crowns are among the esthetic crowns that are accessible for pediatric patients. The most recent addition to this line of esthetic crowns is the BioFlx crown.¹⁵

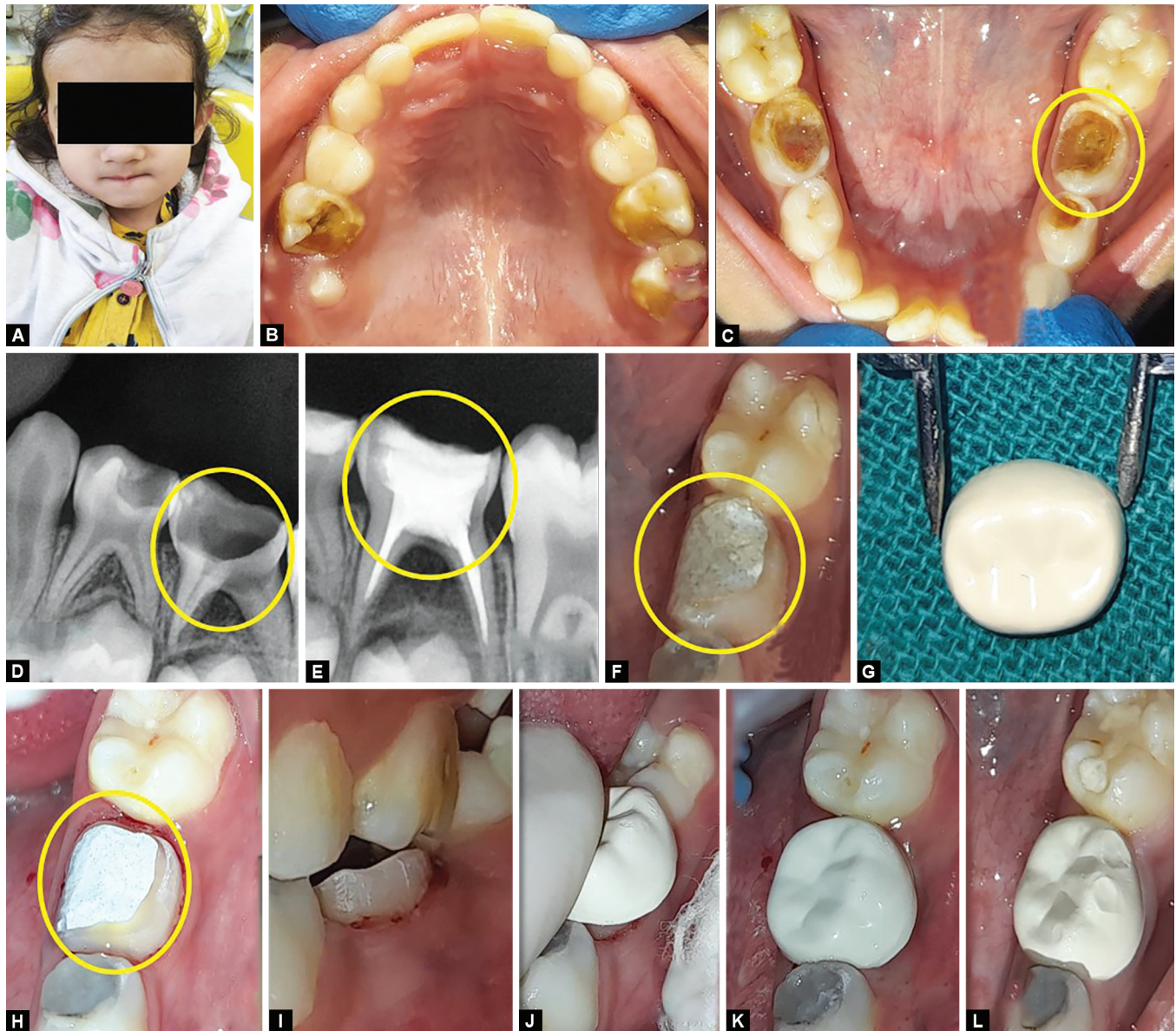
The SSCs, despite being one of the best final restorations for posterior primary teeth, cannot be esthetically pleasing due to their metallic appearance. Additionally, because SSCs are rigid, more time is utilized at the chair side for their manipulation. Parents and children today are more concerned with the esthetics of their teeth. According to Jean Piaget, a child’s perception of their appearance does not develop until they are eight years old, but recent research in the field of child psychology has refuted this idea, demonstrating that, with increased media exposure,



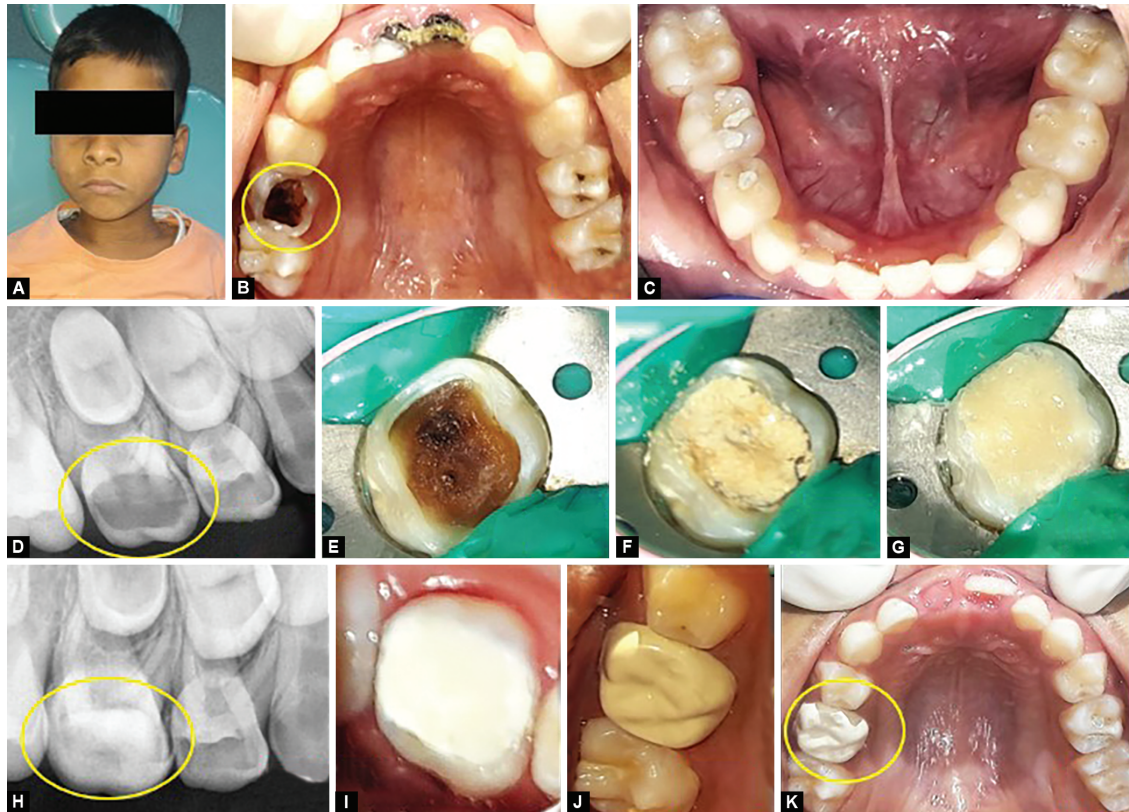
children as young as 3–5 years old already have a concern of their smile.⁹ A beautiful smile depends on the color, shape, and texture of the teeth's surface since young children may perceive esthetics in their teeth.¹²

In comparison to ceramic zirconia crowns, which offer esthetic biocompatible full coverage for primary teeth, BioFlx crowns require less tooth reduction and are handled easily. Compared to zirconia crowns, they have a similar esthetic appearance. The use of zirconia crowns in primary teeth has a number of drawbacks, including the need for higher tooth reduction, the inability to be crimped, the expansion it causes, the wearing out of the tooth next to it, and the inability to be utilized in patients who have strong occlusal forces.¹⁶

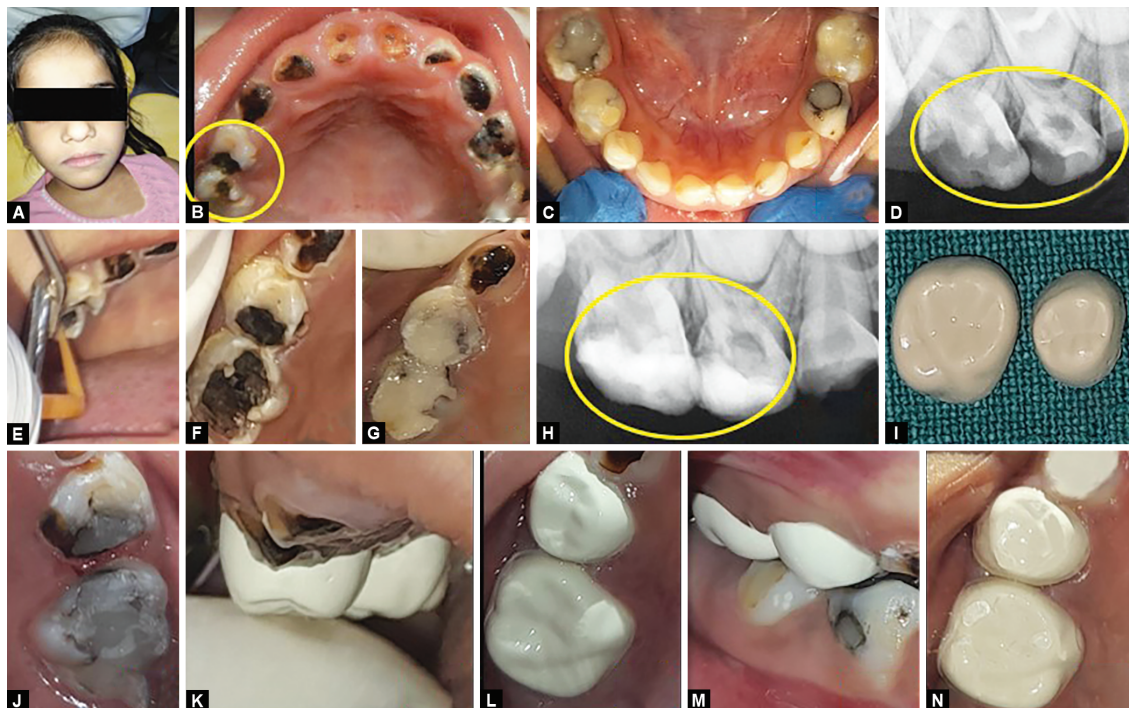
In the present cases, in case I, occlusion was slightly high, and on follow-up visits, it was self-adjusted by putting a dimple on the BioFlx crown (Fig. 1). The radioopacity of crown margins is appreciable on RVG (Fig. 2). The simultaneous placement of two crowns is adapted perfectly on follow-up visits (Fig. 3). In case III, the BioFlx crown also perfectly masked the discoloration of silver diamine fluoride (SDF). In all three cases, the patient and parents were satisfied with the esthetic appearance of the crowns, and there was ease of tooth preparation for pediatric dentists, similar to SSCs. Over a period of 6-month follow-up, BioFlx crowns demonstrated promising results with good esthetics. Due to the esthetic appearance and convenience of adaptation, the BioFlx crowns can be preferred over zirconia crowns. Pediatric dentistry



Figs 1A to L: (A) Patient's profile; (B) Maxillary occlusal view showing carious 55, 65; (C) Mandibular occlusal view showing carious 74, 75, and 85; (D) Preoperative RVG 75; (E) Postoperative RVG 75 after pulpectomy; (F) Clinical view of 75 after pulpectomy; (G) BioFlx crown selection; (H) Occlusal view showing tooth preparation with respect to 75; (I) Left lateral view showing tooth preparation 75; (J) BioFlx crown cementation with respect to 75; (K) Immediate postoperative occlusal view showing BioFlx crown with respect to 75; (L) 6 months follow-up of BioFlx crown with respect to 75



Figs 2A to K: (A) Patient's profile; (B) Maxillary occlusal view showing carious 55, 51, 61, and 65; (C) Mandibular occlusal view; (D) Preoperative RVG 55; (E) Caries excavation; (F) Dycal application; (G) GIC restoration; (H) Postoperative RVG 55 after indirect pulp capping with dycal followed by GIC restoration; (I) Occlusal view showing tooth preparation with respect to 55; (J) Immediate postoperative occlusal view showing BioFlx crown with respect to 55; (K) 6 months follow-up of BioFlx crown



Figs 3A to N: (A) Patient's profile; (B) Maxillary occlusal view showing carious teeth; (C) Mandibular occlusal view; (D) Preoperative RVG 55, 54; (E) SDF application as an indirect pulp capping agent; (F) Immediate postoperative view after SDF application; (G) GIC restoration; (H) Postoperative RVG 54, 55 after indirect pulp capping with SDF followed by GIC restoration; (I) Occlusal view of BioFlx crown; (J) Occlusal view showing tooth preparation with respect to 54, 55; (K) BioFlx crown cementation with respect to 54, 55; (L and M) Immediate postoperative occlusal view and right lateral showing BioFlx crown with respect to 54, 55; (N) 6 months follow-up of BioFlx crown

has adopted BioFlx crowns to overcome the drawbacks of both stainless steel and zirconia crowns. Still, there is a paucity of literature on BioFlx crowns in pediatric dentistry. To the best of our knowledge, there are currently no other published studies that have assessed the durability, flexibility, and esthetics of BioFlx crowns on primary teeth. The clinical trials on BioFlx are still ongoing. The current cases are adding to the existing literature on the series of esthetic crowns by revealing more details about the BioFlx crowns.

CONCLUSION

Even though there are several esthetic crowns available in pediatric dentistry today, none of them can meet all the demands. BioFlx crowns could be an additional option for currently available cosmetic crowns, but long-term follow-up is still necessary for the determination of their durability, flexibility, and esthetic stability.

Clinical Significance

The treatment described in the case series is a new advancement in pediatric dentistry with promising esthetic alternatives. BioFlx crown offers advantages over both SSC and zirconia crowns, primarily in terms of its esthetic appearance and ease of application.

DISCLAIMER

The authors deny any issue regarding the esthetic, flexibility, and durability related to the BioFlx crown. No special concern has been reported after BioFlx crown delivery in patients.

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