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Exploring Bioflx Crowns in Pediatric restorative Dentistry: A Narrative Review

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Abstract

The use of tooth-colored restorations in pediatric dentistry is crucial for treating a variety of conditions involving deciduous teeth, particularly when these teeth are decayed, deformed, or traumatized. Given the challenges posed by young children, especially those with behavioral issues, the selection of appropriate restorative materials becomes even more significant.Bioflxcrowns represent a newer advancement in pediatric dental care. These synthetic crowns are designed to improve upon conventional options by offering better adaptation, enhanced durability, and superior aesthetics. The material's ease of handling and improved fit make it particularly appealing for pediatric cases, where patient cooperation can be a concern. Bioflx crowns are increasingly being used to treat carious teeth in children, providing a reliable, aesthetically pleasing solution that aligns with the evolving needs of pediatric dentistry.

Keywords: Bioflx, Aesthetic ,pediatric dentistry.

Introduction

In pediatric dentistry, one of the major challenges is preventing dental caries, a condition that can significantly impact children's quality of life. According to the 2022 World Health Organization (WHO) Global Oral Health Status Report, nearly 514 million children worldwide suffer from dental caries in their primary teeth (1).The increasing prevalence of this condition poses a serious concern. Untreated dental caries can result in the destruction of tooth structures and lead to complications such as pulpal inflammation, which may necessitate pulp therapy. During the excavation of carious lesions in pulp therapy, a considerable amount of tooth structure is often lost, weakening the tooth's overall strength (2). In cases where multi-surface loss occurs, the tooth may require additional reinforcement to withstand masticatory forces after restoration and to prevent the recurrence of secondary caries. Crowns are frequently used following pulp therapy procedures to restore both the function and the structural integrity of the tooth, ensuring its long-term viability and preventing further damage.

Stainless steel crowns (SSCs) are commonly used in primary teeth due to their cost-effectiveness, durability, and ease of placement. However, one of the major drawbacks of SSCs is their lack of aesthetic appeal, which has led to an increasing demand for more aesthetically pleasing alternatives. To address this concern, zirconia crowns, strip crowns, and preveneered, SSCs are often preferred for anterior teeth, where aesthetics are particularly important (3). While these options offer better aesthetics, they have some disadvantages, including the need for over preparation of the tooth and technical challenges. To overcome these issues, Bioflx crowns have been introduced as a potential solution, offering a balance between aesthetics and functional performance without the need for excessive tooth preparation or technical complexity.

Bioflx crowns represent an exciting advancement in pediatric dentistry, offering a blend of flexibility, durability, and self-adaptability. Developed by Dr. Mukul Jain (kids-e-dental® Mumbai, India), these crowns combine the benefits of both stainless steel and zirconia materials, making them particularly useful for restoring carious primary teeth. Their flexible design allows for a more conservative approach to tooth preparation compared to traditional crown options, which can be

advantageous in preserving more of the natural tooth structure. The aim of this review is to discuss the indications, features, properties, preparation, and availability of Bioflx Crown.
Features: Bioflx crowns are innovative, metal-free dental restorations designed to combine the benefits of both stainless steel and zirconia. These crowns are made from a hybrid resin polymer, offering the flexibility and durability of stainless steel while maintaining the aesthetic and biocompatible advantages of zirconia.(4) Their unique design makes them ideal for pediatric and restorative dentistry, as they are both easy to install and long-lasting

The crowns are free from metals and Bis-GMA, making them a more biocompatible option for patients. Their radiopacity is similar to natural tooth structure, around 1 mm, allowing for better imaging during procedures.

The unique material properties provide the necessary strength, flexibility, and wear resistance, with an ability to adapt naturally to occlusal forces by developing a "dimple" in high-occlusion areas without causing excessive wear(5).

Bioflx crowns are particularly advantageous for their ease of use, with handling and preparation characteristics that are similar to stainless steel crowns, thus reducing chair time. They also offer superior aesthetics by effectively concealing discoloration from arrested caries. For cementation, the intaglio surface is sandblasted to improve retention when using selfsetting resin-modified glass ionomer (RMGI) or glass ionomer cements, such as FujiCem I, FujiCem II, and Ketac. However, light-cured cement is not recommended for optimal bonding. These crowns also feature a laser branding on the inner occlusal surface for easy identification, further enhancing both aesthetic and functional value. Overall, Bioflx crowns offer a combination of excellent aesthetics, long-term durability, and ease of use, making them an excellent choice for dental restorations.

PROPERTIES:

Crimping is not advisable for Bioflx crowns.
For slight contouring, Howe pliers should be used.
Scissors are used for trimming the crown, while the margins can be smoothed using a football diamond bur.
Bioflx crowns exhibit wear resistance comparable to that of stainless steel crowns
Bioflx crowns can be sterilized through autoclaving (6) .

SIZE AND SHADE SELECTION IN BIOFLX CROWN:
Starter Kit: Contains 40 regular crowns in sizes ranging from 2 to 6.

Trial Kit: Contains 24 regular crowns in sizes ranging from 3 to 5.

Master Kit: Contains 56 regular crowns in sizes ranging from 1 to 7.

All Bioflx crowns come in a single shade selection (7).

INDICATIONS AND CONTRADICATION:

Bioflx posterior crowns are a versatile restorative option for a variety of dental conditions. Here's how they can be used in specific cases:
Tooth Decay: A Bioflx crown can restore a posterior tooth with significant decay that can't be repaired with fillings alone, providing strength and protection to the damaged tooth structure.

Fractured Teeth: For posterior teeth that have been fractured due to trauma or other causes, a Bioflx crown can restore their function and protect the tooth from further damage.

Hypoplastic Teeth: Bioflx crowns are effective in addressing posterior teeth affected by hypoplasia (enamel defects), helping to improve both the appearance and function of the tooth.

Teeth with Developmental Abnormalities: Conditions like amelogenesis imperfecta or dentinogenesis imperfecta, which result in developmental defects of the enamel or dentin, can be treated with Bioflx crowns to restore the tooth's appearance and durability.

Primary Tooth Restoration: Bioflx crowns are also suitable for restoring damaged or decaying primary teeth, conservative tooth preparation, when compared to strip crowns, stainless crown and Zirconia crown (8)

Bioflx crowns should not be used in patients with bruxism (teeth grinding) or when employing the Hall technique (9)for primary tooth treatment, as the forces involved may compromise the crown's integrity.

Advantages:

The crown can effectively adjust to regions with higher occlusion, ensuring a good fit in different bite conditions. The crown's material has a radiopacity of approximately 1 mm, making it easier to assess the pulp capping materials and crown margins through X-rays The crown offers a snug, active fit and is

designed to be both flexible for ease of placement and strong for durability. Sandblasting the intaglio surface before applying self-setting Resin Modified Glass Ionomer (RMGI) or Glass Ionomer (GI) cement enhances retention. The crown can be seated effectively with a bite stick, and trimming of excess material can be done easily using crown and bridge scissors.

Disadvantages:

Some tooth reduction may be required to achieve the desired fit, potentially compromising the natural tooth structure. The material used for the crown is not easily crimped or contoured, which may make customization challenging. The crown can be more expensive than other options, making it less cost-effective for some patients.
Crown Preparation Procedure:
Assess the Occlusal Relationship:
Before placing a rubber dam, evaluate the occlusal (bite) relationship to ensure adequate space and a proper fit for the crown.
Measure the Mesiodistal Dimension:
Estimate the mesiodistal width of the tooth to select the smallest suitable Bioflx crown, ensuring proper reestablishment of the proximal (contact) area between neighboring teeth.
Administer Local Anesthesia:
Local anesthesia is generally necessary to ensure patient comfort during the procedure.

Tooth Preparation:

Occlusal Reduction: Use a flame-shaped bur to reduce the occlusal surface by 1-1.5 mm while maintaining the cuspal inclines.
Mesial and Distal Contact Adjustment: Employ a tapered fissure bur to modify the mesial and distal contact areas, ensuring no damage to neighboring teeth and avoiding any ledges on the proximal surfaces.

Crown Selection and Shaping:

Choose a Bioflx crown that corresponds to the tooth's mesiodistal width, following the manufacturer's guidelines for the correct size.

Use a tapered diamond bur to refine the occlusal surface by 1-1.5 mm and adjust the mesial contact area by approximately 0.5 mm. (10)
Crown Fitting:
Position and shape the crown using Howe's pliers to ensure a secure fit. Trim the crown with bridge scissors if needed.
Cement the crown in place using glass ionomer cement (Type I).
Cement Removal:
After cementation, remove any excess cement using an explorer (10) and dental floss.
Occlusal Adjustment:

Check for any high spots in the occlusion that may lead to dimples on the occlusal surface. These dimples result from the crown's self-adaptive technology, which adjusts the fit under occlusal pressure

CONCLUSION:

Dental crowns are essential in pediatric dentistry, serving not only to repair damaged teeth but also to support children's oral and mental health. Various types of crowns, including zirconia, resin-based composites, and stainless steel, offer distinct advantages in terms of durability, biocompatibility, and aesthetics. While further research is necessary to fully understand their potential, innovations like Bioflx crowns, which combine the properties of zirconia and stainless steel, demonstrate ongoing advancements. This review underscores the importance of selecting the right crown type to ensure the best treatment outcomes and enhance the quality of life for pediatric patients.

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