

## Review Article

### Crowns in Pediatric Dentistry: A Review

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#### ABSTRACT:

Dental crowns play a crucial role in pediatric dentistry by restoring decayed or damaged teeth, supporting oral health, and enhancing children's psychological well-being. This literature review examines various crown types, including stainless steel crowns and zirconia, highlighting their benefits, such as biocompatibility and aesthetic appeal. Innovative approaches like Hall crowns demonstrate improved decay management compared to traditional methods. Despite adequate knowledge among general dentists regarding crown use, practical application remains limited. This review aims to enhance understanding and utilization of dental crowns in clinical practice, ultimately promoting better oral health outcomes and patient experiences for children.

**Keywords:** Preformed Crowns, Stainless steel crown, Zirconia Cro

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#### INTRODUCTION

Dental crowns are essential in pediatric dentistry, contributing significantly to the restoration of decayed or damaged teeth, maintaining overall oral health, and supporting the psychological well-being of children. Their application is vital in various contexts, such as forensic pediatric dentistry, where they aid in identification and age estimation, as well as the evaluation of dental evidence.<sup>1,2</sup>

Using dental crowns, including stainless steel crowns (SSCs) and resin-filled celluloid forms, has been proven to enhance psychological behavior, alleviate tooth sensitivity, and improve eating habits in children with conditions like amelogenesis imperfecta. The advancement of crown materials, particularly zirconia, offers benefits like biocompatibility, durability, and superior aesthetics, which are crucial for restoring primary teeth with significant structural loss.<sup>3,4</sup>

The role of dental crowns transcends simple restoration; they are vital in managing decay. Innovative techniques, such as Hall crowns, have been

promoted for their effectiveness in treating decay in primary teeth, outperforming traditional restoration methods. Furthermore, the selection of appropriate crowns can ultimately affect a child's long-term dental health and self-esteem, emphasizing the importance of informed decision-making by dental practitioners.

Despite these advantages, research indicates that while general dentists possess adequate knowledge regarding the use of SSCs, their practical application remains limited, highlighting a disparity between understanding and implementation.<sup>4,5</sup>

The aim of the present literature review is to thoroughly discuss various types of pediatric crowns, examining their materials, benefits, and applications in clinical practice. This review seeks to provide insights that can enhance understanding and improve the utilization of dental crowns in pediatric dentistry, ultimately promoting better patient outcomes and experiences.

## OBJECTIVES OF PREFORMED CROWNS

The objectives of preformed crowns in pediatric dentistry are multifaceted and aim to enhance the quality of dental care for children. Firstly, they restore the function of extensively decayed or damaged primary teeth, thereby enabling proper chewing and eating. Additionally, these crowns serve to protect the remaining tooth structure from further decay and mechanical failure, ensuring the integrity of the tooth. Aesthetic considerations are also paramount, as providing a visually appealing solution fosters confidence and self-esteem in children by promoting an attractive appearance. The design of preformed crowns allows for minimally invasive preparation, reducing the need for extensive tooth alteration while still ensuring adequate coverage and protection. Long-term durability is another significant objective, as these crowns are crafted to minimize the frequency of replacements and additional dental visits. Furthermore, ease of placement facilitates quick and efficient procedures in a pediatric setting, contributing to a more streamlined experience. Parental satisfaction is achieved by effectively addressing concerns related to aesthetics, functionality, and long-term outcomes. These crowns also play a vital role in improving overall oral health by preventing further decay and encouraging good hygiene practices. They help preserve arch space, which is crucial for preventing malocclusion resulting from early tooth loss. Finally, the comfort of young patients is prioritized, with these crowns designed to be well-tolerated, thereby alleviating anxiety during dental visits. Collectively, these objectives aim to provide effective solutions for managing dental issues in primary teeth while promoting positive experiences in pediatric dentistry.<sup>6-8</sup>

## Indication and Contraindication of Preformed Crown<sup>1,2,9</sup>

### Indications for Use in Primary Molar Teeth

1. Decay affecting two or more tooth surfaces.
2. Inability to place an amalgam filling.
3. Restoration following pulp treatment procedures.
4. Restoration for non-carious lesions or developmental defects.
5. Restoration of fractured primary molars.
6. Severe bruxism.
7. Restoration for children requiring general anesthesia for treatment.
8. Children with a high risk and susceptibility to caries.
9. Serving as an abutment for a space maintainer.

### Indications for Use in Permanent Molar Teeth

1. Temporary restoration after tooth fracture.
2. Temporary restoration pending orthodontic evaluation and treatment planning.
3. Temporary restoration prior to final prosthetic restoration.
4. Economic considerations.

5. Restoration for non-carious lesions or developmental defects.
6. Restoration of a permanent molar that requires coverage of the entire crown.

## Contraindications for the Use of PMC

1. Allergy or sensitivity to nickel.
2. Uncooperative patient.
3. Primary tooth nearing exfoliation time.
4. Radiographic evidence of resorption exceeding half of the tooth root.

**Stainless steel crowns (SSCs):** SSCs are a crucial element in pediatric dentistry, valued for their durability and cost-effectiveness. They provide full crown coverage, significantly enhancing caries prevention by safeguarding the entire tooth. In comparison to multisurface amalgam restorations, SSCs are more resilient, making them particularly beneficial for restoring pulp-treated teeth and reducing the risk of fractures due to weakened dentin.<sup>1,10</sup>

They are commonly used in dental procedures performed under general anesthesia since they facilitate more efficient treatments and shorter operation times, which helps in gaining better cooperation from young patients. Nonetheless, SSCs come with some drawbacks. A noteworthy concern is the potential for microleakage at the margins, a consequence of their prefabricated design; however, this issue is generally considered less critical than the crowns' benefits.<sup>11-13</sup>

When evaluating clinical outcomes, SSCs have been favorably compared to alternatives like zirconia crowns, especially regarding their cost-effectiveness and ease of placement. Nevertheless, the aesthetic limitations of SSCs can be a concern for parents. To counter this issue, pre-veneered SSCs featuring a composite-bonded veneer are available, providing a more attractive appearance though at a higher cost and with the necessity for additional preparation. Furthermore, moderate post-operative discomfort has been associated with SSCs, which can typically be alleviated with pain relief medications.<sup>14</sup>

Despite some concerns, SSCs continue to be widely utilized and are recognized as a successful treatment option in pediatric dentistry. They are especially indicated for children with conditions such as hypophosphatemia, hereditary dental defects like amelogenesis imperfecta and dentinogenesis imperfecta, and enamel hypoplasia. When choosing to use SSCs, careful consideration is advised, particularly in scenarios where gingival inflammation may emerge as a potential complication. Proper adaptation of crown margins plays a vital role in minimizing irritation and preventing periodontal issues. In conclusion, SSCs remain a reliable and effective treatment modality in pediatric dentistry.<sup>1,2</sup>

**Strip Crowns:** Resin-based composite strip crowns present an effective solution that combines aesthetics with functionality, significantly enhancing the quality of life for pediatric patients and their families. These crowns are recognized for their cost-effectiveness and straightforward manufacturing process, allowing for the rapid restoration of both appearance and dental function. However, it is crucial to consider their long-term stability, which can pose challenges during their application.<sup>15</sup>

These crowns serve as a practical alternative for restoring primary anterior teeth that have suffered extensive coronal destruction. They offer several advantages, including satisfactory aesthetic results and ease of creation, as they do not require a lengthy laboratory phase and are relatively affordable. The versatility of resin-based composite crowns enables their use for a variety of restorative purposes, such as preventive resin restorations, moderate Class II restorations, Class III restorations, Class IV restorations, Class V restorations, and of course, strip crowns.<sup>16</sup>

Proper tooth isolation is essential during the application process to prevent contamination, and it is important to note that children deemed high-risk may not be the best candidates for resin-based composite restorations. The use of strip crowns to prepare composite resin crowns allows for a reduction in clinical time while achieving improved aesthetic outcomes. This not only restores the patient's smile but also positively impacts their self-esteem.<sup>16</sup>

Follow-up evaluations have shown that over 80% of these restorations are deemed successful, highlighting the technique's effectiveness. By utilizing a single restorative material, the process enhances aesthetic appeal while simultaneously cutting down on chair time and associated costs.<sup>16</sup>

Parental feedback regarding bonded resin composite strip crowns for primary incisors is predominantly positive, with high levels of satisfaction reported overall. However, it is worth noting that the rating for satisfaction concerning color was lower than other aspects. One of the main concerns regarding the longevity of strip crowns is their susceptibility to loss caused by eating or biting. Nevertheless, the bonded resin composite strip crown stands out as the most aesthetically pleasing option available for treating severely decayed primary incisors, making it a preferred choice among dental professionals and families alike.<sup>16</sup>

**Zirconia Crown:** Prefabricated zirconia crowns are solid ceramic restorations that offer enhanced aesthetics and biocompatibility for deciduous teeth. The EZ-Pedo crown was the first pediatric zirconia crown commercially available in the United States, introduced in 2008 by Dr. John Hansen and Dr. Jeffrey Fisher. Since then, the use of all-ceramic restorations has expanded, with various brands such as NuSmile ZR Primary Crowns, Kinder Crowns, Hu-

Friedy Mfg. Co., and Cheng Crowns contributing to the pediatric zirconia market. These crowns are anatomically shaped, metal-free, bioactive, and resistant to decay.<sup>17,18</sup>

Manufacturers like NuSmile provide guidelines for tooth preparation, recommending a reduction of 1 to 2 mm on the occlusal surface while preserving the natural contour. A circumferential reduction of 0.5 to 1.25 mm and a feather edge of approximately 1 to 2 mm subgingivally are also suggested. Research indicates a smaller reduction of around 0.6 to 0.8 mm for the occlusal surface and axial wall, as well as 0.2 to 0.4 mm at the cervical area to accommodate the crown.<sup>17,18</sup>

However, achieving such minimal tooth reduction can be challenging in clinical situations, particularly when considering the crown's thickness. The precise cement space required for a zirconia crown remains somewhat unclear but is generally estimated to be about 0.2 mm. It is also noted that an additional 0.2 to 0.3 mm may be essential for clinical convenience, which can vary depending on the specific scenario. Taking all these factors into account, recommendations suggest a reduction of 1.3 mm at the cusp and 1.1 mm at the fossa rather than the initial guidelines provided.<sup>17,18</sup>

Clinical evaluations have demonstrated that zirconia crowns are comparable to preformed stainless steel crowns (SSCs) for primary molars, exhibiting improved gingival scores and an excellent color match. These crowns effectively prevent the adhesion of *Streptococcus mutans* on their surface, leading to reduced plaque accumulation and inflammation of the surrounding gingiva when compared to conventional stainless steel crowns. This characteristic positions zirconia crowns as a viable option for lowering overall microbial density and prevalence in the oral cavity, subsequently reducing the long-term risk of caries.

In summary, zirconia crowns represent a promising alternative to other restorative materials and crowns in pediatric dentistry. They have shown superior properties and performance across various clinical aspects and have garnered high levels of parental satisfaction. Ultimately, the decision between zirconia crowns and other types should be based on a thorough understanding of their benefits and limitations, ensuring the best outcomes for pediatric dental patients.<sup>17,18</sup>

**Bioflex Crowns:** Bioflex crowns, a recent advancement in pediatric dentistry, are recognized for their flexibility and adaptability, effectively combining the characteristics of stainless steel and zirconia crowns. These crowns are constructed from a biocompatible hybrid resin polymer designed to overcome issues of ductility, color stability, and durability typically associated with fiberglass-reinforced composite crowns. A notable feature of Bioflex crowns is their "flex fit" adaptation over the anatomical cervical convexity of primary teeth, akin

to stainless steel crowns, but they also provide a more aesthetic appearance and require conservative tooth preparation, comparable to pediatric zirconia crowns.<sup>14</sup>

However, there is currently a lack of comprehensive studies evaluating the properties of Bioflex crowns, their effects on clinical outcomes, and the satisfaction levels of parents. This gap highlights the need for

targeted research to assess how Bioflex crowns compare with traditional options such as stainless steel and zirconia crowns, particularly in terms of their aesthetic advantages and potential for tooth conservation. Preliminary case reports have suggested promising results regarding ease of placement and aesthetic outcomes.<sup>19,20</sup>

Feature	Stainless Steel Crown	Strip Crown	Zirconia Crown	Bioflex Crowns
Aesthetic	Low	Good	Excellent	Excellent
Durability	Good	Low	Good	Good
Cost-effectiveness	High	High	Moderate	Moderate
Risk of Allergy	Possible due to nickel content	No	No	No
Tooth reduction required	Minimal	Minimal	High as compared with SSC	High as compared with SSC
Parental satisfaction	Moderate	Moderate	High	High
Long-term stability	High	Low	High	High
Plaque Accumulation	Moderate	Moderate	Less	Less

## CONCLUSION

In summary, preformed crowns are vital in pediatric dentistry, providing effective restorations for primary and permanent teeth. They address issues such as caries, trauma, and developmental defects, promoting optimal oral health for children. These crowns restore function and aesthetics while reducing dental anxiety, as they typically require less chair time than traditional methods. They also prolong the life of primary teeth, protecting permanent teeth and supporting dental development. With ongoing advancements in materials and techniques, preformed crowns will continue to improve pediatric dental care outcomes. Emphasizing early intervention and prevention, pediatric dentists can help foster lasting good oral health habits in children.

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