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Assessment on Preformed Crowns in Pediatric Dentistry: Composition and Application with Role and Responsibility of the Nurse: An Update

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Abstract

Preformed crowns represent a fundamental component of pediatric restorative dentistry, offering durable and esthetically pleasing solutions for the management of extensive carious lesions, developmental defects, and traumatic injuries in primary teeth. This review provides a comprehensive assessment of preformed crowns in pediatric dentistry, encompassing their indications, types, clinical techniques, outcomes, and advancements in material science.

Keywords - Preformed crowns, primary teeth, stainless steel crowns, aesthetic crowns, clinical outcomes, material science, restorative dentistry.

INTRODUCTION

Preformed crowns have long been recognized as indispensable tools in pediatric dentistry for the restoration of extensively decayed, fractured, or malformed primary teeth. These crowns offer durable and reliable solutions to preserve tooth structure, maintain function, and promote oral health in young patients. Over the years, advancements in material science and clinical techniques have expanded the repertoire of preformed crowns available to pediatric dentists, enhancing their versatility and esthetic appeal.[1]

The utilization of preformed crowns in pediatric dentistry is rooted in the understanding of the unique challenges posed by managing dental caries and developmental defects in primary teeth. Unlike permanent dentition, primary teeth exhibit thinner enamel, larger pulp chambers, and a higher susceptibility to caries due to dietary habits, oral hygiene practices, and developmental factors. Consequently, the treatment of extensive carious lesions or structural defects in primary teeth often necessitates more definitive and robust restorative solutions to ensure long-term success.[2]

The primary goal of using preformed crowns in pediatric dentistry is to provide durable and functional restorations that mimic the natural tooth morphology while withstanding the masticatory forces and oral environment of the growing child. By encapsulating the entire tooth crown, preformed crowns effectively seal off compromised tooth structure, preventing further decay, fracture, or pulpal involvement. Moreover, preformed crowns offer advantages in terms of simplified clinical procedures, reduced chairside time, and improved patient compliance, particularly in young or apprehensive children.

This comprehensive review aims to assess the current landscape of preformed crowns in pediatric dentistry, spanning their indications, types, clinical techniques, outcomes, and recent advancements. Through a systematic examination of the literature, we

seek to elucidate the rationale behind the use of preformed crowns, explore their clinical applications, evaluate their performance in restoring primary teeth, and discuss emerging trends in material science and technology.[4]

By critically appraising the evidence surrounding preformed crowns in pediatric dentistry, this review aims to provide valuable insights for clinicians, educators, and researchers, informing clinical decision-making, enhancing treatment outcomes, and guiding future research directions. Ultimately, a thorough understanding of the role and efficacy of preformed crowns in pediatric dental practice is essential for delivering comprehensive and evidence-based care to young patients, promoting optimal oral health outcomes and ensuring a positive dental experience from an early age.[8]

Nurses play a crucial role in dental clinics, supporting both the dental practitioners and patients throughout their dental care experience. Here are some key responsibilities and contributions of nurses in dental clinics:

Preparation and Assistance: Nurses prepare treatment rooms before procedures, ensuring they are clean and properly stocked with necessary equipment and supplies. They assist dentists during treatments by passing instruments, providing suction, and offering support to patients.

Patient Care and Education: Nurses take patients' vital signs, update medical histories, and provide pre- and post-operative care instructions. They educate patients on proper oral hygiene techniques, post-treatment care, and preventive measures to maintain oral health.

Infection Control and Sterilization: Nurses are responsible for maintaining strict infection control protocols, including sterilization of instruments, disinfection of surfaces, and adherence to universal precautions to prevent the spread of infections in the dental clinic.

Documentation and Record-Keeping: Nurses document patient information, treatment plans, and procedures performed in electronic health records (EHRs). Accurate record-keeping is essential for continuity of care, billing, and legal purposes.[3]

Preformed metal crowns

They are prefabricated metal crown forms that are adapted to individual teeth and cemented with a biocompatible luting agent. Preformed metal crowns have been indicated for the restoration of primary and permanent teeth with extensive caries, cervical decalcification, and/or developmental defects (Eg-hypoplasia, hypo-calcification), when disappointment of additional available restorative materials is likely, subsequent pulpotomy or pulpectomy, for restoring a primary tooth that is to be used as an abutment for a space maintainer, for the intermediate restoration of fractured teeth, for definitive restorative treatment for high caries-risk children, and used more frequently in patients whose treatment is performed under sedation or general anesthesia. There are very few prospective randomized clinical trials comparing outcomes for this crown to intra-coronal restorations. A Cochrane review and two systematic reviews conclude that the majority of clinical evidence for the use of preformed metal crowns has come from nonrandomized and retrospective studies.[6]

Five studies which retrospectively compared Class II amalgam to preformed metal crowns showed an average five year failure rate of 26 percent for amalgam and seven percent for preformed metal crowns. A 2-year randomized trial concerning repair of deciduous teeth that had experienced a pulpotomy technique found a non-significant difference in survival rate for teeth restored with preformed metal crowns (95 percent) versus resin modified glass ionomer/composite restoration (92.5 percent). In another prospective study, significantly less restoration failure and improved calcium hydroxide pulpotomy success was found with preformed metal crowns (79.7 percent) versus amalgam restorations (60 percent) after one year. [1,3]

However, a systematic review did not show strong evidence that preformed metal crowns were superior over other restorations for pulpotomized teeth. With regards to gingival health adjacent to preformed metal crowns, a one year randomized controlled trial showed no difference in gingival inflammation between preformed metal crowns and composite restorations after pulpotomy.[2,6]

Yet, a two year randomized clinical study showed more gingival bleeding for preformed metal crowns vs. composite/glass ionomer restorations. There is one randomized control trial on preformed metal crowns versus cast crowns placed on permanent teeth, and this report found no difference between the two restoration types for quality and longevity after 24 months.[8]

The remaining evidence is case reports and expert opinion concerning signs for usage of PMC on permanent molars. The indications include teeth with severe genetic/ developmental defects, grossly carious teeth, traumatized teeth, along with tooth developmental stage or financial considerations that require semi-permanent restoration instead of a permanent cast restoration.[7]

FULL COVERAGE FOR POSTERIOR TEETH PREFORMED METAL CROWNS

A preformed metal crown (PMC) is a prefabricated dental restoration used primarily in pediatric dentistry to restore extensively decayed, fractured, or structurally compromised primary teeth. PMCs are typically made of stainless steel, although variations exist with other metal alloys such as chrome-

cobalt or nickel-chromium. These crowns come in a range of sizes and shapes to accommodate different tooth anatomy and clinical scenarios.

The primary purpose of a preformed metal crown is to provide a durable, functional, and esthetically acceptable restoration for primary teeth. They are commonly indicated when a tooth has extensive caries involving multiple surfaces, when there is insufficient tooth structure remaining to support a traditional filling, or when the tooth has undergone pulpal therapy and requires full coverage protection.

Durable Material: Stainless steel is highly durable and resistant to wear, making it suitable for withstanding the forces of mastication in primary teeth. This durability ensures the longevity of the restoration, providing long-term protection for the underlying tooth structure.

Full-Coverage Restoration: PMCs completely cover the entire anatomical crown of the tooth, providing comprehensive protection against further decay, fracture, or loss of tooth structure. This full-coverage design helps to maintain the integrity of the tooth and prevent bacterial ingress.

Ease of Placement: PMCs are prefabricated and require minimal chairside adjustment, simplifying the placement procedure and reducing chair time. This is particularly advantageous in pediatric patients who may have limited attention spans or difficulty tolerating lengthy dental procedures.

Biocompatibility: Stainless steel is biocompatible and well-tolerated by oral tissues, minimizing the risk of adverse reactions or inflammation in the surrounding gingiva or oral mucosa.

Cost-Effective: PMCs are generally cost-effective compared to custom-made restorations such as crowns fabricated in a dental laboratory. This makes them accessible to a wide range of patients and healthcare settings.

Preformed crowns are prefabricated dental restorations designed to fit over a primary tooth to restore its function, shape, and aesthetics. These crowns are commonly used in pediatric dentistry for the management of extensively decayed, fractured, or malformed primary teeth. Here are the complete details about preformed crowns.

MATERIAL

Stainless Steel: The most common material for preformed crowns is stainless steel. Stainless steel crowns (SSCs) are highly durable, resistant to corrosion, and provide excellent longevity in primary teeth. They are available in various sizes and shapes to accommodate different tooth anatomy.

Other Metal Alloys: In addition to stainless steel, preformed crowns can also be made from other metal alloys such as chrome-cobalt or nickel-chromium. These alloys offer similar durability and strength characteristics as stainless steel but may have different aesthetic properties.

Types:

Full-Coverage Crowns: Preformed crowns cover the entire anatomical crown of the tooth, providing comprehensive protection and restoration. They are indicated for primary teeth with extensive caries, pulpal involvement, or structural defects.

Partial-Coverage Crowns: Some preformed crowns have a partial-coverage design, covering only a portion of the tooth surface. These crowns are typically used for teeth with specific defects or lesions that do not require full coverage.

Clinical Indications:

Extensive Dental Caries
Pulpal Therapy (Pulpotomy or Pulpectomy)
Fractured or Traumatized Teeth
Developmental Defects (e.g., Hypomineralization, Enamel Hypoplasia)
Teeth with Poor Prognosis for Other Restorative Options

Advantages:

Durable and Long-lasting
Easy to Place with Minimal Chairside Adjustment
Provide Full Coverage and Protection
Suitable for Pediatric Patients with Limited Cooperation
Cost-Effective Compared to Custom-Made Restorations

Clinical Technique:

Tooth Preparation: Minimal tooth preparation is required, typically involving removal of caries and smoothing of sharp edges.

Crown Selection: Choose an appropriate size and shape of the preformed crown to match the tooth anatomy.
Crown Adaptation: Adapt the crown to fit snugly over the tooth, making any necessary adjustments to ensure proper fit and occlusion.

Cementation: Secure the crown in place using dental cement, ensuring complete coverage and sealing of the margins to prevent bacterial ingress.

Outcomes

Preformed crowns demonstrate high success rates and durability in restoring primary teeth. They provide excellent retention and marginal integrity, minimizing the risk of recurrent decay or crown loss. Clinical studies have shown favorable outcomes in terms of restoration longevity, patient satisfaction, and preservation of tooth function.

Esthetics

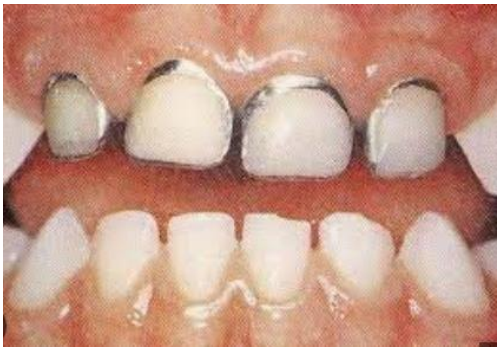
While preformed crowns may not match the esthetics of natural teeth, they are primarily used in posterior teeth where esthetics are less critical. However, efforts have been made to improve the esthetic appearance of preformed crowns, such as resin-faced stainless steel crowns or zirconia crowns.

In summary, preformed crowns are essential restorative options in pediatric dentistry, providing durable, functional, and cost-effective solutions for the management of extensively decayed or damaged primary teeth. Their ease of placement, durability, and comprehensive coverage make them invaluable in preserving primary dentition and promoting long-term oral health in pediatric patients.

Top of Form

OPEN-FACED STAINLESS STEEL CROWNS

Open-faced stainless steel crowns are dental prosthetic devices used primarily in pediatric dentistry to restore extensively decayed or damaged primary (baby) teeth. Here's a detailed breakdown of open-faced stainless steel crowns:



Indications

Extensively decayed primary teeth
Teeth with developmental defects or hypomineralization
Teeth requiring pulp therapy
Teeth at risk of fracture due to large cavities or trauma.

Contraindications

Allergy to stainless steel or dental cement components
Teeth with inadequate remaining structure to retain the crown.
Teeth with extensive periodontal disease or poor prognosis

Pre-Veneered Stainless Steel Crowns

Pre-veneered stainless steel crowns are a type of dental restoration used primarily in pediatric dentistry to restore primary (baby) teeth with extensive decay or damage. They are similar to traditional stainless steel crowns but come with an additional layer of tooth-colored material (veneer) bonded to the outer surface, providing improved aesthetics compared to plain stainless steel crowns. Here's a detailed overview of pre-veneered stainless steel crowns:

Advantages

Aesthetics: The tooth-colored veneer layer provides a more natural appearance, making the restoration less noticeable compared to plain stainless steel crowns.
Durability: Stainless steel base provides strength and longevity, while the veneer layer enhances aesthetics.
Protection: Like traditional stainless steel crowns, pre-veneered crowns offer excellent protection against further decay and damage.
Biocompatibility: Both stainless steel and the veneer materials are biocompatible and well-tolerated by the body.
Contraindications and Alternatives: Contraindications and alternatives are also similar to traditional stainless steel crowns.

Overall, pre-veneered stainless steel crowns offer a balance between aesthetics and functionality, making them a popular choice for restoring primary teeth in pediatric patients. They provide both structural integrity and improved appearance, helping to restore the child's smile and oral health effectively.

Pedo Pearl

Pedo pearl crowns are a type of dental crown used in pediatric dentistry to restore primary (baby) teeth that have extensive decay, damage, or have undergone pulpal therapy. These crowns are prefabricated and pre-veneered stainless steel crowns with an added layer of tooth-colored material for improved aesthetics. The "pearl" in the name refers to the natural appearance of the tooth-colored veneer layer.

Improved aesthetics: The tooth-colored veneer layer provides a more natural appearance, helping to restore the child's smile.

Durability: Stainless steel base ensures strength and longevity, while the veneer layer enhances aesthetics.
Protection: Pedo pearl crowns offer excellent protection against further decay and damage, preserving the primary tooth until it naturally falls out.
Indications*:* Pedo pearl crowns are indicated for primary teeth with extensive decay, damage, or following pulpal therapy. Proper oral hygiene practices, including brushing and flossing, along with regular dental check-ups, are essential for maintaining the integrity and longevity of the restoration.

Polycarbonate Crowns

Polycarbonate crowns are a type of dental restoration commonly used in pediatric dentistry and occasionally in adult dentistry. These crowns are prefabricated and provide a temporary or permanent solution for damaged or decayed teeth. Here's a detailed overview:

Indications

Primary teeth with extensive decay or damage.
Permanent teeth with small to moderate cavities or fractures.
Temporary restoration during dental procedures such as root canal treatment or while waiting for a permanent crown or bridge.

Advantages

Aesthetic appearance: Polycarbonate crowns are tooth-colored, making them more aesthetically pleasing, especially for anterior teeth.
Easy to customize: The thin shell of polycarbonate crowns can be easily trimmed and shaped to achieve a proper fit and alignment.
Biocompatible: Polycarbonate material is well-tolerated by the body, reducing the risk of allergic reactions or adverse effects.
Cost-effective: Polycarbonate crowns are generally more affordable than custom-made crowns, making them a cost-effective option for dental restorations.

Contraindications

Severe tooth decay or damage where the tooth structure cannot support the crown.

Allergy to polycarbonate or dental cement components.

Polycarbonate crowns offer a practical and aesthetically pleasing solution for restoring damaged or decayed teeth, particularly in pediatric patients where aesthetics are crucial. However, their suitability for long-term use may depend on individual cases and should be determined by a qualified dental professional.

Strip Crowns

Strip crowns, also known as preformed strip crowns or celluloid crowns, are dental prosthetic devices used primarily in pediatric dentistry to restore primary (baby) teeth that have extensive decay or damage. They are prefabricated crowns made of transparent or tooth-colored celluloid material, resembling a thin strip or shell. Here's a detailed overview:

Purpose

Restoration of primary teeth: Strip crowns are used to restore primary teeth with extensive decay, damage, or following pulpal therapy (such as pulpotomy or pulpectomy). They provide both functional and aesthetic benefits, offering protection, strength, and improved appearance to the affected tooth.

Indications

- Primary teeth with large cavities or fractures
- Teeth requiring pulpal therapy (e.g., pulpotomy or pulpectomy)
- Restoration of primary teeth for aesthetic purposes.

Advantages

Aesthetic appearance: Strip crowns are transparent or tooth-colored, making them more aesthetically pleasing compared to traditional stainless steel crowns.

Easy to customize: The thin shell of strip crowns can be easily trimmed and shaped to achieve a proper fit and alignment.

Biocompatible: Celluloid material is well-tolerated by the body, reducing the risk of allergic reactions or adverse effects.

Cost-effective: Strip crowns are generally more affordable than custom-made crowns, making them a cost-effective option for dental restorations.

Care and Maintenance*:* Proper oral hygiene practices should be maintained to prevent further decay and gum disease.

Regular dental check-ups are essential to monitor the integrity of the crown and the underlying tooth.

Contraindications

- Severe tooth decay or damage where the tooth structure cannot support the crown.
- Allergy to celluloid or dental cement components

Strip crowns offer a practical and aesthetically pleasing solution for restoring damaged or decayed primary teeth in children. However, their suitability for specific cases should be determined by a qualified dental professional.

Pedo Jacket Crown

Pedo jacket crowns, also known as "strip crowns" or "celluloid crowns," are commonly used in pediatric dentistry to restore primary (baby) teeth that have extensive decay, damage, or structural defects. Here's a detailed overview of pedo jacket crowns:

Indications

- Primary teeth with large cavities or fractures
- Teeth requiring pulpal therapy (e.g., pulpotomy or pulpectomy)
- Restoration of primary teeth for aesthetic purposes

Contraindications

- Severe tooth decay or damage where the tooth structure cannot support the crown
- Allergy to celluloid or dental cement components.

Pedo jacket crowns offer a practical and aesthetically pleasing solution for restoring damaged or decayed primary teeth in children. However, their suitability for specific cases should be determined by a qualified dental professional.

New Millennium Crowns

New Millennium Crowns (NMC) is a type of dental restoration used in pediatric dentistry. They are preformed stainless steel crowns designed specifically for primary (baby) teeth. These crowns are named "New Millennium" to signify advancements in technology and materials used in their manufacture.

Indications

Primary teeth with large cavities or fractures.
Teeth requiring pulpal therapy (e.g., pulpotomy or pulpectomy).
Teeth with developmental defects or hypomineralization.
Restoration of primary teeth for aesthetic purposes.

Advantages:

Durability: Stainless steel construction provides strength and longevity, allowing the crown to withstand the forces of chewing and grinding.

Protection: New Millennium Crowns offer excellent protection against further decay and damage, preserving the primary tooth until it naturally falls out.

Aesthetic options: Some variants may come with tooth-colored facings or coatings to improve their appearance, making them more aesthetically pleasing.

Easy placement: As preformed crowns, they can be quickly and easily placed on the tooth, reducing chairside time for both the dentist and the patient.

New Millennium Crowns offer a reliable and effective solution for restoring primary teeth in pediatric patients. Their durability, ease of placement, and potential aesthetic enhancements make them a popular choice among dentists for pediatric dental restorations.

Art glass Crowns

Art glass crowns, also known as all-ceramic or glass ceramic crowns, are a type of dental restoration used to repair damaged or decayed teeth. These crowns are made from a special type of ceramic material that closely resembles natural tooth enamel in appearance and translucency. Here's a detailed overview:

Indications:
Teeth with large cavities or fractures
Teeth that have undergone root canal treatment and require reinforcement
Cosmetic enhancements, such as covering stained or misshapen teeth
Restoration of anterior (front) teeth for aesthetic purposes

Advantages:
Aesthetic appearance: Art glass crowns closely mimic the natural color, translucency, and texture of tooth enamel, resulting in a highly aesthetic restoration.

Strength and durability: Despite their porcelain-like appearance, art glass crowns are strong and durable, capable of withstanding the forces of chewing and grinding.

Biocompatibility: Glass ceramic materials are biocompatible and well-tolerated by the body, reducing the risk of allergic reactions or adverse effects.

Minimal tooth preparation: In some cases, minimal tooth preparation may be required to accommodate the crown, preserving more of the natural tooth structure.

Zirconia Pediatric Crowns
Zirconia pediatric crowns are a type of dental restoration used in pediatric dentistry to restore primary (baby) teeth that have extensive decay, damage, or structural defects. Zirconia is a type of ceramic material known for its strength, durability, and biocompatibility. Here's a detailed overview of zirconia pediatric crowns:

Material: Zirconia crowns are made from zirconium dioxide, a ceramic material that exhibits exceptional strength and durability. It is biocompatible, meaning it is well-tolerated by the body, reducing the risk of allergic reactions or adverse effects.

Design: Zirconia pediatric crowns are designed to cover the entire visible portion (coronal surface) of the tooth, providing protection and restoring its function and appearance. They are pre-formed and available in various sizes and shapes to fit different primary teeth. The crowns may have anatomical features to mimic natural tooth morphology and occlusal surfaces for proper alignment with opposing teeth.

Purpose: Zirconia pediatric crowns are used to restore primary teeth with extensive decay, damage, or structural defects. They provide both functional and aesthetic benefits, offering protection, strength, and improved appearance to the affected tooth.

Indications:
Primary teeth with large cavities or fractures
Teeth requiring pulpal therapy (e.g., pulpotomy or pulpectomy)
Teeth with developmental defects or hypomineralization
Restoration of primary teeth for aesthetic purposes

Advantages:
Strength and durability: Zirconia crowns are highly resistant to wear and fracture, making them suitable for restoring primary teeth subjected to chewing and grinding forces.

Aesthetic appearance: While not as translucent as some other materials, zirconia crowns can be customized to match the natural color of surrounding teeth, providing a pleasing aesthetic result.

Biocompatibility: Zirconia is biocompatible and well-tolerated by the body, reducing the risk of adverse reactions.

Minimal tooth preparation: In some cases, minimal tooth preparation may be required to accommodate the crown, preserving more of the natural tooth structure.

Placement:
The tooth is prepared by removing any decayed or damaged tissue and shaping it to accommodate the crown.
Impressions or digital scans of the prepared tooth are taken to fabricate the crown.
The zirconia crown is custom-made by a dental laboratory technician based on the impressions or digital scans.
Once fabricated, the crown is cemented onto the tooth using dental cement.

Care and Maintenance:
Proper oral hygiene practices should be maintained to prevent further decay and gum disease. Regular dental check-ups are essential to monitor the integrity of the crown and the underlying tooth. Zirconia pediatric crowns offer a reliable and effective solution for restoring primary teeth in pediatric patients. Their strength, durability, and aesthetic properties make them a popular choice for both functional and cosmetic dental restorations. However, their suitability for specific cases should be determined by a qualified dentist based on the patient's individual needs and oral health status.

CONCLUSIONS

In conclusion, stainless steel crowns represent a cornerstone of modern pediatric dentistry, offering a durable, cost-effective, and versatile solution for restoring extensively decayed or damaged primary teeth. Their robust construction and biocompatibility make them particularly well-suited for addressing the unique challenges of pediatric dental care. Despite their traditional metallic appearance, advancements such as pre-veneered options have enhanced their aesthetic appeal without compromising their efficacy. Stainless steel crowns provide numerous benefits, including longevity, ease of placement, and reliable protection against further decay and damage. While they may not offer the same level of aesthetic customization as some alternative materials, their affordability and proven track record of success make them a preferred choice for many pediatric dentists.

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