INTRODUCTION
Dental decay in children’s teeth is a significant public health problem, affecting 60% to 90% of school children in industrialized countries (WHO Report 2003). In Scotland, the National Dental Inspection Programme (NCHIP 2003) showed that over half of 5-year old children had decayed primary teeth, with the average number of decayed teeth in these children being five. 15% of the 5-year olds in this sample had already at least one tooth extracted. This large burden of treatment need has implications both for individual patients, and on a public health agenda basis.

Several options are available for providing full coverage restoration for the primary dentition, with each approach having advantages and disadvantages. Commonly used full coverage crowns include stainless steel crowns and its modifications, polycarbonate crowns and strip crowns. Stainless steel crowns (SSC) have been used to restore primary and permanent posterior teeth for almost 50 years. They are prefabricated crown forms that are adapted to individual teeth and cemented with a biocompatible luting agent. “The SSC is extremely durable, relatively inexpensive, subject to minimal technique sensitivity during placement, and offers the advantage of full coronal coverage.”

The SSC is extremely durable, relatively inexpensive, subject to minimal technique sensitivity during placement, and offers the advantage of full coronal coverage. A considerable amount of literature exists to support the success of SSCs to restore severely decayed and/or pulpotomized primary molars. Despite the favorable qualities mentioned, SSCs have a major drawback—namely, their poor esthetic appearance.

Open-face SSCs are another cosmetic solution to stainless steel crowns, although they also have several disadvantages. The procedure is time consuming and requires additional preparation and use of multiple materials. Excellent esthetic appearance with acceptable longevity has been obtained from resin-based crowns (strip crowns) for decayed and/or fractured anterior primary incisors.
but they are technique-sensitive restorations. Polycarbonate crowns are another treatment approach to address the restoration and esthetics of anterior primary decayed teeth. They are more esthetic than stainless steel crowns, easy to trim and adjust and requires less chair side time. Each of these methods has short comings but each of them can be used at some time. The search for the ideal full coverage restorations in pediatric dentistry continues. The purpose of this library dissertation is to throw light and analyze the recent developments and trends regarding the full coverage restorations in pediatric dentistry.

**PRE-FORMED METAL CROWN**

Preformed metal crown (PMCs) for primary molar teeth were first described in 1950 by Engel followed by Dr. William Humphrey. They were made of stainless steel and were referred to by an acronym of SSC. However soon the metal used was changed to nickel-chromium and these days it is best referred to as a preformed metal crown (PMC).

**INDICATIONS FOR USE IN PRIMARY TEETH**

Stainless steel crowns are the restoration of choice in the following situations:

1. Extensive decay of primary teeth
2. Following pulp therapy procedures
3. As a prevention restoration
4. Restoration of primary molars affected by localized or generalized developmental problems
5. As an abutment for a space maintainer or denture
6. Strong consideration should be given to the use of stainless steel crowns in children who require general anaesthesia for dental treatment.
7. Severe bruxism

**INDICATIONS FOR USE FOR PERMANENT MOLAR TEETH**

1. As an interim restoration of a broken-down or traumatized tooth until construction of a permanent restoration can be carried outor the eventual orthodontic status is established.
2. When financial considerations are a concern, permanent PMCs are useful as a medium-term, economical restoration in clinically suitable cases.
3. PMCs can be used in teeth with developmental defects. The crowns are beneficial for restoring the occlusion and reducing any sensitivity caused by enamel and dentin dysplasias in young patients.
4. Restoration of a permanent molar which requires full coverage

**ADVANTAGES**

1. Their lifespan is the same as that of an intact primary tooth.
2. They provide protection to the residual tooth structure that may have been weakened after excessive caries removal.
3. The technique sensitivity or the risk of making errors during their application is low.
4. Their long-term cost effectiveness is good.
5. They have a low failure rate.

**DISADVANTAGES**

1. Unsightly metallic appearance.
2. Cannot be used when the tooth is only partially erupted.

**OPEN FACED STAINLESS STEEL CROWN**

The preformed stainless steel crown is the most durable and reliable restoration for a primary incisor in need of complete coverage but it is also true that it is the least attractive. To take advantage of the strengths of preformed stainless steel crowns and improve the appearance of treated teeth, the dentist can cut away the cosmetically prominent aspect of the crown, remove enough of the luting cement to leave retentive undercuts, and fill the void with bonded resin composite.

**THE SUCCESS OF OPEN-FACE STAINLESS STEEL CROWN IS CAUSED BY:**

1. Firmly bonding resin to teeth tissue
2. Using dentin bonding
3. Phosphoric acid etching. A rough and porous structure may be formed on the remaining glass ionomer cement. Unfilled resin may infiltrate into this irregular and hard surface, form holding tags, and, thus, contribute to bonding.

**ADVANTAGES**

There is dramatic improvement over the plain metallic appearance of stainless steel.

**DISADVANTAGES**

1. The procedure is time consuming.
2. Metal margins can still be seen.
3. Clinicians have to contend with hemorrhage control during application of composite facings.
4. May have a short lifespan
5. May have poor color stability under oral conditions

Yilmaz et al. in 2004 compared the clinical success of stainless steel crowns (SSCs) made esthetic by open facing or veneering on posterior primary teeth. Thirty-three crowns (18 open-face and 15 veneered) were placed and followed up for 18 months with semiannual evaluations. This study showed that open-face SSCs had a higher but not significantly different success rate than veneered SSCs. Upper-arch crowns exhibited a higher success rate than those in the lower arch.

PREVENEERED STAINLESS STEEL CROWNS

Preveneered stainless steel crowns (PVSSCs) offer a potential esthetic and durable restoration for grossly decayed primary teeth, as these crowns allegedly combine the durability of conventional SSC with the esthetic appeal of composite resin. These crowns are available with a variety of facing materials such as composite resin or thermoplastic resin bonded to the stainless steel crown. Esthetic veneers are retained on the stainless steel crowns using a variety of mechanical and chemical bonding approaches. Currently, at least 4 manufacturers fabricate this product. Preveneered crowns were initially developed for primary anterior teeth; later preveneered crowns for primary molars became available. The various types of PVSSCs available commercially differ in terms of the method of facing attachment to the SSC, shades available, crown length and clinician's ability to crimp the crown.

ADVANTAGES

1. Aesthetically pleasing result is obtained with relatively short operative time.
2. Durability
3. They give good results in conditions where moisture control is difficult.

LIMITATIONS

1. The addition of resin creates a SSC with an increased thickness compared to a conventional SSC, and therefore more extensive tooth preparation is required to allow for proper fit and occlusion.
2. The dentist has no choice on the resin shade, and the supplied crowns are sometimes so white that they look artificial in the mouth.

3. Pre-veneered crowns are substantially more expensive than traditional stainless steel crowns.
4. The labial section of the margin cannot be crimped, because the bonded resin material will detach. The uncrimped region, therefore, does not fit as precisely as does a nonveneered steel crown.
5. Crown forms that are tried in, but do not fit, cannot be sterilized under pressure with high heat, because such treatment will destroy the attached resin layer.
6. Re-shaping of the resin veneers is often necessary to eliminate the overly convex appearance characteristic of these crowns, and this takes additional laboratory or clinical time.
7. Difficulty in placing multiple approximating crowns in patients with crowding or space loss due to bulk.
8. Resin facing material is relatively inflexible and brittle that tends to break when subjected to heavy force.

STRIP CROWN

Among the most esthetic and popular restorations for carious primary anterior incisors are composite resin strip crowns. Resin composite strip crowns (SCs) have been utilized for over 2 decades to restore carious primary teeth. This is the first choice of many clinicians due to the superior esthetics and the ease of repair if the crown subsequently gets chip off or fracture. This is, however, the most technique-sensitive option.

Figure 1: Strip crowns

Strip crowns serve in the anterior sector as a matrix for a composite reconstruction (figure 1) Besides the celluloid crown form that historically has been used for strip crowns, there have been at least 2 other bonded alternatives. (Table 1)
Table 1:

<table>
<thead>
<tr>
<th>Crown</th>
<th>Manufacturing Company</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strip crowns</td>
<td>Space Maintainers Laboratory; 3M</td>
<td>Seamless plastic crown forms without long cervical collars</td>
</tr>
<tr>
<td>Pedo Jacket crowns</td>
<td>Success Essentials; Maintainers Laboratory</td>
<td>Copolyester crown form One shade</td>
</tr>
<tr>
<td>New Millenium crowns</td>
<td>Success Essentials, Space Maintainers Laboratory</td>
<td>Laboratory-enhanced composite resin material</td>
</tr>
</tbody>
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resulting in stronger restoration and resurgence in their use. Some of the commercially available polycarbonate crowns include:

- 3M ESPE Polycarbonate Crowns
- Kudos polycarbonate crowns
- PedoNatural Crowns

**INDICATIONS**

1. Full coverage restorations of maxillary anterior teeth extensively involved with caries. Children exhibiting nursing bottle syndrome frequently require full coverage offered by polycarbonate crowns.
2. Malformed or fractured teeth
3. Discolored teeth
4. Restoration of teeth after pulpectomy or pulpotomy procedures.

**CONTRAINDICATIONS**

1. Bruxism
2. Evidence of excessive abrasion to anterior teeth
3. Deep impinging overbite

The tensile modulus and flexural strength and compressive strength can be increased by addition of certain particulate additives to produce a composite. Such fillers could greatly increase the wear resistance and longevity of the polycarbonate crowns.

**ADVANTAGES**

1. Improved esthetics
2. Extreme dimensional stability
3. They are unaffected by dilute mineral and organic acids, ether and alcohol.
4. Less chair side Time

**DISADVANTAGES**

1. Poor abrasion resistance.
2. Crown is frequently dislodged if the tooth is heavily destroyed and retention form is inadequate.

**ZIRCONIA PAEDIATRIC CROWN**

These are crowns made of zirconia for the primary dentition that contain no metal. Zirconia restorations are not new to the dental world and are one of the dominant types of ceramics used for a variety of computer aided design /computer aided manufacturing restorations, including framework/hand veneer, framework/milled veneer, full-contour fixed prosthodontics, implant abutments, and large implant-supported substructures. Zirconia is currently the strongest dental ceramic available and is also esthetically pleasing. Even though zirconia is widely accepted as a restorative material for the permanent dentition, it is a relatively new restorative material for the primary dentition. Current research on passive fit prefabricated zirconia crowns for primary anterior teeth is limited. Some of the commercially available pediatric zirconia crowns are discussed:

1. E Z Pedo crowns
2. NuSmile Zirconia crowns
3. Cheng Zirconia pediatric crowns
4. Kinder Zirconia pediatric crowns

**IMPORTANT CONSIDERATIONS FOR PROPER SEATING OF THE CERAMIC CROWN**

(a) Adequate subgingival facial reduction
(b) Complete removal of the cingulum area
(c) Labial and lingual surface should meet at the thin incisal edge corresponding to the planned incisal edge of the final restoration. The thin incisal edge helps to reduce the internal interferences between the tooth and the internal surfaces of the crown.

**CONCLUSION**

Through this manuscript, effort has been made to bring together the various approaches for full coverage restorations in pediatric dental practice. Each technique and material carries its own advantages and disadvantages. Many options exist to repair carious teeth in pediatric patients as is discussed, from stainless steel crowns to its various modifications to other esthetic crowns like strip crowns and zirconium crowns which are rising in their popularity.

There is insufficient controlled, clinical data to suggest that one type of restoration is superior to another. This does not discount the fact that dentists have been using many of these crowns for years with much success. Operator preferences, esthetic demands by parents, the child’s behavior, and moisture and hemorrhage control are all variables which affect the decision and ultimate outcome of whatever restorative outcome is chosen.
REFERENCES:

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