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Esthetic Options for Restoring Primary Molars: A Review

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Abstract

Oral health is a reflection of a wholesome lifestyle in both children and adults. Dental caries affecting mankind still remained one of the most widespread, multifactorial diseases.[1] Carious destruction of tooth structure in a child leads to various abnormalities which affect esthetics, self-esteem, mastication, speech, maintenance of arch length and development of oral habits which in general causes disorientation of overall health. Hence, the mutilated teeth need to be restored to preserve the integrity of dentition till the eruption of permanent teeth.

Parents from today's society are with increased awareness for esthetic restorations. Primary molars can be esthetically restored using intracoronal and extra coronal restorations. The best suitable materials for intracoronal restorations are glass ionomer cements (GICs), composites, compomers etc. Since the maximum masticatory load bearers are usually the molars for primary dentition therefore sometimes the strength is compromised by simply restoring them using intracoronal restorations. For extensively compromised crown structure including those affected by severe early childhood caries or those primary molars that have undergone endodontic therapy, a much stronger restoration is recommended that can provide esthetic and help to restore the lost function. A number of conditions can lead to esthetically unacceptable dentitions like dental caries, discoloration, trauma, early loss of teeth, misalignment and any abnormality of shape and size.[2] At such points extra-coronal restorations come into functions that includes the esthetic crowns. Crowns offer an additional advantage of securing the space in the arch that may sometimes be unable to achieve using intracoronal restorations. Therefore, it can be concluded that there is a large number of solutions available for aesthetic problems in paediatric dentistry. But the biggest dilemma is: How to choose what is best for a particular patient and that situation? Through this review we try to precisely highlight the various options for esthetic restorations along with their indications, advantages and disadvantages.

Keywords: GIC. Dilemma, Orthodontic Bracket

Introduction

A glass ionomer cement is a dental restorative material used in dentistry for dental fillings and luting cements. It is also now commonly used as an orthodontic bracket adhesive, either as a glass ionomer, or a glass ionomer-based cement[3]

Glass ionomer fillings form a chemical link with the tooth. They may also release fluoride, which helps to prevent further tooth decay. This type of filling is fairly weak. Because of this, they are usually only used on baby teeth and 'non-biting' surfaces such as around the 'necks' of the teeth.

Indications

a) Restoration of erosive/abrasive lesions without cavity preparation.

b) Sealing and filling of occlusal pit and fissures.

c) Restoration of primary teeth.

d) Restoration of Class V carious lesions.

e) Restoration of Class III carious lesions, preferably using lingual approach.

f) Repair of defective margins in restorations.

g) Minimal cavity preparations in a proximal lesion through buccal and occlusal approach (tunnel preparations).

h) Core built up.

i) Provisional restorations where future veneer crowns are contemplated.

j) Sealing at root surface for over dentures.

In children, GIC may be used for

a) Class I, Class II, Class III, Class IV in primary teeth

b) Class III and Class V in permanent teeth

c) Caries control for high caries risk patients, restoration repair, Interim Therapeutic Restoration and ART.

d)

Advantages

a) inherent adhesions to the tooth surfaces

b) Good marginal seal

c) Anticariogenic property

d) Biocompatibility

e) Minimal cavity preparation required

Disadvantages

a) low fracture resistance

b) Low wear resistance

c) Water sensitivity during setting phase

d) Less esthetic compared to composities

Resin –based composite

Resin-based composite consists mainly of a resin matrix surrounding inorganic filler particles. The primary constituents of the resin matrix are resin monomers and an initiator/catalyst system for polymerization. The first dental RBC monomer developed in the 1960s is still used today. Based on the reaction product of bisphenol-A and glycidyl methacrylate (bis-GMA), it is a bulky monomer with methacrylate groups at each end of the molecule (Di methacrylate).[4] Polymerization occurs through a free radical addition reaction. The double-bonded carbons of the methacrylate groups at each end of the active site on the monomer cross-links during the polymerization process, producing initially a linear polymer; then by reacting with the second site, a highly cross-linked polymer is produced. Since bis-GMA is quite viscous, it must be thinned by using shorter, more flexible diacrylate monomers, eg, ethylene glycol Di methacrylate (EGDMA) and triethylene glycol Di methacrylate (TEGDMA)

Advantages of Composite Resin Fillings

a) They look more aesthetically pleasing since they match your natural tooth color and appearance.

b) They require less drilling, so not as much tooth structure needs to be removed.

c) They harden in seconds instead of days like other materials.

d) They bond to the tooth giving it greater strength, which helps prevent breaks.

e) They can be repaired if damaged.

Disadvantages of Composite Resin Fillings

a) They're more labour intensive for your dentist to place on your tooth.

b) Brief tooth sensitivity following the procedure.

c) They tend to wear out sooner than metal fillings, especially if you have heavy wear from grinding and chewing.

d) They may stain from frequent and/or prolonged exposure to coffee, tea, red wine and other foods with staining properties.

e) They can degrade from recurrent and/or extended exposure to high alcohol content drinks.

f) They're more expensive than silver fillings.

Indications

a) Class 1 ,2,3,4,5,6

b) Core build up

c) Sealents and preventive resin restorations

d) Esthetic enhancement

e) Temporary restorations

f) Periodontal splinting

g) Enamel hypoplasia

h) Patients allergic to metals

i) Repair of old composite restorations

Compomers or polyacid modified composite resins

A compomer is a polyacid-modified, resin-based composite with constituents derived from composite and glass ionomer. Compomers are derived from composite resin with glass ionomer components, the etchable glass fillers which provide fluoride release.[5] The wear resistance and mechanical properties of compomers are less than composite resin, but the fluoride release and uptake are greater. Ease of handling is a compomer's greatest asset, which led to its popularity.

Esthetic crowns for primary molars

Polycarbonate crowns: It is tooth colored heat cure acrylic resin. Its advantages include esthetic, can be easily trimmed and adjusted. Failure of polycarbonate crowns lies on the fact that they could not resist high abrasive forces. Polycarbonate preformed crowns are thinner and more flexible compare to acrylic resin crowns, making them easily adapted to a prepared tooth. It has better aesthetics, easy to trim and can be adjusted with plier.[6]

Advantages

a) They are very aesthetic, with greater durability than composite strip crowns and pre veneered crowns

b) They are not as technique sensitive as composite strip crowns as the fabricated crown is cemented with self-adhesive resin cement rather than bonding.

c) They take out the same amount of time to place as stainless-steel crowns, composite strip crowns and preveneered crowns, and less than open-faced stainless-steel crowns.

Disadvantages

They are not recommended in patients that are heavy bruxers or having deep bite, crowding and overbites.

Pedo natural crown

They are unique flexible polycarbonate crowns.

Advantage-isolation is not an issue as all materials are hydrophilic in nature.

Disadvantage

- Less durability
- Crowns are relatively soft and fragile.

Resin -veneered stainless-steel crowns

These crowns are recently introduced. In these crowns composite resins and thermoplastics are bonded to the metal. Waggoner and Cohen, in 1995, tested 4 brands of

veneered SSCs, Kinder krowns, Whiter Biter Crown II, NU Smile and Cheng Crowns. They found that veneers on the Whiter Biter II exhibited the greatest shear force and retention compared to other brands.[7]

Advantages

- They are aesthetically pleasing
- They have the durability of a stainless-steel crown
- They are less moisture sensitive during placement than composite strips
- They require relatively short operating time

Disadvantages

- They are 3 times more expensive than stainless steel, strip and polycarbonate crowns.
- They technique does not allow the major recontouring and reshaping of the crown.
- The tooth is adjusted to fit the crown, rather than adjusting the crown to fit the tooth
- There are reports of the veneer facing fracturing, however it can be easily repaired using the open faces stainless steel crown technique.

Cheng Crowns:

They are developed by peter cheng in the year 1982.They are stainless steel crowns faced with composite, mesh –based with a light – cured composite. They can be used for all posterior teeth.[8] They have desirable properties such as color stability, plaque resistance, and can undergo heat sterilization without affecting its bond strength and color. It can also be delivered to the child in a single visit. However, they are very costly and during crimping, they often fracture.

Advantages

- Completed in one patient visit (and with less patient discomfort)
- Natural looking stain resistant
- Doesn't cause wear of opposing teeth

Disadvantages

- Fracture of veneers during crimping and expensive

Dura Crowns

They are made of a high-density polyethylene veneered crown.

Dura crowns have the advantage of higher retention compared to non-veneered crowns when cement and crimping are combined. These crowns can be crimped labially, lingually, and can be trimmed with crown scissors and festooned. it also has a full knife edge.[9]

Advantages

- White faced crowns
- Crowns can be crimped labially and lingually
- Crowns can be easily trimmed and festooned

Disadvantages

- expensive and require more time as compared to change crowns

Kinder crowns

Kinder krowns were introduced in 1989 and are known for offering the most natural shades and contour for the patient. Kinder krown aims to provide the most natural, lifelike and anatomically correct crown possible. These crowns are available for posterior teeth and they come as zirconia kinder krowns or a preveneered kinder crown.[10] Zirconia kinder krowns have an internal retention system in the form of retention bands which locks the restoration to the tooth after cementation. the shades offered for the preveneered kinder krowns are Pedo2 and Pedo 1 shade. Pedo 1 is a lighter –bleached shade compared to the pedo 1 shade. It has a universal contour, whereby the clinician is able to decide to make the crown a left or right by selectively rounding off the mesial or distal corner.

Advantages

- They offer natural shades and contour to primary tooth

- Greater depth and vitality of composite reveal a natural smile without bulky "chiclet" look of other restorations.

Disadvantages

- Expensive
- Less strength

Pedo pearls

Pedo pearls resemble stainless steel crowns but are coated with tooth colored epoxy paint and they are made of aluminum instead. Aluminum is used because it bonds more effectively to epoxy paint to withstand heavy occlusion.[11]

Advantages

- universal anatomy –use on either side
- Easy to cut and crimp, without chipping or peeling.
- Non-bulky and fits easily

Disadvantages:

- Less durability and the crowns are relatively soft
- Self – cured or dura – cured composite is recommended for repairing

Ez pedo crowns:

They are metal free prefabricated crowns which are made of zirconia. they have superior esthetics, strength, durability and are completely bioinert .it is also resistant to decay and plaque accumulation.[12] They are constructed with a ZIR-lock ultra-feature which functions to increase the internal surface area to increase bonding in addition to the in-built retention, then crowns are also treated with aluminum oxide blasting for additional adhesion properties.

Advantages

- superior durability
- Superior esthetics

Disadvantage

- Expense
- Technique sensitive

New millennium crowns

These crowns are similar to pedo jacket and strip crowns. These crowns are made up of lab enhanced composite material and zirconia. They are very esthetic and unlike pedo jacket crowns.[13] They can be finished and trimmed with high-speed bur. They are also filled with resin and bonded to tooth.

Advantages

- highly aesthetic
- Parental satisfaction is high

Disadvantages

- more technique sensitive
- Proper isolation and hemostatic are crucial for successful treatment
- Ideal oral hygiene prior to commencement of treatment is prefered but is not always possible

Zirconia crowns

Zirconia crowns is an exceptionally strong ceramic crown and offers more aesthetic and biocompatible full coverage for primary molars and incisors. They are anatomically contoured; metal free, completely bio inert and resistant to decay.[14] They have high wear resistance, superior mechanical properties and superior corrosion resistance.

Advantages

- superior esthetics
- High strength fracture and crack resistant
- Biocompatible (no allergic response till date)

Disadvantages

- No crimping-tooth must be prepared to fit crown
- Saliva and hemorrhage must be controlled
- High cost

Conclusion

In this article several modifications and newer esthetic options have been presented to overcome the disadvantages of unesththetic options for restorations and crown cementation. These materials were introduced to meet the increasing esthetic demands of patient as well as parents. These modifications include preveneered and open-faced stainless-steel crowns. open-faced stainless-steel crowns have a facial window cut wherein composite resin is bonded onto the tooth whereas in preveneered crowns (Nusmile primary crowns, kinder krowns etc), esthetic composite veneers are retained onto stainless steel using variety of mechanical and chemical approaches. Both esthetic veneered and open-faced stainless-steel crowns have superior esthetics as compared to conventional options. However, their durability is compromised because of limited crimping.

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