Restoring primary anterior teeth

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Abstract

A variety of esthetic restorative materials are available for restoring primary incisors. Knowledge of the specific strengths, weakness, and properties of each material will enhance the clinician's ability to make the best choice of selection for each individual situation. Intracoronal restorations of primary teeth may utilize resin composites, glass ionomer cements, resin-modified ionomers, or polyacid-modified resins. Each has distinct advantages and disadvantages and the clinical conditions of placement may be a strong determining factor as to which material is utilized. Full coronal restoration of primary incisors may be indicated for a number of reasons. Crowns available for restoration of primary incisors include those that are directly bonded onto the tooth, which generally are a resin material, and those crowns that are luted onto the tooth and are some type of stainless steel crown. However, due to lack of supporting clinical data, none of the crowns can be said to be superior to the others under all circumstances. Though caries in the mandibular region is rare, restorative solutions for mandibular incisors are needed. Neither stainless steel crowns nor celluloid crown forms are made specifically for mandibular incisors.

Many options exist to repair carious primary incisors, but 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 treatment is chosen.(*Pediatr Dent*. 2002;24:511-516)

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As is evidenced by the literature review presented by Lee, there is very little long term, controlled clinical data which validates or endorses any of the restorative options for repairing carious anterior primary teeth. Therefore, it must be stated from the outset that any policy statement regarding this issue will be based largely on anecdotal evidence and clinical experience and not on well controlled scientific data. Clinicians can argue that the method they utilize to restore carious primary incisors is best, but there is actually little scientific evidence to support any claims. Additionally, it might be asked what does the phrase "best restore" mean? Is it the most durable restoration? The most conservative? The least technique sensitive? Or the most esthetic? A different restorative option might be suggested for any of these questions.

Because there is a lack of supporting clinical data with regard to the restoration of primary incisors, it would be judicious to consider why this is so and determine if studies can be designed to gain new information.

There are several difficulties in designing clinical studies to evaluate restorative options of primary incisors. One need only consider the population of patients that require these restorations to develop a list of obstacles. First, children who exhibit dental caries in the primary incisors are generally very young. Early childhood caries or baby bottle tooth decay is usually seen in the 18- to 36-month-old child, although it can be seen even younger.[1] These children, due to their young age and lack of cognitive abilities, are usually very uncooperative for dental treatment, and their behavior plays a big factor in restoration. Because these children are usually candidates for sedation, general anesthesia, or immobilization, few clinicians want to consider placing these children into an "experimental" situation where failure of a restoration can mean a significant problem for replacement.[2] Even if the clinician were willing to do this, many parents will not be willing, especially if failure of the "experimental" restoration might require additional sedation or other management techniques to be utilized a second time.

With these young children, unless they are completely unconscious, as with general anesthesia, their negative behavior can influence the clinician's ability to place the restorations under ideal circumstances. To have a valid or useful clinical study the behavior of the children should be similar when all the restorations are placed. Additionally, because incisors will generally not become carious, except in children with a high caries risk, restorations placed in these children may perform differently than a similar restoration in a low caries-risk child.[3,4]

Yet, another concern with this population of children is that high caries risk children often are found in lower socioeconomic groups. It has been found that obtaining consistent follow-up and preventive care in this population can be challenging.[5] Obviously, in clinical studies, follow-up evaluations are an integral part of the study design and, without these follow-up evaluations, long-term performance of the restorations cannot be done. The reluctance of a clinician to attempt a restoration that might not be as esthetically pleasing as they are used to doing is yet another difficulty. For instance, if a clinician routinely places resin strip crowns and has good success with them, he or she would probably be very reluctant to place an open face crown or plain stainless steel crown as part of an experimental design, simply because the resulting esthetics would not be as pleasing as the strip crowns which are routinely placed.

Finally, cost may be a factor which can impede these clinical studies.[1] The time, expense, and effort to manage these young children and restore the incisors can be a costly exercise, particularly when compared to other restorative or surgical procedures that might be done in the mouth.

So, difficulties with behavior management, the young age of the child, parental consent, cost of treatment, reluctance on the part of the clinician and differences in caries risk may all be obstacles to obtaining good clinical data on restorative options for primary incisors. Unfortunately, many of these problems cannot, and will not, go away or change, so while the studies are most definitely needed, they will not likely get much easier to design and complete.

Intracoronal restorations of primary anterior teeth

Class V restorations for primary incisors are relatively easy to do. The cavity preparation is very similar to those in permanent teeth. The preparation should extend beyond any cervical decalcification. Although these restorations appear to be retained fairly well with the retention obtained by acid etching and bonding, small undercuts or retentive grooves incisally and gingivally are recommended to enhance retention. Class V restorations can be restored with any of the esthetic restorative materials: glass ionomers, compomers, resin-reinforced glass ionomers or composite resins.

Class III restorations of primary incisors, on the other hand, can be quite challenging. Due to the small clinical crown, the relatively large size of the pulp chamber, the close proximity of the pulp horns to the interproximal surfaces, and the thinness of the enamel, repairing interproximal decay in these teeth requires preparations that are conservative in depth with close attention to detail, both to the preparation itself and to the material placement.[6] The technique sensitivity of placing Class III esthetic restorations is very high. Moisture control, hemorrhage control from the gingiva, and retention of the rubber dam are all challenges to be overcome to get a successful result. Anecdotally, it would appear that, when removing interproximal decay on primary incisors for a Class III restoration, keeping a very small conservative preparation—such as a slot preparation—may not be the best choice.[7] In many instances, the retention of very small Class III restorations is not adequate because not enough surface area of the tooth was etched and bonded. Therefore, it has been recommended that even small Class III restorations in primary incisors have a labial or lingual dovetail or somehow incorporate a large surface area for bonding to enhance retention. This may entail veneering the entire labial or lingual surface as part of the restoration.[7,8]

It should be noted that the restoration of mandibular primary incisors presents an even greater restorative challenge. These teeth are so small and the pulp chamber so relatively close to the enamel layer that preparing these teeth for restoration without getting a pulpal exposure is very difficult. Fortunately, these are usually the first teeth to exfoliate and, therefore, in many instances definitive restoration may not be necessary. Many clinicians prefer to conservatively treat interproximal caries in the mandibular incisors by disking the interproximal surfaces to open the contacts for easier cleansing and prescribing an at-home fluoride application to arrest the decay.

At other times, gross decay removal can be perfomed and a glass ionomer placed in these areas. This, however, might better be considered as a caries-control procedure rather than definitive restorative dentistry.

Full coronal restoration of primary incisors

Full coronal restoration of carious primary incisors may be indicated when: (1) caries is present on multiple surfaces, (2) the incisal edge is involved, (3) there is extensive cervical decalcification, (4) pulpal therapy is indicated, (5) caries may be minor, but oral hygiene is very poor (high-risk patients), or (6) the child's behavior makes moisture control very difficult, creating difficulties in placing Class III restorations.[6]

The crowns that are available for restoring primary incisors (Table 1) can be placed into 2 categories: (1) those that are preformed and held onto the tooth by a luting cement, and (2) those that are bonded to the tooth. Crowns of many types are available for maxillary primary incisors and canines. However, there are no longer any crown forms manufactured that are made specifically for mandibular incisors. If full coronal restoration of mandibular incisors is necessary, it requires the use of a maxillary lateral crown form, which, unfortunately, results in a very bulky looking restored incisor.

Table 1. Esthetic Crowns for Primary Teeth

Crown	Company	Phone #	Starter kit	Individual crowns	Additional information
NuSmile	Orthodontic Technologies	1-800-346-5133	16 crowns $260.00	Anterior $17.98 Posterior $34.50	Different lengths available Resin facing on an SSC Crimp only on lingual surface
Cheng Crowns	Peter Cheng Orthodontic Laboratory	1-800-288-6784	16 crowns $280.00	Anterior $19.00 Posterior $35.00	One length, one shade Resin facing on an SSC Crimp only on lingual surface
Kinder Krowns	Mayclin Dental Studios	1-800-522-7883	16 crowns $259.00	Anterior $17.95	Different lengths available 2 shades Resin facing on an SSC Crimp only on lingual surface
Dura Crowns	Space Maintainers Laboratory	1-800-423-3270	24 crowns $396.00	Anterior $16.50	May be crimped on labial and lingual 1 shade Flexible facing attached to SSC
New Millenium Crowns	Space Maintainers Laboratory	1-800-423-3270	24 crowns(ant) $290.00 12 crowns(post) $169.50	Anterior $9.95 Posterior $12.95	Lab-enhanced composite resin crown form
Pedo Jackets	Space Maintainers Laboratory	1-800-423-3270	96 crowns(ant) $219.00 24 first molars $64.50	Ant/post 5 for $12.50	Copolyester crown form 1 shade
Strip Crowns	Space Maintainers Laboratory	1-800-423-3270	96 crowns(ant) $210.00 48 first molars $116.00 48 second molars $116.00	Ant/post 5 for $11.00	Seamless plastic crowns form without long cervical collars Other strip crowns forms (3M) are also available through other major dental suppliers

The most esthetic restorative option for carious primary incisors is the bonded strip crown.[9-11] This is the first choice of many clinicians due to the superior esthetics and the ease of repair if the crown should subsequently chip or fracture. This is, however, the most technique-sensitive option. Hemorrhage or saliva on the tooth will interfere with the bond, and hemorrhage can interfere with the shade or color of the material. Additionally, adequate tooth structure must remain after caries removal to ensure sufficient surface area for bonding.

Besides the celluloid crown form that historically has been used for strip crowns, there have been at least 2 other recent bonded alternatives. Neither of these two has the wide use and acceptance of the strip crown. One is the Pedo Jacket (Success Essentials, Space Maintainers Laboratory). The Pedo Jacket is handled similarly to a celluloid crown form, only the "jacket" is made of a tooth-colored copolyester material, which is filled with resin material and left on the tooth after polymerization instead of being removed as the celluloid crown form is.

There are difficulties with this crown. One problem is that these crowns only come in one shade, which is very white, so matching, adjacent, nonrestored teeth can be difficult. Also, because the crowns are made of a copolyester, they cannot be trimmed or reshaped with a high-speed finishing bur due to the fact that the material will melt to the bur.

The other bonded crown is the New Millenium crown (Success Essentials, Space Maintainers Laboratory). This crown is similar in form to the Pedo Jacket and strip crown except that is made of a laboratory-enhanced composite resin material. Like the other 2, the crown form is filled with resin material and bonded to the tooth.[12-14] These crowns can be very esthetic and can be finished and reshaped with a high-speed bur. The crown forms are very brittle, however, and can crack or fracture if forced down onto a preparation that has not been adequately reduced. These crown forms are also significantly more expensive than either of the other 2. For clinical success, all three of these bonded crowns share the need for adequate bonding area, excellent moisture control, and absence of hemorrhage.

The other category of crown for primary incisors is made of metal and held onto the tooth primarily by a cervical crimp on the crown form and a luting cement. The easiest and most durable restoration for severely decayed primary incisors is a stainless steel crown. It can be placed quickly and successfully onto very little tooth structure, even in the presence of blood and saliva, and can be easily crimped. It is, however, very unesthetic, and may be completely unacceptable and rejected by a majority of parents as a viable restorative option for their child's teeth. These crowns can be made more esthetic by removing the facial stainless steel after cementation and replacing it with a bonded tooth colored material.[15,16] These open-face crowns can be inexpensive to place and esthetically pleasing, but do require extra chair time, and hemorrhage control is very important when placing the facing.

Stainless steel crowns are also available from various manufacturers that have a tooth-colored material, usually composite resin, bonded onto the facial surface in a laboratory procedure (Cheng Crowns, Cheng Laboratory; NuSmile Crowns, Orthodontic Technologies; Kinder Krowns, Mayclin Laboratory; Dura Crowns, Space Maintainers Laboratory). These preveneered crowns can be

very esthetic[17] and can be placed successfully even with poor moisture or hemorrhage control.[18,19] These crowns, however, are not easy to fit and require a rather long learning curve. They are available in only 1 or 2 shades, so matching adjacent teeth can be difficult. If these crowns are forced onto a preparation with a lot of pressure, it may cause the white facing to break, crack or chip. Generally, they can only be crimped on the lingual surface, so retention is achieved primarily via the luting cement. Dura Crowns (Space Maintainers Laboratory), however, are advertised as being able to be crimped on the gingival facial margin as well as the lingual margin. Preveneered crowns cost up to 5 to 8 times as much as a plain stainless steel crown or strip crown. If the facing chips or breaks after placement, esthetic repair is difficult and usually requires replacement of the crown. In spite of all these disadvantages, these preveneered crowns are used by many clinicians as their first choice of full coverage for severely decayed primary incisors.

One final new type of crown is in the process of being developed and field tested. It is a metal crown form similar to a stainless steel crown, but it has been completely coated with a tooth-colored epoxy paint (Pedo Pearls). These crowns are made of aluminum instead of stainless steel because the epoxy coating adheres much better to the aluminum. Aluminum crown forms are frequently used as temporary crowns in the permanent dentition, so this is not a novel approach. However, the aluminum crowns are relatively soft and this may create a problem with long-term durability. Additionally, in areas of heavy occlusion, the white coating will wear off. If these crowns can be perfected, they will probably offer the easiest placement technique of all the crowns with reasonable esthetics.

All of the stainless steel crowns are cemented to the tooth with luting cements. There are a number of cements available to accomplish this. Historically, zinc phosphate and polycarboxylate cements have been recommended and do an adequate job of retaining the crowns to the tooth. However, adhesive cements such as glass ionomer and resin modified glass ionomers not only provide excellent retention to the crowns, but also demonstrate less microleakage than the non-adhesive zinc phosphate and polycarboxylate cements.[20] Decreased microleakage has the potential to reduce clinical failures caused by recurrent caries, pulpal pathology and failure of root canal treatments caused by coronal microleakage. For these reasons, use of an adhesive luting cement, such as glass ionomer, is recommended.

To summarize, most clinicians have a favorite crown for primary incisors. However, due to lack of documented support, none of these options can be definitively considered the best or superior to the rest under all clinical circumstances.

Material selection for anterior primary teeth

An in-depth review of dental restorative materials is not the focus of this paper, however, a few comments are appropriate. A good and helpful review of dental materials in pediatric dentistry was published by Berg[21] and is recommended reading. With the vast number of esthetic materials available today, there should be little to no reason to ever consider using amalgam for the restoration of primary incisors. Though amalgam is the least technique-sensitive restorative material for intracoronal restorations, its poor esthetics contraindicates its use.

The esthetic materials available include: (1) composite resin restorative materials, (2) ionomer-modified resins or compomers, (3) resin-modified glass ionomers, and (4) traditional glass ionomers. The clinical circumstances under which the materials are placed may dictate the use of one material over another.

Composite resin materials demonstrate the best strength, wear resistance, esthetics and color-matching capabilities of all of the materials and are often the first choice of many clinicians for restoring anterior teeth. However, these materials are the most technique sensitive, require the use of acid etching and bonding agents, and are intolerant of moisture and/or hemorrhage.

Compomers have many of the same characteristics as composite resins, with similar esthetics. They may have some fluoride release and be a little more moisture tolerant than composite resins, but they are essentially handled the same way as resins. Resin-modified glass ionomers act more like glass ionomers than composite resins.[22] They release fluoride, do not require etching, and are less moisture sensitive. Esthetics can be good, but not as good as compomers or composite resins. Additionally, wear and strength are not as good as the resins, or polyacid-modified resins. Clinical data, although minimal, demonstrates success of resin-modified glass ionomer cement for Class III and Class V restorations in primary teeth.[22,23]

The final option is glass ionomer restorative materials (GICs). These materials are self curing and have a high release of fluoride. They chemically bond to tooth structure and are somewhat tolerant of moisture. Their physical properties and esthetics are not as good as the other three types of tooth colored materials. Primarily due to esthetics and strength, glass ionomers would not be a first choice of material for restoring primary incisors, except in the circumstances of performing the Atraumatic Restorative Technique, also known as ART.[24] The ART approach is sometimes utilized in very young children in which minimal instrumentation is desired or necessary. Hand instruments primarily are used to remove gross decay, and GIC is used to restore the teeth.

This minimally invasive procedure is largely pain free and readily accepted by children. However, long-term success of GIC placed into Class III preparations is not very good, ranging from 20%-73%[25,26] after 1 year, and only 14% after 30 months.[27] Therefore, while this technique may provide caries control for a short time, perhaps allowing a very young child time to grow up and become more accepting of conventional treatment is the best choice. Also, while GICs are useful in situations where economics or access to care is a significant problem, they cannot deliver predictable and esthetic restoration of primary incisors.

Risk assessment and anterior restorations

There is little published data which evaluates any kind of risk assessment for placement of specific restorative options in primary anterior teeth. A recent study by Tate et al[28] reported that children who were treated under general anesthesia had a very high failure rate of composite resins (30%) and composite strip crowns (51%), in comparison to stainless steel crowns (8%). General anesthesia allows treatment to be rendered under theoretically optimal conditions, implying that outcomes should be optimal. However, in this study failure rates were quite high for esthetic restorations. Therefore, it is likely that there are other factors which contribute to failure, besides optimal placement conditions.

Patients with early childhood caries (ECC) have a greater propensity for developing new and recurrent caries.[29] Also, in another study, children with ECC who were treated under general anesthesia demonstrated significantly higher subsequent caries rates than a control group who were initially caries free.[30]

Therefore, while no definitive studies exist, it seems prudent to be cautious in the use of composite resin restorations in young children, especially in those children with a high level of carious activity or when a suboptimal placement environment exists. Anecdotally, it is also recommended to avoid placing composite resin strip crowns or preveneered stainless steel crowns in children with anterior crossbites or significant bruxism due to a likely fracture of the resin material. Open-faced stainless steel crowns will likely be more durable in these situations. Additional data regarding risk assessment and use of various anterior restorative options is needed.

Restorations of permanent anterior teeth

Although the emphasis of this paper has been directed toward the primary anterior dentition, it is important to recognize that resin-based composites are appropriate for Class III, IV and V restorations in the permanent anterior dentition.

Summary

1. Many options exist to repair carious primary incisors, but 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.
2. Clinical studies of all of the restorative techniques which are currently utilized are definitely warranted, though they are, and will continue to be, difficult to carry out.
3. Though caries in the mandibular region is rare, restorative solutions for mandibular incisors are needed. Neither stainless steel crowns nor celluloid crown forms are made specifically for mandibular incisors.
4. Adhesive luting cements, such as glass ionomer cements, minimize microleakage and are recommended for cementing stainless steel crowns.
5. A variety of esthetic restorative materials are available to utilize for restoring primary incisors. Cognizance of the specific strengths, weaknesses, and properties of each material will enhance the clinician's ability to make the best choice of selection for each individual situation.

Recommendations

The dental literature supports, based on available information, the following recommendations for anterior restorations.

1. Resin-based composites may be used for:
   - Class III restorations in the primary and permanent dentitions;
   - Class V restorations in the primary and permanent dentitions;
   - strip crowns in the primary anterior dentition;
   - Class IV restorations in the primary and permanent dentitions.
2. Although minimal clinical data is available, glass ionomer cement or resin-modified glass ionomer cement may be used for Class III and V restorations for primary teeth, particularly those that cannot be isolated well.
3. Full-coverage crowns for primary anterior teeth may be recommended for teeth with:
   - multiple carious surfaces,
   - incisal edge involvement,
   - extensive cervical decalcification,
   - pulpal therapy,
   - hypoplasia,
   - poor moisture or hemorrhage control.

References

1. Tinanoff N, O'Sullivan DM. Early childhood caries: overview and recent findings. *Pediatr Dent*. 1997; 19:12-16.
2. Eidelman E, Faibis S, Peretz B. A comparison of restorations for children with early childhood caries treated under general anesthesia or conscious sedation. *Pediatr Dent*. 2000;22:33-37.
3. Al-Shalan TA, Erickson PR, Hardie NA. Primary incisor decay before age 4 as a risk factor for future dental caries. *Pediatr Dent.* 1997;19:37-41.
4. Almeida AG, Roseman M, et al. Future caries susceptibility in children with early childhood caries following treatment under general anesthesia. *Pediatr Dent*. 2001;22:302-306.

5. Berkowitz RJ, Moss M, et al. Clinical outcomes for nursing caries treated using general anesthesia. *ASDC J Dent Child.* 1997;64:210-211.
6. Waggoner WF. Restorative dentistry for the primary dentition. In: Pinkham JR, ed. *Pediatric Dentistry: Infancy through Adolescence*. 2nd ed. Philadelphia: WB Saunders Co; 1994:298-325.
7. Piyapinyo S, White G. Class III cavity preparation in primary anterior teeth: in vitro retention comparison of conventional and modified forms. *J Clin Pediatr Dent.* 1998;22:107-112.
8. McAvoy SA. A modified Class III cavity preparation and composite resin filling technique for primary incisors. *Dent Clin N Am.* 1984;28(1):145-155.
9. Webber DL, Epstein NB, et al. A method of restoring primary anterior teeth with the aid of a celluloid crown form and composite resins. *Pediatr Dent.* 1979;1:244-246.
10. Croll TP. Bonded composite resin crowns for primary incisors: technique update. *Quintessence Int*. 1990; 21:153-157.
11. Ram D, Peretz B. Composite crown-form crowns for severely decayed primary molars: a technique for restoring function and esthetics. *J Clin Pediatr Dent*. 2000;24:257-260.
12. Yanover L. The artglass primary anterior esthetic crown. *J Southeastern Soc Pediatr Dent.* 1999;5:10-12.
13. Updyke JR. Esthetics and longevity of anterior artglass crowns. *J Southeastern Soc Pediatr Dent.* 2000;6:25-26.
14. Updyke JR, Sneed WD. Placement of a preformed indirect resin composite shell crown: A case report. *Pediatr Dent*. 2001;23:243-244.
15. Hartmann C. The open-face stainless steel crown: an esthetic technique. *ASDC J Dent Child.* 1983;50:31-33.
16. Helpin ML. The open-faced steel crown restoration in children. *ASDC J Dent Child*. 1983;50:34-38.
17. Roberts C, Lee JY, Wright JT. Clinical evaluation and parental satisfaction with resin-faced stainless steel crowns. *Pediatr Dent.* 2001;23:28-31.
18. Croll T, Helpin M. Preformed resin-veneered stainless steel crowns for restoration of primary incisors. *Quintessence Int.* 1996;27:309-313.
19. Croll TP. Primary incisor restoration using resin-veneered stainless steel crowns. *ASDC J Dent Child.* 1998;65:89-95.
20. Shiflett K, White SN. Microleakage of cements for stainless steel crowns. *Pediatr Dent*. 1997;19:262-266.
21. Berg J. The continuum of restorative materials in pediatric dentistry—a review for the clinician. *Pediatr Dent.* 1998;20:93-100.
22. Croll TP, Bar-Zion Y, Segura A, Donly KJ. Clinical performance of resin-modified glass ionomer cement restorations in primary teeth. *JADA.* 2001;132:1110-1116.
23. Mjör IA, Dahl JE, Moorhead JE. Placement and replacement of restorations in primary teeth. *Acta Odontol Scand*. 2002;60:25-28.
24. Smales RJ, Yip, HK. The atraumatic restorative treatment (ART) approach for primary teeth: review of literature. *Pediatr Dent.* 2000;22:294-298.
25. Basso ML, EdelbergMH. Atraumatic restorative treatment-one year clinical report (temporary teeth restorations). *J Dent Res* [abstract #2938]. 1997;76:381.
26. Franca MTC, Bolinelli A, et al. One year evaluation or ART technique. *J Dent Res* [abstract #38]. 1998;77:636.
27. Lo ECM, Holmgren CJ. ART fillings placed in Chinese preschool children—results after 30 months. *IADR* [abstract #9]. 1999;33.
28. Tate AR, Ng MW, Needleman HL, Acs G. Failure rates of restorative procedures following dental rehabilitation under general anesthesia. *Pediatr Dent.* 2002;24:69-71.
29. Johnsen DC, Gerstenmaier JH, Di Sanis TA, Berkowitz RJ. Susceptibility of nursing-caries children to future approximal molar decay. *Pediatr Dent.* 1986;8:68-70.
30. Almeida AG, Roseman M, Sheff M, Huntington N, Hughes CV. Future caries susceptibility in children with early childhood caries following treatment under general anesthesia. *Pediatr Dent.* 2000;22:302-306.