

## Outcomes of dental procedures performed on children under general anesthesia

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*The purpose of this study was to evaluate the integrity and longevity of restorative and pulpal procedures performed on primary teeth under general anesthesia (GA). Fifty-four children, who received comprehensive dental treatment under general anesthesia between 1993 and 1995, were included. The postoperative examination period ranged from 6 to 27 months. Children were examined and the quality of the restorations were recorded and evaluated. Behavior problems and inability to cooperate were the main reasons for treatment under GA. Results showed that restoration of posterior teeth with stainless steel crowns (SSC) were more successful (95.5%) when compared to amalgam or composite restorations (50%). In the anterior teeth, strip crowns had a success rate similar to that of Class III, IV and V composite resin materials. Pulpotomies showed an extremely high rate of success (97.1%), while sealants were retained 68.3% of the time. In conclusion, SSC are more likely to be successful and last longer than multisurface amalgam or composite restorations in children treated under general anesthesia. Definitive treatment is more likely to ensure a more positive outcome for children treated under general anesthesia due to less frequent complications from failed restorations or pulpal procedures.*

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### INTRODUCTION

There are several categories of dental problems in children that cannot be treated optimally in the office setting and are best managed in the hospital. Despite some degree of risk to the patient, the ability to treat children in the hospital environment to provide comprehensive dental care using general anesthesia (GA) is a valuable option for the pediatric dentist.<sup>1</sup> The dentist should be mindful when formulating the treatment plan to consider the durability of the restorative materials to avoid failure of the restorations. Ineffectiveness, breakdown of materials and failure to arrest further demineralization of tooth enamel can often necessitate a second operating room (OR) procedure.<sup>2</sup>

Few studies have evaluated comprehensive dental treatment for children under GA. O'Sullivan and Curzon<sup>2</sup> evaluated 80 children treated under GA for comprehensive dental treatment between 1984 to 1987, with a minimum 2 year follow up period. They found that 3% of SSC failed compared to a 29% failure rate for amalgam or composite restorations, while vital pulpotomies showed a 2% failure rate. Su and Chen<sup>3</sup> evaluated 57 children receiving comprehensive dental treatment under GA from 1989 to 1991 for a minimum one-year follow up period. They found a 1.7% failure rate of Ni-Cr crowns, 9.7% failure rate of amalgam and composite restorations, and 22% failure rate of pedo-strip crowns. Many studies have shown that behavior problems or inability to cooperate are the primary reasons that children are treated under general anesthesia.<sup>2-7</sup>

At New York University College of Dentistry, pediatric dentistry graduate students provide comprehensive care for children attending the children's dental clinic. Children, who cannot be managed in that setting, are referred to the affiliate hospital for dental treatment under GA. No previous studies have evaluated GA cases performed by postgraduate students. Therefore, the purpose of this study was to assess the effectiveness of dental procedures performed by pediatric dentistry graduate students on children under GA.

### MATERIALS AND METHODS

Telephone and recall cards were sent to 92 children, who had been treated under general anesthesia in the

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Department of Pediatric Dentistry at Bellevue Hospital Center (BHC) from 1993 to 1995. Fifty-four children responded and presented for recall examination. Medical and dental histories were reviewed and background data were obtained from the dental records.

Postdoctoral pediatric dental students under the supervision of an attending pediatric dentist performed dental treatment for all children. One pediatric dentist, who recorded all the clinical data, examined the fifty-four children. Criteria were established to evaluate the success and failures of restorative and pulpal treatments.

**Restorative treatment**

The restoration or procedure was considered a failure if one or more of the following was present:

- Recurrent caries around restorations / sealants.
- Missing, fractured, cracked or poorly adapted restorations.
- Open margins, perforated or missing SSC/strip crowns
- Restored tooth extracted/lost due to pathology.
- Complete loss of fissure sealant.

**Pulpal treatment**

Pulp therapy were considered failure if the tooth has one of the following symptoms:

- Sensitivity to percussion.
- Localized pain.
- Presence of swelling or abscess.
- Radiographic evidence of interradicular pathology

**RESULTS**

Of the fifty-four children who were treated under GA, thirty-four were males (63%) and twenty were females (37%). The average age was four years and six months. Sixty-three percent of the children were between 3 and 5 years old. The amount of time elapsed between the time of restorative care to recall ranged from 6 to 27 months. The average was 16.5 months. Table 1 shows the reasons a child was treated under GA. Results show that the majority of patients treated under GA were behavior problems or were unable to cooperate (66.6%).

Table 2 summarizes the findings of the clinical examination. From the total number of sealants placed, 31.7% of the fissure sealants failed. Class II amalgam and composite restorations failed more than class I restorations (29% and 7% respectively). In addition, results indicate that for posterior teeth, full coverage with SSC was highly successful (95.5%). Few class II restorations were even attempted, as the carious destruction to the hard tissue in most cases was extensive. Even so, 50% of those attempted were failures. Anteriorly, strip crowns failed 30% of the time, similar

**Table 1.** Reasons For Treatment Under General Anesthesia.

Reason		No. of Children	Percentage (%)
Caries	Poor Behavior/Inability to Cooperate	44	66.6
	Time	6	9.1
Developmental problems	Mental Retardation	6	9.1
	Cerebral Palsy	3	4.5
	Heart Defect	3	4.5
	Anemia	2	3
	Multiple Syndromes	1	1.5
Surgical Procedure		1	1.5

**Table 2.** Restorations/Procedures Performed Under General Anesthesia.

Type of Restoration/ Procedure	Total No.	Failure (N)	Failure (%)	
Sealant	142	45	31.7	
Posterior teeth	Class I Amalgam	8	7	
	Class II Amalgam or Composite	8	4	50
SSC	111	5	4.5	
Anterior teeth	Composite (Class III, IV, V)	214	62	29
	Full coverage (Strip crown)	23	7	30
Pulp therapy	Pulpotomy	35	1	2.9
	Pulpectomy	2	1	50

to the rate for composite / resin failure of 29%. Pulpotomies showed a high success rate of 97.1%.

**DISCUSSION**

The objective of this study was to evaluate outcomes of GA cases performed by graduate students at New York University College of Dentistry. Results showed that poor behavior of the children and inability to cooperate were the primary reasons for referring patients for GA. This is consistent with the findings of previous studies.<sup>2,7</sup>

Effective restoration of seriously decayed primary teeth has always been problematic for the pediatric dentist. It has long been recognized that the placement of an “ internal restoration “ in a massively decayed tooth will often fail largely due to marginal deterioration resulting from highly demineralized and undermined enamel surfaces<sup>2</sup>.

Braff<sup>4</sup> found that 88.7% of teeth initially restored with multisurface amalgam in primary molars required follow-up care, compared to 30.3% of the crowned teeth requiring such treatment. Messer and Levering<sup>5</sup> reported a 46% failure rate among class II amalgams placed in children younger than 4 years of age and that crowns placed in children younger than 4 years showed a success rate approximately twice that of class II amalgams.

Roberts and Sheriff<sup>6</sup> found that for class II amalgams in primary molars, the replacement rate, true failure rate and 5 years survival estimates were 14.7%, 11.6%, 66.6% respectively, and for preformed crowns 2.8%, 1.9%, 92.0% respectively. Holland *et al.*<sup>7</sup> demonstrated that the average survival time for an amalgam restoration in primary teeth was only 31 months, and that the age of the child at the time of placement was directly related to longevity of the restoration (the younger the child, the sooner the failure). Numerous authors,<sup>8-10</sup> including those cited above, additionally found low failure rates of full coverage restorations (stainless steel / strip crowns) and pulpotomies, both in the 2% to 5% range.

Our results are in agreement with most of the literature in that full coverage and pulpotomies were highly successful procedures, and that restorations dependant on the integrity of dental enamel, such as amalgam and composite materials, had high failure rates. Anteriorly, however, strip crowns failed 30% of the time, similar to the rate for composite / resin failure which was 29%. While this finding is unexpected, it is not all that surprising, when one considers the limitations and technical difficulties of fabricating strip crowns on diseased, demineralized tooth structure and the remarkable advances in bonding and hybrid resin compomer technology over the past five years.

It is certainly in the best interest of the child to provide definitive, durable, comfortable and functional restorations and minimize the amount of time spent in a dental office. Ideally, a restoration should last until the primary tooth is naturally lost through exfoliation. This often is the case when stainless steel crowns and pulpotomies are performed, and all too infrequently with the use of traditional "filling" materials, which rely on hard tissue integrity for success.

We feel that definitive treatment, that is, intervention intended to minimize further complications or follow-ups, is the approach to take when working under GA with a high risk patient population. Extractions, rather than heroic pulpal modalities and esthetic

crowns, should be done in cases of frank, invasive periapical pathology, just as full coverage is the order of the day rather than "fillings" for grossly decayed hard tissue. Conservative dentistry as applied to this particular model of compromised patients will inevitably end in a poor treatment outcome and necessitate frequent repair of "patchwork" restorations.

## CONCLUSION

1. Stainless steel crowns are more likely to be successful and last longer than multisurface amalgam or composite restorations in children treated under GA.
2. There is a substantial failure rate (30%) of both strip crowns and composite restorations in anterior teeth in children under GA.
3. Definitive treatment is more likely to result in positive outcomes for children treated under GA due to less frequent complications from failed restorations.

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