

Clinical Outcomes Among Children with Early Childhood Caries Treated with Silver Diamine Fluoride, Oral Sedation and General Anesthesia



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INTRODUCTION

Early childhood caries (ECC) is characterized by the early onset of caries in young children with often quick progression which can result in early loss of the primary dentition.¹ ECC is a chronic disease that affects a considerable proportion of young children which increase their risk of caries in the permanent dentition as well as primary.² ECC is considered one of the most significant and expensive health conditions among young children.²

Traditional practice for children under 7 years of age with ECC consist of restorative treatment with advanced behavioral management techniques like conscious oral sedation or general anesthesia for the removal of carious lesions to restore the form, function, and esthetics of the child's dentition.²

Recently, less invasive treatment modalities, such as silver diamine fluoride, are being utilized in dental clinics to help arrest caries.¹

PURPOSE

The purpose of the study was to evaluate the clinical outcomes among children treated with early childhood caries with silver diamine fluoride, oral sedation and general anesthesia.

METHODS

Data was collected from 1,642 dental charts, in a multi-site study from children under the age of 7, from 2010-2019 evaluating clinical outcomes via retrospective chart audits. Charts were evaluated from the following sites: Alaska, New York, Tennessee and Florida.

Information regarding the number of pre-treatment visits of silver diamine fluoride applications, post-treatment new caries, post-treatment extractions needed, and post-treatment broken restorations and space maintainers were collected.

Chi-square tests were used to formulate a p-value for each individual questions. P-value was statistically significant if it was <.05.

TABLE 1. DEMOGRAPHIC CHARACTERISTICS

	Overall	Silver Diamine Fluoride	Sedation	General Anesthesia	p-value
n (%)	1642 (100.00)	466 (28.38)	577 (35.14)	599 (36.48)	
Child's age in years; mean (sd); Ordinal					<0.001
Less than 1	2 (0.1)	1 (0.2)	0 (0.0)	1 (0.2)	
1 to less than 2	43 (2.6)	28 (6.0)	10 (1.7)	5 (0.8)	
2 to less than 3	232 (14.1)	113 (24.2)	59 (10.2)	60 (10.0)	
3 to less than 4	401 (24.4)	131 (28.1)	135 (23.4)	135 (22.5)	
4 to less than 5	445 (27.1)	90 (19.3)	158 (27.4)	197 (32.9)	
5 to less than 6	328 (20.0)	64 (13.7)	133 (23.1)	131 (21.9)	
6 to less than 7	191 (11.6)	39 (8.4)	82 (14.2)	70 (11.7)	
Sex (%); Nominal					0.152
Male	862 (52.5)	258 (55.4)	292 (50.6)	312 (52.1)	
Female	774 (47.1)	207 (44.4)	281 (48.7)	286 (47.7)	
Other	1 (0.1)	1 (0.2)	0 (0.0)	0 (0.0)	
No response	5 (0.3)	0 (0.0)	4 (0.7)	1 (0.2)	
Child's Race/Ethnicity n (%); Nominal					<0.001
Hispanic	688 (41.9)	277 (59.4)	205 (35.5)	206 (34.4)	
White, Non-Hispanic	105 (6.4)	30 (6.4)	32 (5.5)	43 (7.2)	
Black or African American, Non-Hispanic	96 (5.8)	27 (5.8)	37 (6.4)	32 (5.3)	
American Indian or Native Alaskan, Non-Hispanic	209 (12.7)	69 (14.8)	69 (12.0)	71 (11.9)	
Asian, Non-Hispanic	22 (1.3)	7 (1.5)	7 (1.2)	8 (1.3)	
Native Hawaiian or Other Pacific Islander, Non-Hispanic	7 (0.4)	2 (0.4)	3 (0.5)	2 (0.3)	
Two or more races, Non-Hispanic	8 (0.5)	1 (0.2)	6 (1.0)	1 (0.2)	
No response	507 (30.9)	53 (11.4)	218 (37.8)	236 (39.4)	
ASA Classification; n (%); Nominal					<0.001
ASA 1	1445 (88.0)	430 (92.3)	515 (89.3)	500 (83.5)	
ASA 2	193 (11.8)	36 (7.7)	62 (10.7)	95 (15.9)	
ASA 3	4 (0.2)	0 (0.0)	0 (0.0)	4 (0.7)	

Table 2. Pre-treatment visits between children treated with silver diamine fluoride and under general anesthesia

	Overall	Silver Diamine Fluoride	General Anesthesia	p-value
n	1067	466	601	
Number of pre-treatment visits; mean (sd)	1.50 (0.76)	1.19 (0.48)	1.57 (0.80)	0.001

Table 3. Post-treatment new caries on permanent molars between children treated with sedation and under general anesthesia

	Overall	Silver Diamine Fluoride	Sedation	General Anesthesia	p-value
Post-treatment new caries on molars; n (%)	1653	466	586	601	
Yes	74 (4.6)	44 (9.7)	9 (1.6)	21 (3.6)	<.001
No	1476 (91.6)	402 (88.5)	525 (91.6)	549 (94.0)	
No response	61 (3.8)	8 (1.8)	39 (6.8)	14 (2.4)	

Table 4. Post-treatment extractions between children treated with silver diamine fluoride, sedation and general anesthesia

	Overall	Silver Diamine Fluoride	Sedation	General Anesthesia	p-value
Post-treatment extractions; n (%)	1653	466	586	601	
Yes	67 (4.2)	34 (7.5)	21 (3.7)	12 (2.1)	<0.001
No	1586 (95.8)	432 (92.5)	565 (96.3)	589 (97.9)	

Table 5. Post-treatment broken restorations/space maintainers between ASA 1 and ASA 2 children treated under general anesthesia

	Overall	Treated under general anesthesia		p-value
		ASA 1	ASA 2	
Post-treatment broken restorations/space maintainers; n (%)	1638	1445	193	
Yes	44 (2.8)	39 (2.8)	5 (2.7)	0.012
No	1416 (88.7)	1265 (89.5)	151 (83.0)	
No response	136 (8.5)	110 (7.8)	26 (14.3)	

RESULTS

- From the 1642 charts collected, Table 1 shows the median age of the sample population was four years old and mostly male (52.5%), Hispanic (41.9%), ASA 1 (88.0%), and Medicaid beneficiaries (83.0%)
- The following data from Tables 2,3,4 and 5 are statistically significant.
- Table 2 concludes that patients had an average of 1.5 pre-treatment visits before definitively completing their dental treatment. Of those, 466 patients receiving silver diamine fluoride treatment had an average of 1.19 pre-treatment visits and 601 of the general anesthesia patients had an average of 1.57 pre-treatment visits. As seen in
- Table 3 shows a total of 21(3.6%) new caries on permanent molars were seen in patients that underwent GA and a total of 9 (1.6%) permanent molars had caries in patients that underwent sedation.
- Table 4 shows that out of 466 children, 34 (7.5%) needed extractions post-treatment. Of the 586 children that had treatment completed under sedation, 21 (3.7%) of these children required extraction post-treatment. Lastly, 601 children required GA and 12 (2.1%) of these children required extraction post-treatment.
- Table 5 shows that there were found to be 39 broken restorations and/or space maintainers in 1,445 (2.8%) ASA I patients. Amongst the ASA II patients there were 5 broken restorations and/or space maintainers out of 193 (2.7%).

CONCLUSIONS

- The following conclusions are statistically significant:
- The frequency of pre-treatment visits for patients receiving general anesthesia as a definitive treatment was higher than those that received SDF applications
 - Overall, less patients have caries on permanent teeth after undergoing treatment under sedation compared to general anesthesia.
 - There is a slight statistical difference of number of post-treatment extractions of those that are treated with SDF versus those that have definitive treatment completed by sedation or under general anesthesia.
 - There is a statistically significant higher prevalence of broken restorations and/or space maintainers among ASA I patients as compared to ASA II pediatric patients post-treatment under general anesthesia.

REFERENCES

- Schmoeckel J, Gorseta K, Splieth CH, Juric H. How to Intervene in the Caries Process: Early Childhood Caries - A Systematic Review. *Caries Res.* 2020;54(2):102-112. doi: 10.1159/000504335. Epub 2020 Jan 7. PMID: 31910415.
- Davis MR, Johnson EL, Meyer BD. Comparing Dental Treatment between Children Receiving and not Receiving Silver Diamine Fluoride. *J Clin Pediatr Dent.* 2020 Dec 1;44(6):400-406. doi: 10.17796/1053-4625-44.6.2. PMID: 33378463.