



Changes in incremental weight and well-being of children with rampant caries following complete dental rehabilitation

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Abstract

Purpose: The purposes of this study were to determine if young children with rampant dental caries that received complete dental rehabilitation under general anesthesia: 1.) weighed less preoperatively compared to national norms; and 2.) demonstrated significant improvement postoperatively in percentile weight gain and/or quality of life indicators.

Methods: The preoperative and postoperative percentile weights based on national norms were calculated for children, aged 2-7 years old, with non-significant medical histories (absence of systemic illness) that underwent rehabilitation for rampant dental caries under general anesthesia. Changes in the quality of the children's life following dental rehabilitation under general anesthesia were determined from parental report.

Results: The results showed that there was a slight, non-significant increase in the mean percentile weight following dental rehabilitation under general anesthesia. There was no significant effect on the mean net percentile weight change based on the chronological age or weighing interval. There was, however, a significant improvement in the children's quality of life as reported by their parents.

Conclusions: Contrary to previous reports, the mean percentile weight of children with rampant dental caries was not below the 50th percentile and the slight gain in percentile weight following dental rehabilitation under general anesthesia was not indicative of a "catch-up growth" phenomenon. There was, however, a significant improvement in the children's quality of life as based upon parental report and confirmed in a previous investigations. (*Pediatr Dent* 24:109-113, 2002)

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It was reported that rampant dental caries inhibited adequate nutrition, thereby adversely affecting the growth of the body, specifically weight.¹⁻³ Acs et al⁴ found that 115 children with early childhood caries (EEC) weighed significantly less than age- and sex-matched caries-free children. The authors reported that these children (mean age=3.2±1.0 years) weighed significantly less than their matched controls. In addition, they found that as the chronological age increased, the likelihood of their representation in the lowest weight percentiles significantly increased. They hypothesized that younger children with initial carious lesions continued their high carbohydrate diet until the caries progressed to the point of chronic pain. With the onset of pain, the children then decreased their dietary intake resulting in an alteration of the established growth curve pattern.

Their study also concluded that children with EEC were more likely to weigh less than 80% of their ideal weight (8.7% vs. 1.7% in the control population), thereby satisfying one of the diagnostic criteria for failure to thrive.

According to their measurements, 19.1% of the children with EEC were in the 10th percentile or less for weight. In a similar study, Ahyon et al⁵ reported that the mean weight of 126 children with EEC, aged 3-5 years old, fell between the 25th to 50th percentile and that 7.1% weighed less than 80% of their ideal weight. Acs et al⁶ reported that, following completion of comprehensive dental rehabilitation, children with ECC demonstrated the phenomenon of "catch up growth," such that they no longer differed in percentile weight compared to their matched controls.

Table 1. Mean Age, Caries Severity, Interval Between Weighing, Weight and Percentile Weight for Patient Population

Subject parameters	Mean±SEM
Age (months)	
Pre-operative (range: 24-84)	50±2
Post-operative (range: 39-101)	64±2
Caries severity (per patient)	
Non-pulpally involved primary teeth	6±0
Pulpally involved primary teeth	5±0
Total no. primary teeth treated	12±0
Interval between weighing (months)	
	13±1
Weight (kg)	
Pre-operative	18±1
Post-operative	22±1
Percentile weight	
Pre-operative	58±5
Post-operative	62±5
Percentile weight change	
	4±3

In a conflicting report, Casamassimo⁷ reported variability in physical development of children afflicted with rampant dental caries when compared to norms for age. He found that weights were not consistently lower and some children were grossly overweight. He suggested that when a thorough look at chronic dental pain in children was accomplished, it was likely that one would see a variety of patterns, including children who 1) are malnourished and overweight; 2) cannot eat a balanced diet and subsist on sweetened liquids; 3) appear normal in weight, but whose diet

provides inadequate nutrition for optimum growth; and 4) are affected by chronic dental pain and its effects on catecholamines and regulation of growth hormone.

Recently, it was reported that rampant dental caries negatively affected the quality of life in children.^{3,8,11} Children do not always verbalize their pain and may only reflect chronic dental pain by decreased appetite and increased irritability and sleeplessness.⁸ Decreased appetite and depression, secondary to chronic dental disease, may also lead to poor behavior in school and negative self-esteem.^{3,10} Acs et al¹¹ concluded from a survey of parental report that children with rampant caries receiving complete dental rehabilitation under general anesthesia demonstrated significant improvements in pain, eating and sleeping. In addition, children with significant medical or developmental conditions were more likely to be perceived by their parents to have improved outcomes and quality of life following dental rehabilitation.

The purposes of this study were to determine if young children with rampant dental caries that received complete dental rehabilitation under general anesthesia 1) weighed less

Table 2. Mean Net Percentile Change Based on Weighing Interval

Weighing interval (months)	No.	Mean net percentile change in weight*
6-12	21	+3.03
12-18	15	+9.31
18-24	14	-0.14

*P=0.388 (ANOVA)

preoperatively compared to national norms; and 2) demonstrated significant improvement postoperatively in percentile weight gain and/or in quality of life indicators.

Methods

Healthy (free from systemic illness) Medicaid recipients ages 2-7 years old, treated under general anesthesia for rampant dental caries at the University of Florida College of Dentistry, were eligible for inclusion in the study. The same parent/care provider was interviewed regarding the child's quality of life prior to and after dental treatment under general anesthesia. The specific questions asked during the interview were if the child: complained about his/her teeth; had

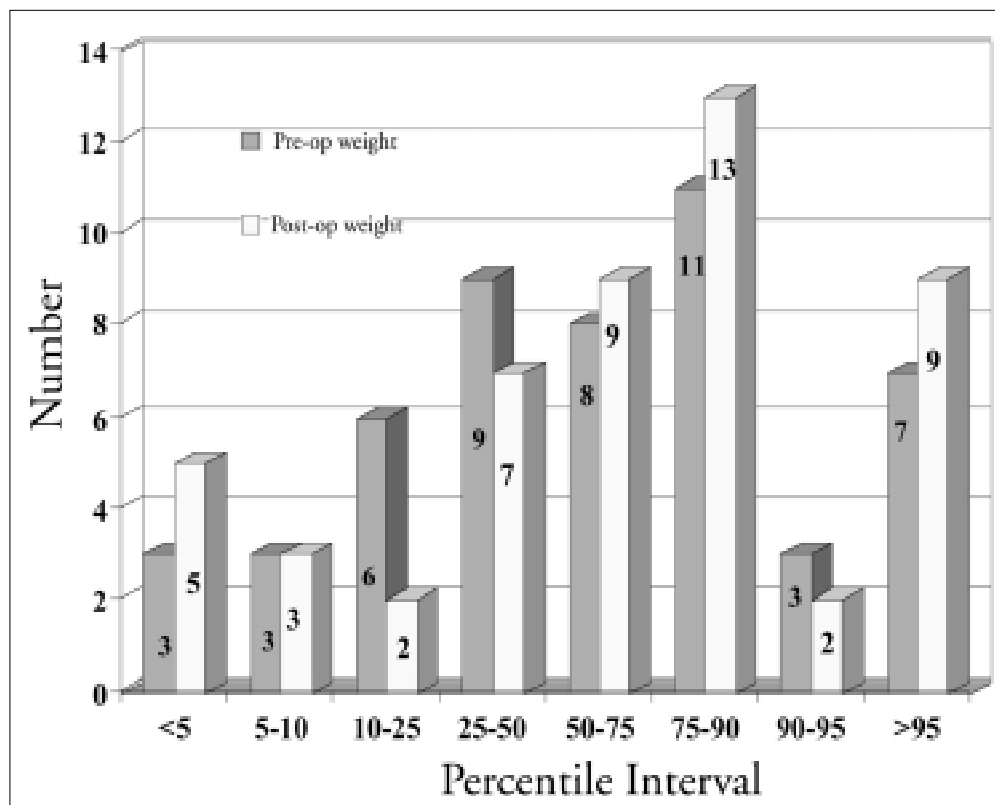


Fig 1. Distribution of subjects within the NCHS Growth Curve Intervals

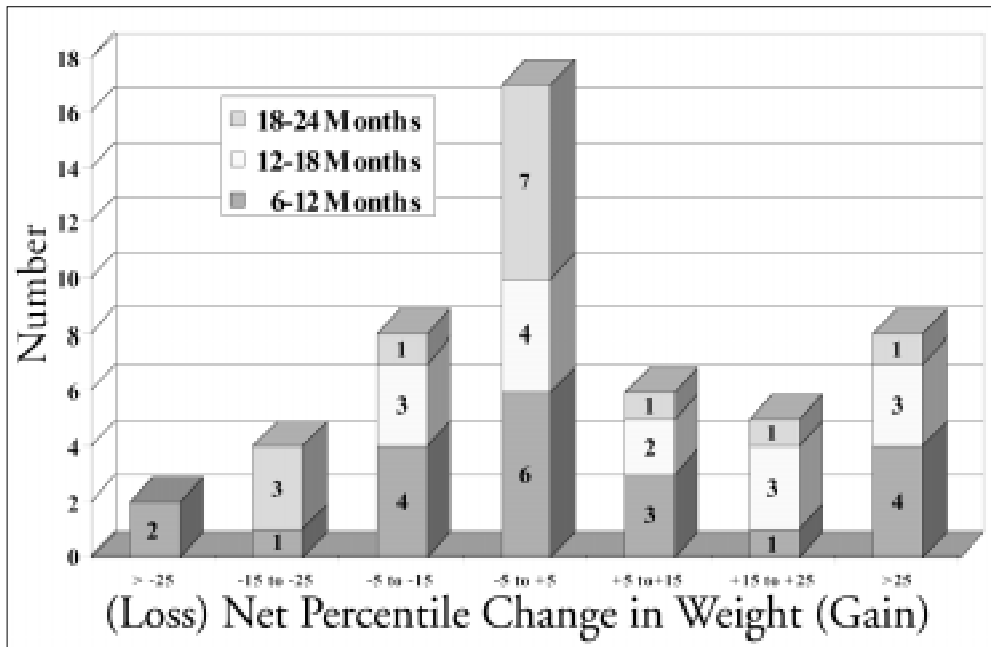


Fig 2. Distribution of subjects according to net percentile change within each weighing interval

problems chewing certain foods (cold, sweet, hard); had limited the amount of food he/she ate; slept poorly during the night; and displayed an agitated behavior. In addition, at the post-op interview, the parent was asked if they felt the child's overall quality of life had improved as a result of the dental rehabilitation.

Pre-operative weights were obtained from the child's pre-op physical examination. The examiner measured post-operative weights at the time of the recall examination (this information was obtained by telephone in a few subjects when the examiner was convinced that the measurement was valid). Weights were converted into z-scores for age-weight-gender percentiles according to the equation: $Z = ((X/M)^L - 1)/(LS)$, where X equals patient's weight and values M/L/S were obtained from age-gender based tables provided by the National Center for Health Statistics.¹² Z-scores were then converted into percentile weights using a standard Z-score table for positive and negative values.^{13,14}

Results

Fifty patients, meeting the inclusion criteria, were recruited for the study. There were 20 (40%) female and 30 (60%) male patients in the population. The mean chronological age, caries severity, interval between weighing, weight and percentile weight for the patient population are illustrated in Table 1. Table 2 demonstrates the mean net percentile change for each of the three, six-month weighing intervals. There was no significant difference in the mean interval between weighing and the mean post-operative age on the type of net percentile change (either a loss, no change, or gain) as illustrated in Table 3. Fig 1 depicts the distribution of subjects within NCHS growth curve intervals. The

distribution of subjects according to net percentile change within weighing intervals is reported in Fig 2. The responses to the quality of life questions are included in Table 4 and revealed significant improvements in all parameters according to the parents interviewed.

Discussion

Regularity in growth is the result of a dynamic and complex system of control.¹⁵ Healthy children establish and follow a stable velocity growth curve for weight. It is very difficult to deflect the children permanently

away from their established weight growth curve. Various insults, including nutritional deficiencies, may deflect children from their normal growth curve temporarily. With correction of these conditions, children will usually exhibit "catch-up growth," rising initially above before falling back onto the established growth curve.^{16,17}

Recently, the effect of rampant dental caries on the weight^{1,2,4-7} and quality of life of children^{3,8,11} has been investigated. In comparison to these previous investigations, the present study of children with rampant caries had a slightly greater mean chronological age but revealed a much different (neutral) effect on body weight. Prior studies have relied on age- and gender-matched, caries-free controls for comparison of weight changes. The new 2000 NCHS growth data provided an opportunity to use contemporary national norms as an alternative means of comparison. Also, previous investigations on weight changes following dental rehabilitation have incorporated children with compromising medical conditions.

Table 3. Net Percentile Change Based on Mean Interval Between Weighing and Mean Post-operative Age

Subject parameters	Net percentile change in weight			P value*
	Loss (28%) ¹	No change (34%) ²	Gain (38%) ³	
Mean interval between weighing (months)	12.7±1.5	13.9±1.4	12.6±1.1	0.753
Mean post-operative age (months)	61.2±2.7	65.4±3.7	65.5±3.9	0.670

¹net percentile change >-5; ²net percentile change -5 to +5; ³net percentile change >+5; *ANOVA

Table 4. Responses to the Survey on the Quality of Life

Child displayed	Pre-operative	Post-operative
Complaints about his/her teeth	56%	2%
Chewing problems	60%	8%
Limiting the amount of food eaten at meals	52%	4%
Sleeping problems	30%	4%
Behavior problems	32%	0
Overall improvement	–	90%

All of the children in this population and previous studies were of low socioeconomic status. It is well known that children who were at or below the poverty level experienced a higher number of untreated carious teeth than do children above the poverty level.^{18,19} Regardless of the low socioeconomic status of the children in the present study, they were not significantly below the 50th percentile in weight according to the 2000 NCHS growth curve data.¹² In fact, the mean preoperative percentile weight of the children in this population was slightly above 50th percentile, at 57.9 ± 4.6 , in contrast to the previous studies^{4,5} where the mean percentile weight was between the 25th and 50th percentile.

Another study by Acs et al³ evaluated the effects of dental rehabilitation on the body weight of children with ECC. They studied growth velocities over a mean follow-up length of 1.6 ± 0.8 years after dental rehabilitation versus a matched control group and found a significantly greater growth velocity in the children with ECC following treatment. They found that comprehensive dental rehabilitation resulted in catch-up growth. Although the present study did not evaluate growth velocity, it did evaluate the mean percentile weight change at three specific intervals of follow-up evaluation and found that the time interval did not affect the mean percentile weight change. The results of this study suggested that dental rehabilitation under general anesthesia resulted in a slight, but non-significant, increase in percentile weight. Therefore, this slight improvement in weight did not support the claim that patients treated for rampant caries under general anesthesia experienced a period of catch-up growth.

The population of this study was fairly evenly distributed across the NCHS growth curve intervals of <5 to >95 percentiles (Fig 1), with the most patients being in the 75th to 90th percentile interval, both pre-operatively and post-operatively. Using ANOVA, there was no significant difference in the mean net percentile change in weight based on the postoperative weighing interval (Table 2) as illustrated in Fig 2. Table 3 illustrates that there was no significant difference in the type of net percentile change (weight loss, no change, or weight gain) according to either the mean interval between weighing or the mean post-operative age. The present study, therefore, did not support the previous finding of Acs et al² that, as the age of children increases, there was an

increased likelihood of representation in the lowest weight percentiles.

The impact of chronic pain varies, depending on the child's developmental level.⁹ Young children in pain may become quiet and withdrawn. School-age children in pain often respond with depression. With dental disease, one could speculate that not only would depression cause anorexia but also dental pain itself might further decrease oral intake, thus creating an undernourished child with inadequate caloric intake for maximal growth. Although there was no significant effect of dental rehabilitation on children's weight changes, there was a significant improvement in their quality of life as reported by their parents. Because children are poor historians, they do not always verbalize their pain but rather reflect their pain by decreased appetite and increased irritability and sleeplessness.^{7,9}

The questionnaire designed in this study addressed all of these indicators. It reflected that, prior to treatment for rampant dental caries under general anesthesia, children complained about their teeth, had chewing problems, limited the amount of food eaten at meals, slept poorly and were irritable. After dental treatment, there was a significant attitudinal change ($P < 0.05$) towards an improvement in all of the indicators addressed. When interviewed, 90% of parents/guardians agreed that their child's quality of life was improved following dental treatment, with the remaining 10% being neutral. Other reports^{8,11} revealed similar results on the effect of dental treatment for rampant caries. They reported a significant effect in alleviating the complaint of pain, of reversing certain eating problems and improving sleeping habits.

Conclusions

Young children with rampant caries, who received complete dental rehabilitation under general anesthesia, demonstrated significant improvement in their quality of the life as reported by their parents. However, they failed to confirm either the below-normal percentile weight pre-operatively compared to the national norms for age and gender or the significant weight gain (catch-up growth) previously reported in the literature to occur among this population following dental rehabilitation.

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ABSTRACT OF THE SCIENTIFIC LITERATURE



PREPARING TO MEET THE DENTAL NEEDS OF INDIVIDUALS WITH DISABILITIES

The purpose of this article was to provide a review of the past and current level of didactic and clinical education received by dental students in the treatment of individuals with disabilities. Secondly, the authors discussed three areas that have led to an increased number of these patients not receiving necessary dental care. In 1993, the Academy of Dentistry for Persons with Disabilities surveyed all U.S. and Canadian dental schools and found that in a four year curriculum, on average, 12.9 lecture hours and 17.5 clinical instruction hours per student were spent on individuals with disabilities. In 1996, these numbers had dropped to less than five hours of didactic training in 53% of the dental schools and less than 5% of total clinical instruction time in 73% of the schools. According to the authors, the three factors that have led to an increase in the number of patients with disabilities not receiving adequate dental care are: (1) deinstitutionalization, which has led to an increase in disabled individuals living in the community; (2) a lack of education and experience in treating patients with disabilities, which results in a negative attitude toward these patients; and (3) inadequate third-party (Medicaid) reimbursement for services rendered.

Comments: As pediatric dentists, we realize the need for us to treat patients with disabilities, but this article points out the need for dental schools to do more to train general dentists to treat these patients.

MM

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