



...broadly

speaking, the milieus in which children spend their early years exert a very strong impact on the standards by which they subsequently judge the world around them. Whether in relation to fashion, food, geographical environment, or manner of speaking, models initially encountered by children continue to affect their tastes and preferences indefinitely, and these preferences prove very difficult to change.

— Howard Gardner

CHARMING CHILD OCCUPIED WITH PLEASURE,  
WE JEER AT YOUR FRAGILE ENDEAVORS,  
BUT BETWEEN OURSELVES, WHAT IS MORE SOLID,  
OUR PROJECTS OR YOUR CASTLE?

—Lepicié



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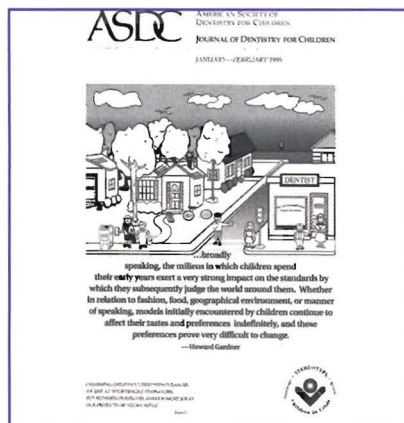
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The infancy and early childhood years are the most important for molding the character and personality of the child.

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- |    |                 |         |                         |
|----|-----------------|---------|-------------------------|
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|    | ASDC Awards     | 11      | Croll book              |
| 7  | Information     | 16      | Editorial               |
| 8  | Nomination form | Cover 4 | IAPD meeting            |
| 6  | ASDC brochures  | 13      | Index to advertisers    |
| 1  | ASDC meeting    | 14      | Message from Norm Olsen |
| 4  | Busy reader     | 15      | President's message     |

## CLINIC

### 17 Class II vitremer restoration of primary molars

Theodore P. Croll, DDS; Mark L. Helpin, DDS

*The successful results obtained with the Vitremer Tri-Cure System suggests its potential as a replacement for silver amalgam in primary teeth.*

### 22 Polycarboxylate cement as a cavity-sealing material for the calcium hydroxide pulpotomy: A retrospective study

R.J.M. Gruythuysen, DDS, PhD; M.F.G. Smits, DDS

*Concerns about the systemic effects of formocresol have led investigators to seek alternatives to formocresol for pulpotomies in primary teeth.*

### 25 Orthodontic diagnosis and treatment planning in the primary dentition

Peter Ngan, DMD; Henry Fields, DMD, MS

*The authors offer a perspective on the orthodontic conditions most closely related to the primary dentition.*

### 34 A longitudinal assessment of predictive value of a caries activity test in young children

Jiro Tsubouchi, DDS, PhD; Seiji Yamamoto, DDS; Tsutomu Shimono, DDS, PhD; Peter K. Domoto, DDS, MPH

*The Cariostat test assesses the acid production of microorganisms in dental plaque.*

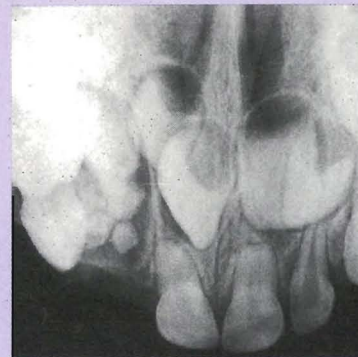
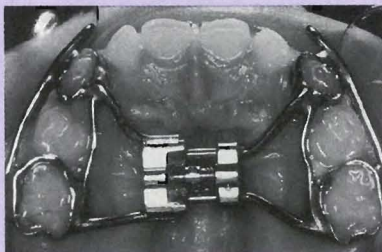
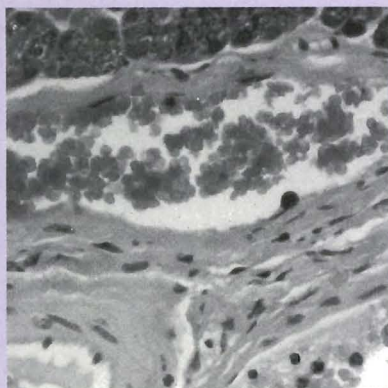
## BEHAVIOR

### 38 How important are techniques? The empathic approach to working with children

John F. Roberts, BDS

*From our positions of experience and authority, we decide which child behaviors we will allow while treating our pediatric patients.*





#### 44 Anxiety reduction with nitrous oxide: A permanent solution?

J.S.J. Veerkamp, DDS, PhD; R.J.M. Gruythuysen, DDS, PhD; J. Hoogstraten, PhD; W.E. van Amerongen, DDS, PhD

*Dental treatment causes a certain amount of stress, and children must learn to cope with it by improving their ability to cope.*

#### 49 Transcutaneous electrical nerve stimulation (TENS) for pain management during cavity preparations in pediatric patients

Mark Harvey, DMD, MDS; Margaret Elliott, DDS, MPH

*With this technique it is possible to treat patients with a nonthreatening, noninvasive, and nonmedicinal analgesia.*

#### 52 Differences between normal and developmentally disabled children in a first dental visit

J.R. Boj, DDS, PhD; J.M. Davila, DDS, MS

*The application of behavioral techniques with developmentally disabled children is especially limited.*

### CHILD ABUSE

#### 57 Child abuse education: Do not overlook dental professionals

Mary M. Von Burg, MS; Roberta A. Hibbard, MD

*Structured courses on identification and reporting of child abuse and neglect should be required for all professionals licensed to work with children.*

### DEMOGRAPHICS

#### 64 Your pediatric patients may be moving away from your practice

H. Barry Waldman, BA, DDS, MPH, PhD

*The author provides a general overview of the residence changes of the children and adults in our respective communities.*

### CASE REPORTS

#### 67 Turner's syndrome in association with hemangioma of the parotid gland: Report of case

Jayashree Mysore, BDS, MDS; Lawrence M. Roth, MD; Abdel H. Kafrawy, BDS, MSD

*Several findings of interest to the dentist have been reported.*

#### 70 Calcifying odontogenic cyst in infancy: Report of case associated with compound odontoma

José Augusto G.P. Oliveira, DDS, PhD; Claudia Jordao da Silva, DDS.; Ivan Miguel Costa, DDS; Adriano Mota Loyola, DDS, MSD

*The authors report a case of the disorder occurring in a three-year-old patient.*

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# For the busy reader

## **Class II vitremer restoration of primary molars—page 17**

Evidence is being rapidly recorded to support the use of vitremer as a replacement for silver amalgam in the primary teeth. The authors have observed more than 600 class II restorations in primary molars placed since March 1992, with excellent results.

Requests for reprints should be sent to: Dr. Theodore P. Croll, Georgetown Commons, Suite #2, 708 Shady Retreat Road, Doylestown, PA 18901.

## **Polycarboxylate cement as a cavity-sealing material for the calcium hydroxide pulpotomy: A retrospective study—page 22**

Because of the unanswered questions concerning the toxic, immunogenic, mutagenic, and carcinogenic effects of formocresol for pulpotomies in the primary teeth, alternative drugs are being tested. This paper deals with polycarboxylate cement as a cavity-sealing material for the calcium hydroxide pulpotomy.

Requests for reprints should be sent to: Dr. R.J.M. Gruythuysen, Department of Pediatric Dentistry, ACTA, Louwesweg 1, 1066 EA Amsterdam, The Netherlands.

## **Orthodontic diagnosis and treatment planning in the primary dentition—page 25**

The authors outline strategies for dealing with problems commonly seen in the primary dentition; and provide a perspective on those orthodontic conditions most related to the primary dentition as the point of intervention.

Requests for reprints should be sent to: Dr. Peter Ngan, Department of Orthodontics, West Virginia University, Health Science Center North, P.O.B. 9480, Morgantown, WV 26506.

## **A longitudinal assessment of predictive value of a caries activity test in young children—page 34**

The authors evaluated longitudinally the predictive value for dental caries of the Cariostat test, used in young chil-

dren. They conclude the test to be reliable and recommend its use.

Requests for reprints should be sent to: Dr. Peter Domoto, Department of Pediatric Dentistry, SB-26, School of Dentistry, University of Washington, Seattle, WA 98195.

## **How important are techniques? The empathic approach to working with children—page 38**

Behavior management is largely about anxiety management, usually that of the child, but not infrequently that of ourselves. We teach children to behave, and strengthen or weaken existing behaviors or coping strategies they may have previously learned, depending upon how appropriate those behaviors are to us.

Requests for reprints should be sent to: Dr. John F. Roberts, 33 Weyworth Street, London W1N 3FL, England.

## **Anxiety reduction with nitrous oxide: A permanent solution?—page 44**

The authors emphasize the importance of realizing that dental treatment will cause a certain amount of stress not to be neglected by the clinician; and secondly, that children must learn to deal with the stress.

Requests for reprints should be sent to: Dr. J.S.J. Veerkamp, Department of Pediatric Dentistry, ACTA, Louwesweg 1, 1066 EA Amsterdam, The Netherlands.

## **Transcutaneous electrical nerve stimulation (TENS) for pain management during cavity preparations in pediatric patients—page 49**

Although clinical data from tests with the device show favorable results, the mechanism of action remains controversial.

Requests for reprints should be sent to: Dr. Mark A. Harvey, Assistant Professor, Pediatric Dentistry Department, School of Dental Medicine, Room 364, University of Pittsburgh, Pittsburgh, PA 15261.



**Differences between normal and developmentally disabled children in a first dental visit—page 52**

The authors developed a tape/slide series based on the principles of desensitization and modeling to prepare three-year-old and four-year-old children for their first dental examinations. The experimental group behaved better and had lower heart rates than the control group.

Requests for reprints should be sent to: Dr. J.R. Boj, Prats de Mollo 10, 08021 Barcelona, Spain.

**Child abuse education: Do not overlook dental professionals—page 57**

Because most states include dentists in the category of medical professionals, it is difficult to learn how many dentists have reported cases of child abuse and neglect. The authors discuss the importance of including all professionals who have any contact with children in our educational programs on abuse and neglect.

Requests for reprints should be sent to: Ms. Mary M. Von Burg, The Community Child Abuse Projects, Indiana University School of Medicine, 1001 West 10th Street, BU 444, Indianapolis, IN 46202.

**Your pediatric patients may be moving away from your practice—page 64**

The author provides a general overview of the residence changes of the children and adults in our respective communities.

Requests for reprints should be sent to: Dr. H. Barry Waldman, 5 Pleasant Drive, Setauket, NY 11733-1918.

**Turner's syndrome in association with hemangioma of the parotid gland: Report of case—page 67**

Several findings of dental interest are seen in these cases, including sphinx-like expression, premature eruption, crowding of the teeth, and deviations in tooth size and shape, and in thickness of enamel.

Requests for reprints should be sent to: Dr. Abdel H. Kafrawy, Professor, Department of Dental Diagnostic Sciences, Indiana University School of Dentistry, 1121 W. Michigan Street, Indianapolis, IN 46202.

**Calcifying odontogenic cyst in infancy: Report of case associated with compound odontoma—page 70**

Contrary to the usual age pattern for this disorder, the patient described in this report was only three years old.

Requests for reprints should be sent to: Dr. José Augusto G.P. Oliveira, Ave. Pará, 1720, DOCR - BLOCO U, C. Umuarama - Uberlandia (MG), Brazil.

## CLINIC

# Class II vitremer restoration of primary molars

Theodore P. Croll, DDS

Mark L. Helpin, DDS

Since initial reports about “resin-modified”, glass-ionomer cements, used for restoring primary teeth, more has been learned about such restorations.<sup>1-3</sup> Although all of the resin-modified glass-ionomers (Fuji II LC [GC International], Photac-Fil [ESPE/Premier Sales Corp] and Vitremer [3M Dental Products Division]) have performed well over two and a half years, when used for Class III and Class V restorations, one of the products is demonstrating remarkable durability for restoration of primary molars with Class I and Class II carious lesions. In addition the procedure for placing such restorations is as quick and uncomplicated as is the technique for placing Class II silver amalgam restorations.

The Vitremer Tri-Cure System (3M Dental Products Division) is made up of four components:

- Primer*—Consisting of the Vitrebond copolymer, HEMA (2-hydroxyethylmethacrylate), ethanol and photo-curing agents. The purpose of the primer is to modify the smear layer and completely wet the tooth structure to accommodate the glass polyalkenoate acid/base bonding reaction.
- Glass powder*—Consisting of fluoroaluminosilicate glass particles. The powder also contains a propri-

etary reduction/oxidation system using “microencapsulated”, potassium persulfate and ascorbic acid that catalyzes a methacrylate “dark cure” of the cement.

- Liquid*—Consisting of an “aqueous solution of polyacrylic acid modified with pendant methacrylate groups” (Internal communication, 3M Dental Products Division). Also in the liquid solution are the Vitrebond copolymer, HEMA, water and photoinitiators for the visible-light curing reaction.
- Resin gloss*—Consisting of a clear, BIS-GMA/TEGDMA visible-light polymerizing, dental-bonding-resin liquid.

Modification of the glass-ionomer formulation with a visible light curing resin component improves the physical properties of the cement, simplifies clinical handling of the material, and significantly reduces operating time. The resin component allows for “on command” initial hardening, and the set cement has all the beneficial properties of traditional glass polyalkenoate formulations such as:

- Biocompatibility.
- Forming a chemical bond to tooth structure.
- Fluoride ion release with uptake by adjacent tooth structure.
- Coefficient of thermal expansion quite similar to tooth structure.

Dr. Croll is in private practice, pediatric dentistry, Doylestown, Pennsylvania; Clinical Professor, Department of Pediatric Dentistry, University of Pennsylvania School of Dental Medicine; Clinical Professor, Craniofacial Growth and Development (Pediatric Dentistry) University of Texas Health Science Center at Houston (Dental Branch); Adjunct Assistant Professor, Department of Pediatric Dentistry, University of Iowa College of Dentistry.

Dr. Helpin is Chairman, Department of Pediatric Dentistry, University of Pennsylvania School of dental Medicine; Chief, Dental Division, Children's Hospital of Philadelphia.

The authors gratefully acknowledge 3M Dental Products Division for a grant to support the color photographic reproduction in this work.

The senior author (TPC) acknowledges financial interest in STRIP-T's matrices by virtue of a licensing agreement with DENOVO CORP.





Figure 1. The rubber dam is applied and wooden wedges are placed.



Figure 2. Preparation of outline form exposes the proximal carious lesions.



Figure 3. Carious substance is debrided. Final cavity form resembles that for silver amalgam restorations.



Figure 4. .0015 in. thickness matrix strips are inserted and firmly wedged.

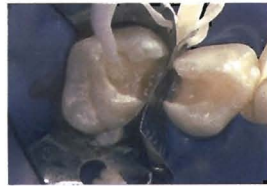


Figure 5. Vitremer Primer is applied, saturating each preparation.



Figure 6. The primer is exposed to the light beam for twenty seconds.

- Hydrophilic nature.
- Tooth shades.
- Injectability for easy handling.
- Low solubility in the oral environment.

In addition to the light curing mechanism, Vitremer hardens by the acid/base, glass-ionomer reaction, and a chemical "dark cure" catalyzed by a reduction/oxidation reaction. The dark cure is perhaps important in deeper restorations in which light beam penetration may not be sufficient for completion of the light-hardening phase.

Ultimate intraoral longevity of Vitremer restorations can only be conjectured now, but the remarkable success of glass-ionomer silver-cermet cement (Ketac-Silver, ESPE/Premier Sales Corp.) in primary molars over a six to ten-year period and the positive reports offered at the Second International Symposium on Glass Ionomer Cements perhaps augur similar or greater potential for the resin-modified glass-ionomer cements.<sup>4-6</sup>

This article describes a step-by-step procedure for simultaneous placement of two Class II, resin-modified, glass ionomer restorations in adjacent primary molars. Observations on more than 600 other such restorations, placed since March of 1992, are reported and the potential of resin-modified, glass-ionomer, restorative cement is discussed.

## TECHNIQUE

Class II restorations of adjacent primary molars, using the Vitremer Tri-Cure System, can be placed as follows:

- Appropriate local anesthetic is administered and the rubber dam applied. Occlusion should now be evaluated and opposing "plunger" cusps flattened and rounded. A wooden wedge is inserted interproximally to protect the rubber dam material and gingival tissue (Figure 1). An extra wooden wedge can be used to help stabilize the rubber dam.
- Cavity design can be similar to that for a Class II silver amalgam restoration. After initial outline form is cut with a water-cooled, high-speed bur, the carious substance is exposed and removed (Figures 2 and 3). Cavity design should include greater width and depth than in an analogous preparation made for silver amalgam (Figure 3). Even though more tooth structure is sacrificed, there will be a greater bulk of cement, enhancing some strengths. One also must keep in mind that the tooth will eventually exfoliate and conserving tooth structure is less critical than in a permanent tooth preparation.
- Two .0015 in. matrix strips (Strip-T's, Denovo Corp.) are bent, contoured and then inserted in-



Figure 7. A thick, completely blended mixture of cement is slowly injected, taking care to avoid air entrapment.



Figure 8. Each restoration is exposed to the light beam for forty seconds.



Figure 9. The matrix strips are removed with pliers or the tethered dental tape. An explorer tip, inserted through the wing holes, can also be used to withdraw the strips.



Figure 10. A #10 round bur at slow speed is used to remove excess hardened cement and sculpt occlusal anatomic form.

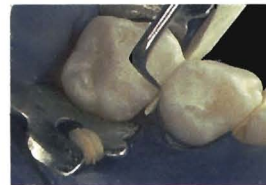


Figure 11. A sharp carver removes overhanging cement excess in the proximal regions.



Figure 12. A matrix strip is reinserted and 40 percent phosphoric acid is applied to the cement and enamel surfaces, for twenty seconds.

terproximally. Using a serrated amalgam condenser, a wooden wedge is forcibly compressed between the strips, (Figure 4). The wedge not only firmly compresses the matrix strips against the respective teeth, but also causes slight separation of the teeth, which makes up for the thickness of the matrices. Once the wedge and strips are withdrawn, the separated molars rebound in their periodontal ligament spaces, and proximal contact of the two restorations follows. Reestablishment of contact can be confirmed by testing with dental floss after completion of the restorative procedure.

- Vitremer primer is applied within the preparation and exposed to the visible light beam for twenty seconds (Figures 5 and 6).
- A thick blend of cement is mixed and placed in a Centrix Accudose syringe tip (Centrix Inc., Shelton, CT). The cement blend should include the highest powder/liquid ratio possible, but great care must be taken to assure that all the powder is wetted during spatulation, and that the mixture is sufficiently plastic to permit injection by syringe. The cement is

then carefully injected into the cavity preparation, slowly filling it, from the bottom up, with care to avoid any entrapment of air bubbles (Figure 7). Once hardened, entrapped air makes voids in the restorative mass, and can undermine the restoration. The visible light beam is then applied for forty seconds from the occlusal direction (Figure 8).

- Using pliers, the tethered dental tape, or explorer tip inserted in the holes, the matrix strips are removed (Figure 9). With the wooden wedge still in position, the excess occlusal cement is carved with a #10 round bur using slow-speed (Figure 10). The excess is rapidly reduced and the large bur prevents gouging of the surface. No attempt is made to trim the restoration to its cavosurface margins. Though excess silver amalgam material at cavosurface margins is considered "flash" and removed, excess adhesive restorative material can be considered a cavosurface marginal sealant. Using sharp hand-held carving instruments or a periodontal scaler, the restorations are trimmed to contour (Figure 11).





Figure 13. Resin "gloss" (sealant) is applied and cured with twenty seconds light exposure.



Figure 14. The occlusion is evaluated and adjustments are made to the restorations or opposing molars.



Figure 15. Sixteen months after treatment.

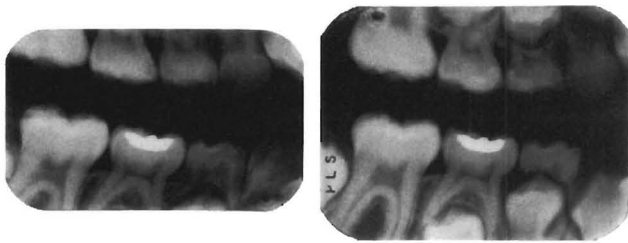


Figure 16. Bitewing radiographs: preoperatively (left), sixteen months after treatment (right).

- After rotary and hand-instrument carving are completed, one matrix strip is again inserted interproximally, in preparation for application of the resin sealant "gloss". Forty-percent phosphoric acid is applied to the cement surface and adjacent enamel for twenty seconds (Figure 12). After rinsing and drying the tooth surface, the resin gloss is applied and after saturating the cement and enamel for five to ten seconds, it is polymerized with a twenty-second-light-beam exposure (Figure 13).
- The matrix strip and rubber dam are then removed. Occlusal contacts are evaluated with articulating paper and necessary adjustments are made to the restorative surface or opposing tooth (Figure 14). Proximal contact can now be confirmed with dental tape or a double thickness of floss.
- The restorations are shown, sixteen months after placement (Figures 15 and 16).

## DISCUSSION

We have placed over 600 Class II Vitremer restorations in primary molars since 1992. Each of these restorations was documented by patient name, tooth designation,

date of placement, and whether the restorations were sealed or not. Even though the manufacturer provides a variety of tooth-colored shades, we use the "Pedo" shade for all primary tooth restorations. We have had the opportunity to observe more than 250 of our Class II Vitremer primary molar restorations, between twelve and eighteen months postoperatively and have seen no fractures, no marginal stain, no signs of subsequent caries and no wear sufficient enough to expose cavosurface margins of any cavity preparation. None of our primary molar Class II Vitremer restorations has yet required repair, replacement or any other clinical intervention as of this writing (October 1994).

Apparently, addition of the resin component to the predominantly glass polyalkenoate formulation overcomes the two chief physical deficiencies of the self-hardening glass-ionomers: poor wear resistance and poor fracture strengths. Another advantage of the rapid initial light-hardening is that the cement surface doesn't experience early damage from overhydration or desiccation. The "on command" hardening potential in less than sixty seconds is also a significant practical benefit that can save five to seven minutes of operating time for each restoration when compared to the self-hardening glass-ionomers.

The final application of bonded resin sealant may not be necessary in resin-modified glass ionomer restorations for primary teeth. We have performed many Vitremer primary molar restorations without the sealant and observations of some of these at two years reveal no perceptible difference in wear rates or marginal staining or other signs of deterioration, when compared to contralateral, sealed, primary-molar, Vitremer restorations. We still, however, strongly recommend application of the resin sealant for Vitremer restorations in permanent teeth.<sup>7</sup> The value of sealing resin-modified glass-ionomer restorations with bonded liquid resin in both primary and permanent teeth should be investigated *in vivo* to

determine whether the practice enhances the quality of the restoration or increases its longevity.

## CONCLUSION

This clinical technique report is a follow-up to our ongoing investigations on the use of resin-modified glass-ionomer cements for restoration of primary teeth. Our observations of Class II restorations of primary molars, using the Vitremer Tri-Cure System, reveal that such restorations are durable and reliable for at least twelve to eighteen months and show promise of even greater longevity. If any of the resin-modified glass ionomer cements do prove to last for five to eight years, used in Class I and Class II primary molar restorations, silver amalgam may be replaced as the standard restorative material for primary teeth.

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## F-GUM AND FLUORIDE RELEASE DEVICES

There is widespread agreement that fluoridated drinking water has been effective in the prevention of dental decay, and similar caries reductions have been reported in the United States and other industrialized nations in regions with F-deficient drinking water (First International Conference on Declining Prevalence of Dental Decay, 1982) where topical F agents appeared to be major determinants in the decline of dental caries. However, dental caries persists as a common disease, and it has been reported that in the United States 80% of the dental caries occurs in 20% of the population. This suggests a highly 'caries-susceptible' segment of the population, for whom the anticaries benefits which generally would be provided by conventionally available F agents/methods of application have not been realized. The reasons for these persistently high caries rates are not fully understood, but factors such as compromised salivary flow, frequent intake of fermentable carbohydrates, and bacterial virulence likely play a role. Additionally, certain special populations who are physically disabled, chronically ill, or mentally impaired and for whom compliance may be difficult or who require assistance with oral hygiene procedures (i.e., toothbrushing or mouthrinsing) could derive significant anticaries benefits from alternative F agents such as F chewing gums and FRDs. Although F gum and FRDs achieved similar levels of remineralization in this study, practical differences in their use exist between them. F gums are cheap and relatively easy to use, but require patient compliance in order to be optimally effective, whereas with FRDs compliance following intraoral placement is minimal, but the use of FRDs is expensive and remains experimental.

C.-W. Wang *et al.*: In situ remineralization of enamel lesions using continuous versus intermittent fluoride application.

*Caries Res*, 27:455-460, November-December 1993.

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# Polycarboxylate cement as a cavity-sealing material for the calcium hydroxide pulpotomy: A retrospective study

R.J.M. Gruythuysen, DDS, PhD  
M.F.G. Smits, DDS

**F**ormocresol is the preferred medication for pulpotomies in the primary dentition. Despite a high clinical success rate, concerns about its toxic, immunogenic, mutagenic, and carcinogenic effects have led investigators to seek alternatives to formocresol for pulpotomies in primary teeth. Especially in Scandinavia, calcium hydroxide is the most widely used medicament for pulpotomies.<sup>1</sup> Critical analysis of the literature suggests that the failures of the calcium hydroxide pulpotomy can be affected significantly by such variables as pulpotomy technique, cavity-sealing material, and the final restoration.<sup>2</sup> The purpose of this study is to evaluate the clinical effectiveness of the commercial polycarboxylate cement, Durelon, as a cavity-sealing material for pulpotomies in primary molars. In addition, the study focuses on the life span of primary teeth, following calcium hydroxide pulpotomy. Since all primary teeth function only temporarily, and similar teeth function for about the same duration, paired comparisons were made of primary molars with and without calcium hydroxide pulpotomy.

## MATERIAL AND METHOD

The material consisted of fifty-five primary molars treated for calcium hydroxide pulpotomy in forty-four

healthy and cooperative children. The patients were, on average, 6.8 (s.d. 1.4) years old at the time of treatment. All pulpotomies in this study were performed by fifth-year undergraduate dental students during the period 1981-1988. The clinical criteria for selection included:

- Absence of radiographically demonstrable morbidity.
- Absence of physiologic root resorption.
- Absence of excessive tooth mobility.
- No tenderness to percussion or only slightly so.
- Only short periods of pain.
- Rubber dam isolation is possible.
- The tooth is restorable.
- Normal bleeding at the site of exposure of the pulp, or at least bleeding that can be stopped easily.

## Treatment

Pulpotomy was performed under aseptic conditions. The teeth were anesthetized and isolated by rubber dam. The coronal portion of the pulpal tissue was amputated to the root canal orifices with a sharp excavator or a large round bur in a slow speed handpiece. The bleeding of the amputated pulp was stopped with a sterile cotton pellet. Next, a suspension of calcium hydroxide and water was pressed gently against the wound surface to ensure tissue contact. The excess calcium hydroxide was removed and polycarboxylate cement was used as a structural lining. The tooth was subsequently restored with amalgam or a stainless steel crown.

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## Data collection

All data were recorded at the half-yearly check-ups and on interpretation of radiographs. These data consisted of the following: patients' age and sex, date and reason of absence of test tooth and control tooth (contralateral), and reasons for extraction. The available radiographs were recorded to assess two criteria: bone resorption and pathological root resorption.

## RESULTS

After one year, two teeth had exfoliated. Of the remaining fifty-three teeth, forty teeth (75.5 percent) were clinically successful (including radiographs not systematically<sup>#</sup> made). After two years, another ten teeth had exfoliated, one tooth was censored<sup>1</sup> and three teeth were extracted, yielding a clinical rate of at least 61.9 percent. After an additional three years, seventeen of the remaining twenty-six teeth had exfoliated, six teeth were censored, and three teeth were extracted. The reasons for extraction of the test and control teeth are indicated in the Table.

The mean life span of all teeth in the test group from the time of pulpotomy was  $2.4 \pm 1.5$  year, whereas that of all control teeth was  $3.1 \pm 1.6$  years. There was a significant difference in life span between the primary teeth on the test side and those on the control side (t-test,  $p < .05$ )

## DISCUSSION

During the collection of data, it proved to be impossible to record all data according to one uniform method in the context of undergraduate teaching. The results of this study should be interpreted, therefore, with care.

For seven of the test teeth and four of the control teeth, the reason for extraction was unknown. Possibly they were extracted because of abscess or fistula formation, pain, caries or tooth fracture.

Without using the preferred 'gentle technique of pulpotomy', the results of the present study compare not unfavorably with those of another study of pulpotomy of primary molars using calcium hydroxide and zinc oxide-eugenol as cavity-sealing material after a 'gentle technique of pulpotomy'.<sup>3,4</sup> Zinc oxide-eugenol may not be the most suitable cavity-sealing material, however, be-

<sup>#</sup>Means that most radiographs were made for diagnosis of caries and not for evaluation of pulpotomies.

<sup>1</sup>Not available for examination because the patient dropped out of the study.

Table □ Indications for extraction of teeth.

Indications	test-tooth (N)	control-tooth (N)
1. pathological root resorption	4	1
2. bone resorption	3	-
3. root and bone resorption	5	3
4. unknown	7	4
Total (N)	19	8

cause of the pulpal inflammatory response associated with the eugenol component of the cement.<sup>5</sup>

In a limited study, highly favorable results were obtained after nine months with seventeen calcium hydroxide pulpotomies by controlling such variables as pulpotomy technique, calcium hydroxide compound (commercially hard-setting, Life), cavity-sealing material (Cavit), control of pulpal bleeding (aluminum chloride) and final restoration (stainless steel crown). This treatment was successful for fifteen teeth.<sup>2</sup> One of the advantages of a hard-setting calcium hydroxide seems to be an early high compressive strength, which may decrease the embolization of calcium hydroxide particles. The use of a soft cavity-sealing material such as Cavit requires placement, however, of a stainless steel crown.

In a retrospective study with formocresol pulpotomies, no significant difference was found in life span of primary teeth with (2.9 years) or without (3.5 years) pulpotomy.<sup>6</sup> The mean age of the children with these formocresol pulpotomies at the time of treatment was the same as the mean age of the children in the present study. Likewise, the number of years recorded and the type of operator (fifth-year undergraduate dental students) were the same in both studies. It is obvious, therefore, that the results of the present study compare unfavorably with those of the formocresol pulpotomy.

The results of the present study might improve, if we were to control such variables as those listed previously, including the choice of the cavity-sealing material. For example, light-cured glass ionomer lining cements may be a viable alternative for polycarboxylate cement, because some show little leakage and can be applied easily.<sup>7</sup>

## CONCLUSIONS

- Significantly shorter life spans were found in primary teeth with pulpotomy than in those without it.
- This study indicates that polycarboxylate cement can be a suitable alternative for zinc oxide-eugenol as a cavity-sealing material in calcium hydroxide pulpotomies.



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## JUVENILE RHEUMATOID ARTHRITIS

Currently, there is some concern about temporomandibular disorders in children. In some cases, these may be related to juvenile rheumatoid arthritis. This disease is best described as chronic synovitis, or synovial inflammation, in children. This synovitis can affect facial growth and cause TMJ abnormalities. A medical and dental team approach is necessary for disease diagnosis, treatment, study and research.

### MEDICAL REVIEW

There is no known cause for JRA but a combination of infection, autoimmunity and genetic predisposition is suspected. Diet, hormones and stress may modify the disease. Treatment is complex, multidisciplinary and non-curative. Its goal is to maintain function, and to prevent joint and organ damage until the disease enters remission.

Treatment may include exercise, physical therapy, splints, surgery and education. Drug therapy is directed at suppressing the inflammatory process with the least amount of medication. However, polypharmaceutical treatment is often necessary.

The diagnosis of JRA is exclusionary based on physical findings, history, radiographic study and lab testing.

The classification of JRA is complicated. Initial classification is based on the mode of presentation. In addition, there are several subgroups of each onset mode based on immunologic criteria, joint number, associated clinical features and disease course. The types are:

- polyarticular, affecting many joints, usually small joints of the fingers and hands, and also the weight-bearing joints. It is often bilateral. Patients may have fever, anemia, rheumatoid nodules and fatigue. The major hazard is deforming polyarthritis.
- pauciarticular, affecting few joints, mostly large joints and seldom bilateral. Patients may have eye inflammation. The major hazard is blindness.
- systemic, affecting few or many joints. Patients may have high fevers, rash, anemia; pericarditis, pleuritis; enlarged liver, spleen, lymph nodes; stomach pain. The major hazard is cardiac failure.

JRA patients experience periods of disease activity (flares) and remissions. The pattern of JRA is highly individual.

Tanchyk, A.: Treating growth and TMJ abnormalities in juvenile rheumatoid arthritis. *JADA*, 125:1617-1621, December 1994.

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# Orthodontic diagnosis and treatment planning in the primary dentition

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**E**arly recognition of conditions predisposing young children to malocclusions is in the hands of primary care providers who, for practical purposes, are the general practitioner and the pediatric dentist. It is important that conditions that predispose one to develop a malocclusion of the permanent dentition, be detected early in the primary dentition. This allows either intervention or monitoring on an effective basis. In general the reasons to advocate early treatment are better stability, reduction in percentage of permanent tooth extraction, reduction in overall treatment time, and better functional or esthetic end results. While this is still an area of controversy in the orthodontic profession and the time for beginning treatment is still a subject of debate, the recognition of conditions that are known to interfere with growth and development of a child should be familiar to any primary care practitioner.<sup>1-4</sup> This paper outlines strategies for dealing with problems commonly seen in the primary dentition. The purpose of this paper is to provide perspective on those orthodontic conditions most related to the primary dentition as the point of intervention.

## DIAGNOSIS OF ORTHODONTIC PROBLEMS IN THE PRIMARY DENTITION

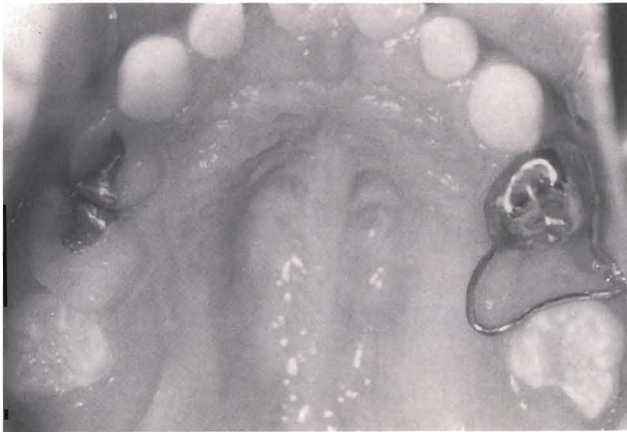
The diagnosis and treatment planning in the primary dentition begin with an adequate data base. The essen-

tial steps in determining the nature of problems include a complete medical and dental history; extraoral and intraoral examination; and appropriate radiographs, usually consisting of bitewings and a maxillary occlusal radiograph.<sup>5</sup> In the primary dentition years, evaluation of facial profiles can be difficult and should be approached carefully.<sup>6-7</sup> Before active tooth movement, or as a basis for monitoring a problem, study casts should be made. A lateral cephalometric radiograph is suggested, if anteroposterior or vertical skeletal discrepancies are suspected. A systematic description of the malocclusion should be performed, including alignment and symmetry, facial esthetics, and occlusal and jaw relationship in all three planes of space.<sup>8</sup> The following are examples of conditions that should be noted during intraoral examinations:

- Early loss of primary teeth and/or crowding (arch length considerations)
- Mesioclusion or distocclusion (anteroposterior considerations)
- Crossbite of individual teeth or in segments (transverse considerations)
- Openbites (including nonnutritive sucking habits) and deep bites (vertical considerations)

A rationale for determining the extent of the practitioner's concern for this view will be presented.





*Figure 1A. A five-year-old male with early loss of the maxillary right primary second molar. A reverse band and loop space maintenance appliance was placed to guide the eruption of the permanent first molar.*

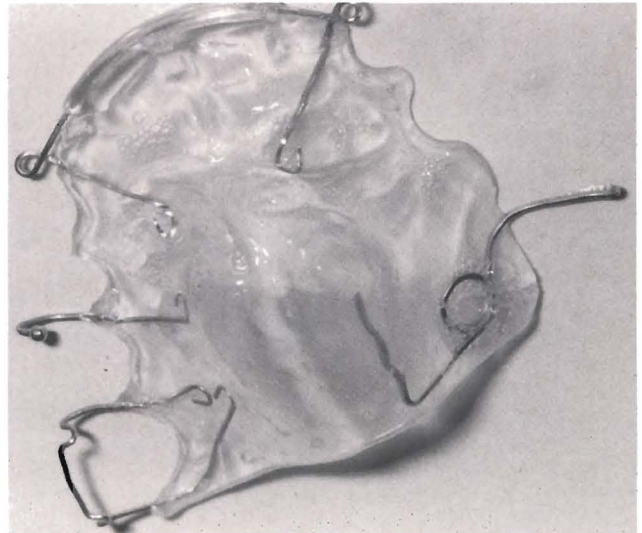
### TREATMENT PLANNING FOR EARLY LOSS OF PRIMARY TEETH

Preventive dentistry and essentially preventive orthodontics should begin during pregnancy. This is largely an educational phase, but one that can pay substantial dividends. Parents should be counseled on the advantages of postnatal, supplemental fluoride and oral hygiene to reduce dramatically the premature loss of primary teeth by caries.<sup>9</sup>

Space maintenance alone is not the appropriate treatment, if space is insufficient. Other types of treatment (extraction, expansion or space regaining) are indicated occasionally, but usually not in the primary dentition. The early loss of primary molars due to caries requires space maintenance, if space is adequate. This is particularly important, if a primary second molar is lost during the active eruption of the permanent first molar, causing the latter to tip mesially. Also, distal drifting of the primary canine is likely, if the loss occurs during the active eruption of the permanent lateral incisors.

Often the treatment of choice for unilateral loss of the primary first molar is a band and loop space maintainer. For bilateral loss of primary first molars, the authors recommend a Nance maxillary holding arch or bilateral band and loops.

A difficult problem occurs when the primary second molar is lost before the eruption of the permanent first molar. An intra-alveolar fixed space maintainer (a distal shoe) has been advocated to preserve the space; but major complications, such as difficulty in the accurate con-



*Figure 1B. A removable appliance with finger spring was used to regain space where loss was due to mesial drifting of the maxillary first molar.*

struction of the appliance and its constant presence as a foreign body can make its use difficult. An alternative approach that requires more mechanotherapy and corrective action is a reverse band and loop placed at the time of eruption of the permanent first molar. This approach requires that one plan for regaining space if needed, when the permanent first molar is erupted. Figure 1A shows a five-year-old male with early loss of the primary maxillary right second molar. A reverse band and loop appliance was placed to guide the eruption of the permanent molar. As the permanent molar erupted into occlusion, a removable appliance with finger spring was used to regain space lost to mesial drifting of the permanent first molar (Figure 1B).

In the normal primary dentition, especially by age five or six, spacing between the incisors is normal and in fact is necessary, if the permanent incisors are to be properly aligned, when they erupt. If the primary incisors contact each other proximally, one can confidently predict that the permanent incisors will be crowded and irregular. Early expansion of the primary arches has been advocated by some in order to alleviate crowding in the permanent dentition. The most aggressive method for early expansion uses maxillary and mandibular removable lingual arches in the complete primary dentition.<sup>10</sup> This produces an increase in both arch perimeter and width. The expansion is maintained for variable periods during the mixed and permanent dentition years. Lutz and

Poulton examined long-term results of this approach, and found little change in intercanine width, however, when control and treated patients were compared, but they did observe a small amount of buccal segment expansion and arch-perimeter increase.<sup>11</sup> The effectiveness of this technique in meeting the challenge of anterior crowding is questionable and unsubstantiated.

### TREATMENT PLANNING FOR MESIOCLUSAL AND DISTOCLUSAL PROBLEMS

According to a longitudinal study by Bishara *et al*, cases with a distal step occlusion in the primary dentition resulted in a Class II permanent first molar malocclusion, which will not self-correct with growth.<sup>12</sup> In cases with a flush terminal plane, 56 percent became Class I occlusions and 44 percent became Class II occlusions in the permanent dentition. In contrast, 76 percent of cases with a 1 mm mesial step became Class I, whereas only 23 percent changed to Class II, and 1 percent to Class III. In cases with a mesial step of 2 mm or more in the primary dentition, 68 percent became Class I, 13 percent Class II, and 19 percent Class III. Thus, a more favorable molar relationship in the primary dentition (flush or mesial step) lessens the chance for a Class II occlusion in the permanent dentition.

Table shows the frequency of treatment of various classes of malocclusion at different stages of tooth eruption. By the use of growth modification treatment methods, it is possible to correct distal step relationships in children relatively easily.<sup>13</sup> Animal studies using functional jaw orthopedics and extra oral forces have shown that craniofacial modifications can be effected in young animals with greater rate and magnitude.<sup>14-18</sup> This is due to the fact that the bones are less mineralized and, there-

fore, more easily deformed; sutures and ligaments are more cellular and are more responsive to mechanical forces; and growing tissues are generally more responsive to external forces.<sup>19,20</sup> There are no data, however, specifically addressing relapse of preadolescent treatment of Class II problems.<sup>21,22</sup> Recent studies on the long-term effect of using the Herbst appliance in early treatment of Class II patients indicated that dentofacial orthopaedics had only a temporary impact on the existing skeletofacial growth pattern.<sup>23,24</sup> For this reason, except in the most severe cases, it is unwise to begin treatment for a skeletal Class II problem in the primary dentition.

Moyers classified Class III malocclusion in three distinct types: The true skeletal Class III malocclusion characterized by skeletal dysplasia involving mandibular hypertrophy, maxillary retrusion or shortening of the cranial base; the pseudo or apparent Class III malocclusion that involved a positional relationship brought about by early interference with the muscular reflex of mandibular closure; the third condition involved simple linguoversion of one or more maxillary anterior teeth.<sup>25</sup> While dental crossbites can be corrected using removable or fixed appliances with relatively stable results, true skeletal Class III malocclusion requires long-term monitoring throughout puberty.<sup>4,26-27</sup> Most clinicians prefer to delay treatment of this type of malocclusion until the permanent dentition is intact, because mandibular growth is difficult to control. On the other hand, Class III treatment in the permanent dentition has often consisted of producing dental compensations for the skeletal disharmony by proclining maxillary incisors and retracting the mandibular anterior segment. Class III elastics are often used in conjunction with mandibular first premolar extraction. This approach can result in increased

Table □ Frequency and recommended treatment during primary dentition years.

Stage of eruption	Age	Class I		Class II		Class III	
Primary	3-6	Space maintenance	+++	Space maintenance	+++	Space maintenance	+++
		Space management (expansion/ext)	-	Space management (expansion/ext)	-	Space management (expansion/ext)	-
				Orthopedics: Headgear/Functional (Case specific)	-	Orthopedics: Protraction headgear and chin cap therapy (Case specific)	++
		Crossbites	++	Crossbites	++	Pseudo Class III	+++
		Nonnutritive sucking habits (openbite)	?	Nonnutritive sucking habits (openbite)	?	Nonnutritive sucking habits (openbite)	?
		Deep bite	-	Deep bite	-	Deep bite	-



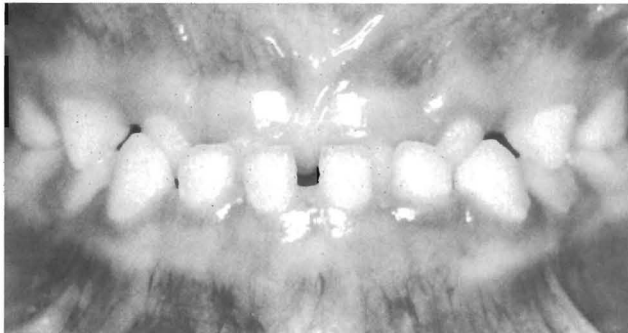


Figure 2A. A five-year-old girl presented with anterior and posterior crossbites in the primary dentition.



Figure 2B. Lateral cephalometric radiograph of the same patient immediately after insertion of maxillary expansion appliance, revealing a Class III skeletal malocclusion with maxillary deficiency.

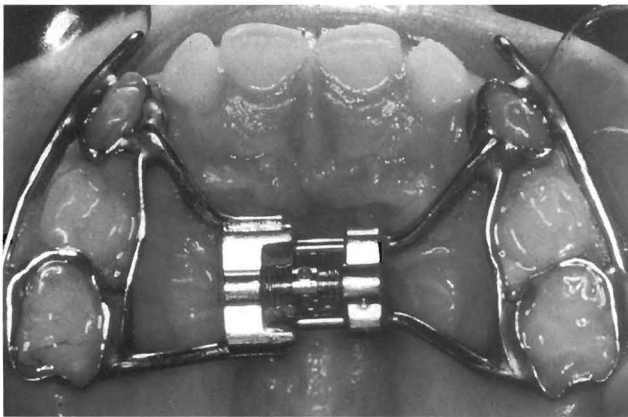


Figure 2C. Rapid palatal expansion appliance was used for transverse expansion and served as anchorage unit for maxillary protraction.



Figure 2E. Lateral view of the same patient after six months of orthopedic treatment. Note the correction in anterior and posterior crossbites.

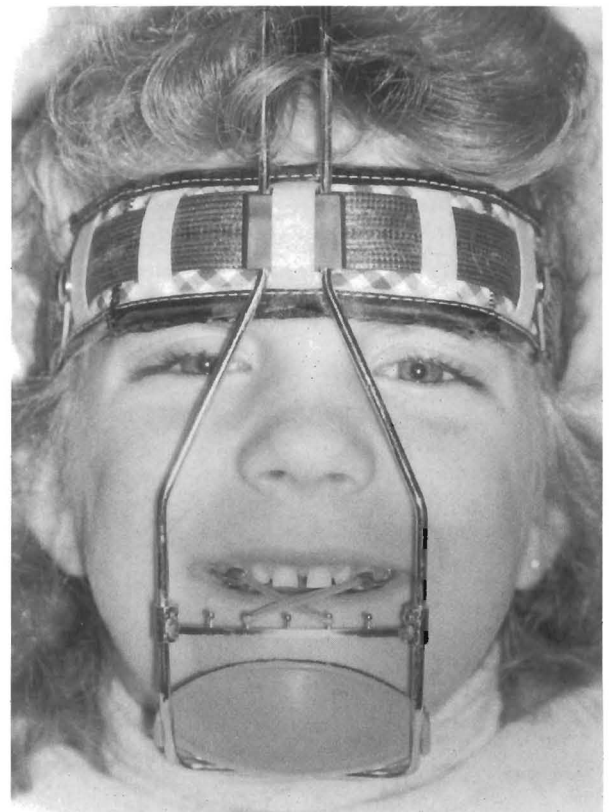


Figure 2D. Elastics delivering 380gm on each side was attached from the protraction headgear to the expansion appliance for maxillary protraction.



Figure 2F. Lateral cephalometric radiograph of the same patient after six months of orthopedic treatment. Note the improvement in maxillo-mandibular skeletal relationship.

gingival recession and tooth mobility in the anterior segment, along with compromised facial esthetics.

Another approach begins treatment after growth has been fully expressed and invariably involves a combination of orthognathic surgery and comprehensive orthodontic treatment. Although such an approach is generally effective in resolving the underlying skeletal and dental malrelationships, patients throughout childhood have to endure poor esthetics, poor function, and concomitant psychosocial problems associated with this type of malocclusion.<sup>28</sup>

Early intervention for some Class III skeletal malocclusions can at least temporarily improve skeletal relationship by influencing the increment and direction of facial growth. Protraction headgears, for example, can be used in treatment of early Class III malocclusions with maxillary deficiencies.<sup>29-32</sup> Thus, it can be argued that in borderline or minimal Class III malocclusions localized in the maxilla, current opinion favors early correction in the absence of long-term data.

Figure 2A shows the occlusion of a five-year-old girl who presented with anterior and posterior crossbites in the primary dentition. Cephalometric measurements revealed a Class III skeletal pattern with maxillary deficiency (Figure 2B). A combination of maxillary expansion and protraction headgear was used to correct maxillary deficiency and crossbite problems (Figures 2C

and D). The objectives of early expansion and protraction of the maxilla are to create an environment favorable to subsequent growth and development. Figures 2E and F show the results after six months of orthopedic intervention.

### TREATMENT PLANNING FOR TRANSVERSE PROBLEMS: POSTERIOR CROSSBITES

Transverse problems in the primary dentition are seen usually as posterior crossbite associated with a narrow upper arch. Sucking habits tend to be associated with some constriction of the upper arch, particularly in the primary canine region, and occlusal interferences may then lead to a functional shift of the mandible anteriorly and laterally. In a study by Lindner and Modeer, 97 percent of the seventy-six patients with unilateral posterior crossbites showed a forced bite with a functional shift on closure.<sup>33</sup> Lateral shift of the mandible to the crossbite side results in lower midline discrepancy, asymmetric condylar positioning, contralateral dental-arch asymmetry (crossbite side toward Class II sagittal relationship, noncrossbite side toward Class I relationship) and facial asymmetry with chin deviation to crossbite side in occlusion.<sup>34-37</sup> Soft tissue discrepancies also have been associated with long-standing transverse problems.<sup>38</sup> This is judged to be the first dimension of the face to cease growth, based on the interdigitation of the midpalatal suture, which complicates mechanical manipulation of the transverse dimension.

In treatment planning for patients with posterior crossbite, it is important to distinguish between skeletal and dental contributions to the malocclusion. A bilateral posterior crossbite could be due to a narrow maxilla or a wide mandible or a combination of both. The diagnosis can be confirmed by analyzing a posteroanterior cephalometric radiograph.<sup>39</sup>

The diagnosis of posterior crossbite often is complicated by skeletal and dental discrepancies in the sagittal and vertical dimensions. Patients with severe anteroposterior skeletal discrepancy such as in the case of Class II division 1 malocclusion can present with a complete buccal crossbite. Conversely, patients with Class III malocclusion can have bilateral posterior crossbite with normal maxillary and mandibular arch-widths.

In a study by Kutin and Hawes, primary dentition crossbites observed longitudinally without intervention show only 8.65 percent (3 out of 35) *self-correction* in the mixed dentition.<sup>40</sup> On the other hand, correction in the primary dentition increases the chance of no crossbite in the permanent dentition, and recurrence of cross-



bite is low. According to the study by Schroeder and Schroeder, thirty-two children ages three to six years with high and narrow palatal vaults and functional posterior crossbites of the primary dentition who were treated by transverse expansion showed no relapse when the permanent first molars were in occlusion.<sup>41</sup> In another study by Thilander, Wahlund and Lennartsson, twenty-six of the thirty-three patients with posterior crossbites were corrected by expansion plates and only six of twenty-eight patients who had no corrective treatment showed spontaneous correction. It is reasonable, therefore, to begin treatment of the primary crossbite in the primary dentition, unless eruption of the permanent first molars is imminent and could require additional treatment following eruption.

Figure 3 shows a flow chart for determining the appliance to be used for treating individual or segments of teeth in crossbite. The simplest form of posterior crossbite observed in the primary dentition is caused by interferences of the primary canines leading to a lateral mandibular shift, and in some cases, to a forward position of the mandible. This problem can be treated by grinding or equilibration of the primary canines. If no correction results, expansion of the maxillary arch is needed to eliminate the canine interferences.

Unilateral posterior crossbite accompanied by a lateral mandibular shift is usually due to a width discrepancy between the maxillary and mandibular arches. The discrepancy between the width of the maxilla and that of the mandible causes the mandible to deviate to one side to occlude with the posterior teeth and is usually the result of bilateral maxillary constriction (Figure 4). The

preferred treatment is to increase the width of the maxillary arch by the use of a fixed appliance such as a lingual arch type appliance (W-arch or quadhelix) or a removable appliance with a jackscrew (Figure 5).

Bilateral posterior crossbite generally results from significant skeletal maxillary constriction. Crossbites that result from bilateral maxillary constriction can be corrected by opening the midpalatal suture, which widens the roof of the mouth and the floor of the nose. Patients with bilateral posterior skeletal constriction, with no lateral mandibular shift, can be treated by a rapid palatal expander. In the primary dentition, lingual-arch-type appliances also usually accomplish skeletal changes.

Occasionally, a patient may present with a true unilateral maxillary posterior constriction. These cases can be diagnosed by the presence of a unilateral posterior crossbite in centric relation and centric occlusion and the absence of a lateral shift to compensate. These patients can be treated by a fixed appliance, such as an asymmetric W-arch, or an asymmetric split-plate removable appliance that incorporates a wire spring or jackscrew for force generation. A subset of these patients have true facial asymmetry and asymmetric growth that require more complex treatment. Generally they have symmetric maxillary arches, and simple crossbite corrections will relapse.

Crossbite corrections in the primary dentition are uniformly successful and also have an influence on arch-perimeter. The decision to treat is more obvious for those patients with mandibular shifts and severe constrictions with related crowding.

### DIFFERENTIAL DIAGNOSIS OF POSTERIOR CROSSBITE

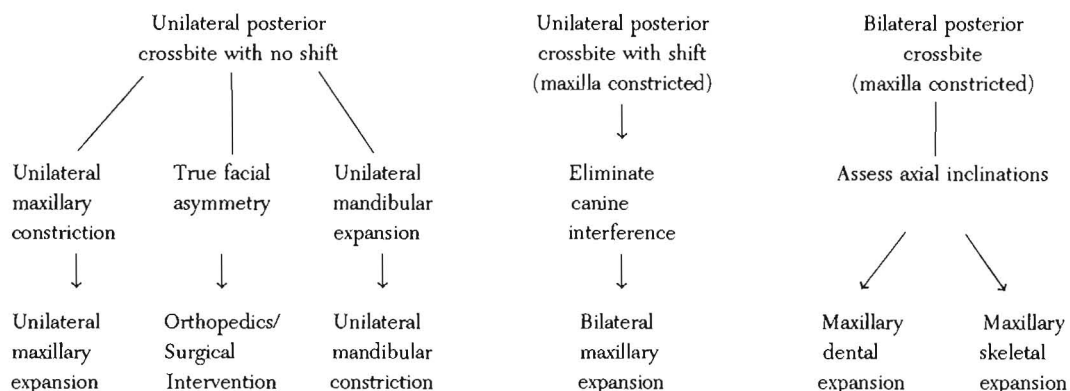


Figure 3. A flow chart for determining the appliance used for treating individual or segment of teeth in crossbite.

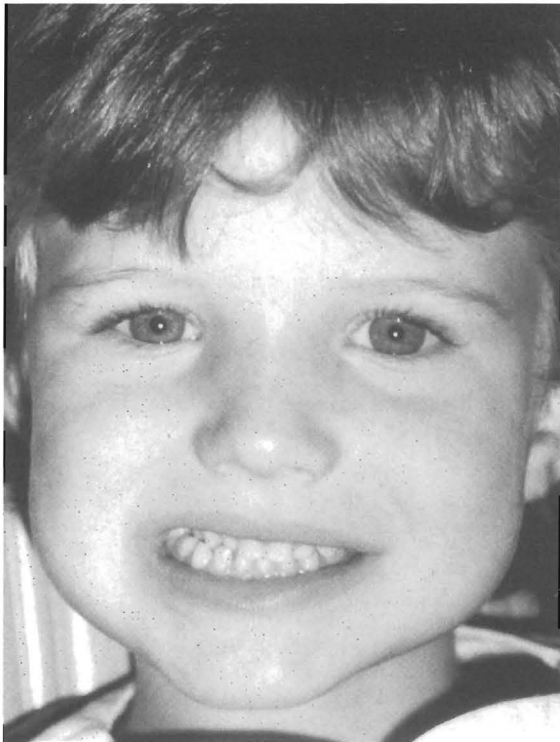


Figure 4. A five-year-old male presented with unilateral posterior crossbite and a mandibular shift on closure. Note the deviation of chin and dental midlines on closure.

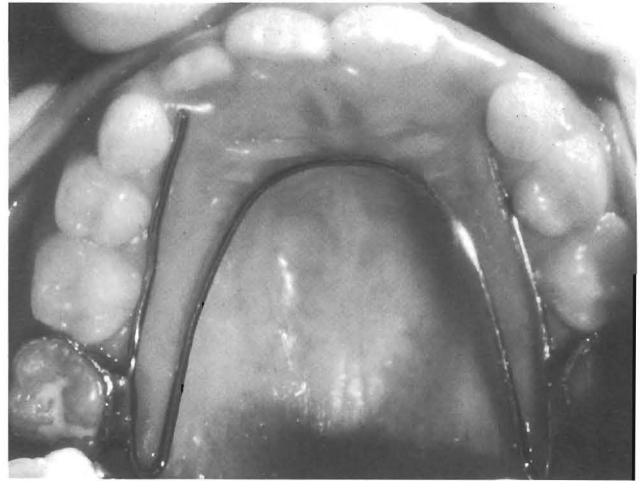


Figure 5. A lingual arch type of appliance (W-arch) is recommended for bilateral expansion in the primary dentition.

#### TREATMENT PLANNING FOR DEEP BITE AND OPENBITE PROBLEMS

Deep-bite malocclusion is usually associated with the skeletal proportions that predispose to this condition: a relatively short face with a square gonial angle and flat mandibular plane. This is classically the Class II division 2 patient for whom intervention for the Class II malocclusion would be delayed. Generally, treatment of deep bites is not indicated in the primary dentition, unless clear functional problems or irritation of the palatal tissue from lower incisor impingement is noted.

Open bite can also occur as a result of a skeletal or dental problem. Those with skeletal problems and disproportionately long lower faces are difficult to treat because the vertical dimension continues to change into adolescence. On the other hand, open bite is often seen in children who have good skeletal proportions and sucking habits. Recommendations regarding the use of "physiologic" and "natural" nursing bottle nipples and pacifiers have been strongly supported by some, but there is no good evidence to support these claims.<sup>43</sup> Al-

though many children who practice digital sucking habits have no evidence of malocclusion, Popovitch and Thompson have reported a high association of abnormal sucking habits with the malocclusion sample at the Burlington Orthodontic Research Center in Ontario, Canada.<sup>44</sup> Melsen *et al* found that both digital sucking and pacifier sucking increased the tendency toward abnormal swallowing.<sup>45</sup> Sucking habits were related to an increase in severe malocclusion symptoms apart from the type of swallow presented. Sucking habits were strongly correlated with distocclusion and open bite and with crossbite and maxillary overjet. Usually sucking habits are spontaneously stopped or reduced to a minimal level because of peer pressure, before the appearance of permanent teeth. In general, up to age five or so, sucking habits are unlikely to cause any long-term problems in children with good skeletal patterns. Some data indicate that ultimately the distortions promoted by nonnutritive sucking habits in terms of openbite and overjet are resolved by the teenage years with no treatment.<sup>42</sup>

The dilemma for the practitioner, then, is either to intercept the habit, probably before the eruption of the permanent teeth, by explanation, support, and use of a reminder appliance if reward and explanation fail to bring about a response, or let the situation resolve naturally. Because both ways appear to bring an acceptable result at different times, much of this decision should be based on the perspective of the parent and child.

Some vertical problems and openbites have been blamed on breathing patterns.<sup>46, 47</sup> The relationship between these variables is difficult to quantify and it is



certainly more difficult to assign causality on the basis of the data. Before any surgical intervention involving the tonsils and adenoid is undertaken, a thorough and objective evaluation of respiratory mode should be undertaken.<sup>48</sup>

## CONCLUSIONS

Treatment of orthodontic problems in the primary dentition requires careful diagnosis and treatment planning. Proper orthodontic records and a systematic description of the malocclusion should be performed, including alignment and symmetry, facial esthetics, and occlusal and jaw relationships in all three planes of space. Strategies in treatment planning for early loss of primary teeth, mesioclusal and distoclusal occlusion problems, and transverse and vertical problems are discussed. Certain conditions such as early loss of primary teeth, anterior and posterior crossbites, and some Class III skeletal problems warrant early intervention to facilitate normal growth and development. Aggressive arch-length modulation, Class II correction, and intervention for vertical problems, including nonnutritive sucking habits, are largely unwarranted.

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#### ACCELERATED WEIGHT GAIN IN PRESCHOOL CHILDREN

The purpose of the current investigation was to determine the dietary, physical activity, family history, and demographic predictors of relative weight change in a cohort of 146 children over a 3-year period. Results indicated that boys of normal-weight parents or who had only one parent overweight showed decreases in their body mass index (BMI) while those with two parents overweight showed increases. Girls with an overweight father showed BMI increases while others experienced decreases in BMI. Additionally, baseline intake of kilocalories from fat as well as decreases in fat intake were related to decreases in BMI. At higher levels of baseline aerobic activity, subsequent changes in BMI decreased. There was also a trend for changes in leisure activity—increases in children's leisure activity was associated with decreases in subsequent weight gain. Modifiable variables (ie, dietary intake, physical activity) accounted for more of the variance in changes in child BMI change than nonmodifiable variables (eg, number of parents obese). These results strongly suggest that encouragement of heart healthy dietary intake patterns and participation in physical activity can decrease accelerated weight gain and obesity, even in preschool children.

Klesges, R.C. *et al*: A longitudinal analysis of accelerated weight gain in preschool children. *Pediatrics*, 95:126-130, January 1995.

# A longitudinal assessment of predictive value of a caries activity test in young children

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The decline of caries prevalence in children has been reported in recent years. Some groups, however, demonstrate active caries and most of them are at high-risk for developing caries in the future. It is useful, therefore, to identify the high risk caries group and to begin effective preventive methods for these groups. The development of reliable and valid caries activity tests has also been needed. It is well known that dental caries is a disease with a multifactorial etiology. Microbiological methods have been developed for predictive testing of future caries activity.<sup>1-5</sup> Many studies with these bacteriological tests, which count the number of mutan streptococci and lactobacilli in saliva or plaque, have reported significant relationships between these results and the occurrence of caries.<sup>6-9</sup> It was shown that these methods were effective for predicting the development of caries. One of the caries activity tests, Cariostat (Sankin, Japan) was developed in Japan. This test assesses the acid production of microorganisms in dental plaque.

In this study, the authors have evaluated longitudinally the predictive value for caries of the Cariostat test in young children undergoing routine government sanctioned dental examinations.

## MATERIALS AND METHODS

The subjects were one hundred children who participated at eighteen-month, twenty-four-month, and thirty-six-month dental health screenings in Okayama prefecture, Japan. Oral examinations and Cariostat tests of caries activity were conducted at each screening. Oral examinations were conducted by dentists with dental mouth mirrors and explorers. Caries was assessed in accordance with the criteria of the Health Policy Bureau, Ministry of Health and Welfare, Japan.

The Cariostat medium contains 20 percent sucrose as a source of carbohydrate, 2 percent tryptose as a source of nitrogen, 0.5 percent NaCl as inorganic matter, 0.02 percent NaN<sub>3</sub> control gram negative bacteria and also bromocresol purple and bromocresol green as pH color indicators. Dental plaque samples were taken from buccal surfaces with a cotton swab. The swab with the plaque sample is put into the Cariostat medium and incubated at 37° C for forty-eight hours. After the incubation, seven grades of colorimetric change are estimated using a standard color chart. Each of these colors is evaluated as follows; blue (pH7.0) = 0, green (pH5.4) = 1.0, green-yellow (pH4.7) = 2.0 and yellow (pH4.0) = 3.0. Intervals between criteria (0-1, 1-2 and 2-3) are divided into halves. In this study, children who had a Cariostat score of 1.5 or higher at eighteen months and 2.0 or higher at twenty-four and thirty-six months were designated at high risk.

After collecting the data, the following statistical methods were utilized: Pearson correlation analyses were performed to examine the relationship between the Cariostat score and caries status. A p-value below

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Table 1. □ Results of caries incidents and Cariostat test at each age.

Age	Caries prevalence		Cariostat score
	prevalence	deft	
18 months	9.0	0.28	1.49
24 months	21.0	0.84	1.58
36 months	70.0	2.98	1.73

Table 2 □ Correlation between Cariostat score and caries incidents.

Cariostat sampling age	18 months		24 months		36 months	
	caries <sup>1</sup>	deft	caries <sup>1</sup>	deft	caries <sup>1</sup>	deft
at 18 months	.34**	.34**	.34**	.36**	.39**	.33**
at 24 months	.23	.20	.32**	.37**	.35**	.36**
at 36 months	.11	.08	.17	.21	.35**	.41**

<sup>1</sup>Caries means "whether the child is caries-free or not".  
<sup>\*</sup>  $p < 0.05$ , <sup>\*\*</sup>  $p < 0.01$

0.05 was considered significant. For the purpose of assessing the predictive value of Cariostat as a screening test, several statistical indices were calculated: *sensitivity* (the probability that a true high-risk child is predicted to be a high risk); *specificity* (the probability that a true low-risk child is predicted to be at low-risk); the *predictive value* of a positive test (the probability that a child is truly at high-risk, when a child is predicted to be at high risk); and the predictive value of a negative test (the probability that a child is truly at low risk, when a child is predicted to be at low risk). In addition, subjects were classified in eight groups based on the change of the Cariostat score from eighteen months to thirty-six months: e.g. when a child showed low caries activity at eighteen, twenty-four and thirty-six months, she was placed in the LL-L group and when a child showed low caries activity at eighteen months and high caries activity at twenty-four and thirty-six months, she was placed in the L-H-H group. The respective caries statuses of the groups were compared in order to examine the relationships between the changes in caries activity and the changes in caries status.

## RESULTS

Table 1 presents the overall caries status and the Cariostat average score of the subjects at each age. Caries prevalence was 9.0 percent at eighteen months, 21.0 percent at twenty-four months and 70.0 percent at thirty-six months. The average number of carious teeth per child (deft) was 0.28, 0.84 and 2.98 at each age, respectively. The Cariostat average score was 1.49, 1.58 and 1.73, respectively.

Table 2 presents the correlation between Cariostat score and caries status (i.e. "cariou or noncariou" and deft score). The Cariostat score at eighteen months was

Table 3 □ Predictive value of Cariostat at 18 months to "cariou or noncariou" at 36 months.

	Cariostat at 18 months		
	High risk	Low risk	
Cariou at 36 months	43	27	70
Noncariou at 36 months	10	20	30
	53	47	100

Table 4. □ Predictive value of cariostat at 24 months to "cariou or noncariou" at 36 months.

	Cariostat at 24 months		
	High risk	Low risk	
Cariou at 36 months	43	27	70
Noncariou at 36 months	8	22	30
	51	49	100

Table 5. □ Comparison of caries status based on transition of Cariostat score from 18 months to 36 months.

Type	N	18 months		24 months		36 months	
		Caries (%)	deft	Caries (%)	deft	Caries (%)	deft
L-L-L	16	0	0	0	0	31.3	1.00
L-L-H	16	0	0	6.3	0.50	68.8	2.25
L-H-L	8	0	0	37.5	1.00	75.0	2.63
L-H-H	7	14.3	0.29	28.6	1.43	71.4	6.00
H-L-L	7	0	0	14.3	0.29	42.9	0.71
H-L-H	10	20.0	0.60	30.0	0.80	80.0	3.80
H-H-L	14	21.4	0.71	28.6	1.00	78.6	2.71
H-H-H	22	31.8	0.45	31.8	1.81	95.5	4.64

significantly related to whether or not the child was caries-free at eighteen, twenty-four and thirty-six months (in order;  $r = .34$ ,  $r = .34$ ,  $r = .39$ , all  $p < .001$ ) and also deft score at all age ( $r = .34$ ,  $r = .36$ ,  $r = .33$ , all  $p < .001$ ). Similarly, the Cariostat score at twenty-four months was correlated with "cariou or noncariou" at twenty-four and thirty-six months ( $r = .34$ ,  $r = .39$ , all  $p < .001$ ) and deft score at twenty-four and thirty-six months ( $r = .36$ ,  $r = .33$ , all  $p < .001$ ). The Cariostat score at thirty-six months correlated significantly with "cariou or noncariou" at thirty-six months ( $r = .35$ ,  $p < .001$ ) and deft score at thirty-six months ( $r = .35$ ,  $p < .001$ ).

The predictive value of Cariostat to "cariou or noncariou" is presented in Table 3 and Table 4. In the case of predicting the caries status at thirty-six months, using the Cariostat score at eighteen months, 61.4 percent of children with carious teeth were considered to be in the high-risk group (sensitivity = 0.614, 43/70), and 66.7 percent of noncariou children were considered to be in the low-risk group (specificity = 0.667, 20/30). Over 80 percent of children in the high-risk group actually had caries (predictive value of a positive test = 0.811, 43/53)

and 42.6 percent of children in the low-risk group had no caries (predictive value of a negative test = 0.426, 20/47). Similarly in the case of predicting for caries status at thirty-six months, using the Cariostat score at twenty-four months, *sensitivity* 0.614 (43/70), *specificity* 0.733 (22/30), *predictive value* of a positive test 0.843 (43/51) and *predictive value* of a negative test 0.408 (20/49).

Table 5 presents the caries status based on transition of Cariostat score from eighteen months to thirty-six months. The L-L-L group showed a caries prevalence of 31.3 percent and a deft score of 1.00 at thirty-six months. On the other hand, the H-H-H group showed almost three times the caries prevalence and more than four times a deft score at thirty-six months in comparison with the L-L-L group.

## DISCUSSION

The caries prevalence and the average number of carious teeth per child increased with age: the increase in caries rate was especially rapid from twenty-four months to thirty-six months. According to the latest report of the Health Policy Bureau, Ministry of Health and Welfare in Japan (1989), the prevalence of thirty-six-month-old infants with caries was 66.7 percent.<sup>10</sup> The caries rate of infants has improved compared to previous reports in Japan (1977), but the caries prevalence remains high.<sup>11</sup> Consequently it is critical to identify high-risk populations using effective screening methods and timely and appropriate preventive procedures. Several investigators have reported that previous caries experience correlated significantly with future caries occurrence.<sup>12-15</sup> This method, however, has an obvious disadvantage: it does not support a primary preventive approach to infant caries. Vanderas reported that bacteriologic predictors seemed to have more advantages than do nonbacteriologic predictors, in his review of the criteria available currently for predicting future caries activity.<sup>16</sup>

A caries activity test is defined as a method to predict whether patients are susceptible to dental caries. An effective caries activity test should be based on appropriate theories, correlate closely with clinical status, be accurate concerning duplication of results, be simple, be inexpensive, and require little time.<sup>17</sup> A good caries predictive test should possess at least three characteristics: *validity*, *reliability* and *feasibility*.<sup>18</sup> The usefulness of Cariostat as a caries activity test was investigated based on these criteria.

The Cariostat method requires less than ten seconds to obtain a dental plaque sample on a cotton swab for

each patient. With the exception of an incubator, no special equipment is required. Personnel at various levels of training and experience can be taught to use this method quickly and reliably. The Cariostat appears to be a feasible method of caries prediction.

The Cariostat scores showed high correlations between present caries statuses (cariosus or noncariosus) and the average number of carious teeth per child (deft). Matsumura *et al* conducted oral examinations and caries susceptibility tests (Cariostat) to estimate whether the Cariostat could screen high caries-activity in children, ages one to fifteen years; they reported significant correlations between the carious teeth and the Cariostat scores for each age.<sup>19</sup> Heriandi *et al* also reported a strong correlation between the Cariostat score and deft in 1385 children, of one to four years old, in Indonesia.<sup>20</sup> Our results correspond with these previous investigations. Moreover, correlations between the Cariostat scores at eighteen months and caries statuses at twenty-four and thirty-six months were found. In like manner, the Cariostat scores at twenty-four months and caries statuses at thirty-six months were found to correlate. The Cariostat scores correlated significantly with not only current caries statuses, but also with the future occurrence of caries. In light of these results, it was concluded that the Cariostat test possessed acceptable validity as a caries prediction test.

The estimation of predictive value indicated the validity of 1.28 (sensitivity 0.61, specificity 0.67) and 1.35 (sensitivity 0.61, specificity 0.73) in predicting *cariosus* or *noncariosus* at twenty-four and thirty-six months, based on the Cariostat scores at eighteen months, respectively. Pienihakkinen *et al* evaluated the caries predictive value of salivary counts of lactobacilli and yeasts in children, ages six to eleven years, and reported that *sensitivity* ranged from 0.50 to 0.74 and *specificity* ranged from 0.36 to 0.75, when each variable was used solely as the predictor.<sup>21</sup> The validity calculated from their original data showed from 0.96 to 1.17 for counting lactobacilli and from 1.14 to 1.49 for counting yeasts, respectively. Other previous longitudinal investigations also demonstrated similar results when the predictive values of the predictors were evaluated individually.<sup>22-24</sup> In spite of the differences in populations and study designs, these findings suggest that the Cariostat test has adequate sensitivity and specificity for screening high-risk children, when a single test is used. In this study, subjects who had a Cariostat scores of 1.5 or higher were designated as high risk; further studies would be necessary to determine a suitable screening point for identifying the degree of risk. Concerning positive and negative predictive

values, Crossner investigated the reliability of salivary lactobacillus counts for prediction of caries activity in adolescents, and reported that positive predictive values ranged from 0.67 to 0.85 and negative predictive values ranged from 0.80 to 0.91.<sup>25</sup> Newbrun *et al* evaluated two microbiological tests for quantifying salivary mutans streptococci levels and showed that the positive predictive values ranged from 0.11 to 0.14 and negative predictive values ranged from 0.95 to 0.97. Our results showed positive predictive values of 0.81 and 0.84, negative predictive values of 0.43 and 0.45.<sup>26</sup> Our positive predictive values were nearly in accordance with other investigations and it seems to be adequate for a screening. Our negative predictive values, however, were not as high as others. This was likely to be caused by the fact that subjects had a very high caries prevalence (70 percent at thirty-six months).

In this investigation, remarkable differences were found between the caries status of low and high risk groups from eighteen to thirty-six months. The H-H-H group demonstrated three times the caries prevalence at thirty-six months than the L-L-L group. Children with high caries activity at eighteen months showed a tendency to develop new or more carious teeth by thirty-six months. These findings support the longitudinal correlation between Cariostat scores and caries statuses and confirm the necessity to screen high-risk populations with suitable caries activity tests and to provide appropriate preventive procedures for them at earlier stages of their lives.

We conclude from this study's results that the Cariostat test possesses adequate predictive value and should be considered as an effective caries activity test.

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# BEHAVIOR

## How important are techniques? The empathic approach to working with children

John F. Roberts, BDS

**T**his presentation will express a practitioner's viewpoint about behavior management, and will discuss how the Children's Charter may influence the way we are with our child patients.<sup>o</sup> As you know, the Charter aims to give children more control over their lives, and to allow them more legal rights over events that influence them.<sup>1</sup>

Several people have been influential in shaping my understanding of behavior management. In 1976, when I began my specialty training at Rochester, David Chambers' papers were reviewed by my group. He did not present original research, but stimulating, thought-provoking philosophy. Later, when my own teaching required solid, well thought-out and reproducible research to present to my students, the steady stream of publications from Philip Weinstein's department at the University of Washington provided just that information. Recently the publications of Jimmy Pinkham have been worthy successors to those of David Chambers almost twenty years ago. Jimmy has represented the writings of such diverse authors as Margaret Mead and Alfred Adler, to encourage our continuing interest and curiosity in the management of child dental behavior. I have also, in a different context from dentistry, been influenced by the writings of Carl Rogers, concerning highly anxious and disturbed people.

Behavior management is largely about anxiety management, usually that of the child, but not infrequently that of ourselves. Psychologists themselves do not agree how we should deal with anxiety, but modern pediatric dentistry uses the combined approaches of behavioral

and humanist psychologies. In behavioral terms, based upon the theories of learning, we learn how to behave; we acquire new skills, and those skills are subsequently strengthened or weakened. That is what we do for our child patients; from our position of experience and authority, we decide which child behaviors we will allow or tolerate while performing dentistry. We teach the children to behave, and we strengthen or weaken existing behaviors or coping strategies they may have previously learned, depending upon how appropriate those behaviors are to us. Behaviorism is a science of this century, from its early days when Pavlov developed his ideas on classical conditioning, and onto Skinner's contingency management by reinforcement and punishment.<sup>2,3</sup> Systematic desensitization came out of Joseph Wolpe's work on neurotic cats and this formed the basis of Adelman's Tell-Show-Do technique.<sup>4,5</sup> From Bandura's work came modelling and expectations.<sup>6</sup>

This body of solid empirical research has provided us with the basic techniques of behavior management. In the first half of the century behaviorism could be described in stimulus-response terms, with behavior being simply the consequence of environmental influences, without reference to thought processes.<sup>7</sup> This very simplistic view of human behavior invited the criticism that our behavior was the result of more complex processes than that. Bandura's Social Learning Theory addressed that criticism. It acknowledged that people think about what is happening to them, and that those thoughts, or cognitive processes, help them decide which behaviors to use.<sup>6</sup> I make this point because I feel dental students, either predoctoral or postdoctoral, are too technique-oriented. They are often taught that if they use a specific management technique the child will behave in a certain way. When the child does not do so, the student is left feeling disillusioned and lacking the necessary under-

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standing and confidence to work successfully with children.

A great deal has been written about the techniques available to us for the management of behavior, from their origins in psychology to their application in pediatric dentistry. Many of those papers, especially in recent years, have been concerned with the more controversial, assertive techniques. These are the ones described by Dr. Pinkham in his hierarchy of requests leading to the desired response as "strong" or "unavoidable".<sup>8</sup> With the changing attitudes of parents to what we do to their children, it is right that we should focus upon these techniques as they are the ones most likely to be viewed by both parent and clinician as being least acceptable in the management of children's behavior. The philosophies of behavior management are continually changing, probably reflecting changes in society at large. In the United States it may soon be unacceptable to use some of the assertive management techniques despite their having long been in use by the majority of pediatric dentists.<sup>9</sup>

My concern is that the results of the research into these techniques are not giving a true perspective of their potential. When I teach a class of students how to prepare Class II amalgam cavities, some will quickly reproduce cavities that I would be proud to have done myself; others simply ruin the tooth, and one or two seem destined to go on ruining teeth forever. Should I condemn the Class II amalgam cavity to history because of those ruined teeth, or should I look at the way I teach, explain and motivate? Similarly, should we condemn some behavior management techniques because they are not being used in an acceptable way, or should we look at the way we teach and motivate our students? Perhaps there is more to the use of a behavior management technique than is being measured in current research. Perhaps there is a quality in its application that needs to be addressed before the technique is condemned.

In the words of the old song, "It ain't what you say, it's the way that you say it, it ain't what you do it's the way that you do it...., that's what gets results".<sup>10</sup>

I am constantly surprised by the reported acceptability of voice control to parents. McKnight-Hanes *et al* reported 98 percent of dentists used it, and Murphy *et al* reported that parents rated voice control as marginally acceptable.<sup>11,12</sup> I have never felt at ease in raising my voice, within earshot of parents, to control a child's disruptive behavior. Perhaps that discomfort is related to my personality and the way voice control was initially taught to me. Greenbaum recently reported on a study into its use, where in the *loud-voice* group a command was given suddenly, loudly and firmly. It was highly ef-

fective in reducing children's disruptive behaviors during treatment; it worked quickly and for a reasonable length of time, and it did not appear to have any long-term negative effects upon the children.<sup>13</sup> Pinkham had previously reexamined the technique and ascribed its benefits not simply to the quality of the voice, but to facial expressions used simultaneously. This implicit communication control was, he suggested, useful for communicating other messages to the child, not simply for interrupting misbehavior.<sup>14</sup> In other words, the actual technique of voice control was not as important as how it was applied. Perhaps the research into voice control has not addressed this point.

Restraint encompasses another group of techniques usually rated as objectionable by parents and controversial by dentists. The Papoose Board is a prime example. Murphy, and Lawrence both showed its unacceptability.<sup>12,15</sup> Again though, I question whether it is wrong to condemn the technique because of these results, without looking at its application. Frankel obtained encouraging results by presenting Papoose Board to the parents in a different way, by actively involving them in every stage of its use from a joint decision to use it, to help in wrapping the child, and holding his hand throughout.<sup>16</sup> The results showed a very high rate of approval of its use and benefits, and a willingness by parents to use it again where necessary, on their other children. The technique was the same, it was the philosophy underlying its use that was different.

Philip Weinstein looked at the effect of physical restraint, and found there was a high probability, 85 percent, of fear-related behavior continuing after the use of restraint by the dentist.<sup>17</sup> Interestingly, in a subsequent paper along similar lines to the first, but looking at the effect of dental assistant behaviors, Weinstein found that when assistants used restraint, it was well accepted by the child and very effective upon the fear-related behavior.<sup>18</sup> Again do we need to look beyond the technique itself?

HOME is arguably the most controversial of the restraint techniques used by pediatric dentists. Paul Casamassimo, in a recent editorial, suggested that society is moving toward preventing us from using the technique, and that we as a specialty are not helping ourselves by our actions.<sup>9</sup> He points out that some amongst us get excellent results with HOME, while there are others who only make the situation worse. HOME polarizes views within the profession, witness the statements by Ted Levitas on the one hand:

"HOME may be the purest expression of understanding, concern and love a dentist can show a child whose

fears of dental treatment are boundless yet unfounded",<sup>19</sup> and Andlaw and Rock on the other:

"Such a technique cannot be popular with any dentist who cares for children and whose aim is to influence positive attitudes in addition to carrying out treatment".<sup>20</sup> Can they be talking about the same technique, or is it that there is something deeper, beyond the actual procedure itself, that one understands and employs, and the other does not? Research seems incapable of telling us. There is little empirical research into HOME, but one recent report by Barton *et al* caught my eye, confirming as it did my own opinions about HOME. His results were encouraging.<sup>21</sup> I was amazed then to find in a subsequent edition a criticism of Barton's research methodology by Philip Weinstein. I did not fully understand the statistical argument, but I did detect a strong prejudice against HOME in that letter, again showing the polarization of views. Weinstein also used a very strong emotive statement that HOME should not be regarded as a behavior modification technique, I find that hard to accept.<sup>22</sup>

If the application of a technique is as important as the technique itself, perhaps it would be helpful to consider the goals of behavior management.

Glasrud, from his questionnaire, identified that for most practitioners compliance was the desired goal, and for those dentists in 1984, the behavioral techniques would have been of great importance.<sup>23</sup> From the research they could have decided which techniques to use to secure compliance with treatment, and thus perhaps increase working efficiency. It did not matter that the child's own goals were ignored or denied. Glasrud said that if, however, the goal of behavior management is for patients ultimately to assume responsibility for their own dental health, we should heed Domoto's opinion that "an approach that emphasizes cooperation and responsibility, not just compliance, will have great long-term benefits to both the individual and to society".<sup>24</sup> If compliance is demanded, the only message the child hears from his dentist is "I'm in charge, do as I say", hardly a recognition of that child's worthiness. Venham moved further away from the compliance goal toward a child-centered approach to behavior management, by saying that we are in danger of overlooking the child's underlying needs and fears, if we only concentrate upon his disruptive behavior. He posed the question "whose needs should predominate, the dentists' or the child's?"<sup>25</sup> In the light of the Children's Charter it would appear that the goal of compliance alone is not satisfactory. We do of course need the child to follow our directions, both for his own safety and to allow us to

complete treatment. We can do this by adopting an integrated approach, so that we recognize and address the child's concerns about dentistry without losing sight of our own objectives.

Here I hesitate; so far I have been on safe ground, presenting facts, figures and opinions from the scientific dental literature. From now on the concepts I will write about seem only marginally accepted by the established dental press, but which to me are central to pediatric dentistry.

The humanist view of behavior is that it is a direct result of the child's perception of dentistry at that moment. Rather than our behavior being dictated by the environment, which you will recall is the behaviorist's position, the humanists say that we choose to behave the way we do in order to influence the environment.<sup>26</sup> New-born babies control the behavior of parents to a very high degree, in order to survive and flourish. In growing up we abandon much of this autonomous position as we fit into society, but it is surely necessary to retain a sense of control over our own lives, in order to succeed. Should we not allow our child patients to express a similar sense of control over their dental experiences?

If the child patient misbehaves because of his perception of dentistry, then by presenting dentistry to that child in a more acceptable way he will probably change his own behavior accordingly. We will not have imposed a behavior pattern upon him, he will have been responsible for his own change of behavior. This autonomous change is certainly feasible for most adolescent patients, but not for two to three year-old children. Between those ages degrees of autonomy are attainable and certainly desirable for a growing self-esteem in our young patients.

To help the child reevaluate the threat of dentistry, we first need to be prepared to understand and accept how he views the dental experience. That is only possible if we are able to give-up our egocentric view and adopt the child's internal frame of reference: this process is called empathy, coming from the early Greek word *empathia*.<sup>27</sup> Its desirability in pediatric dentistry is often written about, as in this quotation from Troutman:

"Contemporary dental care for children must include empathy rather than indifference, structure rather than diffuseness, and flexible authority rather than rigid control", but not often researched satisfactorily.<sup>28</sup> Why is that?

You may have seen a recent guest editorial in the Journal of Dental Research by David Chambers.<sup>29</sup> I had not seen his name in print for several years and was delighted to come across the editorial, especially as it



was as stimulating and challenging as I had found his previous work. He was questioning the narrow band of current dental research and suggested that it does not adequately reflect the whole of modern dental practice. There are several aspects to dental practice that deserve investigation, but that does not lend themselves to traditional research. He considered that current dental research was still firmly bound to its roots, positivism, of the early 20th century, whereby if it could not be measured, it was not science.

Empathy has just such traditionally immeasurable qualities, as Stewart has stated, just as emotions in general cannot be measured.<sup>30</sup> Surely the emotional aspect of our relationship to our patients has to be a powerful factor in the outcome. Gerald Gladstein, in his review of the empathy literature from all branches of psychotherapy, said that traditional research methodology had assumed empathy could be broken down into quantifiable elements, in the way that Weinstein did in his 1982 publication.<sup>17,31</sup> However useful this approach may be, it cannot take account of the quality of the relationship between dentist and patient, or how we apply those component elements of empathy. There are, however, scientifically acceptable ways of looking at empathy holistically, rather than in a reductionist fashion. Chamber's editorial talked about constructs, which are neither observations nor items in the physical world waiting to be measured. They are an interpreted pattern of observations reflecting naturally occurring phenomena, such as *dental aptitude* and *quality*. Quality, by inference, includes empathy. Statistical tests are available for constructs, which are used frequently in the fields of economics, management, education, and other social sciences. He concluded that the methods are no less rigorous than those in the biomedical sciences; they simply address a different range of questions and their use would widen the scope of dental research.<sup>29</sup>

What is empathy? Carl Rogers talked about temporarily living in the client's life and then communicating the sense of that life to the client.<sup>32</sup> Barrett-Lennard said the same thing in a rather more complex cycle.<sup>33</sup> Jackson, who incorporated empathy training into his dental program, felt that in order to establish rapport, it was important first to attend to the feelings and concerns of another person and then to respond to those concerns.<sup>34,35</sup> In most fields of psychotherapy, be it child-centered, behavioral, analytical, developmental or social, two types of empathy are recognized: affective (responding with the same emotions as the other), and cognitive (taking the role or perspective of the other).<sup>31</sup> While I see no benefit in being affectively empathic and dissolv-

ing into tears if our patients are crying, cognitive empathy does offer the chance to develop rapport with patients and parents. Young children, despite their limited vocabulary leave us in no doubt when they are distressed, for instance by crying. Elsbach described four different cries, and the challenge to us is to interpret the reason for that cry empathically, and then to respond appropriately.<sup>36</sup> Most dentists in Weinstein and Getz's study, with all the benefits of a postgraduate training in pediatric dentistry, were unable to alter their response according to the child's needs.<sup>17</sup> Furthermore, the response they did use was often counterproductive.<sup>37</sup> This to me was a sad reflection on their behavior management training, their lack of empathic skills.

Do we always need to be empathic? Jackson identified several categories of response that we could give to the emotional needs of our patients. He said that the ones that are likely to increase rapport between us and our patients are the empathic responses, and pointed out the drawbacks of the others in this regard.<sup>35</sup> Morse pointed out, however, that in nursing, empathy was not always desirable and at times it may be more useful to use other communication methods such as sympathy, consolation, and compassion.<sup>38</sup> Gladstein thought that empathy was useful in only some stages of the helping process.<sup>31</sup> I would suggest the same applies to pediatric dentistry. Empathic responses are very useful at the initial consultation, to help get a full history from the parents in a nonjudgemental manner, and when rapport-building is most important. At that first visit, we could acknowledge the child's nervous state, tell him that those feelings are quite normal, and that it is quite acceptable to show those feelings by crying, if he wishes to do so. This would not only go a long way to managing those anxieties, it would also show the parent that we are concerned for his child's well-being and probably trustworthy in the way we intend to manage him. At times during the appointment, similar reflections on our perceptions of the child's needs and feelings, together with permission to control events by raising his hands, or to freely express discomfort, should help the management process. Empathy does not preclude challenges however, and these should be used to clarify the child's responses, if they are felt to be exaggerated or unrealistic. Being empathic with the child does not mean we have to accept everything at face-value. It does mean that we should not immediately call the child a liar or a baby.

Who is capable of being empathic? Probably all of us, although to differing degrees.<sup>39</sup> Empathic skills, like all others, can be learned, strengthened and refined, but some people can innately develop those skills to a higher

level than others. In his review Gladstein looked at the developmental psychology literature and said that although very young children can have affective empathy skills, they were not ready to give up their egocentric position to take the other's role cognitively, until after the age of seven. He went on to hypothesize that some adults are essentially childlike in their egocentricity, and are unwilling to adopt the other's internal frame of reference.<sup>31</sup> Katz said that barriers exist to the use of empathic responses, such as being anxious ourselves, not being willing to adopt a position of flexible authority, and being with patients who are essentially very unlike ourselves.<sup>40</sup> These perhaps are the reasons that some of us are more empathic than others.

Are there any drawbacks to adopting an empathic relationship with our patients or their parents? Potentially, yes. There is a continuing debate in the literature, questioning the true intentions of those who use empathic responses. The altruistic theory is that empathy is used for the benefit of the recipient, i.e. the client in therapy, or the child dental patient. The egoistic alternatives suggest that it is used selfishly for the benefit of the empathizer, either for reward or for the avoidance of punishment, thereby calling into question our professional integrity.<sup>41</sup> To avoid the latter charge, we need to be absolutely sure of our own goals in behavior management. Are they altruistically for the benefit of the child within an integrative framework that satisfies the needs of both of us, or are they to satisfy our own ego? Perhaps some of us have such a strong desire to be liked by the child, or to be rewarded by the parents for instance by referrals to our practice, that we lose sight of our own objectives for completion of dentistry and settle for a less than satisfactory accomplishment of treatment. Respect for the child in the way that the Children's Charter demands should amount to more than a fearful deference on our part, or diffident toleration of the intolerable. Empathy should not be the excuse for a lack of management skills. It behooves all of us who treat children to refine our skills and techniques of behavior management so that we are not afraid of the child's reaction to dentistry. We should not lack the confidence to deal with whatever emotion or behavior the child presents to us. If there is a need to complete a dental task, then our empathic approach needs to augment our other management skills, and not be an excuse for incompetence.

In conclusion, the title of this paper was "How important are techniques?", and of course this was a rhetorical question. The techniques of behavior management, developed and refined over many years

are important. Their application to pediatric dentistry has enabled us to approach the treatment of children with a greater degree of confidence than most other dentists. The Children's Charter will make us consider the child's concerns and legal rights, and so the way we use those tried and trusted techniques of behavior management will need to be reevaluated. I think that by refining our empathic skills we will go a long way toward meeting the demands of the Charter.

I would like to close with a quotation from Kreince's paper on Ginnott psychology applied to pediatric dentistry.<sup>42</sup> Ginnott published quite extensively, giving advice to parents and teachers; his observations are equally applicable to our speciality, and the one that suits this presentation is: "In human relations the agents of help are never solely the techniques, but the person who employs them. Without compassion and authenticity, techniques fail".<sup>43</sup>

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## PARTICULARITY AND COPING STRATEGIES

Viewed from a stress perspective, psychological dysfunction is always particular, a unique reflection of the individual's coping skills and the press of environmental stressors. While each of us acquires our basic coping strategies in childhood, and while these reflect both training and predisposing temperament, there are no universal strategies or stressors. The stress response is always an individual matter; what is a stressor to one person is not necessarily a stressor to another. For one individual, competition in the workplace is a heady stimulus to overachieve, whereas for another it is the cause of constant anxiety and concern. Moreover, as adults, we can learn new techniques of stress management; we are not necessarily locked into our early coping styles. Each case of psychological dysfunction, therefore, must be treated in its own terms and not as a manifestation of one or another universal complex.

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# Anxiety reduction with nitrous oxide: A permanent solution?

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A child's behavior during dental treatment is one of the items studied most frequently in the pedodontic literature.<sup>1,2</sup> In general, behavior is equated with anxiety, if behavior is scored by independent observers. When behavior is scored by the dentist providing treatment, the score might be affected by the bias of an operator able or unable to fulfil the objectives of treatment.<sup>3,4</sup>

In a review article Weinstein states that "Dental treatment should be seen as a stressful experience that mobilizes the child's existing coping abilities", thereby pointing to two factors easily forgotten by the dental practitioner:

- Dental treatment will cause the (child-) dental patient a certain amount of stress not to be neglected.
- Most children must learn to deal with dental treatment, i.e. must train their coping abilities.<sup>5</sup>

Most behavioral management strategies are based on exposure to treatment.<sup>6</sup> The purpose of these strategies is a combination of guiding a child through a difficult situation, hoping that when the child grows older he/she will understand the situation better, and training the child to develop coping strategies to deal with the treatment more easily. One of the strategies to complete a

dental treatment more effectively is the use of nitrous oxide.<sup>1,2,7</sup> The use of nitrous oxide results not only in a more relaxed patient during treatment, but also creates positive, long-term results.<sup>1,7</sup> When returning to their dentist for a curative session two years after their first filling, children are still less anxious, during treatment when treated with nitrous oxide, than when behavior is controlled by psychological means.<sup>8</sup>

Nevertheless, it is unclear whether the child's anxiety is actually reduced or whether the child copes with the situation in a better way, trusting to the beneficial effect of nitrous oxide. To deal with the question mentioned above, this study will compare the anxiety of the children in the nitrous oxide treatment group, with that of those in the (behavioral management) control group during the check-ups following their first period of treatment. Because the check-up sessions were performed without the use of nitrous oxide for both conditions, real change in dental anxiety could be registered: the behavior registered was not influenced by any sort of medication.

## MATERIAL AND METHODS

### Selection and treatment

For a longitudinal study of dental fear, fifty-five children were selected. The children were referred to our dental-fear clinic by their regular dentists after discontinuation

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of their dental treatment because they proved untreatable. The children were between six and eleven years old, Dutch native speakers, and in normal primary education. No siblings were allowed in the selected group. Selection of the children was accomplished during a separate consultation by a dentist who took no further part in the study, using a Likert-type anxiety scale.<sup>7</sup>

The children were assigned at random to one of two groups, matched by sex and age: one group to be treated with behavioral management only (control group), the other with behavioral management and nitrous oxide sedation (experimental group).

They were treated by two experienced pediatric dentists, each of whom had six years of experience, in managing fearful children. Allocation of the children to each dentist was accomplished at random. No account was taken of the child's or parents' preference. Both dentists treated virtually equal numbers of children from each of the two treatment conditions.<sup>7</sup> The children were given treatment with the objective that the following semiannual check-up should not result in any curative work. Curative work was defined as any dental treatment needing local anesthesia. In practice, a period of between 34 and 110 weeks (mean 72 weeks) elapsed before a second curative period started after ending the first treatment phase. In the second treatment phase, the children were treated under the same conditions as in the first treatment period. During the control period, both conditions were treated without nitrous oxide.

### Scoring procedure and clinical rating

All sessions were recorded using a fixed videocamera with autofocus. The videotapes of the treatment were scored by a dentist and a psychologist, both unaware of the objective of the study. They were given extensive training beforehand, using videotapes that were not included in the study. Processing did not begin until after the final session had been completed. The tapes were evaluated independently (Pearson's correlations between .90 and .97) and in case of disagreement, the final score was made by joint decision.

For the behavioral observations, the measuring instrument described by Venham *et al* was chosen.<sup>9</sup> The children in Venham's original study were three to five years of age. Because the children in this study belonged to a different (older) agegroup, a few modifications had to be made, most of which concerned the older group's more verbal expressions of fear and their generally greater degree of self-control in frightening situations (Figure 1). Venham made a distinction between behavior and fear

**Figure 1. Venham's clinical ratings of anxiety and cooperative behavior.**

- 0 RELAXED, smiling, willing, able to converse, best possible working conditions. Displays the behavior desired by the dentist spontaneously, or immediately upon being asked.
- 1 UNEASY, concerned. During stressful procedure may protest briefly and quietly to indicate discomfort. Hands remain down or partially raised to signal discomfort. Child willing and able to interpret experience as requested. Tense facial expression. Breathing is sometimes held in ("high chest"). Capable of cooperating well with treatment.
- 2 TENSE. Tone of voice, questions and answers reflect anxiety. During stressful procedure, verbal protest, (quiet) crying, hands tense and raised but not interfering much. Child interprets situation with reasonable accuracy and continues to cope with his/her anxiety. Protest more distracting and troublesome. Child still complies with request to cooperate. Continuity is undisturbed.
- 3 RELUCTANT to accept the treatment situation, difficulty in assessing situational threat. Pronounced verbal protest, crying. Using hands to try to stop procedure. Protest out of proportion to threat or is expressed vehemently before the threat. Copes with situation with great reluctance. Treatment proceeds with difficulty.
- 4 INTERFERENCE of anxiety and ability to assess situation. General sitting not related to treatment. Prominent body movements, sometimes needing physical restraint. Child can be reached through verbal communication, and begins eventually to cope, though with reluctance and great effort. Protest disrupts procedure.
- 5 OUT OF CONTACT with the reality of the threat. Hard, loud crying. Screaming, swearing. Unable to listen to verbal communication. Regardless of age, reverts to primitive flight responses. Actively involved in escape behavior. Physical restraint required.

scores. These scores were found to correlate to a very high degree, which was confirmed by subsequent research.<sup>1,9</sup> For the video evaluators in the present study, it was decided to use a single fear score based on the behavior displayed. The fear score was given for the complete treatment (control-) session (average overall score, OSA-c) as well as for the moment the child displayed most fear (average peak score, PSA-c). This was done to prevent the score for a moment of fear in a single part of the treatment from dominating the score for a session as a whole. All results were analyzed using SPSS.<sup>10</sup> Four dependent variables were included in the main analysis. In all cases these are the mean values for the relevant curative sessions for both study groups:

- OSA-c: Average overall score for the control phase.
- PSA-c: Average peak score for the control phase.
- OSN: Overall score for the second treatment phase.
- PSN: Peak score for the second treatment phase.

### RESULTS

Table 1 shows the average of the overall and peak scores of subjects within the experimental condition (curative treatment with nitrous oxide) and the control condition

Table 1 □ Differences of the overall and peak scores between the experimental condition (curative treatment with N<sub>2</sub>O) and the control condition (behavior management) during the control period.

	N <sub>2</sub> O (n=23)		B.M. (n=26)		p)*	t
	$\bar{X}$	s.d.	$\bar{X}$	s.d.		
OSA-c.	0.92	0.82	1.39	0.94	.033	1.88
PSA-c.	1.30	0.75	2.11	1.10	.004	3.04

)\* Anova, t-test, sign. if  $p \leq 0.05$

Table 2 □ Differences between the overall scores of the control (OSA-c) period and the new treatment phase (OSN) for the experimental (N<sub>2</sub>O) condition and the control condition (B.M.).

	OSA-c		OSN		p)*	t
	$\bar{X}$	s.d.	$\bar{X}$	s.d.		
N <sub>2</sub> O (n=15)	1.07	0.76	1.33	0.82	.178	1.42
B.M. (n=21)	1.24	0.77	1.95	1.02	.002)*	3.54

)\* Anova, t-test, significant if  $p \leq 0.05$

Table 3 □ Differences between the peak scores of the control (PSA-c) period and the new treatment phase (PSN) for the experimental (N<sub>2</sub>O) condition and the control condition (B.M.).

	PSA-c		PSN		p)*	t
	$\bar{X}$	s.d.	$\bar{X}$	s.d.		
N <sub>2</sub> O (n=15)	1.39	0.58	2.20	1.42	.020)*	2.62
B.M. (n=21)	1.92	1.00	3.00	1.14	.001)*	3.92

)\* Anova, t-test, significant if  $p \leq 0.05$

Table 4 □ Correlations between overall and peak scores of the control (OSA-c, resp. PSA-c) period and the first treatment (OSA-t, resp. PSA-t) and new treatment (OSN, resp. PSN) phase.

A. Experimental Condition (N <sub>2</sub> O)						
	OSA-t (n=23)	PSA-t (n=23)	OSN (n=15)	PSN (n=15)		
OSA-c	.48	.43	.58	.65		
PSA-c	.40	.50	.44	.57		
B. Control Condition (B.M.)						
	OSA-t (n=25)	PSA-t (n=25)	OSN (n=21)	PSN (n=21)		
OSA-c	.63	.51	.50	.61		
PSA-c	.53	.54	.46	.31		

Significance for all (Pearson's) correlations at  $p \leq 0.05$

(behavioral management) in the control phase of the treatment.

Both the overall and peak scores differ significantly for the two conditions. Even without the use of nitrous oxide, the anxiety of the experimental condition is significantly lower compared with the control condition.

Comparing the anxiety scores of the patients of the two dentists providing treatment did not yield significant differences, either for the overall score (OSA = 1.17, 1.18 resp.,  $p = 0.95$ ) or the peak score (PSA = 1.76, 1.64 resp.,  $p = 0.71$ ). Both dentists did a comparable number of semiannual check-ups ( 2.38, 2.77 resp.,  $p = .21$ ). Also for both dentists, no differences were found between the average number of semiannual check-ups for the control condition and the experimental condition (2.42, 2.70 resp.,  $p = .42$ ).

For the overall- and the peak-scores the correlations were computed with the ages of the patients. The correlations proved to be very weakly negative (OSA-c:  $-.02$ , PSA-c:  $-.25$ ).

The results from Table 1 indicate that, when comparing the observations of the control period and the second treatment phase, this had to be done separately for the two treatment conditions. The differences that appear can be seen in Tables 2 and 3. In the control condition (B.M.) significant differences still exist, but in the experimental condition (N<sub>2</sub>O) the significance has disappeared for the overall score.

Calculation of the correlations between the anxiety scores of the two treatment phases and the control period, as can be seen in Table 4, results in relatively close correlations between both the first treatment phase and the control period, and between the anxiety scores of the control period and the second curative phase, both for the experimental and the control conditions.

## DISCUSSION

In view of the longitudinal effects of the use of nitrous oxide in the treatment of highly anxious children, the results shown in Table 1 are both promising and tempting. Promising because, when initially treated with nitrous oxide, the anxiety scores of the children remained significantly lower during a number of sequential control sessions. Naturally, it is easier for a child dental patient to cope with a control session than with a treatment session, but the significant difference in the anxiety shown between the two groups during the control phase seems to indicate some longer lasting effect of the use of nitrous oxide during the initial treatment phase.<sup>11</sup> The result matches another study giving comparable short-time effects of nitrous oxide in moderately anxious children.<sup>1</sup> Tempting on the other hand, for the child in the nitrous oxide group might know that any possible curative treatment in a following session will be performed using nitrous oxide. The control group, on the other



hand, is less able to master its anticipatory anxiety in this way. Further longitudinal data on curative treatments are, therefore, needed to provide more conclusive evidence.

No differences were found between the two dentists giving treatment, neither in the number of controls, possibly influencing the anxiety score by habituation, nor in the levels of the anxiety scores themselves. Also the number of controls between the two conditions did not differ significantly, indicating that the first treatment phases of both groups were of equal quality: no patient of either of the two groups was in need of earlier curative treatment.

Because during the first treatment phase, anxiety scores had to be corrected for age, correlations of the anxiety scores with the patients' ages were calculated.<sup>7</sup> Only very weak correlations were found, however, so no further corrections had to be made.

As could be expected, the average scores of the control period remained below the level of the first treatment phase. After the control period, a (limited) group of children were in need of some curative treatment. Comparing the anxiety scores of the children treated with nitrous oxide with their scores from the control period, did not yield a significant difference for the overall score, but only for the peak score. So while in the behavior management group the children behaved significantly more anxiously when treated curatively, the nitrous oxide group was just as relaxed as during a semi-annual check-up. Only the most anxiety provoking moment caused an arousal reaction. It looks as if the lowest possible anxiety level is reached for this group of children. Studies concentrating on the next step, curative treatment without nitrous oxide, seem to be indispensable for more conclusive statements. In this study, this extra treatment phase could not be added: as seen in Tables 2 and 3, the number of patients was already dropping slowly.

The average length of the control (no curative treatment) period was seventy-two weeks. The close correlations between the anxiety scores of the control period (Table 4) and both the first treatment phase before, and the second treatment phase following this control period, demonstrate the long-term facet of the treatment of highly anxious children. Anxiety in children who were highly anxious at the time of their referral does not seem to be a problem that can be solved quickly, but seems to be a process that can only be influenced slowly and over a long time. The correlations are consistent with earlier results of a long-term study on the effect of ni-

trous oxide in the treatment of highly anxious children, which states that: "The level of fear during the last session of a course of treatment has clear predictive value for the following curative session, even if it takes place two years later"<sup>8</sup>

## CONCLUSIONS

- When highly anxious children are treated with nitrous oxide for a number of consecutive sessions, their anxiety remains significantly lower during a following control period, even without use of nitrous oxide.
- Correlations between the anxiety scores during initial, control and follow-up treatment of highly anxious children suggest that influencing anxiety in highly anxious children is a long-term process.

## SUMMARY

Anxiety scores of highly fearful children were registered during a control period after their curative treatment. The average length of the control period was seventy-two weeks. The anxiety scores of the children who were treated curatively with the aid of nitrous oxide were significantly lower than those of children from a behavioral management group. All the semiannual check-ups were performed without the use of nitrous oxide. Anxiety scores of all the children during the control period correlated closely with the anxiety scores of the curative treatment before and after the control period. It was concluded that nitrous oxide helps children to lower their anxiety levels during a long period after treatment. Influencing anxiety in highly anxious children might be characterized as a long-term process.

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### INFANT SLEEP POSITIONS

While many pediatricians are most comfortable recommending that infants be put to sleep lying on their side, the advantages to this over the supine position are not clear. The side sleep position is unstable; some infants placed on the side will roll to other positions, including the prone position. Hassall and Vandenberg studied sleep position in New Zealand infants between the ages of 1 and 4.5 months. They found that only 53% of 1-month infants and 31% of 4-month infants placed on their side usually remained on their sides. The majority had turned to a supine position, while some rolled to prone. Engelberts and de Jonge surveyed parents and found only 30% of infants between 2 weeks and 4 months placed to sleep in the side position were found there the next morning. Sixty-five percent of infants placed to sleep on their side had turned to supine, while 4% turned to prone. The side sleep position was more unstable in infants over 4 months. These data suggest that, while placing infants on their sides represents an intellectual compromise, it is a subtle endorsement of the supine position. The international literature overwhelmingly demonstrates an increased risk of SIDS in babies who sleep prone. The risk of SIDS in the side versus supine positions has not been clearly differentiated.

At this time, national educational campaigns aimed at reducing the risk of SIDS through changes in sleep position and other child care practices are just beginning. Other countries, including Great Britain, The Netherlands, and New Zealand, have already adopted comprehensive educational programs that advocate the supine or side sleep position for healthy infants. In addition, these programs have included education regarding proper bedding materials and thermal environment, breast-feeding, and cessation of tobacco smoking as other means of reducing the risk of SIDS.

Although some authors have linked a recent 12% decline in the United States SIDS rate to publication of the AAP recommendations, others have argued that the effect of sleep position should be determined by a prospective, controlled trial. They note that the high relative risks associated with prone sleeping in other countries may be related to child care practices not common in the US.

While the debate over the need for a clinical trial and the ethical implications of such a trial continues, pediatricians must make recommendations to parents. We have shown that the AAP recommendations succeed in changing the practices and the advice of primary care physicians, although most pediatricians remain reluctant to advise the supine sleep position.

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# Transcutaneous electrical nerve stimulation (TENS) for pain management during cavity preparations in pediatric patients

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**T**raditional local anesthesia obtained by dental injections has several disadvantages, including patient anxiety or "needle-phobia", continued anesthesia after completion of the dental procedure, possible local and systemic toxic reactions from the local anesthetic agent, and paresthesia caused by lacerations of regional nerve fibers. A device that generates electrical signals, transcutaneous electrical nerve stimulation (TENS), has been modified to produce analgesia in dental patients. TENS offers the potential of treating many patients with a nonthreatening, noninvasive and nonmedicinal analgesic technique.

The apparatus used in the TENS procedure produces a modulation in pain perception. Mannheimer and Lampe believed this modulation increases a patient's capacity to withstand painful stimuli that normally are beyond comfortable tolerance.<sup>1</sup> Although clinical data from tests of TENS seem to be providing some positive results, there remains much controversy as to the mechanism of action.

Current explanations of how TENS affects pain stimuli include activation of neural modulating "gates" to decrease signal transmission, increased production of morphine-like substances at various anatomical levels along the pain pathway, or elevation of pain tolerance by stimulation of serotonergic pathways.

## MATERIALS AND METHODS

This study was double blind and placebo controlled. Twenty patients with an age distribution of eight to fourteen years were used to evaluate a TENS device for electrical analgesia during cavity preparation. Only healthy, ASA Class I males and nonpregnant females were considered. The patients attended schools at the appropriate grade levels relative to their ages. The patients were receptive to dental treatment, and thus required no special intervention such as restraint or conscious sedation. They had not taken any prescribed medications or unprescribed drugs within the previous week. The patients were obtained from the Graduate and Undergraduate Pediatric Clinics at the University of Pittsburgh, School of Dental Medicine. Each had a mandibular first permanent molar with occlusal caries. Only asymptomatic teeth with incipient caries that presented a "catch" with the #3ES explorer on the occlusal surface with no interproximal caries were used. All patients who met the above requirements were accepted as they came into clinic. Teeth with gross or deep decay within 1 mm of the pulp were not acceptable.

Through computer randomization, assignments were made for ten experimental and ten placebo patients. Of the ten patients in the placebo group, three were female and seven were male. Of the ten patients in the experimental group, five were female and five were male.

All cavity preparations were performed in the University of Pittsburgh Graduate Pediatric Dental Clinic, by the co-investigator without assistance by auxiliary personnel.

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The 1987 F.D.A. approved TENS apparatus\*, the Comfort Machine (Northbrook, Illinois), was used in place of conventional local anesthetic administered by injection.

Two patient hand held control units, which appeared identical; were used. One unit was active, and continuously delivered current; the other served as a placebo, delivering current for only one minute, then automatically "shutting off", but continuing to display the last setting. The restorative procedure was a standard Class I occlusal cavity preparation for an amalgam restoration on the mandibular first permanent molar. In all cavity preparations, a high-speed handpiece was used with water coolant, a new #56 carbide straight fissured bur, and standard suction. Depth of the cavity preparation was a minimum of 0.5 mm into dentin.

At the conclusion of the cavity preparation, the patient rated the pain perception by a 100 mm. visual analogue scale and a verbal descriptor scale. At this time the co-investigator also rated the patient's response by a verbal descriptor scale.

An analysis of variance was used to determine whether significant differences in patient's pain perception existed between TENS experimental and TENS placebo groups and between genders, and whether two-way interactions existed between experiment and gender.

The Fisher's Exact Probability Test and the Phi Coefficient were used to measure the relationship between experimental and placebo groups during cavity preparation and the ratings of pain reported on the verbal descriptor scales.

## RESULTS

An analysis of variance comparing the TENS experimental group to the TENS placebo group, utilizing the ratings of pain perception from the patient visual analogue scale, demonstrated a difference that was highly significant at  $p < 0.01$ ,  $F = 39.74$  ( $df = 1, 17$ ).

An analysis of variance, using ratings of pain perception from the patient visual analogue scale, indicated a statistically significant difference in patient's pain perception existing between the genders ( $F = 4.723$ ;  $df = 1, 17$ ;  $p = 0.045$ ). The mean ratings reported by the male patients was higher than the corresponding mean ratings reported by the female patients in the experimental group, in the placebo group, and overall. There was no significant two-way interaction exhibited between experimental group and gender.

When considering either the operator or the patient verbal descriptor scales, all ten experimental patients

had "low" pain ratings and all ten placebo patients had "high" pain ratings resulting in a Phi Coefficient that was a statistically significant, perfect correlation of 1.0 ( $P < 0.001$ ).

The Fisher's Exact Probability Test was used to test the null hypothesis that no differences existed between the experimental and placebo groups' pain ratings reported on the verbal descriptor scales. When evaluating the operator or the patient verbal descriptor scale, the probability was less than 0.001; the null hypothesis should, therefore, be rejected.

Using the Phi Coefficient, the correlation between the patient pain responses reported on the operator verbal descriptor scales and the patient pain perceptions reported on the patient verbal descriptor scales was a statistically significant perfect correlation of 1.0 ( $p < 0.001$ ).

## DISCUSSION

This study was conducted to evaluate the effectiveness of transcutaneous electrical nerve stimulation (TENS) in the management of pain during occlusal cavity preparations in children.

Using patient pain ratings from the visual analogue scale, an analysis of variance revealed a significant difference ( $p < 0.001$ ) between the means of the patients' pain ratings in the experimental and the placebo groups. The patient pain ratings reported on the visual analogue scale were lower in the experimental group than in the placebo group. The use of the TENS apparatus appeared, therefore, to have led to significant pain abatement during operative dental treatment.

Both the patient verbal descriptor scale and the operator verbal descriptor scale indicated a perfect correlation with each other ( $p < 0.001$ ). One hundred percent of the pain ratings in the experimental group indicated no pain or only slight pain. There was no overlap between pain ratings in the experimental group and pain ratings in the placebo group. No placebo-like effect was evident from any of the three evaluation scales.

The operator evaluated four patients in the experimental group as experiencing no pain. Of these four, two actually reported no pain. Thus in eight out of ten experimental sessions, profound analgesia was not obtained. Despite the lack of profound analgesia, the patients reporting no pain or only slight pain were comfortable. During the sessions with successful evaluations, deeper excavation into carious dentin was tolerated better than during sessions with unsuccessful evaluations. When pain was rated as mild or moderate, the patients appeared to become more sensitive to the caries exca-

vation where deeper excavation was necessary to remove caries.

Patients reporting mild or moderate pain would tighten their muscles of the orofacial structures, move their heads, close their mouths, and make vocalizations indicating discomfort and/or express in words, their discomfort.

All appointments with patients reporting mild or moderate pain may be considered unsuccessful, due to interruptions in treatment and discomfort during caries excavation.

The analgesia from TENS during Class I cavity preparations may be considered 100 percent successful when considering that the completion of the restorative treatment was facilitated in an efficient manner without interruptions or complaints by 100 percent of the experimental patients. One hundred percent of the patients from the placebo group interrupted treatment and complained of discomfort.

The success rates derived from the pain ratings of the verbal descriptor scales are in agreement with previous work by Clark, Silverstone, and Lindenmuth, which reported 92.8 percent (12/14) success rate for restorative treatment at  $p < 0.05$ .<sup>2</sup>

Analysis of variance indicated differences in the means of pain perception reported between experimental and placebo patients and differences in the means of pain perception reported between males and females that were statistically significant ( $p < 0.05$ ). No significant two-way interaction existed; there was no interaction between experimental group and gender. The females exhibited slightly lower means of pain perception reported for both experimental and placebo groups compared to males. This might indicate that the females may have a greater pain tolerance during cavity preparations, but not that the gender of the patient led to any greater abatement of pain when using TENS during cavity preparations. This is contrary to a study by Curcio, Tackney,

and Bergwerger, which stated that females indicated a much greater success rate with TENS.<sup>3</sup>

Considering acceptable comfort of the child patient and the alleviation of pain from, and fear of an injection, along with time saved by eliminating the injection and by having a cooperative patient, TENS may be a valuable adjunct to the dentist's armamentarium, when used in an appropriate manner for small carious lesions.

## CONCLUSIONS

The findings of this study allow the following conclusions to be drawn. There was a statistically significant difference between the patients' reported pain experiences in the experimental group and the patients' pain experiences in the placebo group. The patients' reported pain experiences in the experimental group were significantly lower than the patients' reported pain experiences in the placebo group. There exists a high correlation between use of TENS and the decreased reported pain experiences of child patients. Success rates for the use of TENS in analgesia for Class I cavity preparations in children was 100 percent, using verbal descriptor scales to evaluate the pain experiences of the patients. More studies with larger samples are needed to confirm these findings and further evaluate the effectiveness of TENS in obtaining analgesia for performing dental procedures in children.

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## CARIOGENICITY OF MILK

Our data showed that neither milk, nor lactose-reduced milk is cariogenic. Equally, it is apparent that they do not possess cariostatic properties when the dietary challenge and milk are administered separately. However, if milk is taken simultaneously with the caries challenge (sucrose), it is clear that milk exerts some protection against the cariogenic challenge of sucrose. Nevertheless, milk containing sucrose is more cariogenic than milk alone.

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# Differences between normal and developmentally disabled children in a first dental visit

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**P**roper management of children is probably the most important responsibility of those dentists who practice pediatric dentistry.<sup>1</sup> To establish good rapport with child patients is not only important to complete the required dental procedures, but also to create a solid foundation for their future dental health.<sup>2,3</sup> It is important that not only the normal population receive the best dental care available, but also a frequently forgotten population, developmentally disabled children.<sup>4-7</sup>

Communication problems constitute some of the major barriers for providing dental care for children, because of the difficulty in establishing an appropriate degree of rapport and understanding.<sup>8</sup> Dentists have to change and improve their management techniques, because social attitudes toward dealing with children are changing.<sup>9,10</sup> Certain behavior management techniques are disliked by parents, especially those considered invasive. Parents are more accepting of noninvasive techniques.<sup>11,12</sup> Since parental attitudes toward the way pediatric dentists treat their children change, we continue to improve our management methods.<sup>13,14</sup> The trends in the use of behavior management technology by professionals and the teaching of the different techniques is constantly changing.<sup>15,16</sup>

The importance of a good psychological preparation for the first-time patient has been emphasized by different authors.<sup>17,18</sup> Since children are unfamiliar with any

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new situation, familiarization about what to expect in the first dental visit should be helpful. The way the child is introduced to dentistry is very important, for fear the child may view the appointment, the dentist, and the dental staff as a serious threat.<sup>17</sup>

Behavior modification techniques have been widely developed. Desensitization and modeling are two of the most frequently used techniques in our field. Many researchers have reported these techniques to be successful in providing familiarization and improving behavior.<sup>18-23</sup> With desensitization the child is presented with new stimuli in a relaxing environment to make them incompatible with anxiety.<sup>18,22,24,25</sup> With modeling, children learn by watching other children undergoing treatment.<sup>18,22,25</sup>

The behavioral patterns of preschool children are complex, which may account for the fact that research in the application of behavioral techniques with developmentally disabled children is especially limited.<sup>4,26</sup>

Boj and Davila developed a tape-slide series based on the principles of desensitization and modeling, to prepare three- and four-year-old children for their first dental examinations.<sup>7</sup> A study with this audiovisual product was performed with developmentally disabled preschool children attending Preschool Special Education at John Williams School No. 5 in the city of Rochester, NY. The main findings in the study were that the children exposed to the tape-slide series behaved worse and had a higher heart rate than the children not exposed to it, and that heart rate was sensitive and objective in measuring anxiety and arousal.<sup>7</sup>

A study performed under the same basic conditions was done with preschool normal children at the pediatric dental clinic of the Dental School of the University of



Table 1 □ Table for measuring heart rate.

Heart Rate
1. Patient positioning
2. Oral examination
3. Prophylaxis
4. Taking of the radiographs
5. Fluoride application
6. End of the appointment

Barcelona four years later. The Spanish translation of the tape gave exactly the same explanations as the English version and the tone of voice used was also similar.

The purposes of the investigation were:

- To detect whether the audiovisual product could modify the behavior of normal children.
- To learn whether the results obtained in the study with normal children in Barcelona, Spain, were different from the ones obtained with the developmentally disabled population in Rochester, NY.

## METHODS AND MATERIALS

Twenty-eight children from the list of first visits at the Pediatric Dental Clinic of the University of Barcelona were chosen to participate in the study. The ages of the children at the time of the study ranged from three to four years. It was required that the patients were not previously exposed to a dentist. Consent was obtained from parents or guardians for each child. The study population was divided into two groups: *Experimental* and *control*, of fourteen children each. The groups were matched according to baseline heart rate, age and IQ.

The heart rate was measured with a pulse monitor and the IQ was calculated for each child participating in the study by clinical and school psychologists. The mean IQ for the control group was 108.21; and for the experimental one, 107.71. Baseline heart rate was 97.36 for the control group, and 97.57 for the experimental one. Mean age for the children in both groups was three years and six months.

For the slides, a professional clown and a four-year-old girl appeared as models. Both can be seen going through an initial examination. The visit was divided into six different stages:

- Patient positioning.
- Oral examination.
- Prophylaxis.
- Taking X-rays.
- Fluoride application.
- End of the appointment.

The tape runs for three minutes and thirty-three seconds, and explains what happens the first time children go to the dentist. The tape and slides are synchronized and used with a Camarate (Singer Education Systems) projector. Music and sounds were added to the tape for promoting constant attention of the audience. Each child in the experimental group was taken to the examination room immediately after viewing the tape-slide series. The children in the control group were not shown the tape-slide series. Examinations were limited to fifteen minutes and all the children were seen by the same dentist. The study was designed to be blind in regard to exposure to the audiovisual product. A rubber-cup prophylaxis was performed with a slow speed handpiece and the taking of x-rays simulated with a disconnected portable x-ray machine. Fluoride treatment was given, using

Table 2 □ Modified Melamed's Behavioral Rating Scale.

	1. Patient positioning	2. Oral examination	3. Prophylaxis	4. Taking of the radiographs	5. Fluoride application	6. End of the appointment
Inappropriate mouth closing (1)						
Choking (1)						
Won't sit back (2)						
Attempts to dislodge instruments (2)						
Verbal complaints (2)						
White knuckles (2)						
Negativism (2)						
Eyes closed (2)						
Verbal message to terminate (3)						
Refuses to open mouth (3)						
Rigid posture (3)						
Crying (3)						
Dentist uses loud voice (3)						
Kicks (4)						
Stands up (4)						
Rolls over (4)						
Dislodges instruments (5)						
Refuses to sit in chair (5)						
Leaves chair (5)						



Figure 1. A professional clown was used in the tape/slide series.



Figure 2. This four-year-old girl was a model in the tape/slide series.

disposable foam trays. Three methods were used for evaluating behavior modification. The three methods were used at the six different stages of the appointment.

- Physiological method: *heart rate* (Table 1).
- Dentist's *subjective evaluation*.

The following rating scale was used: 5=excellent, 4=good, 3=fair, 2=poor, and 1=very poor.

- Modified Melamed's Behavioral Rating Scale* (Table 2).

The different factors taken into consideration are weighted by a factor depending on how disruptive the behavior is considered.

## RESULTS

The mean scores of *heart rate*, dentist's *subjective evaluation* and *modified Melamed's Scale* were calculated for both control and experimental groups, in each of the six parts of the first visit.

An unpaired t-test was performed, to determine the significance of differences between the experimental and control groups. The t-test is shown in Table 3. Significance was chosen for p-values < 0.05.

For the dentist's subjective evaluation all p-values are low. The differences are statistically significant in patient positioning, taking of the radiographs, fluoride application, and end of the appointment. Children exposed to the technique behaved better according to this evaluation in all six parts of the examination, although two of them did not reach significance.

For heart rate all p-values are very low. The differences are statistically significant in all six parts of the study. Heart rate for children exposed to the tape-slide series was always lower.

Modified Melamed's Scale was not a sensitive measurement of behavior in this study, because it did not relate to the other two. The scores showed a trend for better behavior in the experimental group, but the differences were not significant in any of the six parts of the study.

## DISCUSSION

The technique used informs the children about what to expect in a first dental examination. The length of the tape and the language used are appropriate for three- and four-year-old preschool children. The girl chosen was four years old at the time of developing the audiovisual product. Being close in age to the population studied improves the effect of modeling according to Melamed.<sup>27</sup> The fact that both models, the girl and the clown, were considered attractive improves the result of modeling, according to Melamed.<sup>27</sup> The method used combined desensitization and modeling, which according to Gatchel improves effectiveness.<sup>20</sup> The clown experiencing each procedure before the girl provides needed repetition for the young population. A rewarding experience was the fact that all the children enjoyed the audiovisual product and payed attention throughout its duration.

Heart rate, as found in other studies, was a sensitive method for measuring anxiety and evaluating behavior. It is a useful method when great changes in behavior are not expected, as in a first dental visit. The dentist's subjective evaluation has its limitations because of its



Table 3 □ Unpaired t-test comparing control and experimental populations.

Part	p-value	Interpretation
DE 1	0.0277	* S.
DE 2	0.0709	N.S.
DE 3	0.1395	N.S.
DE 4	0.0036	* S.
DE 5	0.0088	* S.
DE 6	0.0057	* S.
HR 1	0.0076	* S.
HR 2	0.0042	* S.
HR 3	0.0018	* S.
HR 4	0.0014	* S.
HR 5	0.0026	* S.
HR 6	0.0052	* S.
MM 1	0.4496	N.S.
MM 2	0.1907	N.S.
MM 3	0.7267	N.S.
MM 4	0.1353	N.S.
MM 5	0.1288	N.S.
MM 6	0.3582	N.S.

N.S. = not significant

\* S. = significant (p value < 0.05)

DE = Dentist Evaluation, HR = Heart Rate, MM = Modified Melamed's Scale.

subjectivity. There is the possibility that the behavior of the child in one part of the appointment may influence the ratings of the scale in other parts. It was a useful scale, however, and the information given was related to the one given by heart rate. Modified Melamed's Scale did not relate to the other two methods and was not a good way for measuring microbehavior in the present study, because it was not designed to measure small changes in behavior. Since in a first examination, we do not have invasive procedures, this scale was not useful.

The behavior modification that took place in the present study with normal children was completely different from the one obtained in the study with the developmentally disabled population. The technique is very useful with normal children. All the children exposed to the audiovisual product showed a better cooperation and a lower heart rate in all six parts of the study. Normal children understood what to expect in a first examination and this fact relaxed them. We obtained the opposite results years ago with the special population. In our opinion the fact that the children had different cultural backgrounds (the studies were performed in different countries, Spain and United States) does not explain the results. The developmentally disabled children were excited by the technique, probably could not understand and elaborate the information given, and caused them increased awareness of suspected dental problems. The desensitization and modeling experienced by normal children were extremely helpful. The results of the study showed that anticipation of what will happen in the ex-

amination is useful for normal children. We can say that the tape-slide series used in the study is not useful for the developmentally disabled children, and we suspect that special children do not need as many explanations as normal children before dental procedures are begun, because they can be confused. It appears that new methods should be developed for them.

Methods based on modeling and desensitization are not time-consuming approaches. Sometimes economic factors make it difficult to apply them.<sup>10,23,28</sup> We do not consider expensive the one that has been used in this study. The benefits of better behavior of normal children are greater. Furthermore parents and children are motivated by use of new techniques.

## CONCLUSIONS

The tape-slide series showed before the examination was very useful with normal children. The experimental group showed better behavior and a lower heart rate than the control group, during a first dental examination.

As previously found by the same authors, heart rate was a sensitive method for measuring microbehavior, while Modified Melamed's Scale was found not to be useful.

We suspect that developmentally disabled children do not need as many explanations as normal children before dental procedures.

New research to find out behavioral techniques for improving cooperation in developmentally disabled children are needed.

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## SPANKING THE TODDLER

One hypothesized explanation for why parents spank is that they become angry in the frenzy of the moment as a reaction to their child's behavior, even though they do not believe in spanking. However, our data do not support this explanation as a major factor in spanking. We found that belief and practice were highly correlated, which suggests that mothers who spank their toddlers believe in it. In addition, the finding that maternal anger did not correlate with belief in or practice of spanking is further evidence that belief, rather than impulse, plays a major role in the spanking of toddlers.

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# CHILD ABUSE

## Child abuse education: Do not overlook dental professionals

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In 1962, shortly after Dr. C. Henry Kempe first focused the attention of the medical profession and the nation on the plight of abused children, the Children's Bureau of the U.S. Department of Health, Education and Welfare sponsored a conference on child abuse.<sup>1</sup> Those attending that conference recommended the adoption of child abuse reporting legislation. Beginning in 1963, state legislatures enacted reporting statutes, and within four years, all states had adopted such legislation.<sup>2</sup>

An estimated 2.7 million children in the United States are reported each year for child abuse and neglect and as many as 5,000 deaths may result from maltreatment.<sup>3,4</sup> The Indiana Department of Public Welfare (1993) reports that in Indiana alone over 61,700 reports of child maltreatment were made and thirty-eight children died from maltreatment.<sup>5</sup>

Dentists are in the unique position of seeing patients that are victims of abuse and neglect. More than 50 percent of physical abuse occurs to the head and facial area, and more than 70 percent of the fatalities attributed to abuse are caused by injuries to the head and neck.<sup>6</sup> Many abusive parents do not take their children to the same pediatrician more than once, and rarely visit an emergency room more than once, to avoid detection. They do not seem to use the same caution, however, when seeking dental care for their children.<sup>7</sup>

Blain (1991) states: "Often, the first medical professional to see these children routinely is a dentist."<sup>8</sup> The ability to recognize the signs and symptoms, when such

an incident presents itself, can make the difference in a child's physical, emotional, and social well-being. It may even save a child's life.<sup>9</sup>

There are no statistics available for Indiana, or for the United States, on just how many cases of child abuse and neglect are reported by dentists. Most states include dentists in the category of medical professionals. The Director of the Marion County (Indianapolis, Indiana) Office of the Division of Family and Children stated that she does not recall seeing a report of child abuse and neglect from a dentist.

Numerous surveys have identified reasons why dentists are not reporting suspected abuse and neglect.<sup>10-14</sup> Among the reasons for not reporting it are:

- Lack of knowledge to identify child abuse and neglect.
- Do not know where to report such cases.
- "It is not our responsibility."
- "Let the doctors report it."

Dental educational efforts have included articles on the topic of identifying and reporting child abuse.<sup>15-19</sup> These articles provide information on the types, behavioral and physical indicators of abuse, the importance of documenting what is found, observed, or heard during the evaluation, and how to report. Dental professionals need to be knowledgeable regarding the topic, and willing to become involved, especially when child abuse involves their patients.

In addition, professionals are attempting to educate dental professionals on the topic by offering educational programs, videotapes, and workbooks.<sup>8,18,20</sup> According to a 1989 survey forty-three of fifty-five predoctoral pediatric dental programs include the subject of child abuse and neglect in their curriculums.<sup>21</sup>

This article does not address the actual identification

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Table 1  Maternal and child health educational program for dental professionals on identifying and reporting child abuse and neglect.

## Preprogram questionnaire

Your responses to these questions are very important as we plan for future educational programs. It is our goal that the program will be useful to the professionals attending and effective in improving the care given to abused and neglected children in the State of Indiana. Please take a few minutes to give us your opinions. You will also be mailed a follow-up questionnaire in two weeks to help us evaluate today's program and another in 2-months to assess whether you are using the information you learned today. Thank you for your valuable assistance. Your answers will be kept confidential.

<b>A. General information about you:</b>			
1. Your profession:	11. Estimate the number of hours you have received. _____	21. The term "child neglect" includes cases in which parents provide inadequate supervision so that a child injures him- or herself.	33. Community awareness regarding child abuse and neglect identification and reporting is basically very good.
<input type="checkbox"/> Dentist	12. How did you hear about this program?	<input type="checkbox"/> True <input type="checkbox"/> False	<input type="checkbox"/> True <input type="checkbox"/> False
<input type="checkbox"/> Dental hygienist	<input type="checkbox"/> Mailing	22. Many delinquent adolescents were abused as children.	34. Medical, dental, social, and legal professionals understand and have respect for each other's responsibilities in child abuse cases.
<input type="checkbox"/> Dental office staff	<input type="checkbox"/> Someone shared information	<input type="checkbox"/> True <input type="checkbox"/> False	<input type="checkbox"/> True <input type="checkbox"/> False
Specify: _____	<input type="checkbox"/> Other, please specify: _____	23. Fathers are much more likely to abuse or neglect their children than are mothers.	35. The term "child neglect" includes cases in which the parents do not provide needed medical and dental care for their children.
<input type="checkbox"/> Other		<input type="checkbox"/> True <input type="checkbox"/> False	<input type="checkbox"/> True <input type="checkbox"/> False
Specify: _____		24. Children who have been abused usually tell someone soon after the abuse.	36. Dentists are not required to report suspected child abuse or neglect.
2. Your facility type:	<b>B. Your beliefs about child abuse and neglect:</b>		
<input type="checkbox"/> Private dental office	13. I should report suspected child abuse and neglect to:	25. Dentists do not receive adequate education in identifying and reporting child abuse and neglect in their dental school courses.	37. Abusive parents usually have high expectations of their children.
<input type="checkbox"/> Dental clinic	<input type="checkbox"/> police department	<input type="checkbox"/> True <input type="checkbox"/> False	<input type="checkbox"/> True <input type="checkbox"/> False
<input type="checkbox"/> Hospital clinic	<input type="checkbox"/> hospital emergency department	26. A professional must have physical evidence of child abuse before reporting the case.	38. It is recommended that I obtain a second opinion before I report child abuse and neglect.
<input type="checkbox"/> Other	<input type="checkbox"/> health department	<input type="checkbox"/> True <input type="checkbox"/> False	<input type="checkbox"/> True <input type="checkbox"/> False
Specify: _____	<input type="checkbox"/> department of child protection services (CPS)	27. Investigations are only conducted on reports of child abuse made by professionals.	39. When child abuse is a result of discipline it should not be reported.
3. Gender: <input type="checkbox"/> Male	<input type="checkbox"/> other: _____	<input type="checkbox"/> True <input type="checkbox"/> False	<input type="checkbox"/> True <input type="checkbox"/> False
<input type="checkbox"/> Female	14. Generally no investigation of my report will be conducted unless there is a second report received on the same case.	28. Sexually transmitted diseases (venereal warts, gonorrhea, herpes) in children usually come from sources other than sexual contact.	40. Any bite mark on a child is an indicator of child abuse.
4. Race: <input type="checkbox"/> Black	<input type="checkbox"/> True <input type="checkbox"/> False	<input type="checkbox"/> True <input type="checkbox"/> False	<input type="checkbox"/> True <input type="checkbox"/> False
<input type="checkbox"/> White	15. If I feel a child is not safe at home, I should:	29. Anyone who has "reason to believe" that a child has been abused or neglected must report the case.	
<input type="checkbox"/> Other	<input type="checkbox"/> ignore the situation, it is a domestic problem	<input type="checkbox"/> True <input type="checkbox"/> False	
5. Number of years in practice: _____	<input type="checkbox"/> take the child out myself	30. Community awareness of how to access the system that provides care to abused and neglected children is basically very good.	
6. Marital status:	<input type="checkbox"/> talk to the parents myself	<input type="checkbox"/> True <input type="checkbox"/> False	
<input type="checkbox"/> Married	<input type="checkbox"/> report it to CPS or law enforcement	31. Generally I should not tell the parents or caretaker that I have reported the case.	
<input type="checkbox"/> Single, never married	<input type="checkbox"/> report it to the health department	<input type="checkbox"/> True <input type="checkbox"/> False	
<input type="checkbox"/> Divorced	<input type="checkbox"/> other _____	32. Professionals who work with children are generally well trained in how to make a report when child abuse and neglect is suspected.	
<input type="checkbox"/> Widowed	16. Dentists need not be concerned with child sexual abuse.	<input type="checkbox"/> True <input type="checkbox"/> False	
7. Do you have children?	<input type="checkbox"/> True <input type="checkbox"/> False		
<input type="checkbox"/> Yes <input type="checkbox"/> No	17. I can be held legally liable for false reporting if my statements cannot be substantiated.		
If "Yes":	<input type="checkbox"/> True <input type="checkbox"/> False		
Number of boys: _____	18. I have to be able to prove a child was abused or neglected if I was the only one making the report.		
Number of girls: _____	<input type="checkbox"/> True <input type="checkbox"/> False		
8. Have you ever suspected a patient of being a victim of child abuse or neglect?	19. Child abuse is primarily associated with the stresses of poverty and rarely occurs among middle or high-income families.		
<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> True <input type="checkbox"/> False		
If "Yes" how many patients have you suspected of being child abuse or neglect victims? _____	20. In most cases of child abuse, children are not removed from their home.		
9. Have you ever reported a patient as a victim of child abuse or neglect?	<input type="checkbox"/> True <input type="checkbox"/> False		
<input type="checkbox"/> Yes <input type="checkbox"/> No			
If "Yes" how many patients have you reported as being child abuse and neglect victims? _____			
10. Have you received any previous training on the topic of child abuse and neglect?			
<input type="checkbox"/> Yes <input type="checkbox"/> No			
If "Yes" type of training:			
<input type="checkbox"/> Specific course work			
<input type="checkbox"/> On-the-job training			
<input type="checkbox"/> Other (workshop, seminar, etc.)			

and reporting of abuse, but reports on an educational program provided for dental professionals, who are often overlooked in community child abuse educational efforts, and encourages others to begin including dental professionals in their educational endeavors. The educational program was a direct result of the 1990 survey of nearly 3,000 Indiana dentists on their knowledge of ten basic child abuse concerns.<sup>14</sup> More than 800 dentists requested additional education and training.

## METHOD

The 1993 Indiana State Department of Health, Maternal and Child Health Division dental educational program "Identifying and Reporting Child Abuse" was held in Indianapolis, Indiana. No professional who wanted to attend was turned away.

The 3.5 hour continuing educational program provided information on:



Table 2  Maternal and child health dental educational program on identifying and reporting child abuse and neglect.

Two-month questionnaire

Thank you for participating in the recent Maternal and Child Health Dental Educational Program on Identifying and Reporting Child Abuse and Neglect. Please take a few minutes to help us determine whether the program was effective and whether you are now using the knowledge you gained by participating in the program. Your responses will be kept confidential.

A. It has now been two months since you participated in the Maternal and Child Health Educational Program for Dental Professionals. What are your current beliefs about child abuse and neglect:

- |   |  |  |  |
|---|--|--|--|
| <p>1. Dentists are not required to report suspected child abuse and neglect.<br/><input type="checkbox"/> True <input type="checkbox"/> False</p> <p>2. Abusive parents usually have high expectations of their children.<br/><input type="checkbox"/> True <input type="checkbox"/> False</p> <p>3. It is recommended that I obtain a second opinion before I report child abuse and neglect.<br/><input type="checkbox"/> True <input type="checkbox"/> False</p> <p>4. Child abuse could be a result of discipline and should not be reported.<br/><input type="checkbox"/> True <input type="checkbox"/> False</p> <p>5. Any bite mark on a child is an indicator of child abuse.<br/><input type="checkbox"/> True <input type="checkbox"/> False</p> <p>B. Since participating in the educational program, we would like to know whether you are now applying the knowledge gained to your professional practice?</p> <p>6. I feel I am more aware of the possibility that child abuse and neglect could occur with my patients.<br/><input type="checkbox"/> True <input type="checkbox"/> False</p> <p>7. Since the educational program, I have suspected patients of being victims of child abuse or neglect?<br/><input type="checkbox"/> Yes <input type="checkbox"/> No<br/>If "Yes" how many patients have you suspected of being child abuse or neglect victims?</p> <p>8. Since the educational program, have you reported patients as possible victims of child abuse or neglect?<br/><input type="checkbox"/> Yes <input type="checkbox"/> No<br/>If "Yes" how many patients have you reported of being possible child abuse or neglect victims?</p> | <p>9. A child reveals to you that he does not want to go home with his mother. When you question the reason for this, he states that his dad is sexually molesting him. Should you report this as child abuse?<br/><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>10. During a routine examination, you notice bruises on the face of a 9 year-old girl. When you inquire about the bruises she tells you that her mom slapped her. Should you report this as child abuse?<br/><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>11. A 6 year-old child is noticed to have several "hickies" on her neck. When you ask the child about them, she states that her 12 year-old uncle does this to her and her younger sisters when they play. A palatal lesion was also noted. Should this be reported as child abuse?<br/><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>12. A 5 year old child presents with bleeding from the upper gum. Upon routine examination, a frenum tear and bruising is noted. The mother explained the child fell, hitting his mouth on a wooden block. The child told you the same story when you were alone. Should this be reported as child abuse or neglect?<br/><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>13. Although Mrs. Jones has been educated by you and your staff regarding her three children's dental care and necessary treatment to correct caries and periodontal problems, she has failed to keep numerous appointments. Should this case be reported?<br/><input type="checkbox"/> Yes <input type="checkbox"/> No</p> | <p>14. Nonabusive parents generally seek treatment for their children immediately.<br/><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>15. A 15 year-old girl was brought to your office for treatment of a toothache. Upon routine examination, you note that she is pregnant. She also has suspicious looking lip lesions. Cultures were obtained. Should the case be reported as child abuse?<br/><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>16. Cigarette burns noted on a child's face aroused your suspicion. The child said he accidentally touched his father's cigarette. In routine examination, you also note cigarette burns to the palm of the hands. Should this be reported as child abuse or neglect?<br/><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>17. A 2 year-old accompanied his mother to your office for emergency treatment for injuries received from falling on the ice. The staff noticed that the child did not have a coat, was wearing only socks without shoes, was dressed in a summer tee shirt and thin summer pants. The mother also was dressed in thin summer-like clothes, hair was unkempt, she was without a coat, and was concerned about payment for the treatment. Should this be reported as child abuse or neglect?<br/><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>18. Although dentists have frequent opportunities to observe cases of abuse and neglect, the rate of reporting by dentists is extremely low.<br/><input type="checkbox"/> Yes <input type="checkbox"/> No</p> | <p>19. Finger marks on the neck should make the dentists suspicious of strangulation. Should this be reported as child abuse?<br/><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>20. External ears with signs of pinching, twisting and pulling could be indicators of child abuse.<br/><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>21. A dentally neglected child is often difficult to identify.<br/><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>22. If I suspect child abuse and neglect in the future, I will make a report to the local CPS or law enforcement.<br/><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>23. My staff was unable to attend the program. I feel it is important that they receive this information.<br/><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>24. I would be interested in receiving information in the future regarding educational programs on child abuse and neglect, either in my area or in Indianapolis.<br/><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>25. I have shared the information I received at the program with others.<br/><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>26. I would like to receive a summary of the data collected.<br/><input type="checkbox"/> Yes <input type="checkbox"/> No</p> |
|---|--|--|--|

- Identifying the types of abuse and neglect.
- Reporting to local Child Protection Service (CPS) and law enforcement agencies, what they need included in the reports to enable them to investigate, and what can be expected to happen when a report is received.
- How to talk to the child and caretakers when child abuse is suspected.

The program was offered in the morning and repeated in the afternoon, eliminating the need to close the office an entire day. The program was modelled after successful annual community educational programs on child abuse provided by the Indiana University Community

Child Abuse Projects (IUCCAP) for the past six years.<sup>22</sup>

The letter of invitation, registration/brochure, and all research tools were reviewed and approved by the Indiana University Institutional Review Board.

Preprogram questionnaires were administered to collect demographic information about the participants. Twenty-six true or false questions were included to assess their beliefs about child abuse and neglect (Table 1). The postprogram questionnaire included identical questions included on the preprogram questionnaire and included an evaluation component of the actual program topics and effectiveness of the presenters. The postprogram questionnaire was mailed two weeks after the program.



Table 3 □ Maternal and child health dental educational program on identifying and reporting child abuse. Pre- and Postprogram Questionnaire Comparison

Question	Pre- N=102	Post- N=89	Question	Pre- N=102	Post- N=89
13. I should report suspected child abuse and neglect to: police department hospital emergency department health department department of Child Protection Service (CPS) law enforcement (LE) and CPS other	[ 5%] [ 1%] [ 2%] [74%] [ 8%] [ 7%]	[ 2%] [ 0%] [ 0%] [75%] [21%] [ 1%]	26. A professional must have physical evidence of child abuse before reporting the case. true false	[25%] [75%]	[ 6%] [94%]
14. Generally no investigation of my report will be conducted unless there is a second report received on the same case. true false	[14%] [86%]	[ 5%] [96%]	27. Investigations are only conducted on reports of child abuse made by professionals. true false	[ 1%] [99%]	[ 0%] [100%]
15. If I feel a child is not safe at home, I should: ignore the situation, it is a domestic problem take the child out myself talk to the parents myself report it to CPS or LE report it to the health department talk and report to CPS & LE other	[ 0%] [ 0%] [ 2%] [87%] [ 5%] [ 2%] [ 4%]	[ 0%] [ 0%] [ 0%] [98%] [ 0%] [ 1%] [ 1%]	28. Sexually transmitted diseases (venereal warts, gonorrhea, herpes) in children usually come from sources other than sexual contact. true false	[ 3%] [97%]	[ 1%] [99%]
16. Dentists need not be concerned with child sexual abuse. true false	[ 3%] [97%]	[ 6%] [94%]	29. Anyone who has "reason to believe" that a child has been abused or neglected must report the case. true false	[84%] [16%]	[100%] [ 0%]
17. I can be held legally liable for false reporting if my statements cannot be substantiated. true false	[31%] [69%]	[11%] [88%]	30. Community awareness of how to access the system that provides care to abused and neglected children is basically very good. true false	[14%] [86%]	[12%] [88%]
18. I have to be able to prove a child was abused or neglected if I was the only one making the report. true false	[22%] [78%]	[ 3%] [96%]	31. Generally I should not tell the parents or caretaker that I have reported the case. true false	[76%] [23%]	[61%] [36%]
19. Child abuse is primarily associated with the stresses of poverty and rarely occurs among middle or high-income families. true false	[ 1%] [99%]	[ 0%] [100%]	32. Professionals who work with children are generally well trained in how to make a report when child abuse and neglect is suspected. true false	[28%] [72%]	[35%] [63%]
20. In most cases of child abuse, children are not removed from their home. true false	[73%] [27%]	[69%] [29%]	33. Community awareness regarding child abuse and neglect identification and reporting is basically very good. true false	[ 9%] [91%]	[11%] [88%]
21. The term "child neglect" includes cases in which parents provide inadequate supervision so that a child injures him- or her-self. true false	[91%] [ 9%]	[94%] [ 6%]	34. Medical, dental, social, and legal professionals understand and have respect for each other's responsibilities in child abuse cases. true false	[53%] [47%]	[67%] [28%]
22. Many delinquent adolescents were abused as children. true false	[94%] [ 7%]	[97%] [ 2%]	35. The term "child neglect" includes cases in which the parents do not provide needed medical and dental care for their children. true false	[89%] [11%]	[98%] [ 2%]
23. Fathers are much more likely to abuse or neglect their children than are mothers. true false	[26%] [74%]	[17%] [81%]	36. Dentists are not required to report suspected child abuse or neglect. true false	[12%] [88%]	[ 0%] [100%]
24. Children who have been abused usually tell someone soon after the abuse. true false	[ 3%] [97%]	[ 6%] [94%]	37. Abusive parents usually have high expectations of their children. true false	[53%] [47%]	[65%] [32%]
25. Dentists do not receive adequate education in identifying and reporting child abuse and neglect in their dental school courses. true false	[91%] [ 9%]	[88%] [10%]	38. It is recommended that I obtain a second opinion before I report child abuse and neglect. true false	[21%] [79%]	[ 2%] [97%]
			39. When child abuse is a result of discipline it should not be reported. true false	[ 2%] [98%]	[ 2%] [98%]
			40. Any bite mark on a child is an indicator of child abuse. true false	[18%] [82%]	[19%] [80%]

Thank you for your help!

A two-month follow-up questionnaire with questions and scenarios assessed whether the knowledge gained at the program was being or could be applied to their practice (Table 2).

## RESULTS

The program was considered successful because 114 professionals did attend the program. Earlier in the



Table 4 □ Maternal and child health dental educational program on identifying and reporting child abuse. Pre-, post-, two-month questionnaire comparison questions

Question:	Pre-N=102	Post-N=89	Two-month N=69
Dentists are not required to report suspected child abuse and neglect.[False] ...	88%	100%	94%
Abusive parents usually have high expectations of their children.[True] .....	53%	65%	68%
It is recommended that I obtain a second opinion before I report child abuse and neglect.[False] .....	79%	97%	99%
Child abuse could be a result of discipline and should not be reported.[False] .....	98%	98%	100%
Any bite mark on a child is an indicator of child abuse.[False] .....	82%	80%	83%

month the Indiana Dental Association did host a conference in Indianapolis. Many workshops were included on child abuse and neglect.

Of the 106 completing preprogram questionnaires, fifty-five (52 percent) identified themselves as dentists, twenty-seven (25 percent) were dental hygienists, twenty-one (20 percent) were other dental staff, and

three (2 percent) were nondental professionals. Eighty (76 percent) were from private dental offices, sixty-four (61 percent) were female, 102 (98 percent) were white, eighty-four (80 percent) were married, and eighty (75 percent) had children. The participants reported an average of 14.80 (SD = 11.25) years of professional practice.

Sixty-eight (65 percent) reported they had suspected an average of 3.44 (SD = 3.99) patients of being victims of child abuse or neglect, but only twenty (19 percent) had actually reported child abuse.

An average of 8.33 (SD = 12.89) hours of previous training was acknowledged by only thirty-two (30 percent) and twenty-one (66 percent) of those reported receiving that training in workshops and seminars. Only seven (22 percent) of those who indicated they had received previous training reported participating in actual course work on child abuse and neglect. Eighty seven (82 percent) felt that dentists do not receive adequate training on child abuse and neglect in their dental school courses.

Seventy-five (74 percent) of the participants knew they should report suspected child abuse to the Child

Table 5 □ Maternal and Child Health Dental Educational Program on Identifying and Reporting Child Abuse and Neglect Responses - Two-month Questionnaire Scenarios (Includes information not included on pre- and post- questionnaires)

N = 69	
9. A child reveals to you that he does not want to go home with his mother. When you question the reason for this, he states that his dad is sexually molesting him. Should you report this as child abuse? [68] Yes [ ] No	13. Although Mrs. Jones has been educated by you and your staff regarding her three children's dental care and necessary treatment to correct caries and periodontal problems, she has failed to keep numerous appointments. Should this case be reported? [ ] Yes [ ] No
10. During a routine examination, you notice bruises on the face of a 9 year-old girl. When you inquire about the bruises she tells you that her mom slapped her. Should you report this as child abuse? [50] Yes [13] No	14. Nonabusive parents generally seek treatment for their children immediately. [ ] Yes [ ] No
11. A 6 year-old child is noticed to have several "hickeys" on her neck. When you ask the child about them, she states that her 12 year-old uncle does this to her and her younger sisters when they play. A palatal lesion was also noted. Should this be reported as child abuse? [67] Yes [ 2] No	15. A 15 year-old girl was brought to your office for treatment of a toothache. Upon routine examination, you note that she is pregnant. She also has suspicious looking lip lesions. Cultures were obtained. Should the case be reported as child abuse? [59] Yes [ 9] No
12. A 5 year old child presents with bleeding from the upper gum. Upon routine examination, a frenum tear and bruising is noted. The mother explained the child fell, hitting his mouth on a wooden block. The child told you the same story when you were alone. Should this be reported as child abuse or neglect? [67] Yes [ 2] No	16. Cigarette burns noted on a child's face aroused your suspicion. The child said he accidentally touched his father's cigarette. In routine examination, you also note cigarette burns to the palm of the hands. Should this be reported as child abuse or neglect? [69] Yes [ ] No
	17. A 2 year-old accompanied his mother to your office for emergency treatment for injuries received from falling on the ice. The staff noticed that the child did not have a coat, was wearing only socks without shoes, was dressed in a summer tee shirt and thin summer pants. The mother also was dressed in thin summer-like clothes, hair was unkempt, she was without a coat, and was concerned about payment for the treatment. Should this be reported as child abuse or neglect? [41] Yes [25] No
	18. Although dentists have frequent opportunities to observe cases of abuse and neglect, the rate of reporting by dentists is extremely low. [65] Yes [ 2] No
	19. Finger marks on the neck should make the dentist suspicious of strangulation. Should this be reported as child abuse? [56] Yes [ 7] No
	20. External ears with signs of pinching, twisting and pulling could be indicators of child abuse. [66] Yes [ 3] No
	21. A dentally neglected child is often difficult to identify. [15] Yes [53] No
	22. If I suspect child abuse and neglect in the future, I will make a report to the local CPS or law enforcement. [67] Yes [ ] No
	23. My staff was unable to attend the program. I feel it is important that they receive this information. [48] Yes [ 9] No
	24. I would be interested in receiving information in the future regarding educational programs on child abuse and neglect, either in my area or in Indianapolis. [48] Yes [ 9] No
	25. I have shared the information I received at the program with others. [62] Yes [ 6] No
	26. I would like to receive a summary of the data collected. [58] Yes [ 9] No



Protection Services (CPS). Eighty (86 percent) knew their reports of suspected child abuse and neglect would be investigated whether or not a second report was received. Seventy-six (75 percent) knew that a professional did not need physical evidence of child abuse before reporting the case, and 101 (99 percent) knew that investigations are conducted on reports of child abuse regardless of whether they are made by professionals. All twenty-eight basic questions regarding child abuse and neglect were answered correctly by more than half of those attending the program (Table 3).

Fewer correct responses were observed on several questions. Thirty-one felt they could be held legally liable for false reporting, if their statements could not be substantiated. Twenty-two responded that they needed to be able to prove a child was abused or neglected. Seventy knew that children are not removed from their homes in most cases. Twenty-six felt that fathers are more likely to abuse or neglect their children. Twenty-five responded that physical evidence was needed to report a child abuse case. Seventy-five responded they should not tell the parents or caretaker that they had reported a case. Fifty-four felt that medical, dental, social, and legal professionals understand and have respect for each other's responsibilities. Fifty-one knew that abusive parents have high expectations of their children. Twenty-one felt that a second opinion was necessary before making a report (Table 3). The comparison of answers on preprogram and postprogram questionnaires shows a definite increase in correctness of answers to the majority of questions (Table 3).

Five questions were included on all three questionnaires. There was an increase in knowledge on most of the questions from the prequestionnaire to the two-month follow-up questionnaire (Table 4).

## DISCUSSION

Many dental professionals are interested in additional information on identifying and reporting child abuse. Participation in this program indicates their willingness to become involved in the troublesome area of child abuse. Since many dentists allowed their office staffs to attend, some dentists no doubt recognize the importance for the entire dental office to have information on identifying and reporting child abuse.

Dental professionals attending the program were generally knowledgeable on the topic of child abuse and neglect. Even though the majority (78 percent) did not receive education in their dental school courses, they are aware of key issues.

The question, "Generally I should not tell the parents or caretaker that I have reported the case", generates controversy among professionals. Although it was the opinion of more than half of those attending that this is true, it is a dilemma that concerns many professionals. The CPS and law enforcement agencies stress that the parent or caretaker should not be told, because of their concern for the protection of the child. If the alleged perpetrator is a member of the family, talking to the family may cause the child to suffer additional abuse; or, the family may move and the abuse will no doubt continue. Most health care professionals feel an obligation, however, to talk with the family to share suspicions, concerns for the child, and explain the law (Table 3).

Participants indicated they had not received information on identifying and reporting child abuse in their dental school courses, but believe that most professionals who work with children are generally well trained. Many colleges and universities do not offer the subject of child abuse in their curriculums for any discipline, except for an occasional lecture. Consequently, many professionals that work with children are not receiving information on identifying and reporting child abuse (Table 3).

Sixty-nine participants responded to the two-month follow-up questionnaire (Table 4). Sixty-four reported they were more aware of the possibility that abuse and neglect could involve their patients; nine reported they had suspected child abuse and neglect in their patients since participating in the program; five had reported suspected abuse. In response to the scenarios included on the two-month questionnaire (Table 5), most participants responded correctly to the situations. It is believed that the two-month questionnaire was a worthwhile exercise, but perhaps would have been best administered at six months, after the dental professionals had more time to use the information gained in the educational program.

Other responses indicated that sixty-seven would now report a suspected case to the local Child Protection Service or law enforcement agency. Forty-eight indicated their staffs could not attend this program, but they feel it is important for them to receive the information. Sixty-two would like to receive information on future programs and fifty-eight said that they have shared the information they received.

The educational program confirms that dental professionals do need information on identifying and reporting child abuse and neglect, but it also shows that this brief 3.5 hour program did improve their basic knowledge. Responses to the two-month questionnaire encourage

dissemination of this information to all dental professionals.

It is recommended that the offering of community child abuse educational programs for all professionals, including dental professionals, be widely adopted. It is also recommended that colleges and universities include identification and reporting of child abuse as a course in their curriculums for all disciplines: schools of education, social work, nursing, allied health, psychology, medicine, and dentistry.

New York enacted a law (1991) requiring many professionals to attend approved courses on identifying and reporting child abuse and neglect before a license to practice can be issued or renewed. Similarly, Massachusetts dentists applying for or renewing their licenses must now acknowledge in writing their responsibility to report suspected child abuse and neglect. Other states, including Indiana, should follow these leads.

Structured, approved courses on identification and reporting of child abuse and neglect should be required for all professionals licensed to work with children in any capacity.

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#### FREQUENCY OF BITEWING RADIOGRAPHS

Intervals between initial bitewing radiography and first radiographic recall have been suggested to be two years in low caries children aged three to six years and six months in high caries risk children. The results of this study indicate that particularly the presence of lactobacilli and mutans streptococci in saliva and the detection of three or more discolored enamel lesions or dentinal lesions were good predictors of additional dentinal lesions. It is suggested that these risk factors be used in the timing of bitewing radiography in children with a primary dentition.

Roeters, F.J.M. et al: Prediction of the need for bitewing radiography in detecting caries in the primary dentition.

*Community Dent Oral Epidemiol*, 22:456-460, December 1994.

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# DEMOGRAPHICS

## Your pediatric patients may be moving away from your practice

H. Barry Waldman, BA, DDS, MPH, PhD

**W**e are a mobile population. More than 41 million men, women and children (about 17 percent of the people in our country) change their residence each year. While 25 million people move in the same county,

- Almost eight million people move to other areas in their state.
- Seven million move to different states.
- More than three million move to different regions in the country.
- One out of six children (over one year of age) moves with their family each year.

This change of residence is an added difficulty for pediatric practitioners who continuously must attract new patients as their "older" patients "age-out" of their practices. In an effort to increase the awareness of both the magnitude and the variability of the mobility of different population groups, the following presentation will provide a general overview of the residence changes of the children and adults in our communities.

### SOURCE OF INFORMATION

Most data were developed from the Bureau of the Census geographic mobility report component of the Current Population Surveys.<sup>1</sup> This monthly survey of respondents is drawn from a national, stratified, random sample of residential unit occupants throughout the nation. Between 1990 and 1991, residents in more than 57 thousand housing units were interviewed.

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### GENERAL FINDINGS

In the past forty years the overall trend in population mobility rates has been downward (from 21 percent to 17 percent). As a result of general population increases, between the early 1950s and the mid-1980s, the number of individuals over one year of age that moved annually increased, however, from 31.4 million to 46.5 million. Since the mid-1980s, the number of movers decreased to 41.5 million. Most movers make local moves; i.e. in the same county or metropolitan statistical areas (MSAs), reflecting housing adjustments in response to changes in family life-cycle periods, including marriage, divorce, birth of children, and the death of a spouse.

Long distance moves more frequently are undertaken for economic reasons, including work transfers and new employment. Other moves are associated with attendance at schools, desire for changes of climate, proximity to recreational areas or family reasons.\*

The general trend in the movement of populations to metropolitan areas, except during the 1970s, has been a significant and consistent finding during this century. In addition, there have been substantial movements within metropolitan areas, with parts of MSAs outside of central cities reporting increasing populations. Between 1990 and 1991, central cities gained 3.2 million persons from suburbs and nonmetropolitan areas, while losing 5.7 million individuals. The suburbs gained 2.6 million persons. Suburbanization continues to be a major feature of population redistribution.

\*All data, unless otherwise stated, are for the 1990-91 period and are drawn from the Current Population Reports on geographic mobility.<sup>1</sup>



The emphasis on population mobility should not overshadow totally the fact that large segments of the population tend to “stay-put” either in their same home or general locale. For example in 1990:

- Fifty-three percent of the resident population of the United States lived in the same home as they did in 1985; ranging from 45 percent in the Western region to 61 percent of the Northeastern region of the country (ranging from 35 percent in Nevada and 41 percent in Alaska to 62 percent in New York and 64 percent in West Virginia).
- An additional one out of four residents lived in different homes but in the same county as in 1985.
- Only 10 percent live in different counties in the same state and 9 percent lived in different states as in 1985 (Table 1).

Nevertheless, regional migration is a significant form of population redistribution. The historical westerly movement has been modified with a secondary migration of persons to the Southern region of the nation. The changes in regional migration patterns have occurred as a result of the combination of a series of economic and life-style factors, including the relocation of industries out of the “Rustbelt” into the South because of tax incentives and lower labor costs, the rise of light industries that depend on trucking rather than rail transportation, the spread of home air-conditioning, leveling of regional differences in standards of living, educational opportunities and the success of the civil rights movement. The result since the mid-1980s has been a net outmigration from the Northeast and an immigration to the South. Movers from outside the United States to this country have tended, however, to offset the net losses for the Northeast.

### CHARACTERISTICS OF MOVERS

- Among adults, those in their twenties have the highest rates of moving.
- African-Americans have higher overall rates of moving than whites.
- Hispanics (who report their race as white) have different moving rates and patterns from those of

Table 1  Mobility of the resident population by region: 1990.<sup>2</sup>

Region	Percent distribution – residence in 1985			
	Same house in 1990	Different house in same county in 1990	Different county in same state in 1990	Different state in 1990
Northeast	60.7%	21.9%	8.0%	6.8%
Midwest	56.2	25.7	9.9	7.2
South	51.8	25.0	10.0	11.4
West	45.2	29.4	10.5	11.0
Total US	53.3%	25.5%	9.7%	9.4%

Table 2  Number of children who changed residence: 1990-1991.<sup>1</sup>

Destination of move	Age				Totals
	1-4	5-9	10-14	15-17	
	(in millions)				
Same county	2.2	2.1	1.6	0.9	6.8
Same state (different county)	0.6	0.6	0.4	0.2	1.9
Different state	0.6	0.5	0.4	0.3	1.7
Moved to US	<0.1	0.1	<0.1	<0.1	0.2
Total movers	3.5	3.3	2.5	1.4	10.6

Note: Differences in totals are due to rounding

Table 3  Percent of children who changed residence: 1990-1991.<sup>1</sup>

Destination of move	Age				Totals
	1-4	5-9	10-14	15-17	
Same county	14.5%	11.4%	9.4%	8.7%	11.0%
Same state (different county)	3.9	3.2	2.1	2.4	3.0
Different state	3.7	2.5	2.2	2.6	2.8
Moved to US	0.5	0.6	0.5	0.1	0.4
Total movers	22.7%	17.6%	14.1%	13.8%	17.2%
Total nonmovers	77.3%	82.4%	85.9%	86.2%	82.8%

Note: Differences in totals are due to rounding

other whites and African-Americans. Hispanics have higher rates of local movement and movement into the United States than non-Hispanics.

- African-Americans and Hispanics are more likely to rent than whites and non-Hispanics. Renters are more likely to move than nonrenters (33.6 percent vs 8.8 percent for 1990-1991).
- There is a direct relation between increased education and increased moving rate. (Note: one reason why persons with only limited education had the lowest rates of moving is that they are more likely to include the least mobile older age-groups.)
- In addition to members of the Armed Forces who have very high rates of moving, the unemployed have a higher rate of moving than the employed.
- A lower rate of moving was found among individuals who were not in the labor force, including retired persons, students, individuals keeping house and/or caring for their families and others who do volunteer work.
- In 1990-1991, the median household income of nonmovers was more than movers (\$31,200 vs \$24,600).

### AND WHAT OF CHILDREN?

More than 10 million children (17 percent of children over one year of age) move with their families each year.

- Almost two-thirds (64 percent) of the children who move stay in the same county.
- There is a progressive decrease, as children age, in



Table 4 □ Percent of children who changed residence by Metropolitan and Nonmetropolitan Statistical Area: 1990-1991.<sup>1</sup>

Destination of move	Age				Totals
	1-4	5-9	10-14	15-17	
Same MSA	12.9%	9.7%	7.8%	2.6%	9.5%
Between MSA	3.7	2.5	2.1	2.3	2.7
Outside MSA to MSA	0.7	0.7	0.5	0.8	0.7
From MSA to outside MSA	1.2	0.8	0.4	0.5	0.8
From outside MSA to outside MSA	3.6	3.3	2.8	3.0	3.2

Note: Differences in totals are due to rounding

the number and percent of children whose residences change.

- Almost two thirds (64 percent) of children who move are less than ten years of age (Tables 2 and 3).
- Most children who change residence, move in the same Metropolitan Statistical Area (MSA).
- Children more often move from outside MSAs to outside other MSAs than children move between MSAs, or to and from MSAs (Table 4).
- A greater percent of minority children of all ages, (particularly Hispanic children) than nonminority children change their residences.
- The greatest percent of white, African-American, and Hispanic children who move remain within the same county.
- There is a decrease in the percent of white and African-American children who move as the children age.
- After age four, there is no general decrease in the percent of Hispanic children who move (Table 5).

### FROM THE DENTIST'S PERSPECTIVE

While there is a great deal of geographic mobility by children and their families with the potential for loss from one's roster of active patients, it is significant that most moves are within the same county and/or metropolitan community. The potential thus remains for continued "loyalty" to one's current health provider, if the rapport that has been developed is sufficient to overcome the probable increase in travel time from the new place of residence to the current dental practice location. It is important to note that there is a greater tendency for younger children (the children most often served by pediatric dentists) to change their residence.<sup>3</sup>

In addition, as pediatric dental practices increase the demographic diversity of their patient population, they will need to deal with the fact that minority families have a greater rate of geographic mobility. Once again, the

Table 5 □ Percent of children who changed residence by race and ethnicity: 1990-1991.<sup>1</sup>

Age	Same county	Same state*	Different state	Moved to US	Total Movers
<b>1-4 years</b>					
White	13.7%	4.3%	3.6%	0.4%	22.0%
African-Amer.	19.0	2.2	4.2	0.2	25.6
Hispanic	21.3	2.6	1.8	1.5	27.2
<b>5-9 years</b>					
White	10.5	3.3	2.5	0.4	16.8
African-Amer.	16.2	2.4	2.8	0.7	22.2
Hispanic	15.5	1.9	1.6	0.8	19.8
<b>10-14 years</b>					
White	8.7	2.2	2.0	0.4	13.3
African-Amer.	12.6	1.4	2.4	0.3	16.8
Hispanic	13.9	2.2	1.4	1.3	18.8
<b>15-17 years</b>					
White	8.2	2.5	2.6	0.5	13.8
African-Amer.	11.6	2.0	1.9	0.2	15.7
Hispanic	11.9	2.7	2.1	2.4	19.2
<b>Total</b>					
White	10.4	3.1	2.6	0.4	16.2
African-Amer.	15.1	2.0	2.9	0.4	20.0
Hispanic	16.0	2.3	1.7	1.4	21.4

\*Different county

Note: Hispanics may be of any race

Differences in totals are due to rounding

need will be to develop a sense of confidence and rapport with the pediatric patient and the family, if there is to be any possibility for the practitioner to overcome the probable increase in travel time from a changed home residence to the current practice location.

In the past, the primary concern of health practitioners was providing preventive and curative services to their patients. In order to fulfill this primary concern, practitioners increasingly must concern themselves with the dramatic changes in the family and community environment within which our patients are being reared and live their lives. An awareness that many individuals move into and out of our communities each year must be considered as we welcome new patients to our offices (and communities) and transfer other patients to new practices and geographic areas. The young new patient may not be just new to our practice, but also may be passing through the traumatic process of becoming acquainted with a new school, friends, and neighbors. It surely is not easy when it includes becoming accustomed to a new dentist.

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## REPORTS

# Turner's syndrome in association with hemangioma of the parotid gland: Report of case

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**H**enry H. Turner's (1938, Endocrinologist, University of Oklahoma) constellation of physical features of infantilism, webbed neck and cubitus valgus (unusual carrying angle of the elbow) were subsequently recognized by Ford *et al* in 1959 to be associated with the deletion of one X chromosome. The symptom complex of Turner's syndrome (XO syndrome/Bonnevie-Ullrich syndrome) is characterized in addition by short stature, shield chest, low posterior hair line, epicanthal fold, ptosis of the eyelids, prominent ears, visual abnormalities such as strabismus, otitis media, ovarian dysgenesis, congenital lymphedema, multiple pigmented nevi, increased risk of keloid formation, hypoplastic nails and abnormalities affecting multisystems in the body.<sup>1-3</sup> These include skeletal abnormalities such as delayed maturation, epiphyseal irregularities, short metacarpals and osteoporosis; cardiovascular abnormalities, most commonly coarctation of the aorta and renal anomalies. Affected patients are also at increased risk for thyroiditis and other autoimmune diseases.

The literature is replete with reports of Turner's syndrome in association with varied conditions, such as anorexia nervosa, spondyloepiphyseal dysplasia tarda, myxoid degeneration of the mitral and aortic valves, hy-

poparathyroidism, insulin-dependent diabetes, idiopathic thrombocytopenic purpura, neural tumors, transitional cell carcinoma of the bladder, cholangiocarcinoma and dysgerminoma.<sup>2,4</sup> Others have studied a wide array of conditions such as digital dermatoglyphics, carbohydrate tolerance, HLA-typing, immunoassay of urinary growth hormone and the presence of double nucleolus organizer variant in these patients.<sup>1,5</sup>

Several findings of interest to the dentist have been reported. The angles of the mouth are pulled downward by pterygium colli, giving the face a so-called sphinx-like expression. The dental age corresponds to the chronological and skeletal ages of the patient. Premature eruption, crowding of teeth and deviations from normality in tooth shape and size and enamel thickness have been reported.<sup>6-10</sup> Takala *et al* in 1985, reported a lower prevalence of dental caries in the permanent teeth of 45,X women than in controls.<sup>11</sup> This finding was more pronounced in teeth in the incisor region than in the premolar and molar teeth. Reports on the periodontal findings in these patients include marginal gingivitis, pathologic pockets and tooth mobility.<sup>12,13</sup> A high arched palate was observed in about 36 percent of cases and a somewhat higher than normal frequency of cleft palate occurrence was noted.<sup>14,15</sup> Increased prevalence of malocclusion, the most common being cross bite, large maxillary overjet, distal molar occlusion, and a tendency to open-bite have been reported. Imbalanced craniofacial skeletal growth with both jaws retruded in relation to

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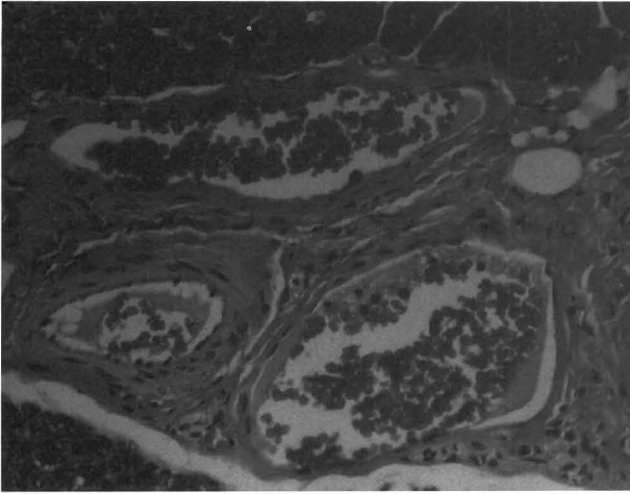


Figure 1. Photomicrograph depicting prominent vasculature in the parotid gland stromal tissue. (Hematoxylin and Eosin Stain; Original Magnification X 200).

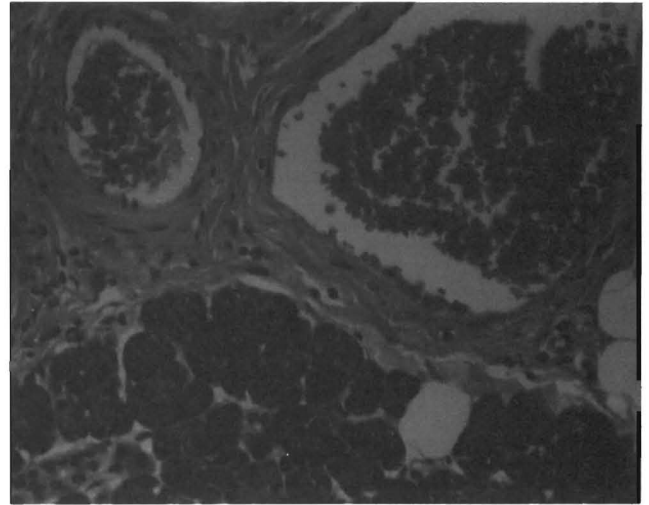


Figure 2. Light microscopic appearance of dilated and engorged vascular spaces in the parotid gland. (Hematoxylin and Eosin Stain; Original Magnification X 400).

the cranial base and a micrognathic mandible were described.<sup>16</sup> Severe forms of craniosynostosis can occur in Turner's syndrome and hence a careful examination of the skull needs to be performed in these patients.<sup>17</sup>

We have reported elsewhere vascular neoplasms of the parotid gland and present here the details of a case of Turner's syndrome associated with hemangioma of the parotid gland. Though a variety of vascular anomalies such as intestinal telangiectasia and pedal hemangiomas have been reported in Turner's syndrome, to the best of our knowledge this is the first case report of vascular malformation of parotid gland in such patients.

In the present case a progressively enlarging mass was noted in a two-month-old female infant in the left parotid gland area, and a provisional clinical diagnosis of lymphangioma was made. At one-and-half years of age superficial parotidectomy was performed in order to preserve the facial nerve, although the vascular tumor also involved the deeper lobe of the gland and the facial nerve. Histologically, the sections revealed endothelium-lined vascular spaces separated by connective tissue septa and was diagnosed as hemangioma of the parotid gland. The swelling persisted in the parotid area and at two-and-half years of age, bilateral carotid angiography was done. An elective embolization/ligation of the feeding vessels was planned for a later date.

At five years of age the mother had noticed the short stature of the patient. At fourteen years the clinician suspected Turner's syndrome in view of the additional

physical features of prominent ears, high palatal vault and the presence of numerous pigmented nevi on the face, extremities, and the trunk. A delayed bone-age was confirmed by radiographs of the hands. Karyotype findings revealed an XO chromosomal pattern. The patient in addition has amenorrhea and is now on treatment with Premarin.

Other medical history includes the occurrence of otitis media at eight months of age and hospitalization for pneumonia at age five. At twelve years of age she suffered from unilateral headaches with associated blurring of vision, occasional abdominal cramps, and dizziness.

A case report of Turner's syndrome with hemangioma of the parotid gland is reported. Hemangiomas of the parotid gland are benign hamartomatous lesions. The histologic features of pronounced cellularity and increased mitotic figures often seen in these rapidly growing lesions should not be mistaken for malignancy. Treatment consists of watchful expectancy for resolution and conservative surgical approach.

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### NUTRITION, DIET AND ORAL HEALTH

Data collected after 1945 provide no evidence indicating an increased caries resistance of teeth formed during the war years, a period marked by sugar restriction and increased consumption of high-extraction wheat flour rich in phosphate, vitamins and trace elements. The Hopewood House study in New South Wales, Australia, examined children who, from soon after birth, had virtually no sugar and white bread but ate wholemeal bread, soya beans, oats, rice, potatoes, and some treacle and molasses as well as dairy products, fruit, raw vegetables and nuts supplying protein, calcium and vitamins above the recommended levels. Young children had an extremely low caries prevalence, but as the children grew older, were relocated, and exposed to 'normal' urban dietary patterns, there was a steep increase in caries experience, contradicting previous assumptions that teeth during formation may acquire caries resistance.

Midda, M. and König, K.G.: Report of an FDI Working Group.  
Nutrition, diet and oral health.

*International Dent J*, 44:599-612, December 1994

# Calcifying odontogenic cyst in infancy: Report of case associated with compound odontoma

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**T**he Calcifying Odontogenic Cyst (COC) was recognized as a distinct clinicopathologic entity by Gorlin *et al* and several cases have been reported subsequently in the literature.<sup>1</sup> Although uncommon, it is a well characterized lesion from a clinicopathological view. Swan *et al* found that the COC represents 0.03 percent of the biopsied lesions and less than 2 percent of all odontogenic tumors and cysts.<sup>8</sup>

The COC usually manifests itself as a painless, slow-growing swelling, anterior to the first molar region. Radiographically it appears as a well-defined, unilocular radiolucency, and may have a radiopaque mass in its center. It can occur at any age, although the majority of the cases appear before the fourth decade of life, affecting equally maxilla and mandible without sex predilection.<sup>3,4</sup> Approximately 50 percent of cases are associated with unerupted teeth.<sup>5,6</sup> Radicular resorption is not common.<sup>3,7</sup>

Histologically the epithelial lining shows a well-defined basal layer of columnar cells and an upper layer with cell arrangement similar to that of the stellate reticulum of the dental organ and a mass of ghost cells that also may be found in the fibrous capsule.<sup>2</sup>

The COC is found rarely in patients in the first decade of life, where it can occur associated with odontoma.<sup>4,10,11</sup>

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The purpose of this paper is to report a case of COC associated with a compound odontoma involving an unerupted primary tooth in a three-year-old patient.

## CASE REPORT

A three-year-old girl was referred to the Department of Oral Pathology School of Dentistry, Federal University of Uberlândia (August 4, 1990), for evaluation of a swelling in the right maxilla. Intraorally, absence of the right lateral incisor and a swelling extending from the right central incisor to the first molar region were observed. Palpation revealed an asymptomatic vestibular bone enlargement with crepitation. The overlying mucosa was intact. The medical history was noncontributory.

Radiographic examination revealed a well-demarcated unilocular, radiolucent lesion partially occupied by a radiopaque mass, involving the right lateral incisor crown (Figure 1).

The patient's history showed that the lesion had been observed six months before (February 12, 1990) in a periapical radiograph, which was taken to investigate the absence of the right lateral incisor tooth (Figure 2, A and B).

The hypothetical clinical diagnosis was cystic odontoma, and using general anesthesia the lesion was enucleated (nasotracheal intubation). By means of the Newman-Novick incision, mucoperiosteum was detached with further osteotomy, curettage of the lesion, and extraction of the right lateral incisor. Suture was





Figure 1. Occlusal maxillary radiograph showing unilocular radiolucence, cortical expansion, and radiopaque masses.



Figure 2. Periapical radiographs: A) (Right) View of lesion at the first consultation. B) Six months earlier.

accomplished with polyglycolic acid (PGA 4.0). The specimen was sent for histologic examination.

### Macroscopic examination

The material included an uniradicular primary tooth with a cystic lesion, partially attached to the dental crown, and fragments of solid tissue, similar to denticles, measuring 2.5 x 1, 5 x 0.9 cm.

### Microscopic examination

The histologic sections showed a cystic cavity lined with odontogenic epithelium consisting of a prominent basal layer of columnar and cuboidal cells with hyperchromatic nuclei (Figure 3). In the upper layers, the epithelial cell arrangement bore similarity to the stellate reticulum of the dental organ. The so-called “ghost

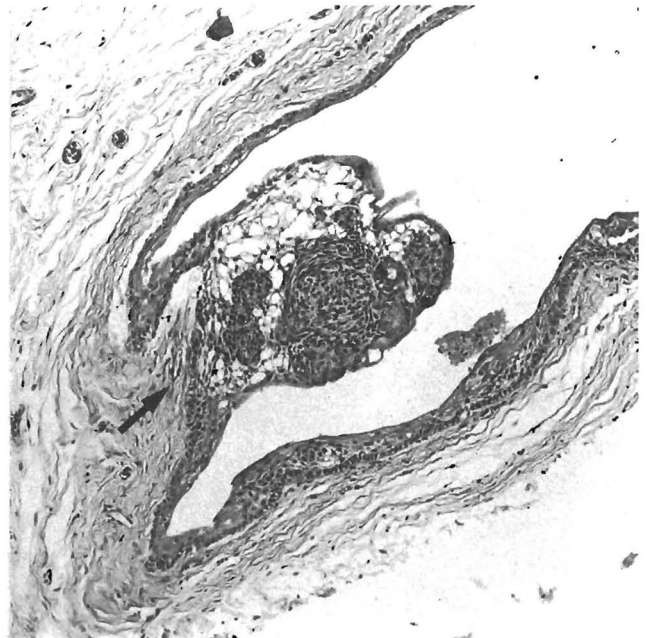


Figure 3. Histopathological components of cystic epithelial lining.

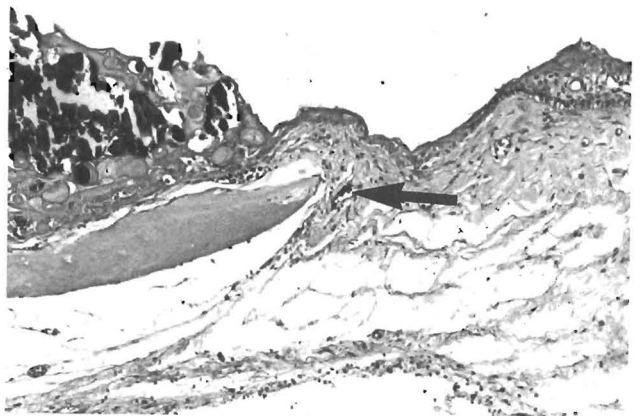


Figure 4. Presence of ghost cells and calcifications.

cells” were often intermingled within the stellate reticulum-like areas associated with focal calcifications (Figure 4). The cystic wall composed of fibrous connective tissue, sometimes loose, contained islands of odontogenic epithelium and areas of calcification. Moreover, it was observed that cementum, dentine, and pulp tissue, organized as denticles, were partially enclosed by calcified areas, which was probably representative of enamel matrix (Figure 5). The final diagnosis was *calcifying odontogenic cyst* associated with *compound odontoma*.

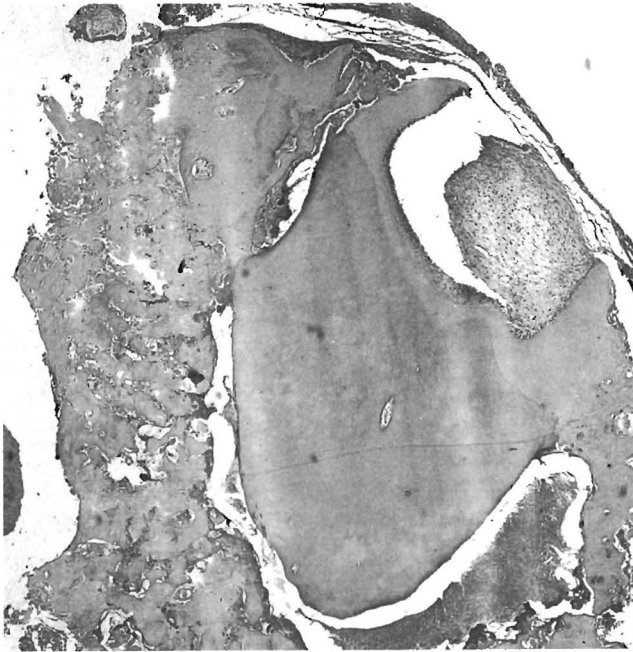


Figure 5. Partial view of the histological components of compound odontoma.

Table 2 □ COC in first decade of life, associated with unerupted teeth and odontogenic tumors.

Author	Age-group	Unerupted tooth	Odontogenic tumors
Gorlin <i>et al</i> <sup>1</sup>	8	Present NE*	NE*
Eda <i>et al</i> <sup>13</sup>	9	Supernumerary molar	Complex odontoma
Saito <i>et al</i> <sup>14</sup>	9	Second molar	Compound odontoma
Wright <i>et al</i> <sup>15</sup>	6	Present NE*	Odontoma
Shamaskin <i>et al</i> <sup>11</sup>	5	Present NE*	Odontoma
Toida <i>et al</i> <sup>16</sup>	8	Lateral incisor	Compound odontoma
Oliveira <i>et al</i>	3	Primary lateral incisor	Compound odontoma

\*NE = Not specified.

view, 50 percent of the lesions diagnosed in the first decade of life showed an unerupted tooth associated with an odontoma, usually in the mandible.<sup>4</sup> Moreover, isolated cases (Table 2) have shown an association of 100 percent between calcifying odontogenic cyst and unerupted teeth. Approximately 86 percent of these cysts were also associated with a compound odontoma.

The low frequency of odontogenic tumors and cysts in the first decade of life, as well as the uncharacteristic clinical and radiographic aspects, makes a preoperative diagnosis of calcifying odontogenic cyst very difficult. The unilocular radiolucent aspect may simulate radicular cysts, residual cysts, lateral periodontal cysts, and odontogenic keratocysts, and if associated with the crown of an unerupted tooth, may resemble dentigerous cysts. The multilocular radiolucent aspect may simulate ameloblastoma.<sup>17</sup> The presence of radiopaque masses associated with a retained tooth and radiolucent areas suggest, however, that other lesions must be considered: Ameloblastic fibrodontoma, odontoameloblastoma and adenomatoid odontogenic tumor.<sup>4,16</sup> In the current case, the presence of radiopaque structures similar to a rudimentary tooth, and in consideration of the patient's age, lead to the diagnostic hypothesis of cystic odontoma. Puncture of the lesion may be useful in determining its cystic nature, although cystic neoplasms cannot be excluded. In some situations, a preoperative incisional biopsy may be desirable. In the present case, the age of the patient and the benign radiographic aspect of the lesion recommended, however, enucleation as the initial approach.

Since the work of Gorlin *et al*, many attempts have been reported in the literature for further naming and classifying the lesion.<sup>1</sup> In 1971, the International Classification of Odontogenic Tumors and Cysts included calcifying odontogenic cyst in the group of odontogenic

Table 1 □ Frequency of COC in first decade of life.

Author	N. of cases	First decade	%
Gorlin <i>et al</i> <sup>1</sup>	15	1	6.6
Fejerskov and Krough <sup>5</sup>	52	5	9.6
Freedman <i>et al</i> <sup>3</sup>	70	3	4.3
Altini and Farman <sup>9</sup>	70	4	5.7
Praetorius <i>et al</i> <sup>2</sup>	16	1	6.3
Shear <sup>10</sup>	80	5	6.3
Shamaskin <i>et al</i> <sup>11</sup>	20	2	10.0
Buchner <sup>4</sup>	215	8	3.7

The patient follow-up has been satisfactory, with normal bone reshaping and without recurrence to date (four years).

## DISCUSSION

The occurrence of COC in the first decade of life is very uncommon (about 10 percent of reported cases) (Table 1). The youngest patient recorded was two days old.<sup>12</sup>

The calcifying odontogenic cyst often occurs in association with an unerupted tooth and/or an odontogenic tumor. In general, a fourth of reported cases have been in association with an impacted tooth and a tenth with odontomas.<sup>15</sup> Nevertheless, in Buchner's extensive re-

tumors describing it as a "nonneoplastic lesion". After the review by Praetorius *et al*, calcifying odontogenic cyst has been classified as two separate entities: one cystic (COC) and the other as neoplastic in nature (odontogenic ghost cell tumor).<sup>2</sup> Recently, Kramer *et al* commented that this lesion can show considerable diversity in structure and behavior.<sup>22</sup> Those lesions that most closely resemble Gorlin's original description, appear to be nonneoplastic, while the others may have an infiltrative pattern of growth.<sup>22</sup> Although the true nature of the lesion is nondefined to date, the marked tooth-resorption, bony expansion, and destructive potential of calcifying odontogenic cyst suggest a more aggressive lesion.<sup>16</sup> We believe it to be a neoplastic lesion with two variants: cystic and solid.

The question raised by Shear, whether calcifying odontogenic cysts that have features of other odontogenic tumors developed this tumor secondarily, or whether the calcifying odontogenic cyst is itself a secondary phenomenon in an odontogenic tumor, remains unanswered.<sup>10</sup> Taking the potentials of odontogenic epithelium into consideration, both possibilities are plausible. Although uncommon, recurrences of both cystic and solid lesions of calcifying odontogenic cysts have been reported after one to eight years.<sup>4</sup> Recurrences, including patients in the first decade of life, have been observed five years or more after initial surgical therapy.<sup>12,15,21</sup> Thus, enucleation seems to be the appropriate treatment for most lesions, although marsupialization has been used with apparent success.<sup>18-20</sup> One should keep in mind, therefore, that adequate follow-up over a period of ten years would be desirable.<sup>4,17</sup>

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# ABSTRACTS

**Croll, Theodore P. and Helpin, Mark L.: Class II vitremer restoration of primary molars. J Dent Child, 62:17-21, January-February 1995.**

Several resin-modified, glass-ionomer cements have proved successful when used in Class III and Class V cavities in primary teeth. One of them, Vitremer, is proving to be very durable when used in Class I and Class II cavities in primary teeth. The material is handled as quickly and easily as silver amalgam. The components of the Vitremer Tri-Cure System are: Primer, Glass powder, Liquid, and Resin gloss. In addition to a light-curing mechanism, Vitremer hardens by the acid base, glass-ionomer reaction, and a chemical "dark cure", catalyzed by a reduction/oxidation reaction.

Over 600 Class II Vitremer restorations have been placed and over 250 have been in the teeth long enough (12 to 18 months) to be observed regularly. **Vitremer Tri-Cure System; Primary teeth; Class I and Class II restorations**

**Gruythuysen, R.J.M. and Smits, M.F.G.: Polycarboxylate cement as a cavity-sealing material for the calcium hydroxide pulpotomy: A retrospective study. J Dent Child, 62:22-24, January-February 1995.**

Polycarboxylate cement was evaluated as a cavity-sealing material in calcium hydroxide pulpotomies of primary molars. The lifespan of these teeth (N = 55) were compared with that of the corresponding teeth on the contralateral sides. The success rate for the treatment was 75.5 percent after one year and at least 61.9 percent after two years.

Significant shorter life-spans were found in primary teeth with pulpotomy than in those without it. However, polycarboxylate cement can be a suitable alternative for zinc oxide-eugenol as a

cavity sealing material in calcium hydroxide pulpotomies.

**Polycarboxylate cement; Cavity-sealing material; Calcium hydroxide pulpotomy; Primary teeth**

**Ngan, Peter and Fields, Henry: Orthodontic diagnosis and treatment planning in the primary dentition. J Dent Child, 62:25-33, January-February 1995.**

Early recognition of malocclusions is in the hands of the primary care providers. Pediatric and general dentists should be familiar with conditions that are known to interfere with growth and development of a child. Conditions such as early loss of primary teeth, anterior and posterior crossbites, and some Class III skeletal problems can be treated in the primary dentition to facilitate normal growth and development and offered some benefit to the patients. On the other hand, aggressive arch length modulation, Class II correction and intervention for vertical problems, including non-nutritive sucking habits, is largely unwarranted.

**Orthodontics; Diagnosis; Treatment; Primary dentition**

**Tsubouchi, Jiro; Yamamoto, Seiji; Shimono, Tsutomu; Domoto, Peter K.: A longitudinal assessment of predictive value of a caries activity test in young children. J Dent Child, 62:34-37, January-February 1995.**

A longitudinal study was conducted in Okayama, Japan to investigate the predictive value of a caries activity test (Cariostat). The subjects were 100 children who participated in routine dental examinations at 18, 24 and 36 months. Results indicated caries prevalence of 9% at 18 months, 21 percent at 24 months and 70 percent at 36 months. Cariostat scores at each age were correlated with dmft at 36 months and with

whether or not child was caries-free at 36 months. Cariostat scores at each age showed good validity (sensitivity + specificity) for whether or not child was caries-free at 36 months. These results indicated that caries activity test, Cariostat, was effective for predicting caries occurrence in young children.

**Cariostat; Caries activity tests**

**Roberts, John F.: How important are techniques? The empathic approach to working with children. J Dent Child, 62:38-43, January-February 1995.**

The author presents behavior management as essentially anxiety management, not alone in the child but in ourselves as well. Behaviorist and humanist psychologies are discussed. The author is critical of the teaching that behavior management can be taught as a technique: if a specific management technique is used, the child will behave in a certain way. Several techniques are discussed. Voice control and facial expression are discussed.

Physical restraints are considered and their use discussed, along with their long-term effects. Empathy is discussed at length.

**Empathy; Behaviorism; Humanism; Restraints**

**Veerkamp, J.S.J.; Gruythuysen, R.J.M.; Hoogstraten, J.; van Amerongen, W.E.: Anxiety reduction with nitrous oxide: A permanent solution? J Dent Child, 62:44-48, January-February 1995.**

The authors equate behavior with anxiety. Operator bias is considered in determining the level of a patient's behavior. Stress is considered always to be a factor in patient behavior. The use of nitrous oxide and its long-term effects are discussed.

**Nitrous oxide; Behavior; Stress**

ABSTRACTS *continued from page 10*

**Harvey, Mark and Elliott, Margaret:** Transcutaneous electrical nerve stimulation for pain management during cavity preparations in pediatric patients. *J Dent Child*, 62:49-51, January-February 1995.

The purpose of this study was to evaluate the effectiveness of Transcutaneous Electrical Nerve Stimulation (TENS) in pain reduction during cavity preparations in pediatric patients. Twenty patients, ages eight to fourteen years, were treated for Class I amalgam restorations in mandibular first permanent molars using TENS in a double blind protocol. Randomized assignments were made for ten experimental and ten control patients. Using the visual analogue scale, the ANOVA test indicated a significant decrease ( $p < 0.01$ ) in patient ratings between the TENS experimental and the control group. It can be concluded there was a statistically significant decrease in the pain perceptions of pediatric patients during Class I amalgam cavity preparations in mandibular first permanent molars.

**Pain; Electrical nerve stimulation**

**Boj, J.R. and Davila, J.M.:** Differences between normal and developmentally disabled children in a first dental visit. *J Dent Child*, 62:52-56, January-February 1995.

Twenty-eight three- and four-year-old normal children participated in a study where they were exposed to a tape-slide series before a first dental examination. The audiovisual product gives an explanation about a first examination, the children having no previous dental experience. The purposes of the study were to evaluate the behavior modification that took place and to see whether differences could be found with the results of the same study performed four years before, with developmentally disabled children. The results obtained with normal children were the opposite of those obtained with special children. The normal population subjected to the

audiovisual technique behaved better and had a lower heart rate throughout the appointment.

**Modeling; Tape-slide series; Behavior modification; Developmentally disabled children; Heart rate**

**Von Burg, Mary M. and Hibbard, Roberta A.:** Child abuse education: Do not overlook dental professionals. *J Dent Child*, 62:57-63, January-February 1995.

Dental professionals are mandated by law to report suspicions of child abuse and neglect (CAN), but surveys show dentists do not fulfill their obligation to report. Even though more than 50 percent of physical abuse occurs to the head and facial area, and more than 70 percent of child abuse and neglect fatalities are caused by injuries to the head and neck, dental professionals are often overlooked in efforts to educate the public on the problem. Pre-program questionnaires completed by dental professionals attending an educational program on identifying and reporting child abuse indicated that 70 percent had no previous training in identifying and reporting child abuse, 65 percent had suspected child abuse in their patients, but only 19 percent reported the abuse. As a result of this educational program, it is expected that some children in the state of Indiana will receive improved assessments by dentists and suspected child abuse and neglect will be reported to the proper agencies when identified. **Child abuse and neglect; Head injuries; Facial injuries; Education**

**Waldman, H. Barry:** Your pediatric patients may be moving away from your practice. *J Dent Child*, 62:64-66, January-February 1995.

A review is provided of general population movements to different places of residence. Emphasis is placed on the need for practitioners to consider the impact on young children as they leave

familiar surroundings and enter the world of a new residence.

**Change of residence; Impact on children; Impact on dental practice**

**Mysore, Jayashree; Roth, Lawrence M.; Kafrawy, Abdel H.:** Turner's syndrome in association with hemangioma of the parotid gland: Report of case. *J Dent Child*, 62:67-70, January-February 1995.

We report a case of Turner's syndrome with hemangioma of the parotid gland. The symptom complex of this syndrome are infantilism, pterygium colli and unusual carrying angle of the elbow. Oro-dental alterations and multisystem afflictions have been reported in these patients. Diagnosis is based on a combination of the clinical features, buccal smear finding of the absence of barr body and confirmed by karyotyping which can detect mosaic cell lines of the X chromosome.

**Turner's syndrome; Hemangioma; Parotid gland**

**Oliveira, José Augusto G.P.; da Silva, Claudia Jordão; Costa, Ivan Z.; Loyola, Adriano Mota:** Calcifying odontogenic cyst in infancy: Report of case associated with compound odontoma. *J Dent Child*, 62:70-73, January-February 1995.

A case of calcifying odontogenic cyst associated with compound odontoma in an unerupted primary tooth in a three-year-old patient is reported. Some considerations regarding the age of the patient, differential diagnosis and treatment are discussed. Although the cyst can occur at any age, the majority of cases appear before the fourth decade of life. This malady represents less than 2 percent of all odontogenic tumors and cysts.

**Calcifying odontogenic cyst; Compound odontoma; Unerupted primary tooth**