

Tooth eruption and otitis media: are they related?

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Abstract

The relationship between tooth eruption and otitis media has been a subject of debate in the literature. Teething may produce conditions conducive to the initiation or exacerbation of otitis media as well as other local and systemic clinical manifestations. A report of a child with bacterially involved pericoronitis associated with primary tooth eruption is presented. The potential relationship of the findings to otitis media is discussed.

The eruption of the primary teeth and the co-existence of any systemic disturbances in the so-called "teething" process is controversial.¹⁻⁵ Some of the purported systemic disturbances have included diarrhea, irritability, fever, loss of appetite, rhinorrhea, excessive salivation (drooling), and vomiting.^{1,2} The exact nature of the relationship of tooth eruption to that of other physiologic signs which occur concurrently has not been established scientifically and remains relatively dependent on accumulated observations of physicians and mothers. That there exists a localized gingivitis in the area concomitant with tooth exposure in the oral cavity is not disputed.

Theoretically, teething has been thought to be either a normal physiologic phenomenon dissociated with the etiology of other signs, a pathophysiologic process with localized disturbances, or a generalized pathophysiologic process capable of mediating multiple systemic findings.³ Clinically, one of the more frequently observed signs of teething is excessive salivation and drooling.⁴ It has been suggested that the excessive salivation and drooling is associated in time with the maturation of salivary glands and may be unrelated to the concomitant process of tooth eruption.⁵ This explanation is unlikely as the salivary glands reportedly mature in utero.⁶ Furthermore, there is evidence that noxious stimulation in the oral cavity produces voluminous amounts of saliva.⁷ Whether tooth eruption is, in it-

self, a noxious process is difficult to ascertain because of the inability of the infant to communicate specific information. Additionally, it is known that the placement of foreign objects (e.g., fingers) also reflexively produces increased salivary flow⁸ and teething infants frequently place their fingers in their mouths.

Certainly any cause and effect relationship between the eruption of primary teeth and more remote systemic disturbances is difficult to establish. An example of this dilemma is described in the following case report.

Case Report

An 11-month-old black female presented to her pediatrician's office with the maternal chief complaint of fever during the preceding 24 hr and a decreased oral intake. No vomiting, diarrhea, or other symptoms were present.

The medical history revealed an unremarkable perinatal course with the early infancy marked by 2 episodes of otitis media at 5 months and 8 months of age. Each responded to antibiotic therapy with resolution on follow-up examination. The infant had received appropriate immunization and was well nourished, maintaining weight at approximately the 10th percentile, height at the 20-25th percentile, and head circumference corresponding to the 10th percentile. In addition, developmental milestones appropriate for age had been accomplished. The mother described putting the child to bed each night with a bottle of formula.

A physical examination revealed the following: rectal temperature, 101.5°F; pulse rate, 120; respiratory rate, 20; weight, 8.2 kg; and height, 72.5 cm. The patient was a slightly irritable, well developed, well nourished, febrile female infant. Positive findings included a dull, hyperemic, immobile left tympanic membrane and edematous, erythematous anterior maxillary gingiva with a slight cyanotic discoloration.

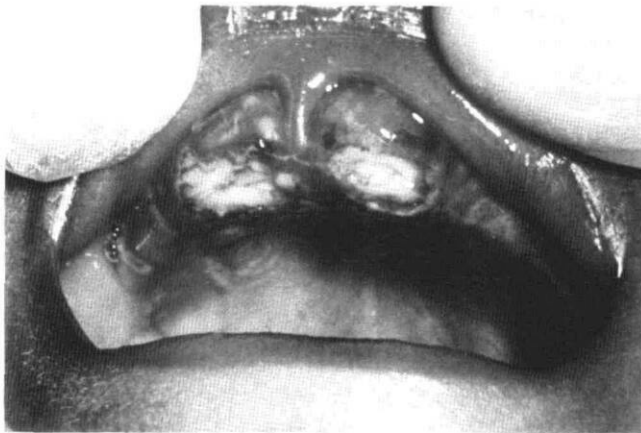


FIG 1. Photograph of partially erupted maxillary primary central incisors in an 11-month-old child. Note the thick, whitish purulent exudate surrounding each incisor.

tion. The maxillary central incisors were partially erupted with approximately one-third of the clinical crown visible. A whitish, relatively thick purulent exudate, which could be removed by gentle abrading, surrounded each erupting incisor (Fig 1). Otherwise, the physical examination was unremarkable. Cultures of the lesion on the gingiva adjacent to the erupting teeth were taken and the patient was started on Amoxicillin suspension, 125 mg p.o. every 8 hr for treatment of the otitis media.

Two days after presentation the gingival swelling and hyperemia had decreased, but the cyanotic discoloration with some necrotic-appearing areas persisted. In addition, a 1-cm lymph node at the left angle of the mandible was noted. On the fifth day of antibiotic therapy, the gingival lesions appeared to be significantly improved as evidenced by decreased cyanotic hue and hyperemia, and a decreased size of the lymph node at the left angle of the mandible. On the 15th day after the condition was noted, the gums appeared pink and healthy and the patient was asymptomatic. The mother was advised regarding the habit of putting the infant to bed with a bottle of formula and its association with nursing bottle caries.

Cultures of the necrotic gingiva revealed a mixed culture of normal oral flora without a predominant organism. The following were identified: alpha streptococcus; gamma streptococcus; *Neisseria*, and *Klebsiella* genus. The *Neisseria* organism was tested to exclude *N. gonorrhoea* but was not otherwise characterized.

Discussion

This report describes an infant with moderately severe pericoronitis around erupting maxillary primary incisors. In addition, the infant presented with

signs indicative of a mild systemic disease process (viz., increased irritability, slightly elevated body temperature, reduced feeding response, and lymphadenopathy). Clinical examination revealed positive findings associated with otitis media of the left ear. It is impossible to determine if the mild systemic manifestation process was caused by the ear involvement, the eruption process, other systemic etiologies, or some combination thereof. The association between the previous incidences of otitis media and tooth eruption are only speculative. However, the present findings are not atypical.^{1,2,9}

There are some studies which have evaluated the relationship between teething and clinical signs. Increased irritability and salivation were the 2 most frequently reported signs by pediatricians who were surveyed in 1 study.⁴ In a survey of parents, the generalized manifestations of increased irritability, disturbed sleep, decreased food intake, and drooling were reported frequently.⁹ In another study evaluating the local disturbances attributable to tooth eruption as reported by parents,¹⁰ local inflammation of the gingiva followed by "cheek flush" was the most common finding for anterior primary teeth, with the findings being reversed (cheek flush followed by gingival inflammation) when the posterior primary teeth erupted. The infant in this case report was noted to have clinical signs which were congruent with the findings of the studies cited previously. In addition, the patient exhibited signs indicative of otitis media at the time of examination and had a history of the same consistent with normally expected tooth eruption times.

The incidence of otitis media and its relationship to the eruption of primary teeth needs to be evaluated. The predominant organisms etiologically associated with otitis media include: *S. pneumoniae*, *H. influenzae*, *S. pyogenes*, and *B. catarrhalis*.¹¹ All of these can be transiently harbored in the oropharynx of healthy patients.¹² It may be hypothesized that increased production of oral secretions along with local inflammation that occurs during teething may predispose colonization of the middle ear from organisms residing in the oropharynx. It has been stated that otalgia is associated with dentally related phenomena, but this relationship is tenuous.¹³

The proportions of different types of oral flora change as a function of tooth eruption. For instance, in 1 study the incidence of *Streptococcus milleri* and *S. sanguis* was found to be significantly greater in groups of infants who had teeth than those who were edentulous.¹⁴ These observations support the hypothesis that the presence of teeth contributes to conditions suitable for the establishment of certain bacterial species. Others have shown similar findings.^{15,16} The

rate at which these bacteria colonize on teeth is variable.¹⁵ The ability of bacteria to locate in sites distant from the mouth through oropharyngeal and extraoral (e.g., fingers) pathways, and their potential for initiating inflammatory processes with systemic manifestations subsequent to tooth eruption is not known; however, this possibility remains credible.

The bacterial species found in this case report are not unusual and are similar to those reported elsewhere.¹⁶ It is possible that an infection or colonization forming around newly erupted teeth as in the present case report may contribute to systemic findings, including otitis media. It was reported recently that positive nasopharyngeal cultures are significantly more frequently observed with positive middle ear cultures.¹⁷ An extension of these findings should include oropharyngeal cultures associated in time with tooth eruption.

Finally, it is noteworthy that the amount of information related to teething in textbooks of pediatric dentistry is limited. This probably reflects the limited amount of clinical research which has been devoted to this area by pediatric dentists and other professionals and the lack of interaction between pediatric dentist and parents who have teething infants.

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Future Annual Session Sites

The following sites have been selected for future Annual Sessions of the Academy. Properties have not been selected for all sites, and there is not a firm date for the San Antonio Annual Session.

New Orleans, Louisiana ~ May 2-5, 1987

San Diego, California ~ May 14-17, 1988

Orlando, Florida ~ May 27-30, 1989

San Antonio, Texas ~ May, 1990