
Association between primary dentition wear and clinical temporomandibular dysfunction signs

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SCIENTIFIC ARTICLES

Abstract

Dental wear facets often are considered indicators of temporomandibular dysfunction (TMD). Dental wear facets are common in children, but their association with TMD signs is unknown. A reproducible, clinical evaluation of TMD signs for young children shows no statistically significant association between primary dentition wear facets and clinical signs of TMD ($P \leq 0.05$). Wear facets in young children do not appear to warrant TMD evaluation or treatment. (Pediatr Dent 13:263-66, 1991)

Introduction

Interest in pediatric temporomandibular dysfunction (TMD) is increasing. The patient age for TMD diagnosis and treatment is getting younger (Nilner and Lassing 1981; Ogura et al. 1985; Vanderas and Ranalli 1989). Many pediatric dentists routinely evaluate TM function, and some advocate early treatment (Padamsee et al. 1985).

The TMJ exhibits mature morphology and more than 50% of mature size upon complete eruption of the primary dentition (Nickel et al. 1988). After 5 years of age, growth velocity diminishes significantly and the TMJ is sufficiently formed at an early age to be affected by parafunctional habits.

Bruxism and grinding are parafunctional habits often implicated in TMD (Ramfjord 1961; Keith 1983; Reding et al. 1966; Seligman 1988). Wear facets are suggested as indicators of these parafunctional habits (Lindquist 1971; Ahmad 1986; Cash 1988; Seligman et al. 1988; Rugh 1988). Wear faceting from bruxism is common in the primary dentition (Lindquist 1971) and is used to justify evaluation and treatment of suspected TMD (Kirveskari et al. 1989). However, a relationship between primary dentition wear and TMD signs and symptoms has not been shown (Bernal and Tsamtouris 1986). The purpose of this study was to evaluate any association between wear faceting of the primary teeth and objective, clinically measurable signs suggesting TMD.

Materials and Methods

Children age 3 through 6 years with complete primary dentitions were used as both comparison and sample populations. Fifty children without wear facets comprised the comparison population, and 50 children with wear faceting served as the sample population. Patients with conditions affecting TMJ function or faceting (juvenile rheumatoid arthritis, hemifacial microsomia, trauma, cerebral palsy), who could not cooperate for dental examination, or who had an incomplete or mutilated dentition (oligodontia, extractions without proper space maintenance) were excluded from the study. Population size requirements were determined using the formula for comparing two population proportions for independent samples (Rosner 1990), with $\alpha = .05$, and $\beta = .4$.

Children were selected during clinic and school screening examinations. Consent for examination was obtained through written clinic consent forms and school parental consent policy. The first 50 children meeting the criteria for each study group were evaluated. Two observers were trained in examination techniques. Interrater reliability was evaluated with Cohen's Kappa (Dworkin 1988).

Parameters from other studies (Helkimo 1974; Morawa et al. 1985; Ogura et al. 1985; Vanderas 1987; Riolo et al. 1988; Okeson 1989) were used as much as possible for comparison of data. However, to prevent false positive results, examination of young children must exclude ambiguous, uncomfortable, or prolonged procedures. Therefore, intra-auricular TMJ palpation, intraoral pterygoid palpation, and subjective questioning about symptoms were inappropriate. Because of these limitations, only objective, easily measurable clinical signs associated with TMD were evaluated.

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The clinical examination evaluated the following:

1. Muscle (temporalis, masseter) sensitivity to palpation
2. TMJ pain upon palpation during opening and closing
3. Deviation of mandible upon opening
4. Maximum extent of opening
5. Joint noise upon opening
6. Extent of dental wear.

Patients were seated upright for examination (Okeson 1989). The examiner palpated the temporalis, masseter, and TMJ bilaterally with gentle pressure (approximately 32 ounces) with two fingers (Vanderas and Ranalli 1989) while patients opened and closed their mouths (Dworkin 1988). Pain responses were categorized as "none," "wincing or guarding," or "unsolicited comment about pain" (Helkimo 1974; Egermark-Eriksson et al. 1981; Nielsen et al. 1989).

Joint noise was evaluated during opening and closing, with the examiner's ear within 5 cm of the TMJ. A stethoscope was not used due to the high incidence of false positive noises recorded by the acuity of the stethoscope (Okeson 1989; Nielsen et al. 1989). Joint noise evaluations were "none," "soft click," "crepitus," and "harsh grating" (Dworkin 1988).

Opening deviation more than 2 mm from the midline plane was considered a positive finding (Egermark-Eriksson et al. 1981; Nielsen et al. 1989).

Maximal opening was measured from maxillary central incisor edge to mandibular central incisor edge. Any overbite in centric occlusion was added to the maximal opening figures (Ingervall 1971; Hanson and Nilner 1975; Nielsen et al. 1989; Okeson 1989). Evaluation was either "normal" or "below normal limits." The lower limit for normal opening in this age group was considered 34 mm (Bernal and Tsamtsouris 1986).

Dental wear was evaluated using a simplification of the scale devised by Hanson and Nilner (1975) and Carlsson (1984). Primary incisors, primary canines, and primary molars were evaluated as three groups. Evaluation of wear was "none or enamel only," "dentin exposed," and "severe wear" (more than one third of the tooth abraded). Wear into dentin was considered atypical wear faceting (Ramfjord et al. 1961).

Any single positive finding in the muscle, TMJ, or opening criteria categorized the patient as having signs of TMD (Morawa et al. 1985; Ogura et al. 1985). These loose parameters were used intentionally to maximize the sensitivity of associating wear faceting with TMD signs. Data were evaluated with Chi-square testing at a 95% confidence limit. The Statistical Package for the Social Sciences was used for computer data analysis.

To maximize the sensitivity of this study, any single finding made the patient positive for signs of TMD. In

the comparison group (no wear), 14% presented with clinical TMD signs. Of these, 10% had single signs and 4% had multiple signs. Ten per cent had opening deviation. Eight per cent had joint noise that was noted as a "soft click." None of the comparison group exhibited limited opening, muscle pain, or TMJ pain.

In the study group (wear facets), all subjects exhibited wear into dentin in either incisors, cuspids, or molars; 42% had wear into dentin in two groupings of primary teeth, 10% had wear in all three groupings of teeth, and 30% had severe wear in at least one subset of teeth.

Sixteen per cent presented with clinical TMD signs. Of these, 10% had single signs and 6% had multiple signs. Fourteen per cent exhibited opening deviation and 6% had joint noise that was noted as a "soft click." One patient reported muscle pain upon palpation. None of the dental wear group had any opening limitation or TMJ pain (Figure).

PRIMARY DENTITION WEAR AND TMD SIGNS

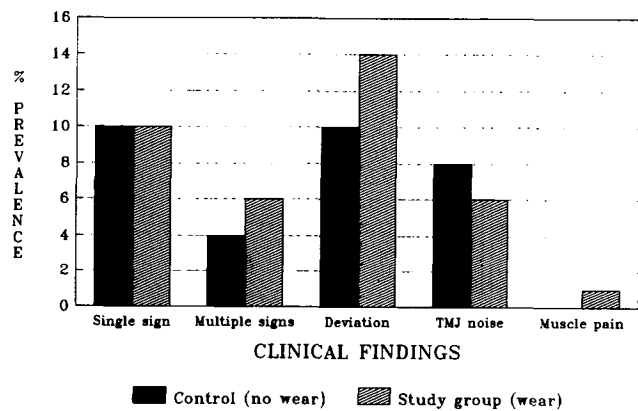


Figure. Prevalence of TMD signs in primary dentitions with and without wear.

Interrater reliability had a Kappa of 0.82 ($N = 12$). Chi-square evaluation showed no statistically significant association between the presence, severity of location of wear and clinical signs of TMD. There was no statistical difference in incidence of single or collective TMD signs between the comparison and study populations of the 95% confidence level.

Discussion

This study developed and utilized an accurate and reliable format for TMD evaluation of the young child patient. All evaluation parameters were objective, reproducible, and involved no discomfort or lengthy procedures for the child. Nilner and Lassing (1981), Nilner (1986), and Cash (1988) showed that questioning chil-

dren younger than age 7 is unreliable. Children are unaware of parafunctional habits (Love and Clark 1978) and the manner of asking questions often leads young children to a particular response (Riolo et al. 1988; Okeson 1989). Parental questioning about a child's parafunctional habits or symptoms also is unreliable (Cash 1988). Other inappropriate or uncomfortable diagnostic procedures for young children include TMJ palpation with fingers in the auditory meatus, and intraoral palpation of the pterygoid muscles. The examination used in this study is realistic for a pediatric dental practice and still includes the major clinical signs associated with TMD.

The incidence of TMD associated signs was low, even though just one finding was sufficient to categorize a patient as positive for TMD signs. Compared to other child studies, this study finds even lower incidence of some TMD associated signs (Table). This is probably due to the use of only objective, reproducible examination procedures that minimized false positive results. All findings were mild, confirming Carlsson's (1984) observation that children's TMD symptoms are seldom severe.

Interrater reliability was good. However, most of the subjects exhibited negative findings and the reliability testing often measured agreement in finding absence of signs. To further validate interrater reliability either a larger subsample size (N) or a select subsample with positive findings is needed.

Conclusions

Even with evaluation parameters that maximized any dental wear/TMD sign association, and pediatric specific examination procedures, there was no statistically significant association between primary tooth wear facets and TMD-associated signs. This lack of association in young children parallels similar findings in studies of dental wear and TMJ signs in adults (Droukas et al. 1984; Seligman et al. 1988). These similar results in both pediatric and adult populations strongly suggest that dental wear at any age is not reason to suspect other TMD signs or TMJ. Therefore, lengthy examination, diagnosis of TMD, and TMD treatment for young children cannot be justified solely by the presence of wear faceting.

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Table. Cross-study comparison of TMD sign prevalence in children

Study	Patient age	At least one sign	Opening deviation	Opening limitation	TMJ noise	TMJ pain	Muscle pain
Present study (control and study group data pooled)	3-6	15%	12%	0%	7%	0%	1%
Bernal and Tsamtsouris 1986	3-5	21%	11%*	4%	5%	3%	—
Ogura 1985	6-18	10%	—	—	9%†	2%	—
Grosfeld and Czarnecka 1977	6-8	56%†	36%†	0%	10%	6%	—
Egermark-Eriksson 1981	7	30%	5%	1%	11%	6%	20%

*Did not count patients with "asynchronous movement". † No measurement parameters given. ‡ Stethoscope used to detect noise, — Parameter not evaluated.

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FDA to test, set standards for gloves

The Food and Drug Administration (FDA) approved test methods and minimum quality levels for the billions of rubber and plastic gloves worn by dentists and other health care workers.

The new regulations, which became effective March 12, 1991, standardize manufacturer testing and define the maximum failure rate for the test, according to an item in the March 1991 issue of *Dental Management*. The FDA will examine randomly selected samples for tears, holes, and any foreign matter embedded in the gloves.

Gloves also will be subjected to a water leak test, and may not be sold for medical use if leaks are found in more than 25 per 1,000 of surgeons' gloves and 40 per 1,000 of patient examination gloves. The FDA says that these limits can be reproduced in its field laboratories, thus providing a standard level of quality.

Foreign glove manufacturers may be placed on an import detention list if their gloves consistently fail to meet the new FDA requirements. Domestic gloves that do not meet requirements will be seized, if necessary, to keep them off the market.