Dental Traumatology

Dental Traumatology 2012; **28**: 273–276; doi: 10.1111/j.1600-9657.2011.01080.x

Parents' ability to recall past injuries to maxillary primary incisors in their children*

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Accepted 1 October, 2011

*This article is based on the DMD dissertation of Dr. Kineret Sheinvald-Shusterman.

Abstract – *Aim*: To evaluate the ability of parents to recall past injuries to their children's maxillary primary incisors. *Materials and methods*: Clinical and radiographic trauma-related major and minor signs observed in the first dental visit of 727 preschool children were recorded. Major signs included crown fracture, coronal discoloration, internal resorption, pulp canal obliteration, swelling, fistula, and periapical lesion. Minor signs included enamel cracks, sensitivity to percussion, dull or metallic sound on percussion, increased mobility, and widened periodontal ligament. Children were divided into groups: CT = certainly traumatized (presenting with at least one major sign or a combination of three minor signs), PT = probably traumatized (presenting with one or two minor signs) and NT = not traumatized. Accompanying parents were asked to recall past injuries to their children's teeth. Possible replies were 'no', 'yes' and 'probably yes'. Disagreement when both parents were present was recorded as 'yes'. Crown fractures involving dentin, coronal discoloration, swelling and fistula were defined as 'observable signs of trauma'. *Results*: One-hundred and eighteen children were accompanied by fathers, 411 by mothers and 198 by both. The CT group comprised 464 children; the PT group, 103; and the NT group, 160, with no statistically significant differences by gender. Parents' positive recall was similar for boys (33.3%) and girls (31.0%). Mothers recalled trauma in 32.6% and fathers in 27.1% of their children. Parents failed to recall trauma in 52.6% of the CT-group children and in 43.5% of the PT-group children. Parents failed to recall trauma in 37.6% of the children who had observable signs of trauma. *Conclusions*: Parents' recall of dental trauma occurring in their children's maxillary primary incisors was reliable in < 50% of the cases.

Traumatic injuries to the primary teeth are common in preschool children. The incidence of injuries to primary teeth differs between boys and girls and was found to be the highest in boys aged 2–4 years and in girls aged 2–3 years (1). Incidence rates were shown to decrease dramatically with age. Prevalence rates of injuries to primary teeth have been reported to range between 10% and 42%, depending on the country, the site of examination, age group, and the type of teeth included in the survey: maxillary incisors only; or maxillary and mandibular incisors, with or without canines (2, 3). Differences in methods of diagnosing injuries have been suggested as explanations for the wide range of rates. In some surveys of young children, the investigators use the knee-to-knee method and a head lamp for illumination, with (4) or without (3) drying the teeth.

Other retrospective studies are often based on reports from patient records and questionnaires, with parents asked to recall dental injuries that occurred in their children (1, 5, 6). Parents' awareness of dental trauma to their children's teeth has significance beyond epidemiological surveys. It directs parents to seek treatment shortly after an accident, improves prognosis, and helps explain causes of defects in permanent successors. The purpose of this study was to evaluate the ability of parents to recall past injuries to their children's maxillary primary incisors.

Materials and methods

This study is based on patient files from one of the investigator's private practice (GH). The data consist of information regarding the maxillary incisors and the surrounding soft tissues that was recorded during first visits to the dentist of children who had their primary maxillary incisors in place. Files of children whose first visit was because of dental trauma were excluded from the study. The information collected for statistical analysis included demographic data and clinical and radiographic signs (Appendix 1). A size Two film was used for a periapical radiograph of the premaxilla region, taken as part of the initial dental examination of each patient. According to the current guidelines of the Department of Pediatric Dentistry at the Hadassah School of Dental Medicine, a single periapical radiograph of the premaxilla is taken once, during the first dental visit, to detect disturbances that develop almost exclusively in the premaxilla (see Comment at the end

of the discussion). Accompanying parents were routinely asked to recall past injuries to their children's teeth. Possible replies were 'no', 'yes', and 'probably yes'. 'Yes' answers were confirmed by further inquiry in which parents were asked to provide details that verified the recollection of an accident. When both parents accompanied the child and agreed about the history of dental trauma, their reply was recorded only once. When parents disagreed, their reply was recorded as 'yes'. Avulsion, crown fracture involving the dentin, coronal discoloration, and fistula were defined as 'observable signs of trauma'.

Clinical signs of trauma were considered 'irrelevant' in certain conditions, such as the presentation of 'increased mobility', 'sensitivity to percussion', or 'dull sound on percussion' when teeth were close to natural exfoliation or when the teeth had been avulsed. Cases in which severe decay masked signs of traumatic injuries were excluded from the study.

The children were divided into three groups according to the clinical and radiographic findings: CT = certainly traumatized, PT = probably traumatized, and NT = not traumatized. Children were classified in the CT group if one or more of their maxillary primary incisors presented with at least one of the following MAJOR SIGNS: enamel fracture, crown fracture with dentin exposure, crown fracture with pulp exposure, internal coronal discoloration, fistula, root fracture, pulp canal obliteration, internal resorption, and a periapical radiolucent lesion. Also included in the CT group were children who presented with a combination of at least three of the following MINOR SIGNS in one or more of their primary incisors: enamel cracks, increased mobility, sensitivity to percussion, a dull or metallic sound produced when a percussion test was applied, swelling or redness of the soft tissue above the primary incisors, and expansion of the periodontal ligament. When only one or two of the aforementioned minor signs were present in the primary incisors, the teeth were considered as probably traumatized' and the children were included in the PT group. The NT group consisted of children who did not present any of the aforementioned signs.

Between October 1998 and November 2007, 727 patients (369 boys and 358 girls) met inclusion/exclusion criteria. The mean age of the children was 52 months (range 17–106, median 50 months). The data were analyzed statistically using the chi-square test with the significance level set at $P < 0.05$.

Results

Table 1 presents the number of children presenting with various clinical and radiographic signs of dental trauma. Enamel cracks, the most frequently observed clinical sign, were detected in 47.2% of the children, followed by fracture of the enamel in 37.4%. Signs of dental trauma usually appeared in combination; only 7% presented with enamel cracks alone and 8% with enamel fracture alone.

Of the 727 children, 63.8% were classified as CT; 14.2% as PT, and 22% NT (Table 2). Statistically significant differences were not observed according to gender (Table 2), also not when analyzed by age groups.

The number of children accompanied by their mothers alone (56.5) was 3.5 times the number accompanied by their fathers alone, 56.5 and 16.2%, respectively.

Table 1. Numbers of children presenting with the investigated clinical signs of dental trauma

	Number of children presenting with the pathological signs	Number of children with this as the only pathological sign
Clinical signs		
Teeth		
Enamel cracks	343	51
Enamel fracture	272	59
Crown fracture with dentin exposure	56	7
Crown fracture with pulp exposure	15	2
Internal coronal discoloration	194	22[1]
Sensitivity to percussion	40	0
Sound of percussion	71	1
Increased mobility	81	2
Soft tissue		
Oral mucosa pathology (swelling, redness)	32	0
Fistula	16	0
Radiographic signs		
Teeth		
Root fracture	13	1
Pulp canal obliteration	18	0[2]
Internal root resorption	113	22
Arrest of dentin apposition	3	0
Surrounding tissues		
External pathologic root resorption[3]	187	17
Periapical radiolucent lesion	28	0
Expansion of the dental sac[3]	135	12
Expansion of the periodontal ligament	9	1

[1]Coronal discoloration without pulp canal obliteration.
[2]Pulp canal obliteration without coronal discoloration.
[3]Signs of dental trauma that were observed but not included in the evaluation list.

Table 2. Distribution of children according to evidence of traumatic injuries to their teeth

Evidence of trauma	Gender		
	Boys *n* (%)	Girls *n* (%)	Total *n* (%)
NT	77 (20.9)	83 (23.2)	160 (22.0)
PT	56 (15.2)	47 (13.1)	103 (14.2)
CT	236 (64.0)	228 (63.7)	464 (63.8)
Total	369 (100)	358 (100)	727 (100)

NT, not traumatized; PT, probably traumatized; CT, certainly traumatized.

Parents of 32.2% of the children could recall an event in which their child had injured a primary tooth. There was no statistically significant difference between parents' ability to recall trauma of boys (33.3%) and of girls (31%). Neither was there a statistically significant difference between the ability of mothers and fathers to recall an event of dental trauma to their children. As expected, a significantly higher percentage of parents of children in the CT group were able to recall an event of dental trauma than were parents of children in the PT and NT groups: 43.5%, 16.5%, 9.4%, respectively, $P < 0.0001$ (Table 3). Fifteen parents (9.4%) recalled a history of dental trauma despite classification of their children in the NT group.

Observable signs of dental trauma were detected in one-third (242) of the children. Of their parents, 60.3% (146) recalled an event of dental trauma to their children's primary teeth, and 91 (37.6%) did not (Table 4).

Discussion

The main finding of this study is that only 43.5% of parents of children who certainly experienced dental trauma, and only 16.5% of parents of children who probably experienced dental trauma, were able to recall the event. The probability of dental trauma was determined by clinical and radiographic signs. In addition, only 60.3% of parents of children were able to recall the event despite such noticeable signs of trauma as crown fracture, fistula, or dark coronal discoloration.

Interestingly, the parents of 15 children (9.4%) for whom there were no clinical or radiographic signs of trauma recalled an event of dental trauma. This can be explained by the fact that not every impact to the teeth leaves a long-lasting sign. Dark discoloration, for instance, which is a well-known consequence of dental trauma, may fade, leaving no hint of injury to the teeth (7, 8). Similarly, damage to the supporting tissues, evidenced by increased mobility, or sensitivity to percussion, or to a metallic or dull sound produced by percussion, may heal. Even intruded or orally luxated incisors may re-erupt or be pushed back to their original alignment by the force of the tongue (9, 10). Fractures of the incisal edge of anterior primary teeth may gradually disappear as a result of physiologic attrition or bruxism.

Table 3. Distribution of children according to evidence of traumatic injury to their teeth and parents' ability to recall traumatic injuries

Trauma recall	Evidence of trauma			
	NT *n* (%)	PT *n* (%)	CT *n* (%)	Total *n* (%)
No	135 (84.4)	80 (77.7)	244 (52.6)	459 (63.1)
Yes	15 (9.4)	17 (16.5)	202 (43.5)	234 (32.2)
Probably yes	10 (6.3)	6 (5.8)	18 (3.9)	34 (4.7)
Total	160 (100)	103 (100)	464 (100)	727 (100)

NT, not traumatized; PT, probably traumatized; CT, certainly traumatized.
Chi-square $P < 0.0001$.

Table 4. Distribution of children according to the presence of observable signs and parents' ability to recall traumatic injuries

Trauma recall	Observable signs of trauma		
	No *n* (%)	Yes *n* (%)	Total *n* (%)
No	368 (75.8)	91 (37.6)	459 (63.1)
Yes	88 (18.2)	146 (60.3)	234 (32.2)
Probably yes	29 (6.0)	5 (2.1)	34 (4.7)
Total	485 (100)	242 (100)	727 (100)

Chi-Square $P < 0.0001$.

In light of the above, only children who presented clear evidence of a past dental injury were included in the CT group.

The current study was conducted in families of middle and upper socioeconomic status residing in Jerusalem and may not be generalizable to other populations. Nonetheless, our findings support other studies in the dental literature. Robson et al. found that parents' report of injury to primary teeth in children up to 5 years of age (27.4%) was lower than clinical evidence of trauma (39.1%). In that study, only 41% of parents of children with clinical diagnosis of dental trauma recalled a known injury to their children's teeth (4). In a study conducted in Brazil, Cunha et al. (11) found that 27.8% of parents of children up to age 3 did not remember the age at which their child had experienced dental trauma. In a study on dark discolored primary incisors, Holan found that parents of 23.3% of the children could not recall any event of dental trauma, despite the change in tooth color, which is a noticeable outcome of dental injury (8). While Viegas et al. (12) found the prevalence of traumatic dental injuries to be as high as 62.1%, 61% of the parents of children with clinical diagnosis of dental injuries could not recall a traumatic episode. Andreasen & Ravn (1) claimed that surveys based only on questionnaires are 'not realistic', as exemplified by a Swedish survey in which only 1.7% of the children were reported to have injured their primary teeth. In contrast to the above, Ferreira et al. found that parents' report was only slightly lower than the percentage of children with the evidence of trauma to the primary teeth (14.7% and 14.9%, respectively) (13).

Unreliability of parents' recall of dental trauma challenges reported findings of injuries to primary teeth, such as the peak age of dental trauma experience, the male to female ratio, prevalence of repeated injuries, and the time interval between an injury and the first appearance of late complications that are based on parents' report. In addition, parents' awareness of injuries to their child's teeth has clinical implications. While damage inflicted on permanent successors during luxation injuries may be unavoidable, late complications can be prevented by appropriate treatment. However, parents who are unaware of dental trauma, or who overlook noticeable clinical signs that result, will not take their children to pediatric dentists for consultation on this matter. The consequence may be delayed diagnosis of, and severe damage to, the permanent teeth. An example would be a long-lasting periapical infection

that may involve the follicle of the permanent successor, for which extraction or root canal filling is indicated. Unnoticed repeated injuries, which are common in children (14), may result in inappropriate treatment, if dentists attribute clinical signs to very recent injuries, when they actually resulted from an earlier unnoticed dental trauma. While worldwide campaigns have greatly increased parents' awareness to caries prevention and treatment, similar actions have not been taken to raise parent awareness to the risk of dental trauma to primary dentition.

Comment

The authors became aware to the current standard of care regarding the indication of X-rays in preschool children. According to the European guidelines on radiation protection in dental radiology, the safe use of radiographs in dental practice Issue No. 136, 2004, routine radiography is unacceptable practice.

The attention of the Department of Pediatric Dentistry at The Hebrew University – Haddassah school of Dental Medicine – has been drawn to these guidelines to encourage re-evaluation of its policy regarding diagnostic radiographs used in children.

Conclusions

Parents' report of dental trauma in their children's maxillary primary incisors is reliable in $< 50\%$ of the cases. Parents of more than one-third of children presenting with clearly observable signs of dental trauma to their primary incisors could not recall an event.

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Appendix 1: List of clinical and radiographic signs evaluated

Clinical signs	
Teeth	
Enamel cracks	No/yes
Enamel fracture	No/yes
Crown fracture with dentin exposure	No/yes
Crown fracture with pulp exposure	No/yes
Internal coronal discoloration	No/yellow/pink/gray/brown
Sensitivity to percussion	No/yes/not relevant
Sound of percussion	Normal/dull/metallic/not relevant
Increased mobility	No/yes/not relevant
Soft tissue	
Oral mucosa pathology	No/redness/swelling
Fistula	No/yes
Radiographic signs	
Teeth	
Root fracture	No/yes
Pulp canal obliteration	No/yes
Internal root resorption	No/yes
Arrest of dentin apposition	No/yes
Surrounding tissues	
Periapical radiolucent lesion	No/yes
Expansion of the periodontal ligament	No/yes