Literature review correlating Dental Trauma and Overjet (and other orthodontic variants)

Using solely Medline to determine the first investigator to find an increased incidence of incisal trauma was Jarvinen, Acta Odontol Scand. 1978. He reported that he frequency of injury was 14.2% in children with normal overjet (0--3 mm), 28.4% in children with increased overjet (3.1-6mm), and 38.6% in children with extreme overjet (greater than 6 mm).

Subsequent studies have supported this finding:

Forsberg, in 1993 found the mean overjet of mild injuries was 4.3mm while that of children experiencing severe fractures was 5.0mm. (1) postnormal occlusion, (2) an overjet exceeding 4 mm, (3) short upper lip, (4) incompetent lips, and (5) mouth breathing were all factors which significantly increased susceptibility to traumatic dental injury. Dental injuries sustained during participation in sports were twice as common in boys (18.2%) as in girls (8.2%).

Otuyemi, from Nigeria corroborated the gender differential. Of the 111 children with traumatic dental injuries, 71 (64.0%) had increased incisor overjet (> 3 mm) compared to 257 of the 905 children (28.4%) in the non-trauma group. Similarly, 72 (64.9%) of the trauma group had inadequate lip coverage compared to 224 (24.8%) in the non-trauma group. These differences were statistically significant ($P < 0.001$).

Kania, in Florida, found Wilcoxon rank sum tests identified differences in age, overjet, time of screening, and interlabial gap between those with and without injury ($P < 0.05$). Results of logistic regression analyses indicated risk of incisor injury was greater for children who had a prognathic maxilla, a history of trauma, were older, were male, and had greater overjet and mandibular anterior spacing.

Petti, in Italy, found, using the Mantel-Haenszel's Odds Ratios stratified for age and sex, injuries were related to individual predisposing factors (overjet larger than 3 mm: OR = 2.57, p = 0.0001, short upper lip: OR = 2.23, p = 0.0001 and upper medial incisor protrusion: OR = 3.95, p = n.s.), but not to children's trauma predisposing behaviour (OR = 0.92, p = n.s.). Serious injuries, however, happened to children without predisposing factors and were caused by strong impacts, suggesting that individual risk factors may not affect these type of injuries.

Nguyen, of the Netherlands found, using a meta-analysis that it could be concluded that children with an overjet larger than 3 mm are approximately twice as much at risk of injury to anterior teeth than children with an overjet smaller than 3 mm. The effect of overjet on the risk of dental injury is less for boys than for girls in the same overjet group. In addition, risk of injury of anterior teeth tends to increase with increasing overjet size.

Cortes, from Brazil, found that the prevalence of dental injuries increased from 8% at the age of 9 years to 13.6% at 12 and 16.1% at 14 years. Boys were 1.7 times (95% CI = 1.41-2.16) more likely to have dental injuries than girls. Children with an overjet size greater than 5.0 mm were 1.37 times (95% CI = 1.06-1.80) more likely to have a dental injury than children with an overjet size equal or lower than 5.0 mm. Finally, children with an adequate lip coverage were 0.56 times (95% CI = 0.44-0.72) less likely to have a traumatic dental injury than those with inadequate lip coverage.

Al-Majed, of Saudi Arabia, demonstrated that the prevalence of dental trauma in 354 Saudi boys aged 5-6 years was 33%. The most common type of dental trauma was fracture of enamel (71%) followed by loss of tooth due to trauma (13%), fracture into enamel and dentine (7%), discolouration (5%), pulp involvement (4%). No relationship between the degree of overjet and the occurrence of dental trauma in the primary dentition was observed. The prevalence of dental trauma in 862 12-14-year-old boys was 34%. The most common dental trauma was fracture of enamel (74%) followed by fracture into enamel and dentine (15%), fracture into enamel-dentine and pulp (5%), loss of tooth due to trauma (3%), and discolouration (0.4%). A significant relationship (P=0.02) between the increased overjet (> or = 6 mm) and the occurrence of dental trauma in the permanent dentition was reported.

Mohlin and Kurol, from Sweden, speculate that early correction of large overjet may be valuable in order to reduce the risk of traumatic injuries. Such treatment is usually motivated during the primary or mixed dentition periods. From the teenage period and onwards, psychosocial or aesthetic reasons for orthodontic treatment are dominating.

Hamdan, in Jordan, reported that 13.8% of the children examined showed dental trauma. Difference in prevalence between boys (17.1%) and girls (10.6%) was statistically significant ($p < 0.05$). Maxillary central incisors were the most affected (79.2%) and the most common type of crown injury was enamel-dentin fracture (40.6%). The relationship between dental injuries and socio-economic indicators was not statistically significant. There was a tendency for children with an incisal overjet greater than 5.0 mm to have experienced dental injuries ($p < 0.01$).

Baus, of Germany, reported that, compared to patients with normal overjet and adequate lip coverage, the frequency of dental trauma was significantly higher in patients with increased overjet and adequate lip coverage (P = 0.028) or with increased overjet and inadequate lip coverage (P = 0.003).

Shulman, in Texas, found that 23.45% of all individuals evidenced trauma on at least one incisor, with trauma more than four times more prevalent on maxillary (22.59%) than on mandibular incisors (4.78%). Males (OR = 1.67) had greater odds of trauma than females; Whites (OR = 1.37) and non-Hispanic Blacks (OR = 1.37) had greater odds of trauma than Mexican-Americans. The odds of trauma increased with age, peaked from age 21 to 30 (OR = 2.92), and declined. As overjet increased, so did the odds of trauma.

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Compared to individuals with < or =0-mm overjet, odds of trauma increased from 1-3 mm (OR = 1.42) to 4-6 mm (OR = 2.42) to 7-8 mm (OR = 3.24) to >8 mm (OR = 12.47). Trauma to incisors is prevalent but mostly limited to enamel.

Soriano, in Brazil, reported that The prevalence of dental injuries was 23.3%. Boys experienced more injuries than girls, 30 and 16.1%, respectively ($P > 0.05$). There was a statistically significant difference between traumatic dental injuries and overjet ($P < 0.05$) and between traumatic dental injuries and lip coverage ($P = 0.000$). No statistical significant differences were found when obesity and dental trauma were analysed ($P < 0.05$). It was concluded that boys from lower social strata attending public schools, presenting an overjet size greater than 5 mm and an inadequate lip coverage, were more likely to have traumatic dental injuries in Recife, Brazil.

Behavior as a factor in incisal injury:
Odoi, from London, England found that the odds ratio of having a dental injury increased 3.14 times if children have peer relationship problems ($P = 0.032$), whilst a prosocial behaviour showed a tendency to have a protective effect ($OR = 0.25$; $P = 0.064$). Emotional symptoms, conduct disorder and hyperactivity behaviours were not related to dental injury ($P > 0.75$). Results were adjusted by father's level of education, size of overjet and type of lip coverage, and these variables were significantly related to dental injury ($P < 0.05$). CONCLUSION: Problem behaviour may play an important role in the occurrence of traumatic dental injury. (from Northway: one wonders if exaggerated dental features provoke uncommon behavior.)

The only article that failed to show a correlation between dental trauma and malocclusion:
Stokes' data in Singpore did not follow the data: The mean overjet for the trauma group was 3.42 +/- 1.45 mm and for the injured group 3.42 +/- 1.33 mm. These means were not statistically different ($p = 1.00$), neither did the distribution of overjet between the groups differ.

Reference are included in separate hand-out.