

# Refractory epilepsy is highly associated with severe dentoalveolar and maxillofacial injuries

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**ABSTRACT** – *Background.* Dental intrusion and avulsion, crown fracture and mandibular fractures are important dentofacial complications in patients with epilepsy-related traumas. The objective of the present study was to describe the occurrence of orofacial injuries in patients with epilepsy. *Materials and methods.* One hundred and nine consecutive patients (60 women; mean age  $38.81 \pm 14$  years), treated for refractory epilepsy (45 with extratemporal epilepsy and 64 with temporal epilepsy) at the outpatient clinic of our University Hospital, were included in the present study. Orofacial injury occurring as a direct result of a seizure was determined by clinical examination and interview. In addition, seizure frequency, use of medication, and the occurrence and type of injury to other parts of the body, were documented. We employed regression analyses to investigate the association between teeth fractures and frequency of seizures. *Results.* The majority of injuries were crown fractures (42 subjects), followed by mandibular fractures (eight subjects) and tooth avulsion (eight subjects). Sixteen patients had more than two fractured teeth. Patients with mandibular trauma also suffered concomitant injuries (teeth fracture, avulsion and dislocation). The number of fractured teeth was associated with seizure frequency ( $r^2 = 0.59$ ,  $p < 0.001$ ). The data suggest that there is an increased rate of dentoalveolar and maxillofacial injuries in patients with poorly controlled epileptic seizures.

**Key words:** oral injuries, seizure, accidents, dental care, risk factors

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Patients with epilepsy are at increased risk of accidental injuries, due to a loss of muscle tone and self-protective reflexes to minimise trauma during a fall. The most common examples are bone fractures and head injuries. Status epilepticus is also an important factor increasing the possibility of maxillo-facial fracture in these patients (Aragon *et al.*, 2001). Orofacial traumas arising from falls are known features of seizures (Karasu *et al.*, 2005) and important complications include crown fractures, intrusion, avulsion and dentoalveolar fractures.

Little is known about the occurrence of trauma and the hazardous consequences of orofacial injuries as a result of epilepsy (Nakken and Lossius, 1993; Buck *et al.*, 1997; Ogunbodede *et al.*, 1998), and only one study has specifically investigated dental injury (Thomas *et al.*, 2009). Moreover, the interpretation of these studies is hampered by the lack of information in the reviewed medical records and/or applied questionnaires.

An understanding of the cause, severity, and distribution of orofacial trauma can assist in establishing clinical priorities for effective treatment and prevention of these injuries. The purpose of this study is to present a broad spectrum of dental and facial injury as a consequence of seizures in patients with epilepsy.

## Materials and methods

One hundred and nine consecutive patients (60 women; mean age  $38.81 \pm 14$  years), treated for refractory epilepsy (45 with extratemporal epilepsy and 64 with temporal epilepsy) at the outpatient clinic of our University Hospital from March 2008 to June 2009, were recruited for the present study. All participants signed the informed consent form, approved by the Internal Review Board of our institution.

Subjects were interviewed using a dental questionnaire about frequency and type of orofacial injury (facial bone fractures and dentoalveolar trauma) during their lifetime. Dental trauma was classified as avulsion, crown fracture and dislocation. Fractures of the facial bones were only considered when resulting directly from a seizure. Minor traumas such as concussion of teeth, laceration, contusion and abrasion of gingiva and oral mucosa were not evaluated. Subsequent to the interview, the patients were clinically examined. The dental examination aimed at finding indications of sustained traumatic dental injuries. In addition, seizure frequency, the use of medication and the occurrence and type of injury to other parts of the body, were documented.

## Results

Sixty-four patients had mesial temporal lobe epilepsy and 45 had extratemporal lobe epilepsy (43 with frontal, one with parietal and one with temporo-parietal seizure onset). Patients were treated with a combination of two or three antiepileptic drugs (including carbamazepine, lamotrigine, valproic acid, phenytoin, primidone, clobazam and topiramate). The seizure frequency of patients per month was grouped as follows: 22 subjects with no seizures, 72 subjects with one to five seizures and 25 patients with more than five seizures.

The total number of occurrences of dental and oral injuries was 89, affecting 40.74% of patients. Most injuries were crown fracture (42 subjects), followed by mandibular fracture (8 subjects) and tooth avulsion (8 individuals) (*table 1*). Sixteen subjects had more than two fractures in their teeth. In 66 examined dental fractures, a single crown fracture was found in 34 patients, affecting mostly the teeth in the maxilla.

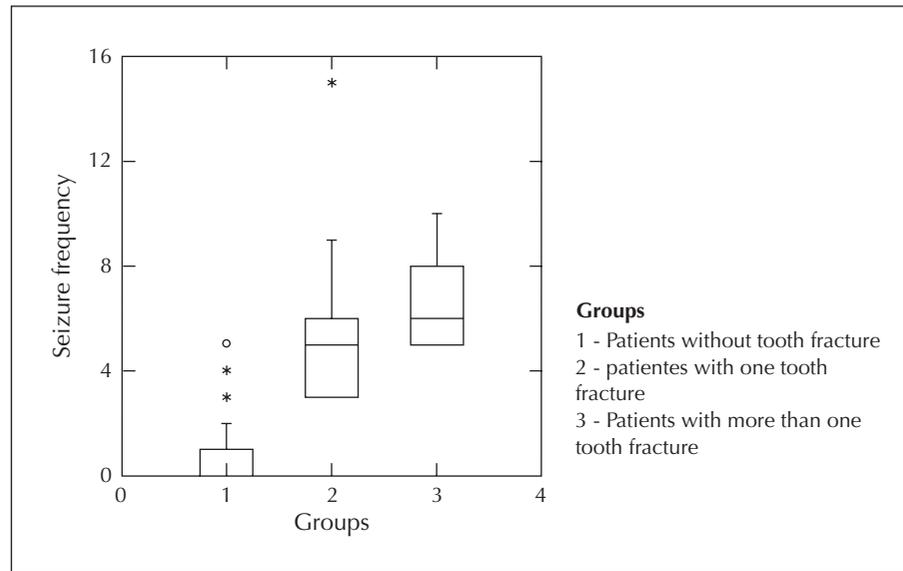
Patients with mandibular trauma also suffered concomitant injuries (teeth fracture, avulsion and dislocation). Accidental burns occurred in 15 patients, head injury in 21 patients and others types of injuries (laceration, trauma in the body, and contusion) were found in 43 patients (*table 2*). The Mann-Whitney test showed a statistically significant relationship between the frequency of seizures and mandible fracture in patients with extratemporal epilepsy ( $p < 0.03$ ) and temporal epilepsy ( $p < 0.03$ ). Tooth fracture was significantly associated with frequency of seizure in extratemporal epilepsy (T-test;  $p < 0.0001$ ) and temporal

**Table 1.** Type, number and the frequency of dento-alveolar injuries.

Type of injury	Number of occurrences	Number of subjects affected
Crown fracture	66	42
Mandible fracture	9	8
Tooth avulsion	9	8
Tooth dislocation	5	4

**Table 2.** Associated injuries.

Burn	Head injury	Other injuries
15	21	43



**Figure 1.** Box and whisker plots of seizure frequency and distribution of number of teeth fractures in three patient groups.

epilepsy ( $p < 0.0001$ ). *Figure 1* shows seizure frequency in the three groups of patients defined according to the number of tooth fractures. We found that tooth fracture was linked to seizures which are difficult to manage ( $r^2 = 0.59$ ,  $p < 0.001$ ). Patients with more seizures had more dental injury.

The number of fractured teeth was similar in patients with either temporal or extratemporal epilepsy ( $0.53 \pm 0.7$  vs  $0.73 \pm 1.5$ ,  $p = 0.43$ , respectively). In addition, we did not find significant differences regarding seizure frequency between the two groups ( $2.8 \pm 2.9$  vs  $2.7 \pm 2.9$ ,  $p = 0.75$ , respectively).

## Discussion

Epileptic seizures are a well recognized risk factor for trauma, as many seizures result in fall (Nakken and Lossius, 1993; Buck *et al.*, 1997; Ogunbodede *et al.*, 1998; Thomas *et al.*, 2009; Kwan and Brodie, 2000; Beghi *et al.*, 2002; Lawn *et al.*, 2004). The consequences of injury to the dentoalveolar and maxillofacial regions have not been well studied and, consequently, the magnitude and severity of the problem is underestimated. Thus, adequate treatment is not provided for patients.

This study was based on a large sample size, and as such, accurately reflects the type and prevalence of epilepsy related to dental and facial trauma seen at our clinic. Most of our patients received polytherapy at the time of evaluation. Despite antiepileptic drug therapy, seizure control was inadequate in about 30% of patients with epilepsy (Kwan and Brodie, 2000) and the more seizures individuals had, the more likely they were to find themselves in hazardous circumstances

(Nakken and Lossius, 1993). Numerous retrospective studies have found an increased risk of trauma in patients with epilepsy (Aragon *et al.*, 2001; Nakken and Lossius, 1993; Buck *et al.*, 1997; Beghi *et al.*, 2002; Lawn *et al.*, 2004).

Maxillofacial and dental injuries have been shown to be commonly associated with medical incidents in patients suffering from epilepsy (Karasu *et al.*, 2005; Nakken and Lossius, 1993; Buck *et al.*, 1997). As for other types of injuries, the frequency of seizures is likely to be the single most important risk factor for orofacial trauma, which is confirmed by our results (*figure 1*). In our study, an association between the presence of seizure and a higher prevalence of dental trauma was observed and the group of patients without seizures had no teeth fractures.

The apparent contrast between our findings and those from other studies (Thomas *et al.*, 2009) may be explained by different study design. Severe events causing injury can be more readily observed retrospectively. According to the medical records, major injuries are more easily or readily recalled and reported than minor injuries (Lawn *et al.*, 2004). Simple crown fractures, although found in more than 38% of our patients, are less likely to involve strong emotional reactions and may thus be under-reported. However, dental trauma can cause serious aesthetic, functional, and psychological consequences since adequate management requires treatment which is specific to each fracture in order to preserve the remaining tooth.

The presence of mandibular fractures has also been reported in epileptic seizures (Aragon *et al.*, 2001; Zachariades, 1985). The incidence and aetiology of mandibular fractures vary with socioeconomic status,

geographical region, cultural and religious beliefs, and time of year (Afzelius and Rosen, 1980). Almost half of cases are reported to result from road traffic accidents (Adeyemo et al., 2008). Our results show that the frequency of mandibular fracture was high (7% of subjects) in patients with epilepsy.

The prevalence of dentoalveolar and maxillofacial injuries in a group of patients with refractory epilepsy was found to be higher than previously reported. There is a need to create dental awareness in patients with refractory seizures in order to improve their quality of life regarding aesthetics and orofacial function. □

#### Disclosure.

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#### References

- Adeyemo WL, Iwegbu IO, Bello SA, et al. Management of mandibular fractures in a developing country: a review of 314 cases from two urban centers in Nigeria. *World J Surg* 2008; 32: 2631-5.
- Afzelius LE, Rosen C. Facial fractures: A review of 368 cases. *Int J Oral Surg* 1980; 9: 25-32.
- Aragon CE, Burneo JG, Helman J. Occult maxillofacial Trauma in Epilepsy. *J Contemp Dent Pract* 2001; 4: 26-32.
- Beghi E, Cornaggia C, & RESt-1 Group. Morbidity and accidents in patients with epilepsy: results of a European cohort study. *Epilepsia* 2002; 43: 1076-83.
- Buck D, Baker GA, Jacoby A, et al. Patients' experiences of injury as a result of epilepsy. *Epilepsia* 1997; 38: 439-44.
- Karasu HA, Uyanik LO, Koçyiğit ID. Displacement of avulsed tooth into soft tissue of chin resulting from epileptic attack trauma. *N Y State Dent J* 2005; 71: 26-8.
- Kwan P, Brodie MJ. Early identification of refractory epilepsy. *N Engl J Med* 2000; 3: 314-9.
- Lawn ND, Bamlet WR, Radhakrishnan K, O'Brien PC, So EL. Injuries due to seizures in persons with epilepsy: a population-based study. *Neurology* 2004; 63: 1565-70.
- Nakken KO, Lossius R. Seizure-related injuries in multihandicapped patients with therapy-resistant epilepsy. *Epilepsia* 1993; 34: 836-40.
- Ogunbodede EO, Adamolekun B, Akintomide AO. Oral health and dental treatment needs in Nigerian patients with epilepsy. *Epilepsia* 1998; 39: 590-4.
- Thomas RH, Higgins S, Fuller GN. Dental injury during seizures associated with juvenile myoclonic epilepsy. *J Neurol Neurosurg Psychiatry* 2009; 80: 91-3.
- Zachariades N. Recurrent fractures of the mandible. *Oral Surg Oral Med Oral Pathol* 1985; 60: 562-4.