Accidents and injuries in patients with epilepsy

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A wide spectrum of risks related to epilepsy

- Seizure-related accidents and injuries
- Cause-specific and seizure-related mortality
- Side-effects of AEDs
- Psychosocial burden
A case history - 1

- Male, born 1966
- Many years of drug abuse
- After SAH in 1999: right-sided central hemiparesis, focal epilepsy, VP-shunt, and mild cognitive failure
- Wheelchair bound
- Inpatient at Røysumtunet, a nursing home for people with epilepsy +
A case history - 1

• On LTG 150 mg daily – as monotherapy – he had a fairly good seizure control

• In February 2013, while bedridden, he had an episode of convulsive status epilepticus; i.e. simple partial seizures with rightsided convulsions lasting for > two hours – despite 30 mg diazepam given rectally (10+20 mg)
A case history - 1

• He was sent to the local hospital (Lillehammer)
• Here he was diagnosed with a rightsided femoral neck fracture
• Operated two days later
A case history - 1
A case history - 1

• Blood sample:
  – Calcium: 2.19 mmol/L
  – Vitamin D: 52 nmol/L
  – Vitamin D3: 52 nmol/L

• Measurement of bone mineral density:
  – 2 and 1.7 SD below values for his age in the spine and right femur, respectively (T-score: – 2.3 and – 2)
  – T-score in two vertebrae was – 2.7 and - 2.9, respectively
  – Antiresorptive treatment was recommended
Why are people with epilepsy accident prone?

• Apparently, people with sudden impaired or loss of consciousness, with or without falls, and with or without convulsions, are more prone to accidents than the general population.
How extensive is the problem?

- The assumption that epilepsy carry a high risk of accidents is mostly based on clinical observations (Beghi 2001)
- The results of previous studies within this field are somewhat conflicting
- Solid prospective population-based studies are lacking (Tomson 2004)
Conflicting results of previous studies

• The differences are probably due to different:
  – Study design
  – Study populations
  – Sample size
  – Definition of epilepsy
  – Definition of accident/injury
  – Length of observation period
Conflicting results of previous studies

• In many studies the injury risk is probably overestimated

• There are considerable selection biases;
  – Institutionalized patients are often over-represented; i.e. patients with severe epilepsy and intellectual disabilities – and/or other comorbidities
Definition of accident

• An accident is any non-spontaneous unintended event secondary to a sudden unexpected cause leading to physical damage - and occasionally to death (Tomson 2004)
Was the accident/injury really seizure-related?

- A cause-effect relationship between a seizure and an accident can be proven only by an eyewitness
- Accidents and injuries are expected to occur in people with epilepsy as in any other individual
- Is non-seizure-related injuries in patients with epilepsy underestimated?
Occurrence of seizure-related injuries

• 12-month injury rate: 14.9-20.6%

• Number of injuries per 100 patient years: 2.4-300

• Lifetime seizure-related injury rates: 30-55%
Occurrence of seizure-related injuries

- A multinational European study:
  - 270 injuries among 199 epilepsy patients
  - 149 injuries among 124 controls in the same period
  - i.e. 1.4 injury/patient vs. 1.2 injury/control

(Beghi 2000)
Occurrence of seizure-related injuries

• A Norwegian prospective study:
  – Among 62 patients in residential care (severe epilepsy +) we registered 6,889 seizures and 80 injuries during 13 months
  – I.e. an injury risk of 1.2%/patient/year
    (Nakken 1993)
Occurrence of seizure-related injuries

• An English study:
  – 33 adult patients in residential care had in the study period 15,751 seizures and 59 injuries
  – I.e. an injury risk of 0.4%/patient/year
    (Deekollu 2005)
Seizure-related injuries among children and young adults

- Database study; 12,000 PWE and 46,000 controls were followed for 2.6 years:
  - 18% increased risk of fracture
  - 49% increased risk of thermal injury
  - Doubled risk of drug poisoning (esp. 19-24 years) (Prasad 2014)
Ictal injuries among patients with PNES

- Of 211 patients with PNES, 65 (31%) had experienced injuries;
  - Tongue biting
  - Lacerations
  - Bruises
  - Limb fractures
  - Dental injuries
  - Burns

(Asadi-Pooya 2014)
The most frequent types of injury

• Most injuries are trivial;
  – Soft tissue injuries (85%)
  – Fractures (26%)
  – Burns (9%)
  – Concussion (6%)
  – Dislocation (4%)
  – Brain injury (2%)

(Bellon 2013)
Location of injury

- Facial (27%)
- Head (16%)
- Tongue (12%)
- Dental (9%)
- Shoulder (7%)
- Leg (7%)
- Ribs (5%)
- Ankle (4%)
- Foot (4%)
- Spine (3%)  
  (Bellon 2013)
Traffic accidents among PWE

- Uncertain data
- A Danish study found a 7-fold increased risk (wide 95% CI!) (Lings 2001)
- A cluster of studies have revealed a frequency of seizures while driving between 18 and 28%
- About 2/3 resulted in a seizure-related crash (Tiamkao 2009, Webster 2011)
- One study found crashes among people with epilepsy not significantly different from controls (Kwon 2011)
Traffic accidents, risk factors

- Factors known to increase risk:
  - Seizure-free interval < 1 year
  - No auras
  - Male gender
  - History of alcohol abuse
  - Psychiatric disorder
  - Non-adherence to AEDs

Case history - 2

- Female, born 1964
- Diagnosed with JME in 1978
- Seizure-free on VPA
- While attending a weekend-meeting at a hotel in 1992 she had forgotten the VPA-pills at home
Case history - 2

- After having been without VPA 36 hours, she had a GTC seizure while taking a shower.
- During the fall she turned the regulator of the water temperature – and she was severely scalded.
Seizure-related accidents - risk factors

• Patient-related factors
  – Life style. Risk-taking behavior?

• Epilepsy-related factors
  – Epilepsy syndrome (e.g. LGS)
  – Seizure type and –frequency
  – Treatment. Polytherapy?

• Comorbidity

• External circumstances
Seizure-related accidents - risk factors

- High seizure frequency
- GTC- and atonic seizures (without aura)
- Symptomatic epilepsies
- Temporal lobe epilepsies (Friedman 2010)
- AED polytherapy
Seizure-related accidents - risk factors

- It appears fairly easy to categorize patients into:
  - High risk group
  - Low risk group
Are people with epilepsy prone to low-energy fractures?

• Several studies indicate that the epilepsy population has a lower bone mineral density than the general population. Several potential explanations:
  – AEDs, esp. EIAEDs
  – Physical inactivity
  – Low sun exposure
  – Insufficient diet
  – Smoking
  – Other bone-depleting drugs

(Nakken 2010)
Humoral fracture
How can injuries be prevented?

• The best prevention is fewer seizures!
• Those with a fairly good seizure control (70%) should be encouraged to lead normal lives.
How can injuries be prevented?

• Those with pharmacoresistant seizures have to take some reasonable precautions, e.g.
  – Avoid furnitures with sharp edges
  – Carpets on the floors
  – Microwave oven in stead of stove
  – Chair in the shower
How can injuries be prevented?

– Avoid smoking and candlelight
– Avoid working in the height
– Avoid working with dangerous machines
– Wear a bike helmet
– Wear a lifevest at sea
How can injuries be prevented?

• Such precautionary measures may reduce the injury risk
• However, such measures should be individually tailored, aiming at a reasonable balance between cautioness and living a normal life to the extent possible
Overestimated fear of injuries

• Traditionally, the fear of seizure-related injuries has been grossly overestimated.
• The consequences may have been:
  – Inactivity
  – Dependency
  – Social isolation
Conclusion

• Only 1-2% of the seizures is associated with injuries, and they are rarely severe (0.05%)
• Trivial soft tissue injuries constitute ~ 80%
Conclusion

• High seizure frequency, GTC- and atonic seizures increase the injury risk
• Some injuries may be prevented
• However, the preventive measures must be in a reasonable proportion to the injury risk