

AN EMBLEMATICAL CASE OF FIRST ACCESS IN EPILEPSY WHILE DRIVING ACCORDING TO THE ITALIAN LAW N. 41 OF 23 MARCH 2016 AND A REVIEW OF LITERATURE INDEX

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ABSTRACT

Introduction: People with epilepsy, all over the world, have many problems in everyday life because of unpredictable seizures that could hinder every human activity. In particular, they are restricted from driving because of the fear over seizure-related car accidents. The purpose of this work is to raise some questions about risk of traffic accident, driving restriction and personal liability in people with and without diagnosis of epilepsy.

Case presentation: We present a case of a 49-year-old woman who accidentally hit a pedestrian with her car, causing him severe personal injury. After many clinical and instrumental examinations, the physicians diagnosed to her generalized epilepsy and she started a daily anti-epileptic therapy.

Results: Studies have tried to estimate the real risk of road traffic accident in order to evaluate when a person with epilepsy reaches an acceptable risk of driving, balancing public traffic safety and personal freedom, without a real success. Therefore, we present an overview of laws regarding epilepsy-driving restriction and a recent court case related to a car accident during a first seizure, according to the Italian law n. 41 of 23 march 2016 about personal injuries and murder caused by vehicular accident and a review of Literature about the first seizure while driving.

Conclusion: We believe that the driver cannot be held liable for any personal injuries or murder caused by vehicular accident, according to the Italian law n. 41 of 23 march 2016, likewise it happened in the case presented. Indeed, the crisis represent a temporary reduction of liability (incapacity to understand and want), making the person not imputable for own actions during the time of the seizure.

Keywords: first seizure, people with epilepsy (PWE), car accident, personal injuries.

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Introduction

We know that some medical diseases can reduce driving capability, but epilepsy, differently from other diseases (such as cardiovascular disease or diabetes mellitus), is able to modify temporally every human performances. From clinical point of view, the epileptic disease is diagnosed by the appearance of at least two unprovoked seizures in five years. The provoked seizures are a particular crisis triggered by a specific and detectable cause. In particular, the four main generalized epilepsy syndromes (CAE, juvenile absence, JME and generalized tonic-clonic alone), charac-

terized by unpredictable seizure with a loss of consciousness, are able to influence driving ability and causing serious car crashes⁽¹⁾. In 1906, for the first time, some authors described a car accident caused by a seizure while driving and from this moment, the Scientific Community started to regard epilepsy disease like a serious risk for public traffic.

Therefore, the relationship between seizures during driving and road accidents has been studied for years while the states of whole world, have banned drive licenses for people with epilepsy (PWE). Public policy changed its mind only when the anticonvulsants became able to control seizures and researchers

discovered that the rate of motor vehicle crashes was only slightly increased for drivers with controlled epilepsy compared to the general population, similarly to patients with other medical diseases (such as diabetes and heart disease). Therefore, from 1949, when the state of Wisconsin wrote new driving restriction, each state began to allow driving license in patients with controlled epilepsy⁽²⁾.

Today, the driving regulation is quite different all over the world and even among EU member states there are some differences. For these reasons, the Epilepsy Foundation for easy reference tabulates driving information for every state⁽³⁾. In fact, each state use drive license based on a seizure-free interval of 3 - 18 months, evaluation of clinical (e.g., prescribed change in antiepileptic drug (AED), nocturnal seizures, auras only) and/or neurological factors with EEG and MRI^(4,5). In particular, Italian legislation provides that driving licenses - limited to categories A and B (car and moto vehicle) - are allowed with a seizure free interval of at least one years, regardless of the assumption antiepileptic therapy and a local medical commission through neurologic controls verifies these conditions. The validity of this license cannot exceed two years, after which a renewal is required, with the same procedures. The restrictions end after ten years without seizures. Unlike other European countries, in Italy PWE cannot permanently drive heavy vehicles (categories C, D and E). Differently, UK allow regaining their ordinary driving licence six months after last crisis; instead, heavy vehicle drivers can regain their licence after five years, provided they have not taken antiepileptic drugs during this interval⁽⁶⁾. For the medical examiner, the responsibility of the subject who, unaware of their epileptic disease, has a first seizure while driving remains of criminal interest. This situation must be carefully considered in order to establish the responsibility of the driver, analysing when he could prevent the accident or when the crisis starts without warning.

The law n. 41 of March 23, 2016 describes the personal injuries and the murder caused by vehicular accidents⁽⁷⁾: "Whoever causes guilt for the death / personal injury of a person with violation of the rules on the regulation of road traffic is punished with imprisonment from two to seven years". However, it establishes that if the event is not an exclusive consequence of the action/omission of the driver, the penalty is reduced to half. In the Italian legal system, the article 45 of the penal code describes that: "it is not punishable who committed the act due to unforeseeable circumstances or force majeure".

Case presentation

We present a case of a 49-year-old woman who accidentally hit a pedestrian with her car in March 2018, causing him severe personal injury. After the car accident, she was taken to the emergency room where she reported: "blurred vision and loss of consciousness". The clinical examination was negative, the patient was lucid and reactive, vital signs were normal. The toxicological test was negative for alcohol and drugs. The electroencephalogram performed on arrival at the hospital showed epileptogenic abnormalities. Therefore, the doctors performed an additional electroencephalogram with sleep deprivation and it showed the same alterations (theta wave). This examination, conducted six months later, confirmed the presence of epileptogenic foci, ascertaining the diagnosis of generalized epilepsy. From this moment, the patient started daily anti-epileptic therapy. The patient's report, the EEG alterations detected on the day of the car accident and the subsequent diagnosis of generalized epilepsy lead us to say that the car accident of March 2018 was caused by the loss of consciousness secondary to the first crisis. In fact, there were no suspected medical examinations or assessments of epilepsy in previous numerous medical records (surgery for haemorrhoids, childbirth, surgical revision in endometriosis). No element of risk was detected in the history. It was only from the family point of view that it was found that the mother often had fainting. The patient was of Brazilian origin and in her childhood had lived in a small village where there was no medical assistance and then she was transferred to Italy without ever finding problems.

Therefore, we conducted a MEDLINE research on Pubmed and Scopus website with the keywords «"first seizure" AND "driving"» (on Pubmed 34 results, on Scopus 52 results); «"first seizure" AND "accident"» (on Pubmed 12 results, on Scopus 71 results); «"first seizure" AND "drive"» (on Pubmed 15 results, on Scopus 11 results).

Subsequently, we performed a second selection according to two main inclusion criteria:

- abstract and/or full text in English language;
- titles and/or abstracts suggested a first seizure while driving evaluation in patients without epilepsy.

Discussion

Worldwide PWE commonly have driving restrictions due to the risk of road accidents. However, only few studies have analysed the relative risk of ac-

cident in PWE and very little research have estimated when a person with epilepsy could receiving driving because he has an acceptable risk of driving⁽⁸⁾. The real number of annual seizure-related motor vehicle accidents (MVAs) is not well known because not all accidents are reported and some of them are not caused by crisis, in fact 85% of road accidents in PWE depends on common driver errors. Some studies have estimated that MVAs range from 0.1 to 1 % of total annual vehicle accidents; in Germany, a third of PWE (about 500 people) were involved in MVAs and the 20% of these accidents were the result of a seizure. Based on these data, there are no concrete evidences that PWE have a higher risk of having a MVAs then the general population. In fact, if we compare the percentage of road accidents due to convulsions (approximately 1%) and alcohol abuse (7%), we note that the first one is significantly lower. Furthermore, seizure-related accidents can frequently cause personal injuries, but they are less severe and fatal than accidents due to other causes⁽²⁾.

Although epilepsy nowadays does not denote an absolute ban on driving, the current driving restrictions represent a huge problem in everyday life. The recommended period of abstention from driving after a crisis is inconstant and the clinical evidences to support these indications are often obscure⁽⁹⁾. However, most states require having a seizure-free interval of at least 3 months before drive⁽¹⁰⁾.

The time interval without seizure is actually the most useful and practical predictor of seizure recurrence and, therefore, of driving accidents risk even if it remains quite difficult to evaluate the return of a crisis⁽⁶⁾. Many studies have demonstrated that longer intervals without seizure are associated with a progressively diminishing of seizure recurrence risk. In particular, an adult has a highest risk of recurrence within the first 2 years after an unprovoked first attack while, in the following 12 months, the risk decreases significantly with increasing of free interval: after 6 months of seizure freedom, the risk in the next 12 months is 14%; after 1 year, it is 7%; after 18 months, it is 8% and after 24 months, it is 7%.

The challenge in driving restriction laws for PWE is the balance of public safety and personal freedom. To prohibit someone from driving in our mobile society could be a failure because it limits personal autonomy and contributes to many disadvantages in the labour market. In fact, driving in modern society is an indispensable part of life, both economically and socially, which is the reason why, sometimes, PWE drive freely, despite the regulations⁽¹¹⁾.

Although most researchers have focused on seizure prevention in PWE, some studies have evaluated seizures while driving in people without a previous epilepsy diagnosis. In particular, our MEDLINE research highlighted, after a restricted selection (we excluded if abstracts and/or full texts revealed themselves irrelevant to the topic of the review), five articles about experimental studies, published between 1991 and 2019. These studies are subsequently described in chronological order (Table 1).

AUTHORS	YEAR	TOPIC
Hesegawa S et al. [12]	1991	The study was based on a questionnaire filled by one hundred and twenty-nine epileptic drivers from 20 to 50 years old and it tested about car accidents experience from 1989.
Krauss et al. [2]	1999	The Authors analysed the clinical risk factors for seizure-related motor vehicle crashes in patients with epilepsy s in a retrospective case-control study comparing patients with driving crashes during seizures (cases) with patients with epilepsy who drove but did not have crashes (controls).
Pohlmann-Eden B et al. [14]	2013	Three hundred and eleven patients were referred to the Halifax First Seizure Centre between July of 2008 and August 2011. All patients were clinically assessed about their experience of first seizure while driving and, to confirm the diagnosis, they received routine EEG, sleep-deprived EEG, MRI or both.
Brown et al. [15]	2015	1386 patients with first-ever seizure were prospectively analysed. Seizure recurrence was evaluated using survival analysis. Additionally, the percentage of patients that were driving at the time of their first ever seizure or at the time of the recurrence and the related risks of seizure recurrence were calculated.
Inamasu J et al. [16]	2019	The Authors conducted a single-center, retrospective study using prospectively acquired data of 658 adult seizure patients who visited their emergency department between January 2011 and December 2016. They analysed many clinical variables in drivers that described a seizure while driving, with and without diagnosis of epileptic disease

Table 1: Review of the Literature about seizures while driving in people with or without a previous epilepsy diagnosis.

For the first time, Hesegawa S et al.⁽¹²⁾ considered 72 automobile accidents attributed to seizure and they did not find any accident caused by a first seizure.

Some years late, Krauss et al.⁽²⁾, studying the frequency of MVAs; observed that 18% of these occurred during a first seizure, without analysing the clinical management⁽¹³⁾.

Pohlmann-Eden B et al.⁽¹⁴⁾ showed that over 8% of the patients who presented to their First Seizure Clinic described their first crisis while driving. In particular, thy observed that most of these patients caused a car accident because of an impaired consciousness, but some of them, had a preceding “warning”, such as visual auras and/or vasovagal symptoms, and were able to stop the car.

Similarly, Brown et al.⁽¹⁵⁾ evaluated the recommended duration of non-driving after a first seizure and showed that 55 patients (4% of all the patients studied) were driving at the time of their first-ever seizure.

At the end, Inamasu J et al.⁽¹⁶⁾ observed that the frequency of seizure occurring while driving was higher in people without epilepsy diagnosis compared on PWE, although the difference was statistically insignificant. Seizure in patients without epilepsy depends on heterogeneous factors, including both acute and chronic encephalic lesions. This finding indicates that brain-imaging studies are essential in the initial workup of patients who have experienced seizures while driving for the first time⁽⁹⁾.

The unpredictability of seizure, which can occur in every moment of daily life, even while driving, and the small number of studies on this topic, highlights the need to deepen research this argument.

Conclusion

The purpose of our work regards on the personal liability of drivers who causes personal injuries or death during a first seizure while driving, as in the case presented above.

We believe that first seizure is an unexpected and unforeseeable event, so drivers cannot be held liable for any damage caused during a crisis. Pursuant to Article 45 of the Criminal Code It is not punishable who has committed the act due to unforeseeable circumstances or major force. A fortuitous event is the unpredictable and exceptional event that suddenly appears in the subject's action. The major force is an external force that determines the person to perform an action, which the person cannot oppose.

Based on this idea, the Italian court (Cass. Pen. n. 3031/1993 e 1668/2018) has repeatedly stated that epilepsy disease is not a permanent insanity, but the crisis represent a temporary reduction of liability (incapacity to understand and want), making the person not imputable for own actions during the time of the seizure.

In conclusion, the absence of a diagnosis of epilepsy and the unpredictability of seizure did not allow us to suspect which people present a risk for traffic accidents and to prevent it. The frequency of the first attack while driving is certainly underestimated because this pathology is often not investigated in drivers after an accident.

The car accident described in the case reported is certainly a consequence of a first attack while driving

and it was unknown, unpredictable and uncontrollable. Therefore, we believe that, in these situations, the driver cannot be held liable for any damage caused during seizure; in particular, we think he cannot be convicted of personal injuries or murder caused by vehicular accident, according to the Italian law n. 41 of 23 march 2016.

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