

# Characteristics of Epilepsy Patients who Committed Violent Crimes: Report from the National Forensic Hospital

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**Background and Purpose:** We investigated the clinical and criminal characteristics of patients with epilepsy who had committed violent crimes in order to understand the mechanism of violence and to prevent future criminal activity.

**Methods:** We reviewed medical and legal reports of criminals with epilepsy who were incarcerated in the Korean National Forensic Hospital between October 2007 and September 2008.

**Results:** Of 761 criminals admitted to the National Forensic Hospital, 17 patients (2.2%) were diagnosed with epilepsy. All of them had localization-related epilepsy, and no patient reported an overt seizure attack around the time of a crime. Psychosis was present in eight patients, and seven patients were in a drunken state at the time of the crimes. There was a positive correlation between the patients' age at their first crime and their intelligence quotient score.

**Conclusions:** These results suggest that most violent crimes take place during interictal periods, and diverse medical conditions, including inebriation, psychosis, and low intelligence, are associated with violent crimes among epileptic patients. (2011;1:13-18)

**Key words:** Violence; Aggression; Epilepsy

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## Introduction

Violence can be defined as overt behavior that involves the intent to inflict noxious stimulation or to behave destructively toward another organism [1,2]. Violent behavior in human society is a complex output of biological, behavioral, and social factors [3,4]. Epilepsy and violent behavior have long been regarded as similar because of their episodic or impulsive natures [5,6]. Violent behavior among patients with epilepsy can be categorized into peri-ictal violence (preictal, ictal, and postictal), which occurs around the time of a seizure attack, and interictal violence, which has less of a temporal relationship with a seizure attack [2].

There has been a belief that people with epilepsy are more prone to committing violent acts than the general population [7]; however, there has been no convincing evidence to indicate that epilepsy is associated with violent behavior [8]. The prevalence of violence among patients with epilepsy can vary according to the definition of violent behavior, epilepsy subtypes, and the origin of the study population [1]. For example, temporal lobe epilepsy had been

reported to be related to a high rate of about 7% of violent acts [9]. Some studies have indicated that epileptic prisoners do not commit more violent crimes than nonepileptic prisoners [1]. Another report stated that the rate of epilepsy in prison populations was similar to those found in most economically disadvantaged communities, suggesting that socioeconomic conditions are an important factor leading patients with epilepsy to commit criminal behavior [10]. Combined medical diseases, such as alcohol dependence, brain injury, and psychosis, and frustrated social achievement may contribute to violent behavior [4,11,12].

It is conceivable that only a minority of patients with epilepsy commit a violent crime. This in turn strengthens the social stigma against patients with epilepsy. If we can elucidate potential violence-aggravating factors among patients with epilepsy, we may be able to understand the pathomechanism of aggression and possibly prevent further violent behavior. In this study, we set out to evaluate the clinical and criminal characteristics of epileptic patients who committed violent crimes.

## Methods

### 1. Patient inclusion

The National Forensic Hospital in Gongju is a hospital-based correctional institution that was founded in 1987 by the Ministry of Justice of the Republic of Korea. It is a unique forensic hospital in the Republic of Korea, and those criminals who have committed crimes as a manifestation of their psychiatric or neurological diseases are incarcerated in the institution. When patients are admitted to the hospital, we perform routine blood tests, electroencephalography (EEG), and the Korean version of the Wechsler Adult Intelligence Scale, which measures the intelligent quotient (IQ). Brain magnetic resonance imaging (MRI) is considered when outside data is not available.

Between October 2007 and September 2008, patients with epilepsy who were incarcerated in the forensic hospital due to violent crime were enrolled in the study. Epilepsy was diagnosed when a patient had two or more unprovoked seizure attacks or when antiepileptic drugs had been prescribed for a diagnosis of epilepsy. Epilepsy subtype was determined after reviewing outside hospital records and EEG results upon admission. All of the patients had been diagnosed with epilepsy before their crimes, and one neurologist confirmed the diagnosis after admission to the forensic hospital. The violent crimes included homicide, attempted murder, rape, assault, arson, and robbery. We retrospectively reviewed the patients' medical and legal reports. The seizure-control state was determined as good if a patient was in a state of remission for longer than a year. We obtained their EEG and brain MRI results as well. The study was reviewed and approved by the institutional review board of the National Forensic Hospital in Gongju.

### 2. Statistical analysis

A Spearman test was performed to test for any correlation between the age of the patient at their first crime and values including epilepsy onset age, IQ, and educational achievement with SPSS for Windows (version 12.0; SPSS, Inc., Chicago, IL, USA).  $p$ -values less than 0.05 were considered statistically significant.

## Results

There were 17 epilepsy patients who had committed a violent crime, and these patients constituted 2.2% of the total patient population (761) in the forensic hospital. The mean age of the study

population was  $42.2 \pm 11.2$  years. The mean age of the patients at epilepsy onset and at the time of their first crime was  $15.5 \pm 14.5$  years and  $33.9 \pm 12.3$  years, respectively. There were two female patients.

### 1. Epilepsy

All of the patients were diagnosed with localization-related epilepsy, which involved either frontal lobe epilepsy or temporal lobe epilepsy (Table 1). Possible etiologies included head trauma in three patients, cerebral infection in two patients, and stroke in another. Brain MRI data, which was available for seven patients, revealed various structural lesions, including cerebral infarction, polymicrogyria, meningioma, surgical excision, and encephalomalatic change after head injury. Fifteen out of the 17 patients were not taking regular antiepileptic medication prior to their crimes, partly because of economic problems or adverse effects of the drugs, but mostly because they did not recognize the importance of drug maintenance. All patients, except two, were well controlled by medication after admission. Ten patients were in a remission state with monotherapy, and five were being administered two antiepileptic medications. One patient had surgical treatment for epilepsy eight years prior to his crime. Other combined medical conditions included mental retardation in seven patients, alcohol abuse in four, schizophrenia in three, and dementia in one.

### 2. Violent crimes

The types of crimes among the patients included murder in six patients, attempted murder in three, rape in three, assault in two, robbery in two, and arson in one. Most of the patients did not experience overt seizure attacks before and after the crime, and they did not lose their consciousness or memory during the crime. However, two patients stated that they did not remember their criminal behavior, suggesting the possibility of postictal confusion. Although the two patients experienced overt seizure attacks after admission, they had not shown any alteration of consciousness with violent behavior.

Ten patients (58.8%) had previous criminal records, which were due to similar types of crimes as those discussed in this paper. Seven patients were in a heavily drunken state when they committed their crimes (Table 1). Eight patients experienced psychosis, and two patients committed their crimes in response to auditory or visual hallucinations. In eight patients, the victims of their crimes were family members. A positive correlation existed between the age of

**Table 1.** Demographic and clinical characteristics of epileptic patients with violent crime

Patient no.	Age	First crime age	Seizure onset age	IQ	Educational years	Psychosis	Alcohol intake	Marital status	Family contact	Seizure control	EEG	Epilepsy
1	50	34	19	75	9	+	+	D	+	Good	Rt FT spike	TLE, Rt
2	40	30	5	66	6	+		D			Rt T spike	TLE, Rt
3	51	35	15	109	11	+		D			Rt FT spike	TLE, Rt
4	38	32	18	93	14	+			+	Good	Rt T spike	TLE, Rt
5	45	36	8	57	6		+			Good	Rt T slowing	TLE, Rt
6	30	23	10	45	0		+			Good	Rt FT slowing	TLE, Rt
7	44	24	4	80	6					Good	Rt FT slowing	TLE, Rt
8	52	49	9	92	8	+				Good	Lt FT slowing	TLE, Lt
9	34	19	19	58	8		+			Good	Both T spike	TLE, B
10	66	64	23	74	6	+		W		Good	normal	FLE, Rt
11	23	19	18	74	12		+			Good	Rt FT slowing	FLE, Rt
12	28	25	4	55	10	+				Good	Rt F spike	FLE, Rt
13	37	23	1	72	9				+	Good	Diffuse slowing	FLE, Lt
14	39	36	1		0				+	Good	Lt FT slowing	FLE, Lt
15	51	50	49	108	6	+		D		Good	Lt F spike	FLE, Lt
16	56	45	50	95	8		+	M		Good	Diffuse slowing	FLE, Lt
17	34	33	10	80	11		+		+	Good	Both F spike	FLE, B

IQ, intelligence quotient; D, divorced; W, widowed; M, married; T, temporal; F, frontal; FT, frontotemporal; TLE, temporal lobe epilepsy; FLE, frontal lobe epilepsy; Rt, right; Lt, left; B, both.

**Table 2.** Correlation between the age when the patient committed their first crime and clinical variables

	First crime age	
	R-value	<i>p</i> -value
Epilepsy onset	R = 0.321	<i>p</i> = 0.209
IQ	R = 0.533*	<i>p</i> = 0.033
Education year	R = -0.040	<i>p</i> = 0.880

\* *p*-value < 0.05.

onset of their first crimes and the patients' IQ scores, as illustrated in Table 2 and Figure 1 ( $r = 0.533$ ,  $p = 0.033$ ).

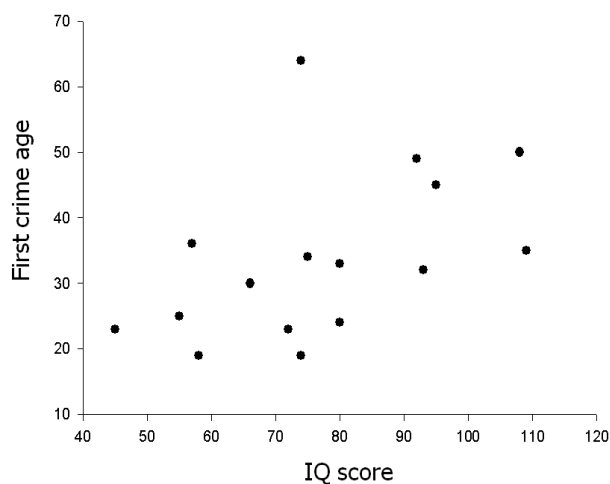
### 3. Educational, occupational, and marital status

Educational achievement was defined as the number of years that were spent in a school (Table 1). Seven out of 17 patients had finished middle school (i.e., they spent nine years in the school system), which is the final step of compulsory education in Korea. One patient was a university graduate. Occupational experience was mostly confined to temporary and daily work in seven patients, while two patients had regular occupations. The other eight patients had never been employed. One patient was married; however, 11 patients were not. Four patients were divorced, and one patient was widowed because she had murdered her husband. Regular contact by family members of at least one visit per year was maintained in five patients.

## Discussion

In this national center-based retrospective study, the most common epilepsy subtype in patients with violent crimes was localization-related epilepsy, and these patients showed favorable responses to medical treatment. It was noted that violent crimes were rarely observed during ictal or postictal periods, suggesting that neuropsychological and social factors might interplay and lead to violence rather than the violence being caused by just the epileptic seizure itself. Our study suggested that a low level of intelligence was related to an earlier onset of crimes. Educational achievement was markedly limited among the epileptic criminals, as were occupational experience and family support.

The temporal relationship between seizure attacks and violent crimes was very subtle in most cases, suggesting that interictal violent behavior was more commonly associated with crimes than that of ictal or postictal periods. Although there have been several



**Figure 1.** Correlation between intelligent quotient (IQ) score and the age at the first crime. There was a positive correlation between IQ score and the age of the patient when they committed their first crime ( $r = 0.533$ ,  $p = 0.033$ ). One patient was not included in the analysis because he could not perform on the IQ test.

reports about peri-ictal violence, those seemed to be associated with purposeless movement or resistive activity against restriction [8]. There was a recent report illustrating violent crimes that were probably due to epileptic automatism [13]. However, it is very challenging to prove violent behaviors as an ictal manifestation, given that video-EEG monitoring is required to determine whether there were ictal discharges during the behavior [10]. Two of our patients reported decreased levels of consciousness and amnesia after committing rape, but seizure attacks cannot be guaranteed at that time because such a complex behavior would be difficult to perform during a seizure attack. In addition, a high level of emotional excitability could also result in transient memory dysfunction [8]. It is generally accepted that violent behavior among epilepsy patients is most commonly observed in the interictal period [14].

Low intelligence has been regarded as one of the major risk factors of violence among epilepsy patients [11]. Our results revealed a positive correlation between the age at the first crime and IQ score, suggesting that epilepsy patients with low intelligence might be prone to violent behavior at a younger age. Although it is hard to ascertain that low intelligence is a direct cause of violent crime among epilepsy patients, low intelligence may force them to remain in a low socioeconomic state, which may possibly increase criminal behaviors [8]. Another possible explanation is that structural brain abnormalities may result in epilepsy, intellectual disability, and impulse control dysfunction, and each of these can contribute to an

overall disability [14,15]. However, it is also possible that early criminal behavior might have caused social discrimination, including a lack of educational opportunities, which would have resulted in a low IQ measured upon admission.

Psychosis is frequently found among chronic localization-related epilepsy patients [16]. Two of our patients committed a violent crime in response to a psychotic manifestation in the form of auditory hallucinations and persecutory delusions. Those crimes might have been prevented if the patients had been adequately treated with antipsychotics. Considering that seven out of 17 patients were drunk before the crime, inebriation seems to be another violence-provoking factor among epileptic patients, justifying educational programs for the responsible use of alcohol and/or abstinence programs.

Social performance was compromised among the epileptic criminals. First of all, educational achievement was markedly limited. Although Korea has had a mandatory educational system since 1954, and given that the majority of the population has completed middle school after 1993, our study revealed that ten patients (58.8%) could not graduate from middle school. The undereducated proportion of patients in our study was much larger compared to the percentage of general criminals who did not finish middle school (6.5%) [17]. The level of educational achievement among epileptic criminals seemed to be stationary compared to a previous study from the same institution, which revealed that 45.5% (10 out of 22 patients) of patients had not graduated from middle school [18]. It is conceivable that low educational status would result in unstable occupational status. Poor employment conditions among epilepsy criminals was shown in another study, which reported a 92.3% (12 out of 13 patients) unemployment rate [13]. Family support and marital relationships were lacking in the majority of the patients, which was reflected by a high divorce rate and lack of family contact during incarceration. This is probably because many of the criminal acts were against family members. Disrupted educational achievement, occupational opportunities, and family background may prohibit social integration after discharge and trigger future crime.

Although this is a single national center-based study, our study population likely included the entire population of violent criminals with epilepsy specific to the selected time period because there is only one forensic hospital in South Korea. We chose those patients with violent crime in order to homogenize the study population; however, selection bias may have taken place since the court ultimately decides the referral of epileptic criminals to the forensic hospital, even though medical advice also plays a substantial role. In

addition, a small percentage of the study population may have produced biased results. Brain imaging could not be routinely performed at admission because of financial limitations. Further studies comparing epilepsy patients with and without violent behavior may increase our understanding of the relationship between epilepsy and aggression.

This study illustrates neuropsychiatric and socioeconomic characteristics of epileptic patients who committed violent crimes. Most of the violent crimes took place during interictal periods. Low intelligence, alcohol abuse, and psychosis appear to be associated with criminal activity among epilepsy patients. Medical interventions to treat psychosis and alcohol abuse and social reinforcement may be helpful to prevent future violent behavior.

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