



## Clinical factors associated with postictal headache in Chinese patients with partial epilepsy



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### ABSTRACT

**Purpose:** To investigate the incidence of postictal headache (PIH) and the factors potentially related to the occurrence of PIH in a Chinese epileptic center.

**Methods:** Consecutive adult patients with epilepsy, referred to the outpatient clinic of the Epilepsy Center of the PLA General Hospital between February 01, 2012, and May 10, 2013, were recruited to this study. 854 patients with partial epilepsy completed a questionnaire regarding headache, 466 patients with temporal lobe epilepsy (TLE), 82 patients with occipital lobe epilepsy (OLE) and 306 patients with frontal lobe epilepsy (FLE). A semi-structured interview was performed in those who confirmed headache.

**Results:** PIH occurred in 328 (38.41%) of the subjects. By type of epilepsy, PIH was found in 164 (35.19%) of the patients with TLE, 46 (56.01%) of the patients with OLE, and 118 (38.56%) of the patients with FLE. The incidence of PIH in OLE was significantly higher than in TLE and FLE ( $P < 0.05$ ). It occurs more frequently after generalized tonic-clonic seizures than other seizure types. Logistic regression analysis revealed that age at onset, type of seizure and classification of epilepsy were each significantly related to the occurrence of PIH.

**Conclusion:** The results of our study revealed possible relationships between PIH and the region of epileptic focus and area of spread of epileptic discharges.

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## 1. Introduction

Epilepsy and headache are all paroxysmal disorders. Headache is one of the comorbidities that may add to the burden of epilepsy. The association between headaches and seizure disorders has long been debated and is still poorly understood. In clinical practice, patients with epilepsy not infrequently complain of headaches, clinicians often fail to explicitly ask the patients about seizure-associated headache. Headache may be temporally linked to seizures in different ways. It may occur prior to a seizure (preictal headache), during a seizure (ictal headache), after a seizure (postictal headache, PIH) or be unrelated to seizures (interictal headache).<sup>1–3</sup> Postictal and interictal headaches are common with a frequency of 35–51% and 31–64%, respectively.

The relationship between type of epilepsy and PIH is also of interest. It is suggested that seizures can trigger secondary

headache attacks (postictal headache).<sup>4,5</sup> It has been pointed out that generalized tonic-clonic seizure (GTCS) is associated with PIH.<sup>6,7</sup> Other researchers have also noted that OLE is often associated with headaches.<sup>8–10</sup> These findings suggest that the underlying mechanism of PIH may be related to seizure type and the location of epilepsy. However, very few studies have addressed this issue, especially in China.

The purpose of this study was to determine the incidence of PIH and to investigate factors potentially related to the occurrence of PIH. We therefore compared the incidences of PIH and examined clinical factors possibly related to PIH for three types of localization-related epilepsy, i.e. TLE, OLE, and FLE.

## 2. Methods

Consecutive adult patients with epilepsy, referred to the outpatient clinic of the Epilepsy Center of PLA General Hospital between February 01, 2012, and May 10, 2013, were recruited to this study. All patients had a definite diagnosis of epilepsy seen by at least two epileptologists. Diagnoses were made according to the International League Against Epilepsy classification<sup>11</sup> on the basis

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of clinical symptoms, electroencephalography (EEG), and magnetic resonance imaging (MRI). Seizures were classified as simple partial seizure (SPS) and/or complex partial seizure (CPS), mixed SPS and generalized tonic–clonic seizure (GTCS), and mixed CPS and GTCS.

Patients included in this study were 18 years-old or more and with intact ability to answer the questionnaires. Patients with mental retardation, learning disability, behavioral disorder or other evident abnormalities that could compromise the cooperation to respond the questionnaires were excluded. In those who confirmed headaches, a standardized semistructured telephone interview was performed, with questions about timing of headache in relation to seizures, in addition to frequency, duration, intensity, localization, and associated features of the headaches.<sup>12,13</sup> In this study, postictal headache as a headache starting within three hours after a seizure and ceasing within 72 h after the attack.<sup>12</sup> Informed consent was obtained from all subjects.

The patients were asked to grade the usual headache intensity as mild (maintaining normal activities without problems), moderate (maintaining normal activities with difficulty), severe (must give up normal activities and lie down) or extremely severe (impossible to stay still). Further diagnostic questions were based on ICHD-II criteria<sup>12</sup> and aimed to identify migraine and tension-type headache (TTH). The medical chart of each patient was reviewed to ascertain clinical factors such as age at onset of epilepsy, duration of illness, type of seizures, and number of antiepileptic drugs (AEDs) taken.

All analyses were performed using SPSS version 14.0. For statistical analysis, we used one-way analysis of variance (ANOVA) to determine the significance of differences in clinical factors among the three groups. Continuous variables were summarized as means and standard deviations, and categorical variables as numbers and percentages. Chi-square was used to compare distributions of categorical variables between groups; the paired-sample *t*-test and ANOVA were used to compare continuous variables. Statistical significance was set at  $P < 0.05$ . Logistic regression analysis with stepwise elimination method was used to test for relationship between each potential risk factor and the occurrence of PIH.

### 3. Results

#### 3.1. Incidence of seizure-associated headache among patients with partial epilepsy:

854 patients with partial epilepsy (464 men and 370 women, average age  $31.06 \pm 11.92$  years) from our epilepsy outpatient clinic were prospectively interviewed by questionnaire as to whether or not they suffer from headaches associated with epileptic seizures. Including 466 patients with TLE, 306 patients with FLE, and 82 patients with OLE.

Table 1 shows the clinical characteristics of the subjects. There were no significant differences in age, age at onset, seizure type, a

**Table 1**  
Clinical features of subjects.

	FLE <i>n</i> = 306	TLE <i>n</i> = 466	OLE <i>n</i> = 82
Sex			
Female	138	212	40
Male	168	254	42
Age, year (mean)	$32.92 \pm 12.60$	$32.87 \pm 12.16$	$31.49 \pm 6.22$
Age at onset, year (mean)	$23.52 \pm 13.64$	$22.70 \pm 13.81$	$21.50 \pm 8.98$
Duration of epilepsy, year (mean)	$9.35 \pm 8.24$	$10.08 \pm 8.96$	$10.03 \pm 7.22$
Seizure type			
SPS/CPS	34	172	4
SPS + GTCS	154	12	4
CPS + GTCS	118	282	74
A history of interictal headaches	22	26	12
Number of AEDs (mean)	$1.28 \pm 0.70$	$1.31 \pm 0.82$	$1.22 \pm 0.85$

TLE, temporal lobe epilepsy; FLE, frontal lobe epilepsy; SPS, simple partial seizure; CPS, complex partial seizure; GTCS, generalized tonic–clonic seizure; AEDs, antiepileptic drugs.

history of interictal headaches, duration of illness or number of AEDs among the three epilepsy groups.

PIH occurred in 328 (38.41%) of the subjects. By type of epilepsy, PIH was found in 164 (35.19%) of the patients with TLE, 118 (38.56%) of the patients with FLE, and 46 (56.01%) of the patients with OLE. The incidence of PIH in OLE was significantly higher than in TLE and FLE ( $P < 0.05$ ), although there was no significant difference in incidence between TLE and FLE.

We examined clinical factors including sex, age at onset, duration of illness, type of seizure, classification of epilepsy, a history of interictal headaches and number of AEDs. Logistic regression analysis revealed that age at onset, type of seizure and classification of epilepsy were each significantly related to the occurrence of PIH (Table 2). The risk of occurrence of PIH was significantly greater with younger age at onset and for patients with GTCS. The OLE group had a significantly higher risk for PIH than did the TLE and FLE groups. Other factors were not significantly related to the occurrence of PIH.

#### 3.2. Postictal headaches

Postictal headaches were most common after generalized tonic–clonic seizures 270 of 374 patients (72.19%), but were also reported by 58 of 152 patients (38.16%) after partial seizures without generalization. There was no correlation between the duration and severity of partial and that of headaches.

The headache was graded as mild in 90 (27.44%), moderate in 194 (59.15%), severe in 44 (13.41%), no patient suffered as extremely severe (Table 3). According to the ICHD-II criteria, postictal headaches were classified as migraine in 200 patients (60.98%). 24 patients' headaches were classified as "migraine-like",

**Table 2**  
Clinical factors related to the occurrence of postictal headaches.

	Post-ictal headaches	Odd ratio	95% CI	<i>P</i>
Age at onset	$19.16 \pm 10.42$	0.896	0.876–0.926	0.036
Duration of illness	$10.33 \pm 8.12$	0.961	0.928–1.003	0.079 (NS)
Epilepsy type		1		
OLE	46 (56.01%)	0.312	0.113–0.869	0.019
TLE	164 (35.19%)	0.341	0.098–0.789	0.026
FLE	118 (38.56%)			
Seizure type		1		
With GTCS	270	0.385	0.156–0.847	0.0002
Without GTCS	58	0.971	0.918–1.012	0.083 (NS)
A history of interictal headaches	32 (9.76%)	1.25	0.983–1.971	0.069 (NS)
Number of AEDs	$1.36 \pm 0.80$			

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