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Epilepsy in patients with pineal gland cyst

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ABSTRACT

Objective: The aim of the study is to describe types of epileptic seizures in patients with pineal gland cyst (PGC) and their outcome during follow up period (6–10 years). We wanted to determine whether patients with epilepsy differ in PGC volume and compression of the PGC on surrounding brain structures compared to patients with PGC, without epilepsy.

Patients and methods: We analyzed prospectivelly 92 patients with PGC detected on magnetic resonance (MR) of the brain due to various neurological symptoms during the period 2006–2010. Data on described compression of the PGC on surrounding brain structures and size of the PGC were collected.

Results: 29 patients (16 women, 13 men), mean age 21.17 years had epilepsy and PGC (epilepsy group). 63 patients (44 women, 19 men), mean age 26.97 years had PGC without epilepsy (control group). Complex partial seizures were present in 8 patients, complex partial seizures with secondary generalization in 8 patients, generalized tonic clonic seizures (GTCS) in 10 and absance seizures in 3 patients. Mean PGC volume in epilepsy group was 855.93 mm^3, in control group 651.59 mm^3. There was no statistically significant difference between epilepsy and control group in PGC volume. Compression of PGC on surrounding brain structures was found in 3/29 patients (10.34%) in epilepsy group and in 11/63 patients (17.46%) in control group with no statistically significant difference between epilepsy and control group. All patients with epilepsy were put on antiepileptic therapy (AET). During the follow up period, 23 patients (79.31%) were seizure free, 3 patients (13.04%) had reduction in seizure frequency, whereas 3 patients had no improvement in seizure frequency. Two patients from epilepsy group and 3 patients from control group were operated with histologically confirmed diagnosis of PGC in 4, and pinealocytoma in 1 patient.

Conclusions: In patients with PGC, epileptic seizures were classified as: complex partial seizures (with or without secondary generalization), GTCS and absance seizures. All patients were put on AET. During follow up period 79.31% patients were seizure free. There was no difference in PGC volume, nor in described compression of the PGC on surrounding brain structures between epilepsy and control group. Based on our findings, pathomechanism of epileptic seizures in patients with PGC cannot be attributable solely to PGC volume or described compression on surrounding brain structures based on MRI findings.

1. Introduction

Pineal gland cysts (PGC) occur in all ages, from the fetal period to senility, with predominance in adults in the fourth decade of life, mainly in women. Symptomatic PGC are most frequent in young women [1]. The incidence of PGC is up to 23% in healthy patients volunteering in imaging studies and up to 40% of cases in autopsy series [2]. A degenerative process in the gland has been suggested to be the origin of the cyst [3]. The diagnosis of PGC is usually established by magnetic resonance (MR) of the brain. Although there are radiological criteria which define benign PGC from the tumors of this area, pathohystological analysis is the endpoint in the final diagnosis [1]. Usually PGC have no clinical implications and remain asymptomatic for years [1]. The most common symptoms are: headache of variable intensity, vertigo, visual and oculomotor disturbances and obstructive hydrocephalus [4–7]. Less frequently patients present with: ataxia [8], motor and sensory impairment [9], mental and emotional disturbances [7,10], circadian rhythm disturbances [7,11], hypothalamic disfunction of precocious puberty [7,12], secondary parkinsonism [13] and epilepsy [1,14–16]. A relationship between PGC size and appearance of the

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symptoms is generally postulated, but in many cases may be irrelevant [17]. The appearance of clinical symptoms is attributable to: rapid enlargement of PGC, rapid coalescence of pre-existing smaller cavities, increase of the fluid pressure gradient between the third ventricle and cyst cavity or direct inflow of the cerebrospinal fluid (CSF) to the PGC due to communication of the cyst with the third ventricle [1]. Possible complications related to PGC are: bleeding to the cyst lumen [18], development of papilloma of the choroid plexus [19], rapid rupture of the cyst with resulting aseptic cerebrospinal meningitis [20] or even sudden death [21]. Authors suggest observation of the PGC for many years [1].

The aim of this study is to describe types of epileptic seizures in patients with PGC and their outcome during follow up. We also wanted to determine whether patients with epilepsy differ in PGC volume and compression of the PGC on surrounding brain structures compared to patients with PGC, without epilepsy.

2. Patients and methods

2.1. General clinical data

We examined 92 patients with PGC with no systemic disorders or other pathological changes described on MR of the brain. Patients had no history of head trauma, developmental delay, central nervous system infection, family hystory of seizures, alcohol or drug abuse.

Patients were collected consecutivelly in Neuropediatric out-patient clinic (Department of Neuropediatrics, Children's Hospital, School of Medicine, University of Zagreb, Croatia) and Neurology outpatient clinic (Department of Neurology, University Hospital, Sestre milosrdnice, Zagreb, Croatia) during the period 2006–2010. They were sent to MR of the brain due to headache, vertigo, visual disturbances, sensory symptoms, sleep disturbances, emotial disturbances and epilepsy as presenting symptom (Table 1). Mean duration of epilepsy was 5 months. Some of the patients were admitted to emergency room with first epileptic seizure, while the longest history of epileptic seizures was 4 years. During the follow up period (6–10 years) all the patients underwent MR in 6 months to 1 year, or depending on neurosurgical assessment.

Table 1
Patient data.

		Epilepsy group (N = 29)	Control group (N = 63)
Sex	Male	13	19
	Female	16	44
Age (years)		21.17 ± 11.50	26.97 ± 17.69
Symptoms	Headache	15	57
	Epilepsy	29	0
	Vertigo	5	18
	Visual disturbances	3	9
	Parinaud's syndrome	0	2
	Sensory	0	2
	Emotional disturbances	0	1
	Obstructive hydrocephalus	0	1
	Sleep disturbances	1	1
Pineal gland cyst volume	0-100 mm^3	7	20
	101-600 mm^3	9	24
	601-2000 mm^3	9	14
	> 2000 mm^3	4	5
	Kruskal-Wallis test	p = 0.2494	
Compression on surrounding structures		3	11
	Fisher's Exact test	p = 0.5360	

2.2. Data collection

We collected data on described compression of the PGC on surrounding brain structures and size of the PGC on MR of the brain, measured in three dimensions (anteroposterior-AP; laterolateral-LL and craniocaudal-CC). The size of the PGC was expressed as volume AP × LL × CC in mm^3. An electroencephalography (EEG) was done to all the patients with PGC and epilepsy according to standard protocol. Epileptic seizures were classified in accordance with the WHO's Epilepsy Dictionary and the WHO Commission on Classification and Terminology [22]. Informed consent was obtained from all patients or their parents/tutors if the patient was < 18 years old. Authorization was received from the Hospital's Ethical Committee, in accordance with the Helsinki Declaration.

2.3. Statistical analysis

Kolmogorov-Smirnov test was used to asses normal distribution of variables (age and gender). Fisher's Exact test was used to compare existence of compression of the PGC on surrounding brain structures between epilepsy and control group. Kruskal-Wallis test was used to determine difference in PGC volume between epilepsy and control group. The statistical significance was taken at the level $p < 0.05$. SAS Entreprise Guide statistical Software Version 7.1. licensed to HZJZ (Croatian Institute for Public Health) was used for statistical analysis.

3. Results

29 patients, mean age 21.17 ± 11.50 years (16 women, mean age 23.69 ± 11.20, 13 men, mean age 18.08 ± 11.54 years) had epilepsy and PGC (epilepsy group). 63 patients, mean age 26.97 ± 17.69 years (44 women, mean age 26.16 ± 16.42, 19 men, mean age 28.84 ± 20.69 years) had PGC without epilepsy (control group). Statistically, these two groups did not differ in age and gender. Types of epileptic seizures were: complex partial seizures in 8 patients, complex partial seizures with secondary generalization in 8 patients, GTCS in 10 and absance seizures in 3 patients. Mean volume of the PGC in epilepsy group was 855.93 ± 1080.70 mm^3, in control group 651.59 ± 1011.10 mm^3. There was no statistically significant difference between epilepsy and control group in PGC volume ($\chi^2 = 1.3264$, df = 1, p = 0.2494). Compression of the PGC on surrounding brain structures was found in 3/29 patients (10.34%) in epilepsy group and in 11/63 patients (17.46%) in control group (Fig. 1). We found no

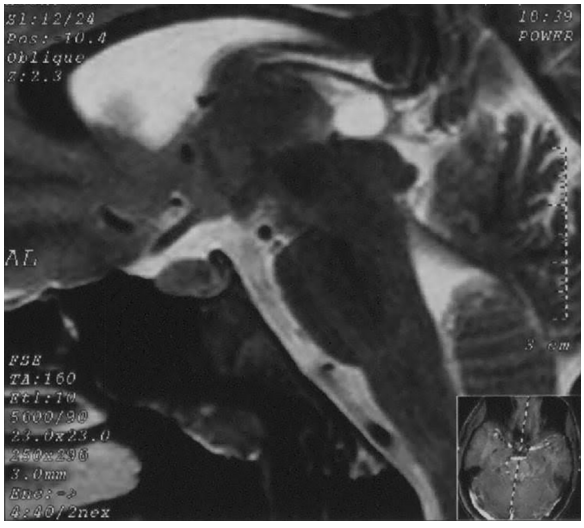

Fig. 1. Pineal gland cyst with compression on superior colliculi in 18 year old male - MRI sagittal T2 image.