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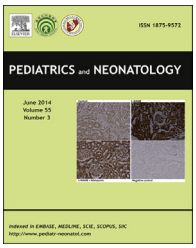

ORIGINAL ARTICLE

Headache in the Pediatric Emergency Service: A Medical Center Experience

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Key Words
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Background: Headache is a common complaint in children and is one of the most common reasons for presentation at a pediatric emergency department (PED). This study described the etiologies of patients with headache seen in the PED and determined predictors of intracranial pathology (ICP) requiring urgent intervention. A secondary objective was to develop rapid, practical tools for screening headache in the PED.
Methods: We conducted a retrospective chart review of children who presented with a chief complaint of headache at the PED during 2008. First, we identified possible red flags in the patients' history or physical examination and neurological examination findings. Then, we recorded the brain computed tomography results.
Results: During the study period, 43,913 visits were made to the PED; in 409 (0.9%) patients, the chief complaint was headache. Acute viral, respiratory, and febrile illnesses comprised the most frequent cause of headache (59.9%). Six children (1.5%) had life-threatening ICP findings. In comparison with the group without ICP, the group with ICP had a significantly higher percentage of blurred vision ($p = 0.008$) and ataxia ($p = 0.002$).
Conclusion: Blurred vision and ataxia are the best clinical parameters to predict ICP findings.

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1. Introduction

Headache is a common complaint in children[1] and is one of most common reasons for presentation to a pediatric emergency department (PED).[2–7] The differential diagnosis is broad. The majority of headaches are benign and self-limited, and although life-threatening intracranial pathology (ICP), such as brain tumors or hemorrhage, is very rare, it does occur.[8] In addition, all forms of headache share a common pathway to some degree and the differential diagnosis may be difficult.

Brain computed tomography (CT) provides useful and rapid information on brain anatomy and pathology in children who reveal significant ICP. However, brain CT is expensive and is associated with radiation exposure.[9] The goal of this study was to describe the etiologies of patients presenting to the PED with headache and to identify predictors of ICP requiring urgent intervention. We also attempted to produce rapid and practical screening tools for headache in the PED.

2. Methods

2.1. Identification of patients

This was a retrospective chart review of children who presented with a chief complaint of headache at the PED of Chang Gung Memorial Hospital between January 1, 2008, and December 31, 2008. Chang Gung Memorial Hospital is a tertiary-care hospital in northern Taiwan. It serves patients from a broad demographic spectrum and a geographic region that includes urban, suburban, and rural areas. During the term of the study, 43,913 visits were made to the PED, and a computer-based search of these identified 409 children whose chief complaint was a headache. All patients were referred to the outpatient clinic for follow-up by a pediatric neurologist if they were not admitted through the PED.

2.2. Data collection and study design

The PED records were accessed through the hospital information system and a standardized data-collection form was completed, which recorded the following data: patient age and sex, headache and associated symptoms, physical examination and neurological examination findings, CT, and outcome. A list of red flags was generated from a literature review. First, we identified possible red flags in the history or physical and neurological examination findings. Then, we recorded the brain CT results. A headache was diagnosed, if possible, using the international headache classification. The final diagnosis was confirmed by a pediatric neurologist (J.-J.L.).

The ICP was defined as a potentially life-threatening space-occupying lesion that was confirmed by brain CT. Follow-up assessment was from records of clinic visits after PED discharge. This study was approved by the ethics committee of Chang Gung Memorial Hospital.

2.3. Statistical analyses

Comparisons of selected parameters were performed using the Chi-square test for categorical variables. All statistical analyses were performed using SPSS version 17.0 for Windows (SPSS Inc., Chicago, IL, USA). A p value <0.05 was considered to indicate statistical significance.

3. Results

3.1. Demographics

During the study period, 43,913 visits were made to the PED; there were 409 (0.9%) patients whose chief complaint was a headache. There were 255 males and 154 females; the mean age was 9.2 years (standard deviation = 4.1 years; range 2.6–17.8 years). By age range, the numbers were 118 (28.9%) preschool children (<6 years), 167 (40.8%) primary school-age children (6–11 years), and 124 (30.3%) adolescents (12–17 years).

3.2. Etiologies

Data regarding final diagnoses are shown in Table 1. In total, 113 cases (27.6%) were diagnosed as having a primary headache, and 296 cases (72.4%) had a secondary headache. Acute viral, respiratory, and febrile illnesses represented the most frequent cause of headache (59.9%). Six children (1.5%) had ICP findings (Table 2). Three patients had newly diagnosed brain tumors and two had intracranial hemorrhages. Patient 5 had transtentorial herniation and died. His family refused an autopsy, so no further information was available for classification.

Table 1 Headache etiologies in the pediatric emergency department.

Diagnosis	Admitted group	Total
Primary headaches		
Migraine	10 (10.8)	38 (9.3)
Primary headache, unclassified	10 (10.8)	75 (18.3)
Secondary headaches		
Neurologic	—	—
VP shunt dysfunction	2 (2.2)	2 (0.5)
Seizures	3 (3.2)	5 (1.2)
Brain tumors	—	—
Known	1 (1.1)	2 (0.5)
Newly diagnosed	3 (3.2)	3 (0.7)
Meningitis	20 (21.5)	21 (5.1)
Post-traumatic	2 (2.2)	9 (2.2)
Intracerebral hemorrhage	2 (2.2)	2 (0.5)
Non-neurologic	—	—
Viral/respiratory/ febrile illness	35 (37.6)	245 (59.9)
Others*	5 (5.4)	7 (1.7)
Total	93 (100)	409 (100)

Data are presented as n (%).
VP = ventriculoperitoneal.
* Toothache, Wilson's disease, disorder of the eyes, systemic lupus erythematosus, Henoch–Schönlein purpura; one patient died.