S.D.Ü Sağlık Enstitüsü Dergisi
Cilt 3 / Sayı 1 / 2012

ARAŞTIRMA

Neuroradiological imaging in childhood headache

Çocukluk çağı baş ağrısında nöroradyolojik görüntüleme

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Abstract

Headache is a common symptom in pediatric practice. Evaluation and diagnosis of headache are very challenging by physicians. Although there are a few reports about headache in childhood, it was shown that headache as the sign of intracranial pathologies in adults can be diagnosed by using radiological techniques. In this study we aimed to determine the etiology of headache, not accompanied by neurological symptoms, in childhood period by computerized tomography (CT) scan and magnetic resonance imaging (MRI) in East Anatolian Region. A total number of 134 children with headache in childhood period (ranged in age from 3 to 15 years, the mean age 12.9±0.6years) were investigated by means of CT scan and MRI. CT and MRI scans were performed in 124 and 10 patients respectively within one year period.. MRI was performed with 0,3 T equipment and CT was performed with multi–detector equipment. We found radiological abnormalities in ten patients (7.46%). From the ten abnormalities, 6 abnormalities were detected with CT and 4 with MRI.We detected 5 patients with sinusitis, one patient with arachnoid cyst, one patient with demyelinated foci, one patient with lacunar infarct, one patient with communicant hydrocephalus and one patient with germ cell tumor. The most frequent radiological abnormality in children was sinusitis. Although MRI was applied to a small group the radiological abnormalities detected by MRI were higher than those detected by CT scan.

In conclusion, we observed that MRI might be used in patients in childhood period who had complicated headache without neurological symptoms.

Key words: Childhood headache, computed tomography, magnetic resonance imaging, sinusitis, mass

Özet

Baş ağrısı çocukluk yaş grubunda yaygın bir semptomdur. Baş ağrısının doktorlar tarafından teşhis ve değerlendirilmesi zordur. Bununla birlikte, çocukluk çağında bildirilen az miktarda olgu olmasına rağmen erişkinlerdeki başağrısında radyolojik tanı yöntemleri kullanılarak intrakranial patolojilerin ortaya çıkarılabileceği bildirilmektedir. Biz bu çalışmamızda Bilgisayarlı Tomografi (BT) ve Manyetik Rezonans Görüntüleme (MRG) yöntemleri kullanarak Türkiye'de Doğu Anadolu bölgesinde nörolojik semptomların eşlik etmediği çocukluk çağı baş ağrılarının etyoljisini tespit etmeyi amaçladık. Bu kriterlere uyan 134 çocuğun yaşları 3–15 arasında değişmekte ve yaş ortalaması 12.9±0.6 idi. Bir yıllık süre içerisinde BT inceleme 124 ve MR inceleme 10 hastada gerçekleştirildi. MR inceleme 0,3 T ve BT inceleme ÇKBT ile gerçekleştirildi. Toplam 10 hastada radyolojik anormallik saptandı (%7.46). Altı adet patoloji BT ile dört adet patoloji ise MR incelemede saptandı. Beş hastada sinüzit, bir hastada araknoid kist, bir hastada demyelinizan odak, bir hastada laküner infarct, bir hastada kominikan hidrosefali ve bir hastada germ hücreli tumor saptandı. En sık saptanan patoloji sinüzit idi. Radyolojik anormallikleri saptamada MR görüntüleme BT'den daha üstün olarak bulundu.

Sonuç olarak MR inceleme nörolojik semptomları olmayan komplike baş ağrısı olan çocukluk çağındaki hastalarda kullanılabilir.

Anahtar kelimeler: Çocukluk çağı baş ağrısı, Bilgisayarli tomografi, Manyetik rezonans görüntüleme, Sinüzit, Kitle

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Müracaat tarihi: 13.02.2012
Kabul tarihi: 28.02.2012

Introduction

Infants and children may express their headache in different ways. They are etiologically divided into 3 major groups: psychological, posttraumatic and organic (1). The other accompanying problems such as neurological and systemic symptoms, family history, emotional problems, findings of neurological and systemic examinations are helpful in differentiating the organic and psychological headache (2). It is a subjective sense and there may not be always a correlation with its severity and its importance. However headaches which not let the patient sleep or awaken from sleep are generally organic. Those with vomiting may be due to intracranial reasons (3). In past, computerized tomography (CT) was common way in diagnosis of neurological diseases before discovery of magnetic resonance imaging (MRI). Then, use of MRI increased in diagnosis of different diseases including pathology of neurological diseases. Till last decade, it has been rarely used in diagnoses of pathology of neurological diseases because it was expensive. Today, the use of MRI has been increasing in radiological imaging (4). The technique has preferred in diagnosis of many diseases by physicians. There are some differences in use of MRI and CT. For example, MRI in evaluation of parenchyma pathology has been preferred to CT although CT in evaluation of bone pathology is still preferred to MRI (5). MRI has been commonly used also to determine intracranial pathology of diseases which cause headache in adult although there are scarce reports in childhood headache without neurological symptoms (6). Hence, it isn't well known about the use of MRI and CT in diagnosis of pathology of childhood headache without neurological symptoms. So, further studies are needed.

The aim of this preliminary study was to determinate the importance of MRI and CT in diagnosis of pathologies of childhood headache without neurological symptoms in the East Anatolia of Turkey.

Materials and Methods

The current study included 134 patients in childhood period with a chief complaint of headache who were admitted to our hospital between 2001 and 2002. The patients were evaluated by CT and MRI. Their ages ranged between 3 and 15 years, meanly 12.9±0.6 years. Of the patients, 59 (%44) were boys and 75 (%56) were girls. Systemic and neurological examination was normal in all the children. 124 patients had undergone CT scan and 10 patients MRI examination.

Investigation was performed with 0.3 Tesla permanant magnet open MRI system (Hitachi, AIRIS, and Tokyo, Japan) and Hitachi W 450 CT scan (Tokyo, Japan) machine. MRI images were obtained in axial plane with SE T1–weigted and in axial and sagital plans with FSE T2–weigted. The MR sequence was as follows: TR/TE, 15–20/4; acquisition, 1; FOV, 250 mm; flip angle, 30°; matrix, 92 x 256; section thickness, 5 mm; imaging time, 1 second; reconstruction time, 1 second. Contrast enhanced examinations were performed in 10 patients. Contrast media is used for all pathologies except sinusitis detected on CT and MRI. Nonionic contrast media (3ml/kg) was used CT studies. IV Gd–DTPA (of 0.2 mL/kg) was administrated in one patient due to the mass on MR studies. Allergic reaction was not detected after any contrast material injection. Unnecessary repetition of CT studies was avoided. Only four cases had repeated CT studies due to motion artifacts. CT Scanning parameters for all patients were as follows: slices obtained with 5 mm thickness, 120 kVp, 170 mA in the posterior fossa and slices obtained with 10 mm thickness, 120 kVp, 170 mA in the supratentorial brain. All images were reviewed by the two radiologists. The patients were excluded from the study if their slices were not entirely included maxillary sinuses and have neurological findings. Mucosal reaction or fluid in the paranasal sinusis with clinical supporting was accepted as a sinusitis.

Results

Images of 124 patients were normal, while 10 patients had pathological findings. Percentage of boys and girls was %44 and %56, respectively. Of the 10 pathologies (%7.46 within 124 patient), 6 pathologies were observed in CT scan although 4 pathologies in MR images (Figures 3 and 4). The pathologies in MRI examination (%40 within 10 pathologies) were sinusitis in two cases (%20), demyelinated foci (%10), lacunar infarct (%10), and germ cell tumor (%10) in one case. The pathologies (%60) in CT examination were sinusitis in three cases (%30), arachnoid cyst (%10), lacunar infarct (%10) and communicant hydrocephalus (%10) each in one case. Arachnoid cyst of left temporal lobe iso–dense with CSF was identified by axial CT and it was shown in Figure 1. The soft–tissue mass that involves the ethmoid and right maxillary sinuses were identified by axial CT and it was shown in Figure 2. Germ cell tumor was identified by MRI. Sagital and axial T1 Weighted images showed a circumscribed, slightly lobulated tumor predominantly low signal as well as smaller zones of high signal in the supracellar region. The lesion causes compression of the optic chiasma. Axial T2 weighted image showed the lesion that had high signal and well circumscribe. CT imaging with contrast for germ cell tumor after surgery demonstrated craniectomy defect, subdural hemorrhage on right front–temporal region without residual tumor in supracellar area.

Discussion

Headache is among the ten most frequent complaints in pediatric and adult patients, which results in admitting them to the physician (1). It is divided into primary/ secondary and acute/chronic groups. There is a broad spectrum of different types of headache including migraine, tension–type headache, cluster headache episodic headaches and daily chronic headaches, or severe therapy resistant cases and cases with additional symptoms. All causes of adult headaches except retro–bulbar neuritis, glaucoma, temporal arthritis and cervical spondylosis may be cause of childhood headache. Serious underlying processes such as brain tumor or intracranial hemorrhage are uncommon, when present with multiple neurological signs such as ataxia, hemiparesia and papilledema (7).

Headache among school children is a health problem that merits increased attention and causes significantly reduced school attendance. In a population–based telephone interview study of 10,169 Washington County, Maryland, residents who were 12 through 29 years old, % 57.1 of males and %76.5 of females reported that their most recent headache occurred within the previous 4 weeks (8). Donald W.Lewis reported that one third of children at least seven years of age and one half of adolescents at least 15 years of age have headaches (9). In another study performed in our region it was reported that %8 of children initially visited the Division of Pediatric Neurology because of headache. This rate was found as %4.33 in a study (10). In current study, %44 of the patients with migraine were boys and 56% were girls. Ten organic pathologies (%7.46) were found in the present study.

In most series it has been reported that the most common cause of headache was migraine, followed by sinusitis and tension–type and psychosomatic headaches (9, 10). In the current study, the most common cause of headache in east Anatolia of Turkey was sinusitis in accordance with results published in the literature.

Headache influences school performance, learning capacity and mutual relation of children, related on its etiology, frequency and its severity. Therefore it is required conveniently evaluating and treating the children with headache. Despite of literature screening apparent significant gender difference in childhood headache is not mentioned (11, 12). Relapsing, severe and unusual headache in period should be cautiously evaluated in childhood period should be cautiously evaluated in view of a probable cerebral tumor (13, 14). In a retrospective study performed in children with cerebral tumors, headache has been found in more than %60 (15). Intracranial tumors in childhood have usually tendency to settle in middle line, accompanying obstructive hydrocephalus and their first symptom is headache with acute initiation. In the current study hydrocephalus also was the cause of headache in one child. The most frequent etiology in pediatric age group is headache accompanying to an infectious disease, especially paranasal sinus infections. The most frequent cause of organic headache in our study was also sinusitis (%3.7). Schwedt et al. (16) reported %3.8 sinusitis and % 2 case of space–occupying lesion. According to another study (10) the most frequent cause of headache was migraine in the middle Anatolia. Sinusitis in Anatolia region of Turkey was the second reason of headache. In our study we detected radiological pathologies in %7.46 of the patients and space–occupying lesion in %0.7, which was requiring surgery. Another space–occupying lesion, arachnoid cyst not required surgical treatment due to its size. Despite of lesser number of patients examined with MRI, pathological findings are higher in MRI examination, since its more sensitive than CT.

The organization of tests and radiological studies depends on the pattern of symptoms and findings obtained during neurological examination. A CT scan or MRI is indicated if the headache is associated with an unusual pattern of symptoms or signs or when increased intracranial pressure is suspected (11). Patients with headache of recent onset (duration of 1 month or less), even with a normal neurological examination, are at a greater risk of significant intracranial abnormality than patients with long–lasting headaches. These at–risk patients should be studied by cranial CT and lumbar puncture if the CT scan is normal and the cause of the headaches cannot be determined clinically (17). Brain CT and MRI examinations were performed in 50 and 7 patients in a study, respectively and they found abnormal findings in six patients following CT and in two patients following MRI (10). In the present study, brain CT and MRI examinations were performed in 124 and 10 patients, respectively; there were abnormal findings in six patients following CT and in four patients following MRI.

In conclusion, we observed that sinusitis was most common pathological finding in childhood headache. Neuroimaging studies, such as CT or MRI, need to be performed, especially in patients with complicated symptoms. In addition, MRI technique was more useful than in CT in childhood period. MRI can be prefered by physicians to determine the etiology of headache in childhood period without neurological symptoms

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