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Management and Treatment of Headaches Based on Neuroradiological Findings

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Headache is one of the common complications of patients referring to treatment centers. Application of different neuroimaging methods in patients with headache is still controversial. The present study aims at determining role of neuroimaging in diagnosis and management of patients suffering from headache. This retrospective study was conducted on medical files of 500 patients with headache referring to neurology clinics considering age, gender, type of headache and role of imaging methods in their management and treatment. In this study, 91.6 and 8.4% of the referrals respectively suffered from non-organic (primary) and organic causes of headache. CT-scan was used to examine all patients with secondary headache and 70 subjects suffering primary headache, out of 458 patients. According to CT-scan findings, there were 25 cases of brain tumor, 9 cases of subarachnoid hemorrhage, 4 cases of aneurysm, 3 cases of subdural hematoma and one case of cerebral hydatid cyst in patients with secondary headache. MRI and angiography were requested in 12 and 2 cases, respectively. It seems neuroimaging should be requested for patients with abnormal neural findings or changes in headache quality and severity and increase of intracranial pressure.

Key words: Headache, CT-scan, neuroimaging, magnetic resonance imaging

INTRODUCTION

Headache is the most common problem of the developing countries (Fardiazar *et al.*, 2012; Nikanfar *et al.*, 2012; Sadeghpour *et al.*, 2012). It includes a range of diseases varying from benign and controllable diseases such as migraine, cluster and tension type headaches to those headaches associated with dangerous diseases such as brain organic damages (Goldust and Rezaee, 2013; Lotti *et al.*, 2013; Macarini *et al.*, 2012). Delayed diagnosis of some secondary headaches developed as a result of brain vessels aneurysm will be followed up by unpleasant complications such as cerebral vessels aneurysm rupture and increase of mortality rate (Goldust *et al.*, 2013a; Malik *et al.*, 2012; Mohebbipour *et al.* 2012). About two third of headache patients refer to neurologists concern about brain tumor or other inter-cerebral abnormalities (Ganjpour Sales *et al.*, 2012; Shakeri *et al.*, 2013; Vahedi *et al.*, 2012). Clinical examinations can't detect or deny organic causes by themselves (Karzar *et al.*, 2012; Nourizadeh *et al.*, 2013; Seyyednejad *et al.*, 2012). Without neuroimaging, it can never be confirmed that a patient suffers from migraine or tension type headaches whether have a serious pervasive cerebral damage (Ganau *et al.*, 2012; Goldust *et al.*, 2013b, c). Classifying headaches into two types of primary and secondary may facilitate evaluation and management of the patient (Farhoudi *et al.*, 2012; Salehi *et al.*, 2013a, b). Exact descriptions of headache maybe helpful in differentiate primary and secondary headache disorders (Goldust *et al.*, 2013d; Komur *et al.*, 2012; Vafaee *et al.*, 2012). "Red flag signs" for secondary disorders include sudden onset of headache, headache onset after 50 years old, increasing frequency and severity of headache, new onset of headache with a positive past medical history, coincidence of headache with a systemic disease, focal neural signs and symptoms, papilledema and headache following head trauma. In these cases, exact neural examination should be done and, if there are abnormal findings, imaging should be done to reject intracranial pathology (Belena *et al.*, 2012; Goldust *et al.*, 2012; Sadighi *et al.*, 2011). Cases for CT-scan and MRI recommended by American Neurology Academy Quality Standards Committee include patients with atypical headache patterns and focal neural signs and symptoms associated with a description of convulsion (Golfurushan *et al.*, 2011; Milan *et al.*, 2011; Park *et al.*, 2013). Being afraid of suffering from an intracranial damage such as brain tumor or aneurysm and negative effects of severe pain on life quality were regarded as two main causes of patients' referring to the physician (Goldust *et al.*, 2011; Sadeghpour *et al.*, 2011; Viticchi *et al.*, 2012) Most patients referring to private

clinics request CT-scan or MRI from their physician (Fardiazar *et al.*, 2013; Ganjpour Sales *et al.*, 2013; Soleimanpour *et al.*, 2013). Evidently, the physician should consider the patients description of conditions and their neural examinations and request neuroimaging when there is doubt of a symptomatic intracranial damage (Daghigh *et al.*, 2013; Nemati *et al.*, 2013; Salehi *et al.*, 2013c). Classification of Headache International Society (HIS) used as diagnostic criteria for headache disorders and differentiate primary headaches from symptomatic ones resulted in less inaccurate diagnosis (Fofi *et al.*, 2012; Haque *et al.*, 2012). Application of diagnostic tools such as CT-scan and cerebral MRI in patients with headache are without any indication and result in imposing heavy expenses to the patients and society (Qadim *et al.*, 2013; Razi *et al.*, 2013; Salehi *et al.*, 2013d). Therefore, it seems necessary to determine a position for role of imaging methods, on-time and optimized application of the methods in kinds of headaches in association with clinical examinations (Kumral *et al.*, 2012; Sadek *et al.*, 2012). However, it is not uncommon to find patients suffering from headache associated with serious intracranial damages (e.g. tumor and ruptured aneurysm) ignored in their previous referring due to their headache (Golforushan *et al.*, 2013; Yousefi *et al.*, 2013). Therefore, the methods can be logically used to usefully solve the diagnostic problems. They play a valuable role in managing and treating these patients (Angelo *et al.*, 2011; Elliot and Kernick, 2011). The study was conducted to determine role of neuroimaging in managing the patients with headache.

MATERIALS AND METHODS

This is a retrospective descriptive study conducted on 500 patients referring to neurology clinics of Imam Khomeini and Razi hospitals, Tabriz University of Medical Sciences. This study was approved by ethic committee of Tabriz University of Medical Sciences. Written consent was obtained from all the patients. The data collected from the patients' medical files include age, gender, features of headache considering time, onset, quality, severity, location of headache and signs and symptoms associated with headache such as vertigo, nausea, vomit and optical disorders. The patients were classified into two primary and secondary groups considering existence or lack of cerebral organic damage.

The patients were divided into three groups:

- Patients with primary headache
- Patients with cerebral damages and headache
- Patients with headache associated with some symptoms including sinusitis or optical disorder referred to ENT specialists or ophthalmologists

Statistical analysis: All understudy data was analyzed using SPSS16 statistical software. Descriptive statistical methods (frequency, percentage, mean, standard deviation) were used to statistically evaluate the data. Chi-square and Independent T-test were used to compare qualitative and quantitative variables, respectively. In this study, $p < 0.05$ was regarded significant.

RESULTS

This study demonstrated that the 500 understudy sample was consisted of 64.8% of females and 35.2% of males. The youngest and oldest patients were, respectively 5 and 81 years with the mean age of 30.8 years. In this study, 91.6% suffered from primary headache. Out of them, 60% suffered from tension-type and 20% from migraine or migraine like headaches. Also, 20% of patients with primary headache were at combined group, i.e., type of headache was not stated from them or they simultaneously experienced signs and symptoms of tension and migraine type headaches. Natural neurological symptoms and asymptomatic headache was seen in 380 (76%) of patients with primary headaches. Physical examinations indicated to abnormal symptoms in 14% of patients with primary headache. Optical symptoms such as photophobia and nausea were regarded as the most common complications associated with headache. Additionally, paresthesia, hemiparesis, ataxia, vertigo, diploid and some degrees of lowering of consciousness level were considered as the most important sensorimotor disorders. CT-scan was requested for 14% of patients with primary headache. However, organic damage related to headache was not observed in any of them and complete or relative recovery was seen through medical treatments. In this study, 112 (22.4%) patients underwent CT-scan. Out of them, 100 patients experience CT-scan without injection of vascular contrast material and 12 cases underwent CT-scan and brain MRI. There were cerebral organic damages in 42 cases of these patients. There were associated symptoms or abnormal neural examination in patients ($n = 25$) with brain tumor. Also, nine patients suffering from subarachnoid hemorrhage referred to the center due to sudden severe headache along with vomit, neck rigidity and some degrees of consciousness disorder. Out of them, CT-scan was used to detect the diseases in 8 patients and CT-scan indicated to aneurysm in 4 patients.

DISCUSSION

Although, neuroimaging- most significantly CT-scan- plays an important role in diagnosis of dangerous factors

of headache including brain tumor, it seems that CT-scan is not required for all referrals with headache symptoms (Azimi *et al.*, 2013; Nejad *et al.*, 2013). On the other hand, available clinical examinations and symptoms are not sometimes sufficient to being assured of brain pathology and there should be strong and reliable causes indicating to imaging in patients with headache (Jaiswal *et al.*, 2011; Pizzanelli *et al.*, 2011). Previous studies suggested some criteria such as increasing frequency and severity of headache, stability of headache in spite of sedatives prescription, changing features of headache, existence of focal signs and symptoms required to CT-scan (Yaich *et al.*, 2011; Yasuhara *et al.*, 2011; Kuriu *et al.*, 2010) studied patients suffering from primary headache (1993) and demonstrated that 2.8% of the patients underwent imaging (Kuriu *et al.*, 2010). This is while 15.28% of primary headache patients of the present study underwent imaging probably resulting from illogical requests to reduce the patients' anxiety based on their insistence. CT-scan is still used as the first and most common instrument to evaluate the patients suffering from headache and it is often sufficient to obtain information about the damages recognized as cause of headache. The present study used CT-scan as its diagnostic instrument although other researchers applied different imaging methods such as PET. However, their role has not been confirmed in detecting causes of headache (Gavra *et al.*, 2010; Kabatas *et al.*, 2009). In their study on those patients with only headache, Ikenaga *et al.* (2009) suggested that CT-scan is not very useful in patients suffering from headache without associated symptoms and normal neural examination (Ikenaga *et al.*, 2009; Derex *et al.*, 2010) demonstrated that 77% of the understudy subjects suffer from tension-type, 90% from migraine and 14% from combined form of headache (Derex *et al.*, 2010). The present study referred to tension type headache in 60% of the subjects. The difference can be attributed to their environment and effects of industrialized society on people. Also, this study demonstrated that 7.2% of patients with headache suffered from kind of high prevalent brain pathology (brain tumor). Cecchini *et al.* (2009) suggested that some symptoms such as nausea, vomit and vertigo associated with sudden onset of headache and positive neural and clinical examinations indicate to probability of previous diseases. Changing of headache quality and condition and focal neural symptoms such as paresthesia and paresis may indicate to radiological evaluation of the patients' neural system (Cecchini *et al.*, 2009) The present study considered abnormal neural symptoms as a CT-scan and MRI criterion. There was not any evident reason to request CT-scan and MRI in some patients.

Previous studies demonstrated that early diagnosis in cases such as infection, hydrocephaly and aneurysm may lead to less mortality. Most of these cases are manifested with symptoms other than headache (Franzini *et al.*, 2010; Mea *et al.*, 2009) It was not possible to evaluate time factor in diagnosis of cerebral diseases in patients with headache in this study. CT-scan findings in patients with subarachnoid hemorrhage include increasing density of basal cisterns and, generally, in all subarachnoid space. Although there is normal CT-scan result, lumbar puncture may be helpful in diagnostic prove of subarachnoid hemorrhages when it is doubtful. Previous studies demonstrated that surgical complications on angioma and vascular malformation of brain in patients with headache are much more than complications and risks of the vascular abnormalities (Pfefferkorn *et al.*, 2009; Zanus *et al.*, 2009). In this study, it was not possible to evaluate surgical-based complications considering less number of patients suffering from brain vascular abnormalities and symptoms of headache. The research data does not recommend CT-scan request for a person suffering from asymptomatic headache. CT-scan is requested when headache is accompanied by clinical symptoms and abnormal neural examinations, changing in type and severity of headache, or severe headache recently experienced by the patient. Early diagnosis of brain tumors and aneurysm in patients with headache and taking on-time surgical measures leads to less mortality in patients. However, imaging instruments help the physicians in detecting of the background diseases resulted in headache or in subarachnoid hemorrhages, vascular malformations and aneurysm.

CONCLUSION

Neuroimaging is recommended if warning symptoms including abnormal neural symptoms, atypical headache, changing of headache pattern, lack of response to treatment and abnormal findings in EEG and cranial radiography and headache in patients suffering from extra cranial neoplasm.

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