

Headache: Investigate or Not to Investigate?

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Purpose: To analyze the need of neuro-imaging in patients presenting with headache.

Study Design: Retrospective observational study.

Place and Duration of Study: Heart and body scan and Ghurki trust teaching hospital, Lahore 2008 to 2015.

Material and Methods: We retrospectively reviewed clinical and neuro-imaging charts of 5289 patients, who were sent to radiology department for neuro-imaging from 2008 to 2015. The major complaint was headache but associated signs and symptoms included vertigo, weakness of limbs, unconsciousness, Proptosis, road traffic accident (RTA), seizures, visual disturbance, neck stiffness, diplopia, memory loss, ataxia, blood from ear, carcinoma, vomiting, cranial nerve palsy, tinitis, Sleep problems and numbness. Results were divided into normal imaging, ENT problems, Space occupying lesions of brain, vascular pathologies of brain and miscellaneous.

Results: There were 5289 patients. The age ranged from 6 to 80 years (mean 48 years) and male to female ratio was 1:1.2. Normal neuro-imaging was seen in 67.25% of the total patients. Space occupying lesions of brain were seen in 16% patients, 7.3% had vascular pathology of brain, 5.05% had ENT problems and 4.36% had miscellaneous findings. Patients having headache associated with Proptosis or bleeding from ears had 100% positive results of neuro-imaging. Headache with sleep disturbances had lowest yield (7.7%).

Conclusion: History of headache not associated with any other signs and symptoms should not be an indication for neuro-imaging.

Key words: Neuro-imaging, Headache, Space occupying lesions of brain.

Use of neuro-imaging techniques has widely increased in the past decade. One of the commonest indications for neuro-imaging is headache, which can be either primary or secondary. No matter whether it is primary or secondary, it is one of the commonest chief complaints encountered by an Ophthalmologist, physician and emergency care practitioners.

There is a need to understand which patients require neuro-imaging and which do not. Despite different guidelines for CT and MRI of brain for headaches, there is an increased tendency towards unnecessary imaging. Keeping in view the cost of neuro-

imaging in a poor country like Pakistan and the adverse effects of this imaging, this retrospective analysis was done.

MATERIALS AND METHODS

We retrospectively reviewed medical records and neuro-radiological data of 5289 patients with headache. The inclusion criterion was the patients with headache, who were referred from ophthalmology, medical and emergency departments for neuro-imaging. Neuro-imaging included CT scan and MRI. Patients with incomplete medical records were excluded from the study.

The data, which was analyzed included age, sex, other clinical symptoms associated with headache and neuro-imaging results. Headache was the chief complaint. Other associated symptoms included vertigo, generalized or localized weakness of limbs, unconsciousness, Proptosis, road traffic accidents, seizures, neck stiffness, visual disturbance, diplopia, memory loss, ataxia, blood from ear, malignancy, vomiting, cranial nerve palsy, tinitis, sleep problems and numbness of limbs. Positive percentage yield of neuro-imaging for each symptom associated with headache was calculated.

RESULTS

There were 5289 patients and male to female ratio was 1:1.2. Headache associated with proptosis and blood from ear had 100% yield. Percentage yield of other symptoms is given in table 1 in descending order of frequency.

In this particular study, 67.25% patients of headache had normal results on neuro-imaging. 16% (n = 847) had space occupying lesions of brain, 7.3% (n = 387) had vascular pathologies, 5.05% (n= 267) had ENT problems and 4.36% (n = 231) had miscellaneous neurological results.

On analyzing the neuro-imaging results, space occupying lesions included Intra cranial neoplasm, intracranial hemorrhage, metastasis, tuberculoma, brain abscess, sub-dural hemorrhage, arachnoid cysts and colloid cyst. Vascular lesions were Ischemic infarcts, carotid stenosis, cavernous sinus thrombosis, dural sinus thrombosis and AV malformation. Positive ENT findings included Sinusitis, DNS, nasal polyps and otitis media. Multiple Sclerosis, brain contusion, meningitis, pseudotumour cerebri, Arnold chiari malformation and encephalitis were classified as miscellaneous.

Table 1: Clinical features associated with headache and percentage yield in neuro-imaging.

Clinical Features Associated with Headache	Total Number of Patients with Clinical Feature	Normal Imaging	Abnormal Imaging	Percentage Abnormal
Proptosis	11	0	11	100
Blood from ear	1	0	1	100
Memory loss	60	6	54	90
Malignancy	46	9	37	80.4
Unconsciousness	136	41	95	69.85
Weakness	348	113	235	67.53
Diplopia	24	9	15	62.5
Ataxia	35	14	21	60
Visual disturbance	9	4	5	55.56
Vomiting	730	349	381	52.2
Seizures	154	76	78	50.65
Neck stiffness	66	39	27	40.9
Vertigo	756	479	277	36.64
Cranial nerve palsy	24	16	8	33.33
RTA	71	48	23	32.4
Numbness	101	70	31	30.69
Tinitis	28	24	4	14.3
Sleep problems	26	24	2	7.69

DISCUSSION

According to WHO, headache is among the ten most disabling conditions worldwide¹. In the past two decades, rate of neuro-imaging has increased in patients with headache. In a research, it was seen that the rate of neuro-imaging increased from 5.1% of all annual headache visits in 1995 to 14.7% in 2010². Similarly, a large review of 3026 scans of patients with headache showed that only a minority of patients suffered from a serious disease that was diagnosed with cerebral imaging.³

There are several studies which showed a very low yield in cases of isolated headaches^{4,5,6}. In this particular study we included patients who had headache associated with other signs and symptoms with a positive imaging yield of 32.75%. Headache associated with proptosis and blood from ear had 100% yield. Memory loss was the second important factor, which showed positive results on neuro-imaging. Sleep disturbance with headache proved to be the least important for neuro-imaging. The patients with sleep disturbance had other neurological problems as well.

Rising neuro-imaging trends led the American headache society and American academy of Neurology to recommend avoidance of neuro-imaging studies in patients with stable headache that met criteria of migraine^{7,8}. Similarly, certain guidelines were suggested for emergency neuro-imaging as well^{9,10}. European Federation of Neurological sciences also gave guidelines for headache neuroimaging¹¹.

Neither such guidelines exist in developing countries, nor American and European guidelines followed in these countries. This particular study forms a basis, which can draw attention to the importance of making neuro-imaging criteria for headache. In this study, Proptosis, memory loss and history of any malignancy proved to be the most important features associated with headache that needed neuro-imaging. Neuro-imaging in patients of headache with a history of malignancy, was also recommended by other authors¹².

Patients with visual disturbances had 55.56% chance of having abnormal imaging. It is, therefore, recommended that every patient who comes to ophthalmology department should be investigated for the cause of decreased vision and fundoscopy must be done to rule out papilledema. Patients with headache with papilledema or neurological visual field defects should be sent for neuro-imaging. Similarly 33.33%

patients of headache with cranial nerve palsies had positive CT and MRI. All patients with cranial nerve palsies do not require neuro-imaging unless there are other findings which support neuro-imaging or resolution does not occur till 3 to 6 months^{13,14}.

In this study, vomiting, seizures and neck stiffness with headache had 52.2%, 50.65% and 40.9% chance of positive neuro-imaging respectively. Vomiting and headache can be a feature of migraine but when associated with other neurological signs or head injury, is an indication for neuro-imaging. In a prospective study of 152 patients, vomiting was associated with positive CT findings in 40–45% of cases¹⁵. However, vomiting after minor head injury had been a subject of interest for emergency medicine experts. Similarly, not every patient of RTA needs a neuro-imaging scan. NICE (National Institute of Health and Clinical Excellence) guidelines suggest CT head imaging within 1 hour after trauma if there is more than one episode of vomiting post-head injury in adults and three or more episodes in child¹⁶. Unconsciousness, weakness, diplopia and ataxia also had high yield on neuro-imaging in our study.

Many researchers have given “Red flags” for headache^{17,18,19}. These include abnormal neurological examination (others than typical aura), new headache in older patients, headache increasing in frequency and severity, worst headache ever, sudden onset of headache, new-onset headache in a patient with risk factors for HIV infection or cancer, Papilloedema, headache subsequent to head trauma, history of dizziness or lack of coordination and headache worsening with Valsalva manoeuvre.

Apart from these red flags, risk of exposure to ionizing radiations should also be discussed with the patient. Studies have shown that the risk of cancer increases by 0.005% for a 45 years old patient when exposed to ionizing radiations²⁰. So, un-necessary neuro-imaging can harmful and should be avoided.

CONCLUSION

Every case of headache does not require neuro-imaging. As we do not have standard criteria for neuro-imaging in cases of headache, already existing rules of imaging can be followed in our setups, till the time new neuro-imaging criteria are developed matching our requirements. Further studies should be done to set guidelines in our part of the world to save patients from unnecessary expenses and hazards of neuro-imaging.

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