



Correlation of Cortical Sulci Width with Non-Migrainous Headache in 300 Patients on Ct Scan.

KEYWORDS

Cortical sulci; Width; Computed tomography; Headache; Migraine

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ABSTRACT

Background and objective of the study Enlargement of CSF spaces in patients of migraine has shown association in previous studies. The aim of the study was to examine widening/enlargement of the sulci in cases of non migrainous headache and to compare with controls to find an association between them using statistical analysis.

Materials and Methods This prospective study included 300 patients in the age group of 20-40 years presenting with complaints of non migrainous headache. Maximum width of central sulcus, pre-central sulcus, post central sulcus and lateral sulcus on axial sections of CT scan was measured and compared with age- and sex-matched healthy subjects.

Results: The mean value for cases (table 1) was 6.58 SD 1.678 and the mean value for controls was 1.57 SD 1.331. The sulcal width in cases was significantly larger than in cases with t test showing significance level (2-tailed) value <0.01 with mean difference of 5.013.

Conclusion Our study showed significant correlation between the enlargement of CSF spaces in patients of non-migrainous headache

Introduction

Headache is the most often reported neurological symptom. Computed Tomography (CT) is often employed as the primary imaging modality. However, reported yield of CT scan varies from 0.4-1% (1). The rest of the studies are reported as normal or with no significant abnormality. These negative reports refer to absence of focal lesion/ space occupying lesion/hemorrhage in extraxial or cerebrospinal fluid space (sulci & ventricles). However intracranial contents include brain parenchyma, fluid spaces and blood volume. The Monro-Kellie doctrine, or hypothesis, is that the sum of volumes of brain, CSF, and intracranial blood is constant. In migrainous headache sulcal spaces are reported to be widened however there is limited information about abnormalities in sulcal spaces in nonmigrainous Headache in absence of focal pathology/ space occupying lesion/haemorrhage in extraxial or cerebrospinal fluid space (sulci & ventricles).

Materials and Methods

We reviewed total 300 patients presenting with complaints of non migrainous headache in the year 2015 in the age group 20 to 40 years. Each headache patient was first screened and detailed clinical interview was conducted before CT acquisition. Pregnant or breastfeeding women, subjects older than 40 year and less 20 years were not included in study. In addition, patients with gross anatomic asymmetry or clear focal/space occupying pathology on CT scans were not included in the study.

Imaging was performed on single slice helical CT scanner (WIPRO, GE HEALTHCARE). Axial sections of brain were taken from the base of skull till apex parallel to orbito-meatal line having section thickness of 5.0mm, window width 30-50, and window level 45 with exposure factors of 120 kvp and 130 mAs. Maximum width of central sulcus, pre-central sulcus, post central sulcus and lateral sulcus of

patients with headache was measured and compared with age- and sex-matched healthy subjects. The control group was composed of 30 patients who were scanned for complains other than headache like orbital mass and sinusitis. A group analysis was performed.

Results:

We quantified the width of sulcal morphology in 4 areas of cerebral hemisphere involving the perirolandic cortex viz. central sulcus, pre and post central sulcus and lateral sulcus in a cross-sectional study of 300 adults in the age group of 20-40 years presenting with chief complaints of headache. Independent t test was calculated to find the association between the cases and controls.

The controls were chosen in the same age group of 20-40 years, having complaint referring to orbit, nasal cavity or thorax. The scanning parameters were same as that for cases. Out of 30 cases of controls, 12 cases were diagnosed to have orbital pathology which includes 4 cases of orbital lymphoma, 6 cases of haemangioma and 2 cases of cellulitis. 15 cases were found to have sinusitis and rest three were done on suspicion of metastasis.

Maximum width of sulcus was then calculated of 300 cases and compared with 30 controls and statistical analysis was performed. Combined mean distribution for both cases and control was calculated (Table 1 and 2). The mean value for cases (table 1) was 6.58 SD 1.678 and the mean value for controls (Table 2) was 1.57 SD 1.331. (Table 1 & 2 about here)

Table 1: Sulcal width in Nonmigrainous Headache

	N	Minimum	Maximum	Mean	Std. Deviation
Sum of Sulci	300	2	17	6.58	1.679

Table 2: Sulcal width in Controls

	N	Minimum	Maximum	Mean	Std. Deviation
Sum of Sulci	30	0	4	1.57	1.331

Fig-1 (about here)

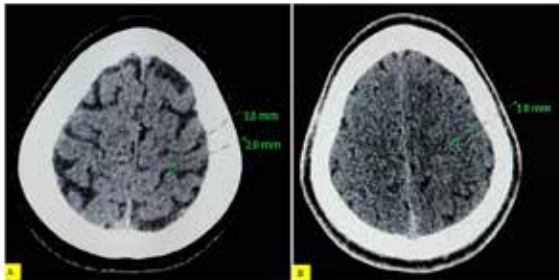
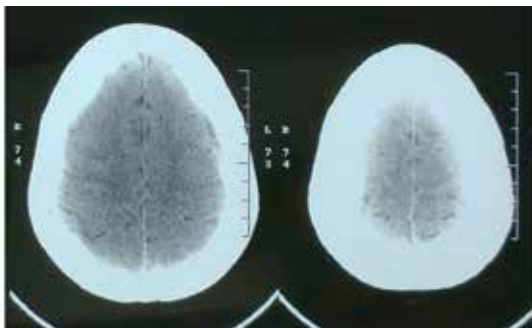


Fig 2 (about here)



Independent t test was done for comparing combined mean value of all sulci between cases and controls (Table 3). Levene's test showed significance value of 0.436. The t test showed significance level (2-tailed) value <0.01 with mean difference of 5.013 and which is statically significant. (Table 3 about here)

Table 3: Independent Samples Test

t-test for Equality of Means						
t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
15.854	328	.000	5.013	.316	4.391	5.635
19.163	38.872	.000	5.013	.262	4.484	5.543

Discussion

The observed findings demonstrates the widening of sulci particularly involving the somatosensory region and lateral sulcus in patients of non migrainous headache. The enlargement of sulci was found to be significant in non migrainous headache cases which represent a sort of brain atrophy targeting these particular regions of interest. The enlargement of CSF subarachnoid spaces follows Monro-Kellie hypothesis as was in our study.

Viewed in light of other morphological studies of brain plasticity this finding of a difference in the sulcal width in patients of headache is intuitively appealing. Previous studies were done on migraine patients, so we evaluated the enlargement of CSF spaces on non migrainous patients. Two previous reports have suggested an association between severe migraine and computed tomographic (CT) appearances considered to represent cerebral atrophy [2, 3]. In addition to atrophy, parenchymal edema and infarction have been reported as CT findings in migraine [4-8]. Most of the previous studies were done on MR as an imaging modality with thickness of somatosensory cortex used as a criterion for determining causal relationship with migraine.

Conclusion

Our study showed significant correlation between the enlargement of CSF spaces in patients of non-migrainous headache but whether the headache is the cause or effect; is still unknown.

REFERENCE

1. Jordan JE. Headache. American Journal of Neuroradiology 2007;28:1824-26 2. Hungerford GO, du Boulay GH, Zilkha KJ. Computerized axial tomography in patients with severe migraine: a preliminary report. J Neurol Neurosurg Psychiatry 1976;39: 990-94 3. Ruiz JS, du Boulay GH, Zilkha KJ, Clifford Rose F. The abnormal CT scan in migraine patients. In: Clifford Rose F, Amery WK, eds. Cerebral hypoxia in the pathogenesis of migraine. London: PHman, 1982 : 105-109 4. Cala LA, Mastaglia FL. Computerized axial tomography in the detection of brain damage. II. Epilepsy , migraine and general medical disorders. Med J Aust 1980;2: 616-620 5. Mathew NT, Meyer JS, Welch KMA, Neblett CR. Abnormal CT scans in migraine. Headache 1977; 16 : 272-279 6. Bousser MG, Baron JC, Iba-Zizen MT, Comar O, Cabanis E, Castaigne P. Migrainous cerebral infarction: a tomographic study of cerebral blood flow and oxygen extraction fraction with the oxygen-15 inhalation techniqu e. Stroke 1980;11: 145-148 7. Ment LR , Duncan CC, Parcells PR , Collin s WF. Evaluation of complicated migraine in ch ildhood. Childs Brain 1980;7: 261- 266 8. Cala LA, Mastaglia FL. Computerised axial tomography findings in patients with migrainous headaches. Br Med [Clin Res] 1976;2: 149-150