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Research Paper

Visual Field Defects in Occipital Lobe Lesions

Medical Science

KEYWORDS : Occipital lobe visual field loss, Homonymous hemianopia, Visual field defects after stoke

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ABSTRACT

Introduction: Damage to occipital lobe results in homonymous visual field defects that continue to respect the vertical midline. Purpose: To describe various types of visual field defects seen in occipital lobe lesions and to do a clinic-anatomical correlation of these visual field defects with neuroimaging. Study design: Prospective cross sectional study
Methods: All patients detected of occipital lobe lesions on neuroimaging and having hemianopias on visual field as obtained by 30-2 program on the Humphrey field analyzer with a white on white Goldmann Size III target are included and the reliability criteria used will be fixation losses less than 20%, false positive and false negative errors less than 33%.. Rsults: Total 16 patients with occipital lobe lesions detected on neuroimaging were studied. A total of 11 Homonymous hemianopia(68.75%) were complete and 5 HH (31.25%) were incomplete. Homonymous hemianopia with macular sparing (4 HH, 25%) was the most common type of incomplete HH, followed by HH Quadrantanopia(1 HH, 6.25%). Causes of HH included stroke (7 HH, 43.75%), trauma (3, 18.75%), tumor (2, 12.5%), intracranial surgeries(2, 12.5%), meningo-encephalitis (1,6.25%).Conclusion: Causes of Occipital lobe lesions includes stroke, head injury, brain tumours, intracranial surgeries, meningo-encephalitis. These field defects affect a variety of cognitive visual functions. Prognosis of visual field defect is highly variable and depends on cause and severity of brain lesion.

Introduction

Crossed nasal fibers from the contralateral eye and uncrossed temporal fibers from the ipsilateral eye course in the retrochiasmal visual pathway together. Lesions in Occipital lobe result in homonymous visual field defects which respect the vertical midline. They produce homonymous visual field defects without loss of visual acuity. Homonymous defects in the visual fields characteristically develop slowly if they are caused by intracranial tumors and rapidly when they originate from vascular processes such as hemorrhage or infarction. This applies wherever the lesion may be situated. The purpose of this study is to study the various visual field defects seen in occipital lobe lesions in terms of describing various types of VFD in occipital lobe lesions, to document the aetiology of these defects.

Homonymous hemianopia impairs visual function and frequently precludes driving[1]. Causes of Occipital lobe lesions includes stroke, head injury, brain tumours, brain surgery, meningo-encephalitis. These field defects affect a variety of cognitive visual functions. Prognosis of visual field defect is highly variable and depends on cause and severity of brain lesion.

MATERIALS & METHODS-

In this study, perimetry was done for 16 patients who were diagnosed cases of occipital lobe lesions and who attended KMC Attavar & KMC Ambedkar circle hospitals during the September 2012 to September 2014.

Study design - Prospective type of cross-sectional study

Inclusion criteria- Patients who are undergoing visual field examinations on automated perimetry and have visual field defects suggestive of retro-chiasmal lesions.

Exclusion criteria- Any ocular disease considered as contributing partly or fully to the field defects including – Cataract

- Retinal diseases
- Glaucoma
- Corneal opacities

METHODS - All patients detected and having hemianopias on visual field as obtained by 30-2 program on the Humphrey field analyzer with –

A white on white Goldmann Size III target

Reliability criteria used :
fixation losses < 20%
false positive and false negative errors < 33%
Field defects will be divided based on the following definitions-

Quadrantanopia- diagnosed if either of the following criteria are fulfilled:

A. Depression of thresholds by 5 db or more, in 3 or more contiguous points adjacent to the vertical meridian compared to their mirror image points

B. Pattern deviation plot showed 3 or more points adjacent to the vertical meridian depressed to the 1% probability level with normal mirror image points across the vertical meridian

Hemianopia- diagnostic criterion for qaudrantanopia has to be applicable to both qaudrants comprising the hemi field.

Instruments – Humphrey visual field Analyser, CT scan/ MRI
Statistical Analysis- By Chi-square Test

RESULTS-

Total 16 cases of occipital lobe lesions were studied. The list of cases is shown in the table 1. Out of 16 cases 13 were males and 3 were females. Sex ratio is 5:1 as shown in Chart 1. A total of 11 Homonymous hemianopia(68.75%) were complete and 5 HH (31.25%) were incomplete. Homonymous hemianopia with macular sparing (4 HH, 25%) was the most common type of incomplete HH, followed by HH Quadrantanopia(1 HH, 6.25%). Causes of HH included stroke (7 HH, 43.75%), trauma (3, 18.75%), tumor (2, 12.5%), intracranial surgeries(2, 12.5%), meningo-encephalitis (1,6.25%).The age group ranges from 24 years to 79 years. Age distribution is shown in Chart 2.

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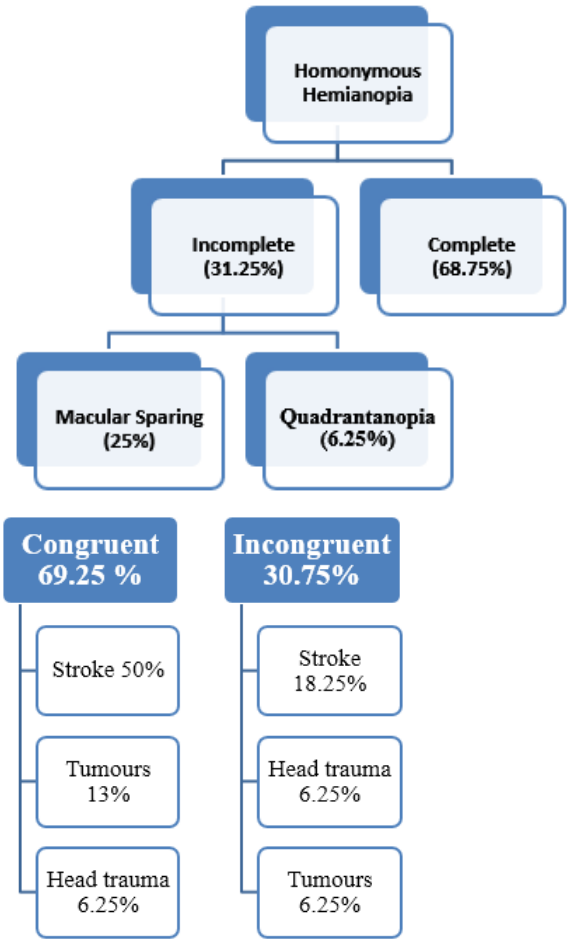

TYPES OF VISUAL FIELD DEFECTS

DISCUSSION –

Perimetry was done for 16 patients who were diagnosed cases of occipital lobe lesions and who attended KMC Attavar & KMC Ambedkar circle hospitals during the September 2012 to September 2014.

The age group ranged from 24 to 79 years. Cases with occipital lobe lesions but unable to perform perimetry (like unconscious or paralysed patients) were excluded.

Parts of occipital lobe	Corresponding visual field
Upper bank of striate cortex	Inferior visual fields
Lower bank of striate cortex	Superior visual fields
Occipital pole	Macular vision
Occipital tip	Foveal vision
Anterior striate cortex	Temporal 30 degree

Classification of subjects according to the causes of lesions revealed vascular lesions, the most frequent cause. In comparison with the reports by Smith (1962), Trobe et al. (1973) and Spiess (1979), our report is closest to that of Trobe et al., who found that vascular lesions were frequent but their study was performed before the availability of modern neuroimaging. The association between presence of dyslipidemia causing infarct is considered to be very statistically significant.

Harrington first emphasized significance of congruity in 1939[1] and later in the early 1960s.[7] As fibres in the optic radiations approach the occipital cortex, their retinotopic order increases, and the left and right eye fibres representing common visual loci fall into closer register and ultimately into ocular dominance columns.[7] Occipital lobe involvement was the most common location for congruent homonymous hemianopia which is similar to Zhang X, Kedar S et al series.[1] This is consistent with the classic rule of congruency saying that "the more congruent is the homonymous hemianopia, the more posterior is the lesion.

Older patients with isolated homonymous hemianopia apparently have an exceedingly high probability of vascular lesions, whereas younger patients may have either congenital or acquired nonvascular aetiologies.

LIMITATIONS :

There was small sample size. Congruousity with other parts of retrochiasmal pathway could not be compared as only occipital lesions were included.

CONCLUSION :

Homonymous hemianopia is usually secondary to stroke, head trauma, tumours and brain surgeries. Vascular lesions are the most frequent cause of occipital lesions and the frequent cause of congruent HH. 11 out of 16 HH were complete and 5 HH were incomplete. HH with macular sparing was the most common type of incomplete HH. Dyslipidemia causing infarct and hypertension causing hemorrhage was found to be statistically significant.

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