



Traumatic chiasmal syndrome: A meta-analysis

Loganathan Vellayan Mookan, Philip A. Thomas*, Ankit Anil Harwani

Institute of Ophthalmology, Joseph Eye Hospital, PB 138, Tiruchirappalli 620001, Tamil Nadu, India



ARTICLE INFO

Keywords:

Traumatic chiasmal syndrome
Optic chiasma
Bitemporal hemianopia

ABSTRACT

Purpose: To report a case presenting with bitemporal hemianopia due to traumatic chiasmal syndrome after head injury, and to compare the findings with individual case reports published in the literature.

Methods: A detailed search was made in PubMed, MedIND, Taylor and Francis online and Wiley online library databases for individual case reports of traumatic chiasmal syndrome. All the case reports were read in full and the findings summarized in a table, which included details of the case who presented with bitemporal hemianopia as an index case.

Results: All published cases of traumatic chiasmal syndrome appear to share some common features, such as injury to the frontal bone and fracture of the anterior skull base. Bitemporal hemianopia and visual acuity have a variable presentation, and do not appear to correlate with severity of injury. Isolated bitemporal hemianopia is rare and clinical improvement may or may not occur.

Conclusions and importance: Traumatic chiasmal syndrome should be considered as a differential diagnosis in patients presenting with bitemporal hemianopia after head injury causing frontal and anterior skull base fracture.

1. Introduction

Bitemporal hemianopia is a hallmark of optic chiasmal injury, because of the peculiar arrangement of the fibres of the optic nerves; various lesions, including tumour, inflammation, demyelination, ischemia and infiltration, can affect the optic chiasma.¹ Traumatic chiasmal syndrome, which occurs due to an injury at the level of crossing fibres in the optic chiasma following trauma to the head, is characterised by bitemporal hemianopia or scotomata. Traumatic chiasmal syndrome is a rare occurrence, since only severe impact will damage the anatomically-privileged chiasma, and it is difficult to survive such an impact. The first case of traumatic chiasmal syndrome was reported by Nieden in 1883; several cases have since been reported. The current brief report describes a patient who presented with traumatic chiasmal syndrome, and compares the findings observed with those of individual cases reported in the literature.

2. Material and methods

A patient presenting with traumatic chiasmal syndrome was investigated and a systematic literature search was performed in the PubMed, MedIND, Taylor and Francis online and Wiley online library databases using the search term: “traumatic chiasmal syndrome” and

“chiasmal injury”. Only individual case reports of traumatic chiasmal syndrome were selected to be included in this report, and all the case reports were read in full. Case reports with no follow-up findings were excluded. A table was prepared to provide an overview and to compare the salient aspects of the published case reports with the case being presented in this report.

3. Results

A total of 9 case reports were selected; the salient findings in these 9 cases are summarized in Table 1, in addition to details of our case.

An analysis of the clinical details revealed that eight out of 10 cases had injury due to road accident while riding a motor vehicle, while one had closed head injury when the bus he was travelling in was targeted by a bomb and one had an accidental fall. The visual acuity after trauma ranged from normal to counting fingers. The extent of field defect, bitemporal hemianopia, was uncertain, being either complete or incomplete, with or without macular splitting. An analysis of the radiological reports revealed that all the cases had fracture of the frontal bone, along with the involvement of the anterior base of the skull. Magnetic resonance imaging (MRI) details were provided in five case reports, which showed some abnormality in the chiasma; the MRI report of the case being presented here did not reveal any chiasmal

* Corresponding author.

E-mail addresses: drvm1940@gmail.com (L. Vellayan Mookan), thomasdiagnosticcentre@gmail.com (P.A. Thomas), ankitanil_harwani@yahoo.co.in, harwaniankit@gmail.com (A.A. Harwani).

<https://doi.org/10.1016/j.ajoc.2018.01.029>

Received 17 February 2017; Received in revised form 20 September 2017; Accepted 10 January 2018

Available online 11 January 2018

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Table 1
Salient features of individual case reports of traumatic chiasmal syndrome published in the literature and of the case described in the current brief report.

Sr. no.	Case reported by	Age	Sex	Mode of injury	Visual acuity	Visual field defect	Other deficits	CT/X- ray Findings	MRI findings	Outcome
1	Index case of the current report	39	M	Motorcycle accident	RE 6/6, LE 6/12	Bitemporal hemianopia (Fig. 1)	Anosmia, CSF rhinorrhea	CT: Comminuted frontal and anterior skull base fractures, bilateral frontal lobe hemorrhagic contusions and multiple frontal arachnoid cysts	Normal optic chiasma (Fig. 2)	Vision improved to 6/9 in LE, Visual fields improved in both eyes (Fig. 3)
2.	Dutta et al. ²	25	M	Closed head injury	RE 6/12, LE 6/60	Bitemporal hemianopia	Intermittent CSF rhinorrhea	CT : Orbital roof and basi sphenoid fracture	Frontal gyrus rectus herniation in sphenoid sinus with chiasmal edema	Marginal visual improvement
3.	Hughes et al. ³	45	M	Road accident	BE 6/9	Complete bitemporal hemianopia	Bilateral anosmia, complete facial paralysis on the right with loss of taste and mild left hemiparesis	X- ray: Fracture of frontal bone	No improvement	
4.	Hughes et al. ⁴	31	M	Head on motor crash	RE 6/18, LE 1/60	RE – upper temporal quadrant defect LE – upper nasal island of vision only	3 rd nerve paresis	X- ray: Fissured fracture in the left frontal bone, traversing the left frontal sinus, also involving left anterior and middle fossa	Significant improvement	
5.	Logan et al. ⁵	33	M	Road accident	RE 6/9, LE Counting fingers	Bitemporal hemianopia	CSF rhinorrhea, bilateral anosmia, LE limitation of ocular movements except lateral movements	Multiple frontal fracture, anterior fossa fracture involving sphenoid and ethmoid air sinus	No improvement	
6.	Mohindra et al. ⁶	17	M	Accidental fall	RE 6/60, LE 6/9	Bitemporal hemianopia	None reported	CT : Speck of air at interpeduncular and chiasmatic cistern	Isolated contusion of optic chiasma	No improvement
7.	Resneck et al. ⁷	50	M	Automobile accident	BE 6/6	Bitemporal hemianopia	Absence of olfactory functions	X- ray: Fracture of right superior orbit	No improvement	
8.	Tang et al. ⁸	17	M	Motor cycle accident	BE 20/25	Bitemporal hemianopia	Diplopia with exophoria, diabetes insipidus, decreased thyroid stimulating hormone and testosterone levels	CT: Pneumocephalus and fracture of sella turcica	Hemorrhagic contusion of the frontal lobes; mild swelling on the left side of the optic chiasm	No change
9.	Vora et al. ⁹	26	M	Motor vehicle accident	RE 6/6, LE 6/36	Complete bitemporal hemianopia	CSF rhinorrhea	Midline frontal bone fracture, basi sphenoid fracture, intraparenchymal hematoma in left frontal region	Central chiasmal contusion with thinning of nasal fibres	Vision improved to 6/6 both eyes but no improvement in fields
10.	Yazici et al. ¹⁰	20	M	Motor vehicle accident	BE 20/20	Bitemporal hemianopia	Exotropia with RE fixation.	Fracture frontal, ethmoid and maxillary, fracture in the sellar region of sphenoid bone, air in the orbit and cranium	Thinning, shape deformity in the optic chiasm	No change in visual fields

Abbreviations: RE = right eye; LE = left eye; BE = both eyes; M = male; CT = computed tomography; MRI = magnetic resonance imaging; CSF = cerebrospinal fluid.

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