Traumatic Chiasmal Syndrome: Clinical Findings and Mechanisms of Injury

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INTRODUCTION

- Traumatic chiasmal syndrome is exceptionally rare due to the deep location of the chiasm within the brain and bony protection from the sphenoid bone and sinus
- Severe blunt force trauma is required to damage the optic chiasm. This amount of trauma may not be survivable. Often associated with skull base or facial fractures.
- The severity and extent of injury can vary widely.

CASE PRESENTATION

- 11yo M ATV vs tree accident
- Polytrauma including subarachnoid and intraparenchymal hemorrhage, clival fracture, pneumocephalus
- Orbital floor, medial wall, roof fractures
- Frontal bone fracture, skull base fracture with CSF leak

Exam findings

- VA OD: 20/20 OS: 20/25
- IOP 18/19 by tonopen
- ptotic lid OS with 1+ APD OS
- left exotropia and left hypertropia consistent with CNIII palsy

TESTING/RESULTS

Figure 1. CT maxillofacial without contrast demonstrating orbital trauma

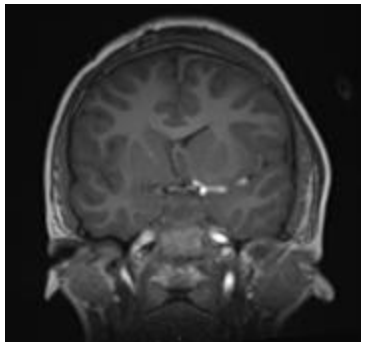

Figure 2. MRI Brain without contrast found no anatomic abnormalities of the optic chiasm

Figure 3. HVF24-2 8 months following injury demonstrates a dense bitemporal hemianopia

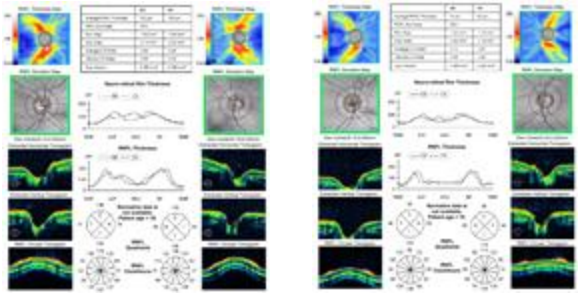

Figure 4. OCT shows progressive thinning of the nerve fiber layer at 8 months post injury (right) compared to 1 month post injury (left)

MECHANISMS

- Historically, the main cause of chiasmal injury was believed to be mechanical stretching and tearing of the crossing fibers at the chiasma
- More recent theories suggest that the damage may be due to the tearing of pial vessels supplying the chiasma, leading to impaired blood flow, or a combination of factors like mechanical stretch, contusion, and necrosis.
- The exact cause of injury, particularly why only the decussating fibers are affected, remains unclear.

CONCLUSION

- Traumatic chiasmal syndrome is rare but should be considered in patients with bitemporal hemianopia post-head trauma, especially with frontal bone and anterior skull base fractures.
- MRI may not reveal chiasmal abnormalities.
- Visual field defects tend to stay stable or worsen

SELECTED REFERENCES

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