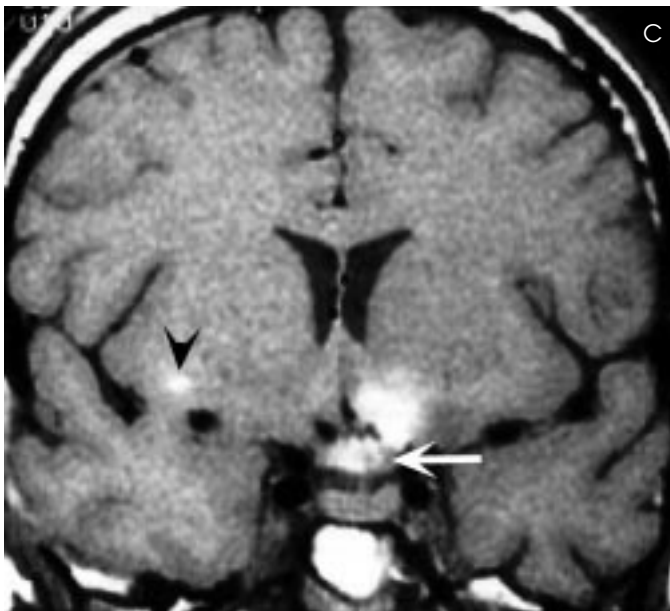
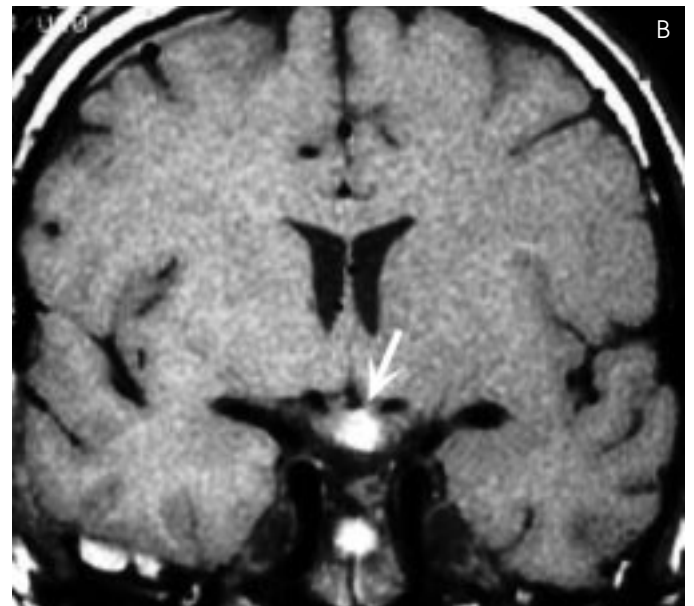
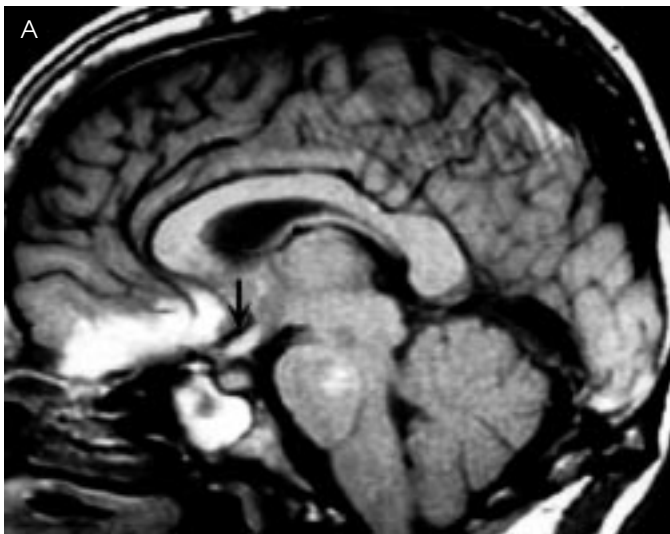


Case W14

Clinical Presentation

A 24-year-old man status post a severe motor vehicle accident is evaluated for blindness.



Radiologic Findings

A sagittal T1-WI (Fig. A) demonstrates hemorrhagic contusion of the inferior frontal lobe and blood in the sphenoid sinus. In addition, there is high signal within the optic chiasm (*arrow*), and in the midpons, consistent with hemorrhagic shear injury. Coronal T1-WIs (Figs. B and C) demonstrate the hemorrhagic injury

Pearls

- In the chronic phase of injury, when hemorrhage has resolved, the chiasm may be severed (Figs. D and E) and patients who have recovered some vision will be left with bitemporal hemianopsia.
- Endocrine abnormalities appearing months after head injury may be due to optochiasmatic arachnoiditis.

Pitfall

- MR is the study of choice for assessing injury to the optic chiasm and hypothalamic-pituitary axis. However, if the suspected injury is at the level of optic canal, then thin-section CT may be useful to look for bony fragments impinging on the canal as these may be missed with MR.

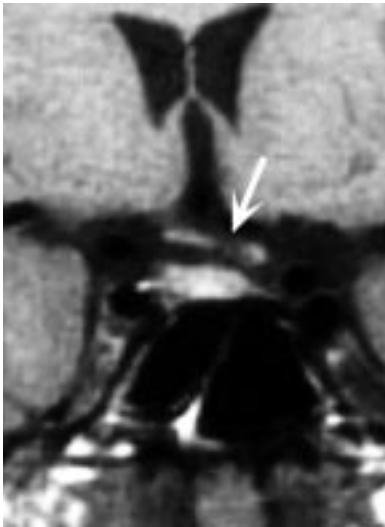


Fig. D. A patient with a history of severe head trauma shows splitting of the chiasm (*arrow*) and optic atrophy. (*Figure courtesy of Alisa D. Gean, M.D., San Francisco, CA.*)

to the optic chiasm (*arrows*), as well as the hemorrhagic parenchymal contusion and a focus of hemorrhagic shear injury in the right subinsular region (*arrow-head*). (*Figures courtesy of Alisa D. Gean, M.D., San Francisco, CA.*)

Diagnosis

Traumatic injury of the optic chiasm

Differential Diagnosis

None: this is a pathognomonic appearance.

Discussion

Background

Traumatic injury to the optic nerve usually occurs at the level of the optic canal. The nerve is relatively tethered in the canal and is therefore subject to shearing forces and is at risk of impingement by bony fracture fragments. In rare cases the optic chiasm may be injured, presumably by a shearing mechanism in association with acceleration-deceleration forces. Injury of the optic nerve and/or chiasm is often associated with injury to the hypothalamic-pituitary axis. Diabetes insipidus (DI) is particularly common and may be permanent in approximately 30% of patients. This may be due to direct injury to the hypothalamus or to pituitary stalk transection. Stalk transection interrupts the portal system, which perfuses the anterior lobe of the pituitary and may lead to infarction of the anterior lobe.

Clinical Findings

Severe head trauma is the initial presentation. Optic chiasm injury presents with bitemporal hemianopsia or blindness, hypothalamic-pituitary injury with diabetes insipidus and pituitary insufficiency.

Complications

Injuries to the optic nerve and chiasm are often accompanied by other serious posttraumatic sequelae such as traumatic carotid aneurysm, carotid cavernous fistula formation, and meningitis due to basal skull fracture and CSF leak.

Imaging Findings

CT

- Chiasmal hematoma may be identified if large
- Midline basal skull fractures are often observed in the setting of chiasmal injury

MR

- Chiasm may be edematous, hemorrhagic, or transected
- The pituitary stalk may not be visible and the normal bright spot in the posterior lobe may be absent
- A defect in the floor of the third ventricle may be seen if there is associated hypothalamic shearing injury



Fig. E. A different patient with bitemporal hemianopsia and a history of severe trauma also shows splitting of the chiasm. (Figure courtesy of T. Hans Newton, M.D., San Francisco, CA.)

Treatment

Medical management of DI and hypopituitarism

Prognosis

- Traumatic DI improves in approximately 50 to 70% of cases
- Traumatic visual injury is usually permanent

Suggested Readings

Domingo Z, de Villiers JC. Post-traumatic chiasmatic disruption. *Br J Neurosurg* 7:141–147, 1993.

Heinz GW, Nunery WR, Grossman CB. Traumatic chiasmatic syndrome associated with midline basilar skull fractures. *Am J Ophthalmol* 117:90–96, 1994.

Tang RA, Kramer LA, Schiffman J, Woon C, Hayman LA, Pardo G. Chiasmatic trauma: clinical and imaging considerations. *Survey Ophthalmol* 38:381–383, 1994.