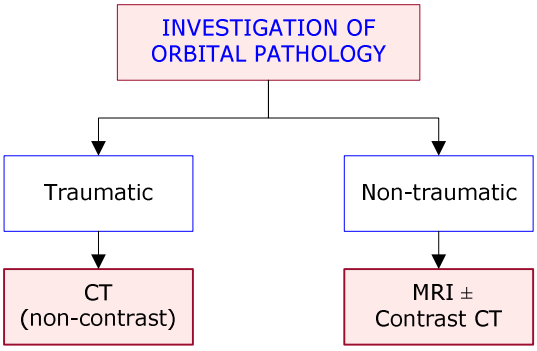
DIAGNOSTIC IMAGING PATHWAYS
www.imagingpathways.health.wa.gov.au

Pathway last reviewed April 2011. Pathways will be reviewed periodically and updated as necessary.



SUSPECTED ORBITAL PATHOLOGY

- Plain films have a limited role in the assessment of orbital trauma.
- If an orbital pathology is suspected clinically, CT is the imaging modality of choice. It enables superior visualisation of the bone structures of the midface and orbits.
- MRI is a useful adjunct to CT, particularly in identifying soft tissue injury. Before a patient undergoes MRI, foreign metal in the orbit should first be excluded (on plain films or CT).

PLAIN RADIOGRAPHY

- Plays a limited role in the detailed evaluation and management of orbital disease and trauma. 1-3
- Limitations:
    - 50% rate of false negatives and non-diagnostic in 30% in the evaluation of orbital blowout fractures. 3
    - Poor visualisation of medial orbital wall and orbital floor fractures.

COMPUTED TOMOGRAPHY

- Imaging modality of choice for investigation of orbital trauma, some inflammatory diseases, Graves' ophthalmopathy, orbital infections and suspected retinoblastoma. 5,6
- Gives the best illustration of fine bony structures of the midface and orbits. 5,6
- Allows detection of the orbital fractures and assessment of the extent of injury in the evaluation of patients with orbital trauma. 3

- Has high sensitivity and specificity for the detection and localisation of intraocular and orbital metal, glass and stone foreign body. 8,9
- Limitations:
    - Less accurate for detection of wooden foreign bodies. 7

MAGNETIC RESONANCE IMAGING

- Due to its superior soft tissue resolution, it is the imaging modality of choice for evaluating: 6
    - Ocular lesions, the optic nerve complex, cranial nerve palsies, and retrobulbar disease with potential intracranial extension. 10-12
    - Intraocular tumours such as uveal melanoma (because of superior delineation of the extent of the disease and unique paramagnetic signal characteristics of melanin). 13,14
- Compared to CT, MRI allows for more accurate depiction of optic nerve or sheath tumours extending into the optic chiasm, optic tracts and lateral geniculate bodies of thalami. 10,15
- As a predictor of multiple sclerosis, it can help to prognosticate the development of MS after optic neuritis. 16
- MRI is valuable in the examination of the optic nerve and globe for injury and hence is a useful adjunct in the assessment of orbital injury. However, metallic fragments in the orbit should first be excluded on plain film or CT. 5
- Advantages: 5
    - Superior soft tissue resolution.
    - Can distinguish the three layers of the globe (sclera, choroid and retina).
    - Allows for visualisation of globe components not seen on CT.
- Limitations: 5
    - A metal foreign body within the orbit is an absolute contraindication because the risk of blindness (since the fluctuating magnetic fields of a MRI machine can potentially move the ferromagnetic foreign body around the orbit damaging important structures).
    - Poor visualisation of the bone.

REFERENCES

1. Mosley IF. **The plain radiograph in ophthalmology: a wasteful and potentially dangerous anachronism.** J Royal Soc Med 1991;84:76-80. (Level II evidence). Click here to view reference
2. Bhattacharya J, Mosley IF, Fells P. **The role of plain radiography in the management of suspected orbital blow-out fractures.** Br J Radiology 1997;70:29-33. (Level III evidence)
3. Brady SM, McMann MA, Mazzoli RA, et al. **The diagnosis and management of orbital blowout fractures: update 2001.** Am J Emerg Med 2001;19:147-54. (Level IV evidence)
4. Otto PM, Otto RA, Virapongse C, et al. **Screening test for detection of metallic foreign objects in the orbit before magnetic resonance imaging.** Invest Radiology 1992;27:308-11. (Level III evidence)
5. Go JL, Vu VN, Lee KJ, et al. **Orbital trauma.** Neuroimaging Clinics of North America 2002;12(2):311-24.
6. Belden CJ, Zinreich SJ. **Orbital imaging techniques.** Seminars in US, CT and MRI 1997;18(6):413-22. (Review article)

7. Maya MM, Heier LA. **Orbital CT: current use in the MR era.** Neuroimaging Clinics of North America 1998;8(3):651-93.
8. Lakits A, Prokesch R, Scholda C, et al. **Orbital helical computed tomography in the diagnosis and management of eye trauma.** Ophthalmology 1999;106:2330-5. (Level II/III evidence). Click here to view reference
9. Gor DM, Kirsch CF, Leen J, et al. **Radiologic differentiation of intraocular glass: evaluation of imaging techniques, glass types, size, and effect of intraocular haemorrhage.** AJR 2001;177:1199-203. (Level II/III evidence). Click here to view reference
10. Ettl A, Kramer J, Daxer A, et al. **High resolution magnetic resonance imaging of neurovascular orbital anatomy.** Ophthalmology 1997;104:869-77. (Level III evidence)
11. Tonami H, Tamamura H, Kimizu K, et al. **Intraocular lesions in patients with systemic disease: findings on MR imaging.** AJR 1990;154(2):385-9. (Level III evidence)
12. Breslau J, Dalley RW, Tsuruda JS, et al. **Phased-array surface coil MR of the orbits and optic nerves.** AJNR 1995;16:1247-51. (Level III evidence)
13. Peyster RG, Augsburger JJ, Shields JA, et al. **Intraocular tumors: evaluation with MR imaging.** Radiology 1988;168(3):773-9. (Level IV evidence)
14. Gomori JM, Grossman RI, Shields JA, et al. **Choroidal melanomas: correlation of NMR spectroscopy and MR imaging.** Radiology 1986;158:443-5. (Level III evidence)
15. Gass A, Barker GJ, MacManus D, et al. **High resolution magnetic resonance imaging of the anterior visual pathway in patients with optic neuropathies using fast spin echo and phased array local coils.** J Neurol Neurosurg Psychiatry 1995;58:562-9. (Level III evidence)
16. Dunker S, Wiegand W. **Prognostic value of magnetic resonance imaging in monosymptomatic optic neuritis.** Ophthalmology 1996;103:1768-73. (Level III evidence)

FURTHER READING

1. Duvoisin B, Zanella FE, Sievers KW. **Imaging of the normal and pathological orbit.** Eur Radiol 1998;8:175-188. Click here to view reference

Website
For more information go to www.imagingpathways.health.wa.gov.au

Government of Western Australia
Department of Health