

# Diagnostic Imaging Pathways - Orbital Pathology (Suspected)

## Population Covered By The Guidance

This pathway provides guidance on imaging patients with traumatic and non-traumatic orbital pathology.

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## Quick User Guide

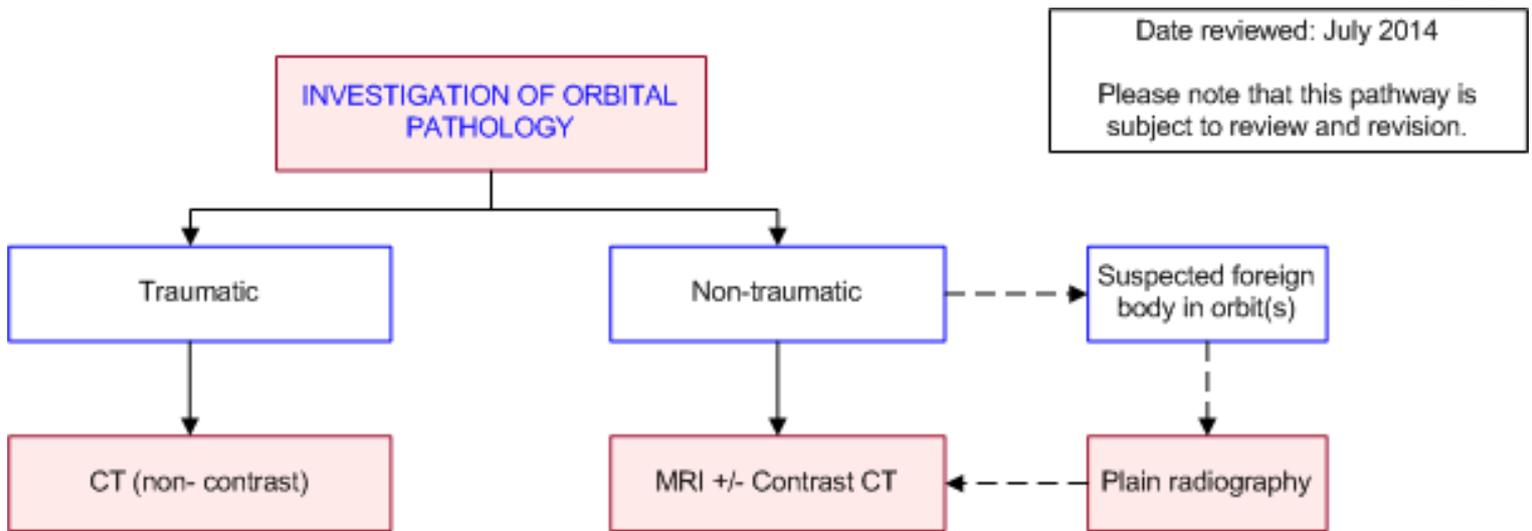
Move the mouse cursor over the **PINK** text boxes inside the flow chart to bring up a pop up box with salient points.

Clicking on the **PINK** text box will bring up the full text.

The relative radiation level (RRL) of each imaging investigation is displayed in the pop up box.

| SYMBOL   | RRL     | EFFECTIVE DOSE RANGE |
|--|---------|----------------------|
|  | None    | 0                    |
|  | Minimal | < 1 millisieverts    |
|  | Low     | 1-5 mSv              |
|  | Medium  | 5-10 mSv             |
|  | High    | >10 mSv              |

## Pathway Diagram



## Image Gallery

*Note: These images open in a new page*

1

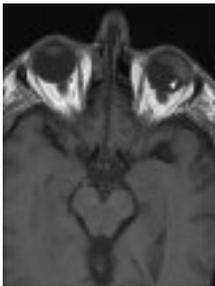


**Inferior Orbital Margin Fracture with Trapping of Inferior Rectus Muscle**

**Image 1 - Computed Tomography**

**Coronal image demonstrating a traumatic fracture of the inferior orbital margin with soft tissue (arrowhead) and inferior rectus muscle (arrow) extending into fracture.**

2a

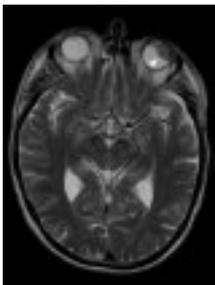


**Uveal Melanoma**

**Image 2a and 2b - Magnetic Resonance Imaging**

**T1 and T2-weighted images showing melanoma of the left uvea (arrow).**

2b



3a



**Uveal Melanoma**

**Image 3a - Gross pathology**

**Orbital enucleation showing a uveal malignant melanoma (blue arrow) arising posteriorly and causing retinal**

detachment (white arrow).

3b



Image 3b (H&E, x2.5) and 3c (H&E, x20) - Histopathology Uveal malignant melanoma infiltrating beneath the retinal layer (blue arrow) and showing marked nuclear atypia with cytoplasmic and extracellular melanin pigment production.

3c



## Teaching Points

- 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)
- In the assessment of traumatic orbital pathology CT is the modality of choice. For non-traumatic orbital pathology, MRI is the preferred imaging modality provided it is available and there are no contraindications

## Computed Tomography (CT)

- Imaging modality of choice for investigation of orbital trauma, some inflammatory diseases, Graves' ophthalmopathy, orbital infections and suspected retinoblastoma [1,2](#)
- Gives the best illustration of fine bony structures of the midface and orbits [1,2](#)
- 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 [4,5](#)
- Limitations
  - Less accurate for detection of wooden foreign bodies [6](#)
- Information for consumers on CT [InsideRadiology](#)

## Magnetic Resonance Imaging (MRI)

- Due to its superior soft tissue resolution, it is the imaging modality of choice

## for evaluating [2](#)

- Ocular lesions, the optic nerve complex, cranial nerve palsies, and retrobulbar disease with potential intracranial extension [7-9](#)
- Intraocular tumours such as uveal melanoma (because of superior delineation of the extent of the disease and unique paramagnetic signal characteristics of melanin) [10,11](#)
- 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 [7,12](#)
- As a predictor of multiple sclerosis, it can help to prognosticate the development of MS after optic neuritis [13](#)
- 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 [1](#)
- Advantages [1](#)
  - 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 [1,6](#)
  - 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
- Information for consumers on Magnetic Resonance Imaging [InsideRadiology](#)

## Plain Radiography

- Plays a limited role in the detailed evaluation and management of orbital disease and trauma [3,14,15](#)
- May be useful in screening for intraocular foreign bodies and in detection of orbital fractures directly or through indirect findings (such as asymmetrical opacification by haemorrhage of a paranasal sinus adjacent to a particular orbital surface, and orbital emphysema) [15,16](#)
- 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
- Information for consumers on plain radiographs [InsideRadiology](#)

## References

Date of literature search: June 2014

The search methodology is available on request. [Email](#)

References are graded from Level I to V according to the Oxford Centre for Evidence-Based Medicine, Levels of Evidence. [Download the document](#)

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3. Brady SM, McManus 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). [View the reference](#)
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evidence). [View the reference](#)

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15. **Bhattacharya J, Mosley IF, Fells P.** The role of plain radiography in the management of suspected orbital blow-out fractures. *Br J Radiol.* 1997;70:29-33. (Level III evidence). [View the reference](#)
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## Further Reading

1. **Duvoisin B, Zanella FE, Sievers KW.** Imaging of the normal and pathological orbit. *Eur Radiol.* 1998;8:175-188. [View the reference](#)

## Information for Consumers

| Information from this website   | Information from the Royal Australian and New Zealand College of Radiologists' website  |
|---|---|
| <a href="#">Consent to Procedure or Treatment</a><br><br><a href="#">Radiation Risks of X-rays and Scans</a><br><br><a href="#">Computed Tomography (CT)</a><br><br><a href="#">Magnetic Resonance Imaging (MRI)</a><br><br><a href="#">Plain Radiography (X-ray)</a> | <a href="#">Computed Tomography (CT)</a><br><br><a href="#">Contrast Medium (Gadolinium versus Iodine)</a><br><br><a href="#">Gadolinium Contrast Medium</a><br><br><a href="#">Iodine-Containing Contrast Medium</a><br><br><a href="#">Magnetic Resonance Imaging (MRI)</a><br><br><a href="#">Plain Radiography/X-rays</a><br><br><a href="#">Radiation Risk of Medical Imaging During Pregnancy</a> |

[Radiation Risk of Medical Imaging  
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