Diagnostic Imaging Pathways - Paediatric, Scaphoid Fracture (Suspected)

Population Covered By The Guidance

This pathway provides guidance on imaging children with suspected scaphoid fractures.

Date reviewed: July 2014

Date of next review: 2017/2018

Published: July 2014

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

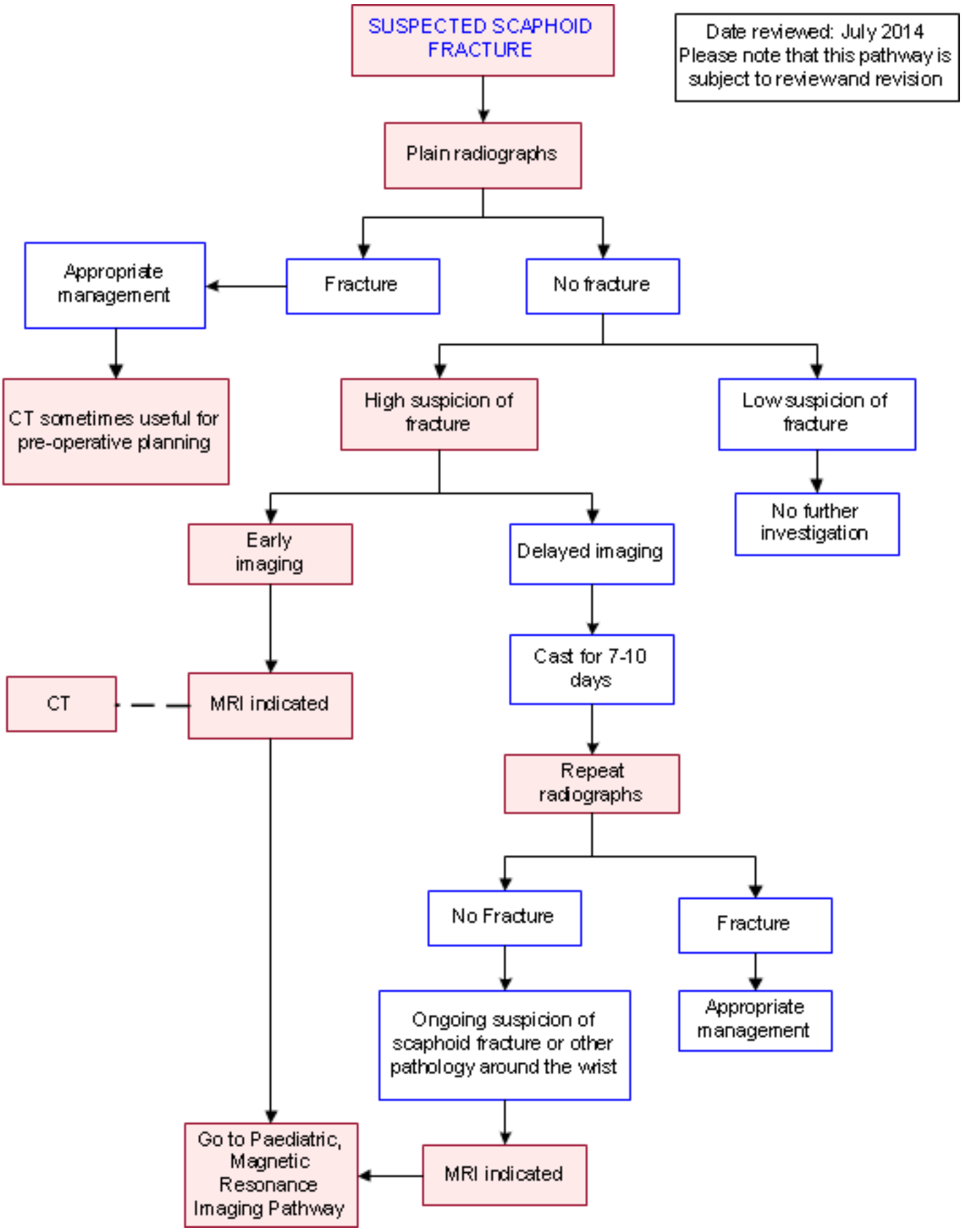

Image Gallery

Note: Images coming soon

Plain Radiography

- **Whilst carpal fractures are rare in children, scaphoid fractures are the most common carpal fracture and have a peak incidence in the 12 to 15 year age group. Scaphoid fractures are very uncommon in children under 8** 1
- **The vast majority of fractures in children occur at the distal pole with approximately 10-20% at the scaphoid waist** 2,3
- **By early adolescence the fracture patterns are similar to adults** 1
- **The detection of scaphoid fractures can be improved with the use of dedicated views performed with ulnar deviation and tube angulation** 4
- **Whilst immobilisation and follow-up radiographs in approximately 10-14 days has been considered appropriate treatment, follow-up radiographs detect only very small numbers of additional fractures** 5-7
- **Approximately 40% of patients (not necessarily paediatric) will have radiographically occult fractures detected on subsequent MRI, with around half of these scaphoid fractures** 8,9
- **There is some evidence to suggest that early imaging is most appropriate as it results in earlier detection of fractures and other injuries and reduces unnecessary immobilsation. Delayed radiographs only detect a small number of additional fractures but remains a reasonable option depending on resources**

Computed Tomography (CT)

- **Estimated sensitivity and specificity of 93% and 99% for the detection of scaphoid fractures** 10
- **Superior to MRI for the depiction of cortical injuries but inferior to MRI for the detection of solely trabecular injuries** 11
- **Useful for**
  - **Detection of occult fractures of the wrist and displacement of fractures** 12
  - **Further characterising complicated fracture-dislocations** 13
- **Assessment of union/non-union and avascular necrosis** 14

Magnetic Resonance Imaging (MRI)

- **Whilst CT also has a very high sensitivity, MRI is superior for the detection of**

solely trabecular injuries [11]

- **Can detect additional fractures and soft tissue injuries** [4,15]
- **Estimated sensitivity and specificity of 96% and 99% for the detection of scaphoid fractures** [10]
- **Has the advantage over both CT and bone scan of involving no ionising radiation and can detect bone bruising and ligamentous injuries** [4]
- **Whilst bone scan has a similar sensitivity it has a relative lack of specificity (approx 89%) and is generally considered inferior to both CT and MRI for the investigation of suspected scaphoid fracture. Bone scan is now seldom used** [10,16]
- **Limited sequences (coronal T1 and STIR) are generally sufficient to determine the presence of a fracture and do not take much longer than a standard scaphoid series of radiographs** [15,17]
- **Where available, the early use of MRI is a sensitive and practical way to diagnose occult scaphoid fractures and saves unnecessary immobilisation** [18]

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

1. **Elhassan BT, Shin AY. Scaphoid fracture in children. Hand Clin. 2006;22:31-41. (Review article)**
2. **Vahvanen V, Westerlund M. Fracture of the carpal scaphoid in children: a clinical and roentgenological study of 108 cases. Acta Orthop Scand. 1980;51:909-13. (Level III evidence)**
3. **Christodoulou AG, Colton CL. Scaphoid fractures in children. J Pediatr Orthop. 1986;6(1):37-9. (Level III evidence)**
4. **Johnson KJ, Haigh SF, Symonds KE. MRI in the management of scaphoid fractures in skeletally immature patients. Pediatric Radiol. 2000;30:685-8. (Level III evidence)**
5. **Leslie IJ, Dickson RA. The fractured carpal scaphoid: natural history and factors influencing outcome. J Bone Joint Surg Br. 1981;63-B:225-30. (Review article)**
6. **Munk B, Frokjaer J, Larsen CF, et al. Diagnosis of scaphoid fractures. A prospective multicentre study of 1052 patients with 160 fractures. Acta Orthop Scand. 1995;66:359-60. (Level II evidence)**
7. **Jacobsen S, Hassani G, Hansen D, Christensen O. Suspected scaphoid fractures: can we avoid overkill. Acta Orthop Belg. 1995;61:74-8 (Level III evidence)**
8. **Hunter JC, Escobedo EM, Wilson AJ, et al. MR imaging of clinically suspected scaphoid fractures. AJR Am J Roentgenol. 1997;168:1287-93. (Level III evidence)**
9. **McCullough NP, Smith FW, Cooper JG. Early MRI in the management of the clinical scaphoid fracture. Eur J Emerg Med. 2011;18:133-6. (Level III evidence)**

10. **Yin ZG, Zhang, JB, Kan SL, Wang XG. Diagnosing suspected scaphoid fractures: a systematic review and meta-analysis. Clin Orthop Relat Res. 2010;468:723-34. (Level I evidence)**
11. **Memarsadeghi M, Breitenseher M, Sheiker-Prokop C, et al. Occult scaphoid fractures: comparison of multidetector CT and MR imaging--initial experience. Radiology. 2006;240:169-76. (Level II evidence)**
12. **Hindman BW, Kulik WJ, Lee G, et al. Occult fractures of the carpal and metacarpals: demonstration with CT. AJR Am J Roentgenol. 1989;153:529-32. (Level III evidence)**
13. **Nakamura R, Imaeda T, Horii E, et al. Analysis of scaphoid fracture displacement by three-dimensional computed tomography. J Hand Surg. 1991;16A:485-92. (Level IV evidence)**
14. **Hidaka Y, Nakamura R. Progressive patterns of degenerative arthritis in scaphoid nonunion demonstrated by three-dimensional computed tomography. J Hand Surg. 1998;23B:765-70. (Level III evidence)**
15. **Khalid M, Jummani ZR, Kanagaraj K, et al. Role of MRI in the diagnosis of clinically suspected scaphoid fracture: analysis of 611 consecutive cases and literature review. Emerg Med J. 2010;27:266-9. (Level II evidence)**
16. **Fowler C, Sullivan B, Williams LA. A comparison of bone scintigraphy and MRI in the early diagnosis of the occult scaphoidwaist fracture. Skeletal Radiol. 1998;27:683-7. (Level II evidence)**
17. **Brydie A, Raby N. Early MRI in the management of clinical scaphoid fracture. Br J Radiol. 2003;76:296-300. (Level II evidence)**
18. **Kumar A, O'Connor A, Despois M, Galloway H. Use of early magnetic resonance imaging in the diagnosis of occult scaphoid fractures: the CAST study (Canberra area scaphoid trial). N Z Med J. 2005;118(1209):U1296. (Level II evidence)**

Information for Consumers

Information from this website	Information from the Royal Australian and New Zealand College of Radiologists' website
Consent to Procedure or Treatment	
Radiation Risks of X-rays and Scans	

Computed Tomography (CT)

Magnetic Resonance Imaging (MRI)

Plain Radiography (X-ray)