Background

- Scaphoid fractures are common injuries accounting for approximately 2-7% of all fractures.
- Complications of missed scaphoid fractures include symptomatic non-union, pseudoarthrosis and avascular necrosis.
- Can involve significant litigation costs averaging £20780 in awarded compensation due to missed or delayed management of scaphoid fractures.
- Early diagnosis and management are crucial.
- Bone scintigraphy and magnetic resonance imaging (MRI) have similar sensitivities but bone scintigraphy has a lower specificity due to the higher rate of false positives.
- Utilising hybrid SPECT/CT to provide anatomical and functional data can improve sensitivity and specificity and should be considered as a second line investigation for occult fractures.

Aim

This study aims to evaluate the role of SPECT/CT in the diagnosis of occult scaphoid fractures, in the nuclear medicine department of a large teaching hospital.

Methods

- Dual-phase bone scintigraphy followed a standard protocol, post injection of 500-550mBq of technetium-99mHDP: blood pool and static images obtained at 5-10 min and 3-4 h, respectively.
- Selective SPECT/CT was introduced in 2014 for patients aged 16-65 with focal hyperaemic uptake in the carpal bones of the affected wrist.
- CT volume acquisition is performed at 2mm.
- Results of bone scintigraphy performed for suspected scaphoid fractures over an 18 month period from 2011-2012 were compared to an 18 month period from 2014-2015, which equates to pre and post introduction of selective SPECT/CT at the author’s institution.
- Reports were obtained retrospectively from the Radiology Information Server (RIS) database, and analysed according to gender, age, and outcome of report.

Results

<table>
<thead>
<tr>
<th>Pre-SPECT/CT 2011-2012:</th>
<th>Post-SPECT/CT 2014-2015:</th>
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<tbody>
<tr>
<td>Total n=777, Female n=473, male n=255.</td>
<td>Total n=777, Selected for SPECT/CT n=165</td>
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<tr>
<td>Mean age 39 (range 16-90)</td>
<td>Female n=473, Male n=304.</td>
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<tr>
<td>Mean age 38 (Range 16-93)</td>
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There was a significant decrease in the equivocal outcomes, post SPECT/CT, from 15.7% to 9.5% (p=0.0005). The equivocal outcomes in the SPECT/CT only group were 5.5% compared to 15.7% in the post SPECT/CT group, which is a significant decrease (p=0.0006).

Conclusion

This retrospective study shows utilisation of SPECT/CT significantly reduces the rate of equivocal reports, largely by depicting the fracture on the CT component and/or allowing for more accurate localisation. These results add support to the selective addition of hybrid SPECT/CT to dual phase bone scintigraphy in the investigation of suspected occult scaphoid fractures.

References