The Evaluation of SPECT-CT in the Early Management of Acute Charcot Neuroarthropathy (CN).

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Charcot neuroarthropathy (CN) is a debilitating condition afflicting the bone, soft tissue and joints of foot and ankle and is related to pain insensitivity.

Its pathogenesis and natural progression is poorly understood but its outcome can be debilitating.

Where there is high clinical suspicion treatment with immediate off-loading and immobilisation may halt and (help to) reverse or prevent deformity.
The classical presentation is of a patient:
- With a red swollen foot with minimal trauma
- Radiographic changes may not be apparent
- Failure of treatment or missed diagnosis may lead to a missed opportunity to prevent destructive arthropathy.

We performed an analysis of patients that presented with normal radiographs to assess:
- Patient Outcomes
- Establish the role of SPECT CT in the diagnosis of acute charcot
Methods

• A prospective, observational review of all patients presenting to the multidisciplinary diabetic foot clinic
  – from 1st Jan 2009 to 1st Jan 2013 with clinically suspected acute active CN was performed.
  – All patients underwent SPECT-CT within 10 days of the assessment after emergency off-loading in a TCC.

• A positive SPECT CT scan was diagnosed:
  – On 3 phases of radioisotope uptake was seen in all 3 phases of scanning.
  – Further CT fusion images provided localization of ongoing activity.

• All patients were followed up for 1-year or until treatment ceased and treated in concordance with clinical symptoms and SPECT CT imaging.
Triple Phase Response

Perfusion

Early Blood Pool

Delayed Phase

Positive radioisotope uptake in each phase represents either acute active or chronic bone turnover.
Results

- 137 patients were referred or self referred with a high suspicion of new onset acute CN.

- 98% were diabetic

- 116 unilaterally symptomatic feet with apparently normal radiographs

- 86 were consequently positively confirmed on SPECT-CT for CN
Results

• 15 new ‘diabetic’ fractures were diagnosed on the CT component.
  – Further analysis revealed that there were some with characteristic fragmentation and locations more consistent with CN & with a triple phase response

• At 1 year –
  – All suspected CN patients were treated with accepted off loading in TCC.
  – Only 5 patients went on to develop radiological changes consistent with CN even with
Analysis of Negative Scan

- Negative scans were recorded as
  - No triple phase trace response
  - Or localisation was uni-focal or not associated with skeletal structures.

- Differential diagnosis included
  - Cellulitis, degenerative changes, old fractures, and planter fasciitis

- At 1-year none of the patients developed CN
  - No evidence of foot deformity or radiological evidence of fragmentation or loss of normal bone anatomy.
Discussion

• A combination of
  – symptoms including swelling, pain and/or heat
  – positive three phase tracer uptake and localisation on SPECT CT

• This may aid the management of acute active CN in radiographically normal feet.

• A negative scan seems to exclude high-risk feet for CN confidently and thus can direct treatment.

• This may represent a high negative predictive value for the test.
Conclusion

- Our interim analysis suggests SPECT CT is
  - a addition to the armamentarium of the treating physician

- It could aid the physician in preventing the possible progression and onset of deformity and avoiding unnecessary treatment.