

University of Oklahoma Health Sciences
Nuclear Medicine Technology

Charcot's Arthropathy: The Use of Three Phase Bone Scans to Detect Diabetic Neuropathy

A Clinical Case Study
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PATIENT INFORMATION

01

Case Report

- 55 year old white female, bilateral foot pain
- Swelling and diabetic ulcer on plantar surface of first MTP joint, left foot

02

Medical History & Prior Exams

- Type II Diabetes, since 2016
- One month: medications for ulcer
 - Doxycycline, Clindamycin, Plaquenil
- X-ray, left foot

03

Exam & Medication

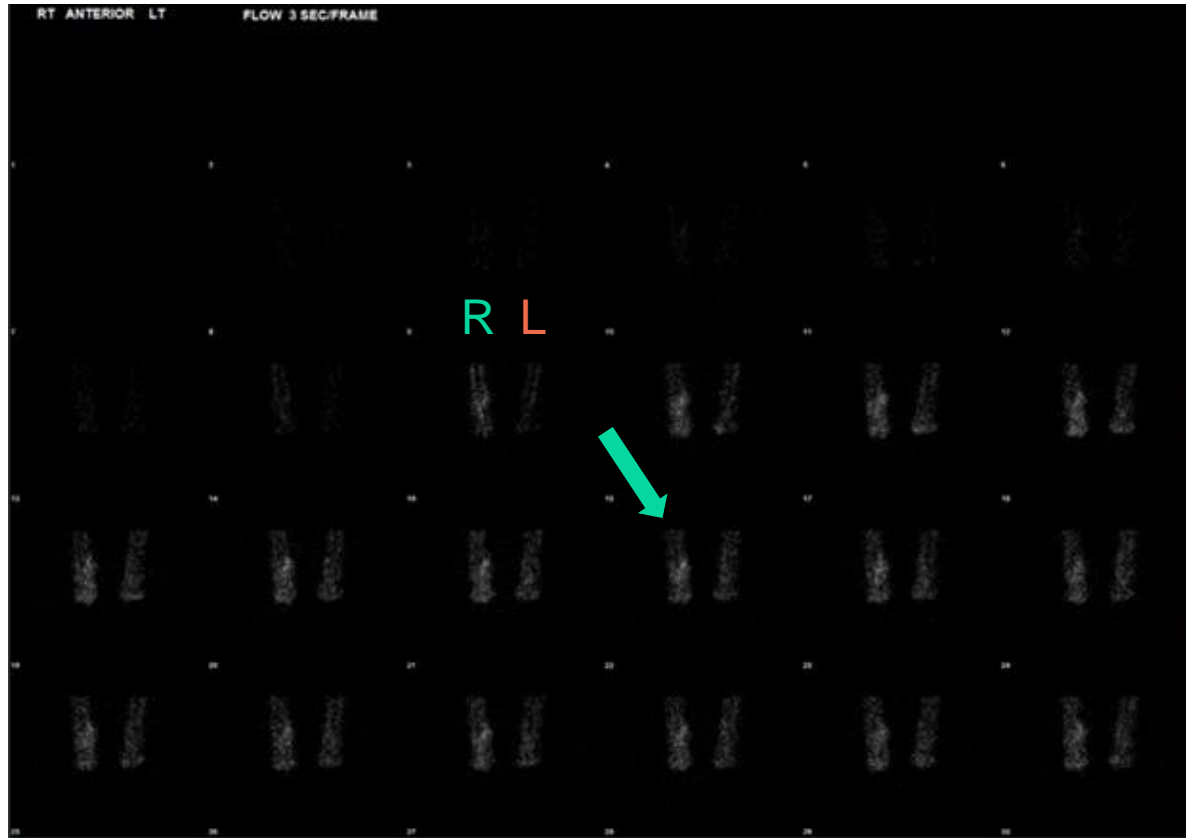
- **3 Phase Bone Scan**
 - **Tc-99m 26.4 mCi MDP**
 - Intravenous Catheter
 - Excreted Renally

04

Purpose of Exam

- Indication: suspected osteomyelitis in left foot surrounding ulcer

26.4 mCi (976.8 MBq) Tc-99m MDP [Injected]

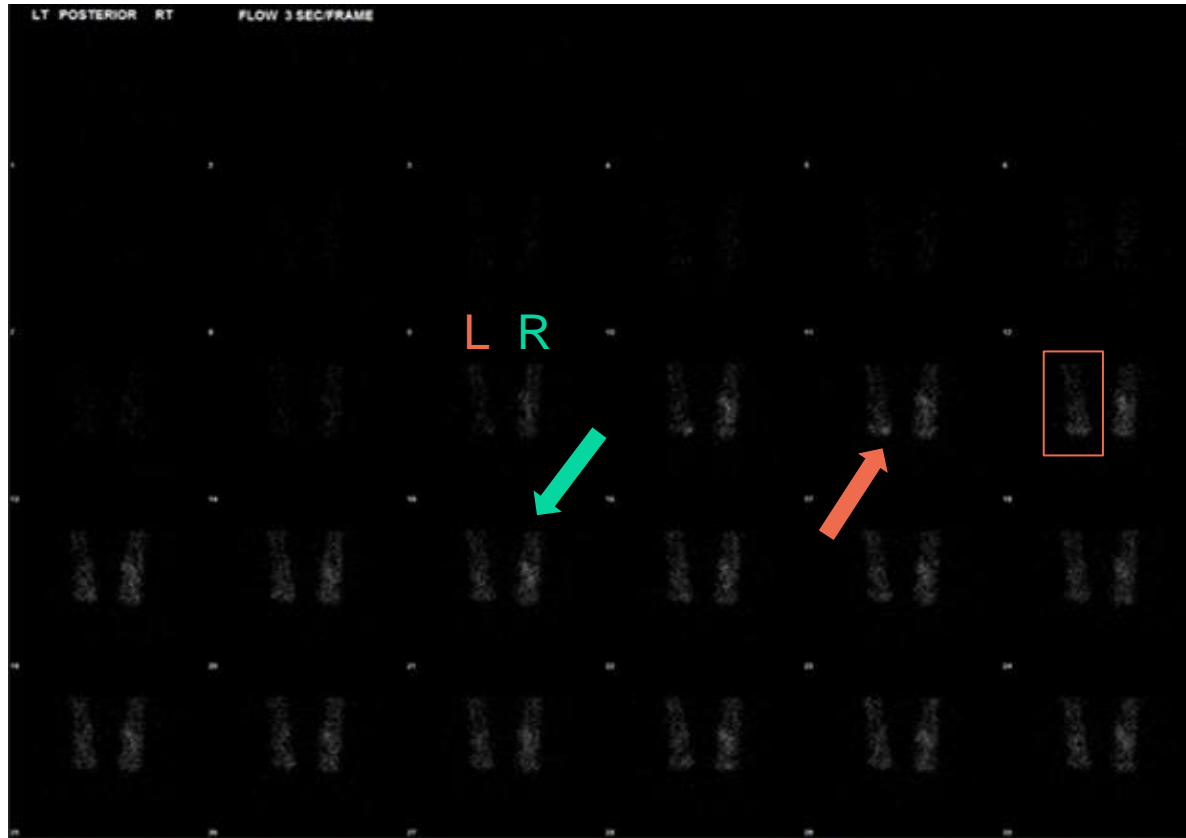


DYNAMIC FLOW - DORSAL

**3 seconds/frame
(total 30 frames)**

Camera Type:
Dual Head
Gamma (GE
830)
Peak: 140.5 keV
 $\pm 10\%$
Matrix: 256 x
256
**Collimator
Type:** LEHR

26.4 mCi (976.8 MBq) Tc-99m MDP [Injected]



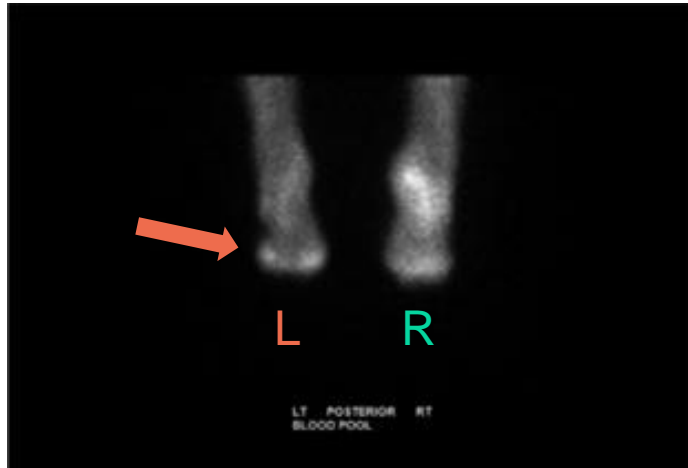
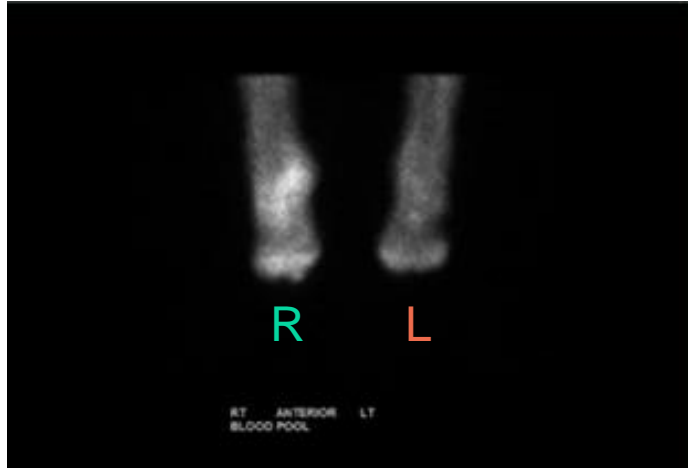
DYNAMIC FLOW - PLANTAR

**3 seconds/frame
(total 30 frames)**

Camera Type:
Dual Head
Gamma (GE
830)
Peak: 140.5 keV
± 10%
Matrix: 256 x
256
**Collimator
Type:** LEHR

26.4 mCi
(976.8 MBq)
Tc-99m MDP

[Injected]

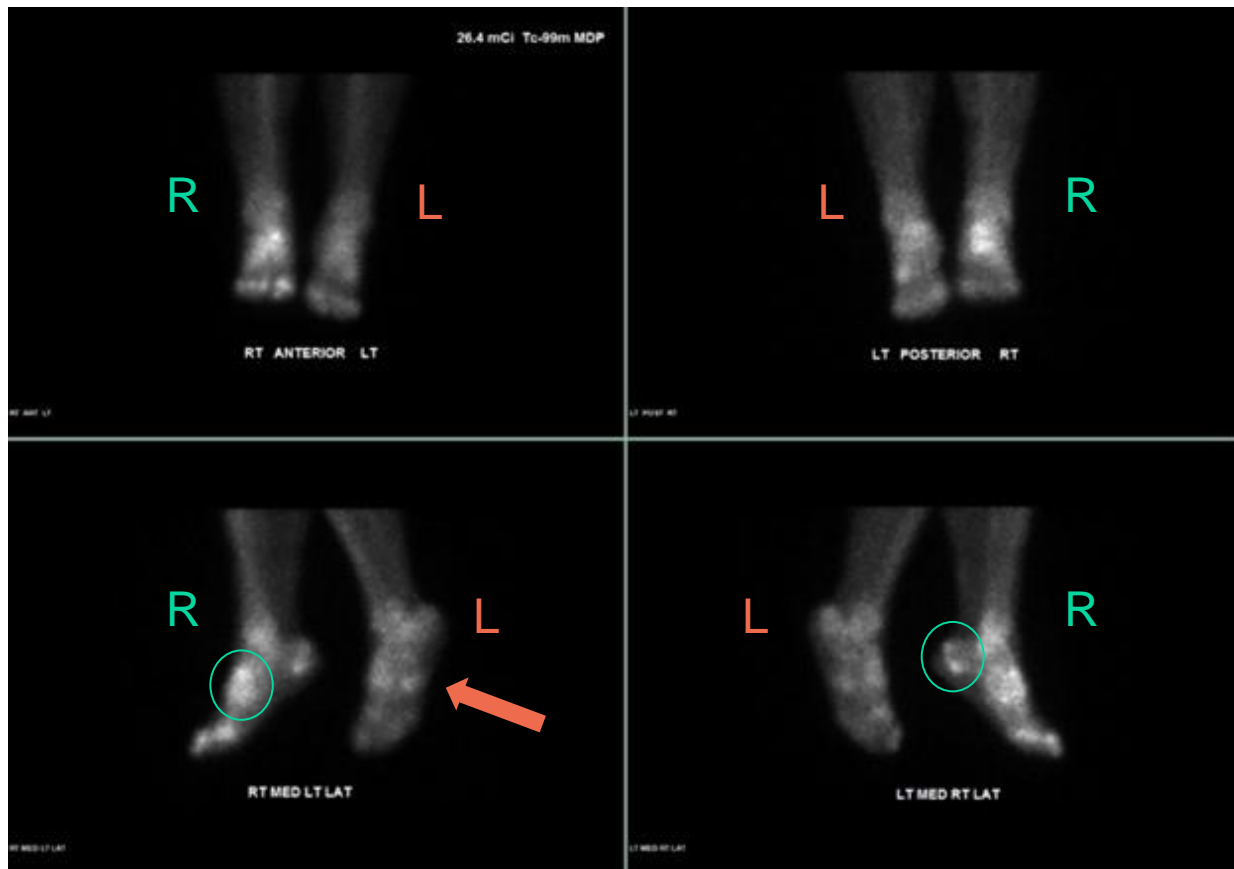


BLOOD POOL - DORSAL & PLANTAR

Static Images
(5 minutes)

Camera Type:
Dual Head
Gamma (GE
830)
Peak: 140.5 keV
 $\pm 10\%$
Matrix: 256 x
256
Collimator
Type: LEHR

26.4 mCi (976.8 MBq) Tc-99m MDP [Injected]



DELAYED IMAGES

**Static Images
(5 mins, 2.5 hrs
post-injection)**

Camera Type:

Dual Head
Gamma (GE
830)

Peak: 140.5 keV
± 10%

Matrix: 256 x
256

**Collimator
Type:** LEHR

DISCUSSION

How does Charcot's Foot develop?

Weakening Bone Structure

Repeated Trauma

Increased Glycation

Inflammatory Cytokines

Bone Deformity

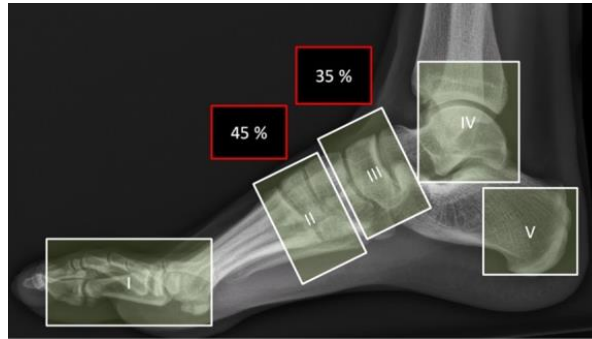
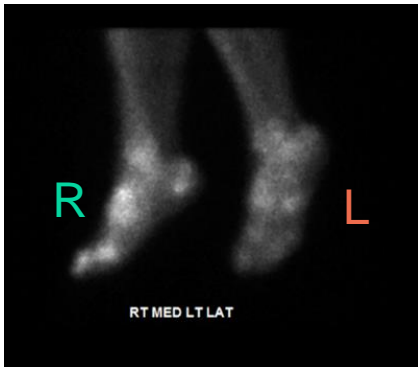


Fig. 1 Common locations of CN ¹



Fig. 2 Rocker-bottom deformity ¹

Pt foot uptake compared to typical pathology

CONCLUSION & TEACHING POINTS

0.1-0.4%

Of diabetic patients
affected ²

Risk factors include:

- Diabetic neuropathy
- Obesity
- Increased age

Possible outcomes:

- Continued deformity
- Amputation
- Ossification



Fig. 3 Total contact cast ³



Fig. 4 Surgical arthrodesis of foot bones ⁴

Teaching Points

- 1 Detect early inflammation
- 2 Imaging patterns show stage of disease ⁵
- 3 Contralateral comparison of paired structures is important
- 4 MRI or WBC imaging to rule out infection ⁶

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