THE CHARCOT PATIENT

Alan J Block, DPM, MS, FACFAS, FASPS
-Co-Chairman My Leg My Choice
-Medical Board Kent State University
-Editor-in-Chief The Journal of the American Society of Podiatric Surgeons
-Past President The Ohio Foot & Ankle Medical Association

blockosu@gmail.com
Traditional Approach

Sidney E. Eichenholtz--1966

“An arthrodesing procedure to stabilize a Charcot joint during the stage of development is doomed to failure”

“Optimal time for surgery is at the completion of the reconstructive stage”
Overview

- What, Who/When and How
- Classifications
  - Stages
  - Zones
- Differential
- Making Diagnosis
- Treatment
- Summary
“Relatively painless, progressive, destructive disorder in single or multiple joints secondary to neuropathy and concomitant trauma”

Epidemiology

Tarsometatarsal (Lisfranc’s) joint most common site 70%

Forefoot & Rearfoot involvement ------- 15%

50% of the patients with neuropathy have an associated plantar ulcer
Charcot Neuroarthropathy is a devastating joint destructive disease.

This can lead to foot deformity, ulceration, bone infection, and amputation.

The cause of Charcot is likely a combination of a traumatic event, increased blood flow, with abnormally high osteoclastic activity in the setting of diabetic polyneuropathy.

There is still much we don’t know about the disease process.
The incidence of developing Charcot in the general diabetic population is close to 1%

The incidence is higher in the higher-risk neuropathic diabetic population

Potential risk factors are age, weight, duration with diabetes, poor glycemic control, and osteoporosis
* Additional Risk Factors

* Some evidence that Kidney/Pancreas (K/P) transplant patients have higher risk for acute Charcot development

* Kidney (K) transplant patients have been shown to have 50% prevalence of osteoporosis, 4x higher risk of fractures

* Diabetics with ESRD (End Stage Renal Disease) have been shown to have more severe neuropathy
Diabetic Kidney and Kidney/Pancreas transplant recipients have higher prevalence of Charcot than the general diabetic population.

Last year alone they performed 176 kidney, and 20 kidney/pancreas transplants.
Material and Methods

* *Retrospective Case Series, level IV study*

* 1000 charts (11 years) reviewed

* ICD9 codes searched for transplant surgery, Diabetes

* 490 patients included in study

**Inclusion criteria:** 490

- Diabetes
- Documented K or K/P transplant

**Exclusion criteria:** 510

- Post transplant f/u < 2 years
- Other type of transplant surgery
- No diabetes
**Demographics**

* 289 males, 201 females
* Median age 57
* 380 Caucasian, 107 AA
* Other variables

* PAD
* Osteomyelitis
* Neuropathy
* Smoking
* Glycemic control

* Ulceration
* Reconstructive Surgery
* Amputation
Statistical analysis

- Chi-squared 2 sample testing with P-values
- Odds Ratio with 95% Confidence intervals
- Logistics regression
56% of total patients had neuropathy.
27% (72/277) of neuropathy patients developed Charcot
There were only 13 patients who did not have a simultaneous kidney pancreas transplant and only 2 of them developed Charcot.
Results

* Type 1 DM develop Charcot > Type 2 DM.  \( P=.0003 \)

* HbA1c level and smoking were not statistically significant variables

  • Average time to development of Charcot was 6.4 years in K/P group and 7.1 in K group

* Only 1% developed Charcot within 1 year after K/P Transplant
The Charcot patients had statistically significant higher risk of developing ulcer, osteomyelitis, amputation.

<table>
<thead>
<tr>
<th></th>
<th>Ulcer</th>
<th>Osteomyelitis</th>
<th>Amputation</th>
</tr>
</thead>
<tbody>
<tr>
<td>All pts n= 490</td>
<td>42%</td>
<td>33%</td>
<td>31%</td>
</tr>
<tr>
<td>Charcot Pts n= 72</td>
<td>80%</td>
<td>64%</td>
<td>61%</td>
</tr>
</tbody>
</table>

In all patients, PAD was a statistically significant independent risk factor for developing ulcer, osteomyelitis, and amputation.
Discussion

* Frykberg. 2008. Epidemiologic study of the Charcot foot
  * Incidence and prevalence of Charcot in the general diabetic population ≤ 1%
  * Higher risk patients have reported prevalence
    * Neuropathy, uncontrolled DM, other co-morbidities
  * These numbers may be under-reported due to
  * Missed Diagnosis
Discussion

* Ndip, Lavery et al. 2010. Foot disease in ESRD and dialysis patients
  * ESRD leads to more severe peripheral neuropathy

  * 50% prevalence of osteoporosis
  * 4x higher fracture risk after renal transplant
  * Bone metabolism issues highest in first year, but continue for years
  * Causes: abnormal PTH levels, Ca and Vit. D levels, glucocorticoid use, metabolic bone disease
Discussion

2 studies discussed acute development of charcot after transplant

  * 4% of 130 patients with Charcot within 1 year of transplant
  * Glucocorticoids main cause of Charcot development

* Matricali, et al. 2007. Charcot in simultaneous K/P transplant
  * 12% of 66 patients developed Charcot. 6% within 1 year after transplant
Conclusion

* The development of Charcot in diabetics who have kidney or kidney/pancreas transplant is much higher than the general diabetic population

* K/P transplants had statistically significant higher incidence (18.4%) than K transplants alone (11.2%) in the total study group and in the neuropathic patients 31.4% vs 20.4%

* Diabetic neuropathic transplant patients should be considered high risk
Limitations

* Retrospective study
* Chart reviews
* No analysis of glucocorticoid medications after transplant
References

Charcot Midfoot Dislocation
Charcot Rocker Bottom Foot
Rearfoot Charcot
49 Y.O. Train wreck
S/P Kidney-pancreas Transplant
10 Months S/P Pilon FX
Casted for 8 months
KIDNEY/PANCREAS TRANSPLANT
IMMUNOSUPPRESSIVE DRUGS
DIABETIC
50 Y.O. Caucasian Male
Security Detail @ coal mine
Charcot ankle and rearfoot
S/P PanTalar procedure 4 years ago
Diabetic...... 350Lbs
Charcot, Infection, Osteomyelitis, Amputation???

49 YO Caucasian Male
Diabetic with Neuropathy
Kidney/Pancreas Transplant
168 pounds
Ulcer Lateral aspect ankle Fibula visible with weight bearing
Amputation Scheduled
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