

# The Diabetic Charcot Foot from 1936 to 2016

## Eighty Years Later and Still Growing

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### KEYWORDS

- Diabetic Charcot foot • Charcot neuroarthropathy • Diabetic Charcot-Jordan Foot
- Diabetic neuropathy • Charcot classification • Diabetes mellitus

### KEY POINTS

- Much of the literature surrounding diabetic Charcot neuroarthropathy (DCN) since its first description in 1936 has focused on advances in diagnosis and treatment.
- A multidisciplinary approach is encouraged for management of the DCN, which can include both medical and surgical options.
- Standardization of definition, nomenclature, classification, and research protocols is needed for further investigations regarding DCN pathogenesis and treatment outcomes.
- The term diabetic Charcot-Jordan foot better describes the disease and avoids misnomers when managing foot and ankle neuroarthropathy joints in patients with diabetic neuropathy since first described by Jordan in 1936.

In every medical and surgical specialty there exist pathologic conditions that continue to confound even the most experienced individuals and, for foot and ankle surgeons, the diabetic Charcot neuroarthropathy (DCN) is an example. With its variety of unique clinical manifestations and still unknown true pathogenesis, DCN represents an elusive entity despite having numerous proposed medical and surgical treatment options becoming available over the years. An in-depth look into the history of DCN, including diagnostic and therapeutic developments over the last 80 years, demonstrates how much knowledge has been gained but also sheds light onto how much is still needed to go on with continued research into this complex disorder.

Although the name of the overall condition is historically attributed to Jean-Martin Charcot, it is William Riely Jordan<sup>1</sup> who is credited for first establishing an association

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between diabetes mellitus and painless Charcot joint of the ankle in 1936. In his article, a 56-year-old woman with a history of 14 years of diabetes mellitus, presented with a “useless and instable”<sup>1</sup> ankle joint that was also found in the contralateral ankle and foot. Two years after the original incidence, a “painless Charcot joint of the ankle in addition to chronic osteomyelitis of the foot of an unusual type and without obvious etiology”<sup>1</sup> was observed and considered “tentatively as a diabetic process of a neurologic trophic nature.”<sup>1</sup>

In 1868, Jean-Martin Charcot first described progressive arthropathic joint changes in tabes dorsalis (neurosyphilis) patients.<sup>2</sup> In 1883, even though Jean-Martin Charcot described neuropathic arthropathy of the foot in patients with tabes dorsalis, there is literature to suggest that Herbert William Page was the first individual to describe tabetic neuroarthropathy in the foot and ankle.<sup>2,3</sup> **Box 1** outlines the years of groundwork on neuropathic arthropathy that was initially laid by William Musgrave, John Kearsley Mitchell, Silas Weir Mitchell, Jean-Martin Charcot, and Herbert William Page before William Riely Jordan’s discovery in a patient with diabetes mellitus.<sup>4,5</sup>

Since 1936, a plethora of publications have associated the Charcot joint with diabetic neuropathy and specifically in the foot and ankle.<sup>6</sup> In 1937, Dreyfus and Zarachovitch<sup>7</sup> published the second case, followed by Bailey and Root<sup>8,9</sup> in 1942 and 1947, Jordan<sup>10</sup> in 1943, Foster and Bassett<sup>11</sup> in 1947, Morris<sup>12</sup> in 1947, Muri<sup>13</sup> in 1949, Wilson and colleagues<sup>14</sup> in 1949, and many others after 1950. In addition, after Jordan’s discovery of the diabetic Charcot joint in the foot and ankle in 1936, multiple diabetic neuroarthropathy anatomic locations have been described, including the knee and spine.<sup>6,15,16</sup>

## DESCRIPTION

Quickly following the time of Jordan’s observation, additional cases of diabetic Charcot foot and ankle populated the literature.<sup>6–14</sup> However, efforts to classify the stages of Charcot neuroarthropathy (CN) of the foot and ankle were not published until

### Box 1

#### Historical timeline for landmarks in the study of neuroarthropathy

*William Musgrave, 1703*

- First described neuropathic joint as arthralgia caused by venereal disease

*John Kearsley Mitchell, 1827*

- Examined spinal origin of rheumatism suggesting relationship between spinal cord lesion and foot and/or ankle arthropathy

*Silas Weir Mitchell, 1864*

- Described alterations in nutrition of joints related to nerve injuries

*Jean-Martin Charcot, 1868*

- Described general arthropathies associated with syphilis (tabes dorsalis)

*Herbert William Page, 1883*

- Earliest description of a rocker-bottom foot deformity associated with a tabetic (syphilitic) arthropathy

*William Riely Jordan, 1936*

- First established link between foot and/or ankle neuroarthropathy and diabetes mellitus

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