Case Report

BILATERAL NEUROARTHROPATHY 11 YEARS AFTER SIMULTANEOUS PANCREAS-KIDNEY TRANSPLANT FOR TYPE 1 DIABETES MELLITUS

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ABSTRACT

Objective: To report a case of a man who developed bilateral Charcot arthropathic feet 11 years after a simultaneous pancreas-kidney transplant (SPKT) for type 1 diabetes mellitus (DM). The patient had remained normoglycemic after surgery.

Methods: We present a retrospective review of the case notes and serial imaging.

Results: The patient developed dense peripheral diabetic neuropathy due to poor glycemic control. His biochemical markers of DM all normalized following SPKT, and he was discharged by his primary and secondary care diabetes services. Eleven years later, he developed Charcot arthropathy in one foot and, within a month, the other foot as well.

Conclusion: Individuals with DM who had preoperative end organ diabetes-related damage who went into biochemical remission after SPKT may be at risk for future complications. They should not be discharged from specialist diabetes services, and they need continued education about foot care. **(AACE Clinical Case Rep. 2019;5:e259-e262)**

Abbreviations:
CA = Charcot arthropathy; **DM** = diabetes mellitus; **SPKT** = simultaneous pancreas-kidney transplant

INTRODUCTION

Charcot arthropathy (CA) is an uncommon but devastating complication that occurs in approximately 1 in 200 people with diabetes mellitus (DM), but can result from any cause of peripheral neuropathy (1,2). Despite its disabling impact on patients, it is often overlooked, leading to a delay in diagnosis and subsequent mismanagement. A timely diagnosis is key to the management of CA (3). Once a diagnosis is established, initial treatment focuses on offloading the affected limb to protect the skeleton until remission is achieved.

Simultaneous pancreas-kidney transplant (SPKT) is currently one of the management options for people with type 1 DM with end-stage renal failure. Results have shown patients have a better quality of life and longer life expectancy. In individuals who may have had long-standing, poorly controlled DM, end organ complications may have occurred prior to SPKT. However, after transplantation eye, gut, nerve, and vascular disease have been shown to stabilize or improve as glycemic control returns to the nondiabetic range (4).

One DM-related complication that does not usually improve, however, is peripheral neuropathy. CA has been recognized to occur following SPKT, but usually within the first postoperative year (5-8). There are reports of CA occurring several years after SPKT (9). We present a case of bilateral CA developing 11 years following SPKT in a patient with DM with preexisting peripheral neuropathy. To our knowledge, this is the first documentation of such a late occurrence of bilateral CA after SPKT.

Submitted for publication August 16, 2018
Accepted for publication December 23, 2018
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DOI:10.4158/ACCR-2018-0408

CASE REPORT

A 55-year-old, self-employed builder had been diagnosed with type 1 DM at age 15, and was managed with insulin until the age of 44. He had several years of poor glycemic control, and had developed proliferative diabetic retinopathy as well as end-stage renal failure. He had developed a dense bilateral peripheral neuropathy for which all other potential causes had been excluded. In particular, he has no history of leprosy, spinal cord defects, syphilis, alcohol misuse, trauma, amyloidosis, or other autoimmune conditions. His vitamin B_{12} concentrations were within the reference range. As a result, he underwent SPKT.

Following the transplant, he was commenced on a regimen of corticosteroids and calcineurin inhibitors for immunosuppression. The operation resolved the need for continued insulin therapy and reduced his blood glucose and glycated hemoglobin (hemoglobin A1c) concentrations to nondiabetic ranges. Because the patient no longer had biochemical DM, he was discharged from his local specialist diabetes services.

Approximately 11 years later, the patient presented to his general practitioner with a 2-month history of increased temperature and swelling in his left foot. He was initially diagnosed with gout and commenced on treatment, which failed to resolve his symptoms. Subsequently a radiograph was requested, which identified features of CA with midfoot fractures, consolidation, and a loss of the medial longitudinal arch (Fig. 1).

The overall duration of treatment was 4 months, during which he was successfully treated in a total contact cast until he was in remission. He was fitted with a removable walking boot below the knee. Unfortunately, 1 month later, he presented with features consistent with a contralateral right CA. The diagnosis was confirmed by radiographs (Fig. 2) and magnetic resonance images (Fig. 3) of his right foot.

Once CA of the right foot was diagnosed, a similar management strategy ensued, which was to offload his affected foot. He is currently stable and remains under regular follow up. Written patient consent was obtained for this case report.

DISCUSSION

We have described the unusual case of a man who presented with bilateral CA of the feet 11 years after SPKT. Prior to the transplant, he had poor control of his diabetes and had evidence of end organ damage, including dense bilateral peripheral neuropathy. The CA occurred despite him having glucose concentrations in the nondiabetic range following SPKT. All other causes of peripheral neuropathy had been excluded prior to his transplant and subsequently, after he had developed his CA.

Previous studies have looked at CA following SPKT (5-9). In 2 reviews, it was reported that the development of CA commonly occurs within the first year, with the latest occurrence at 5 years post transplantation (5,6). Additionally we previously described a case series of patients developing CA after attaining normoglycemia following bariatric surgery (10).

Barrado et al (5) conducted a retrospective review of 100 patients and identified 9 patients who developed CA. Almost half developed CA within the first year, while the remaining 5 developed the condition within the next 5 years. In their analysis, the authors state that patients who developed CA had higher mortality and graft failure rates. They identified high pre-transplant hemoglobin A1c values and use of high corticosteroid doses as risk factors for developing acute CA.

Matricali et al (6) conducted a retrospective analysis of 66 patients and found a higher incidence of CA at 12% (6). Their conclusions were similar to Barrado et al (5), with a high pre-transplant hemoglobin A1c level as a significant risk factor for CA following SPKT. They also measured higher rates of mortality and graft rejection in the CA group. However, they suggested their results may be due to the small cohort size.

In a review by Rangel et al (7), 130 patients without any history of CA were analyzed retrospectively. Six patients developed de novo CA during the first year. They also suggested that high-dose glucocorticoid treatment was the main risk factor leading to bone resorption and myofibril proteolysis. As a result of these reports and their own 2 cases, Del Vecchio et al (8) emphasized the importance of

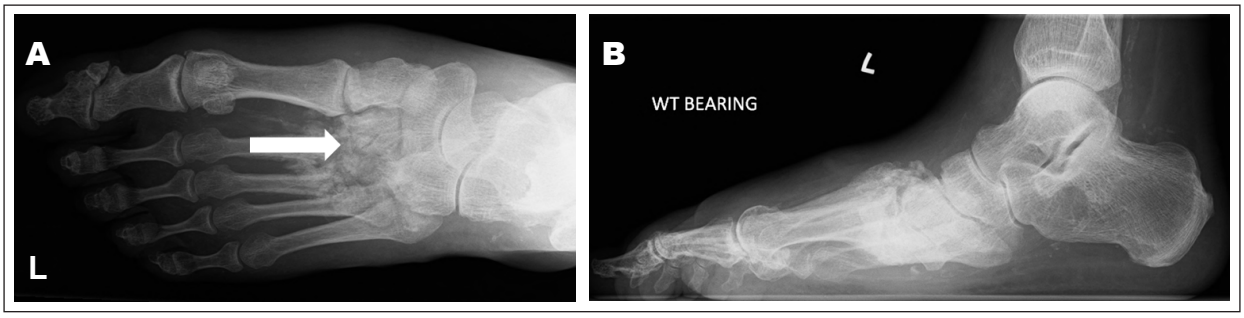

Fig. 1. Left foot anteroposterior (*A*) and lateral (*B*) radiographs demonstrating midfoot collapse as well as widening of the first and second metatarsal interspace.

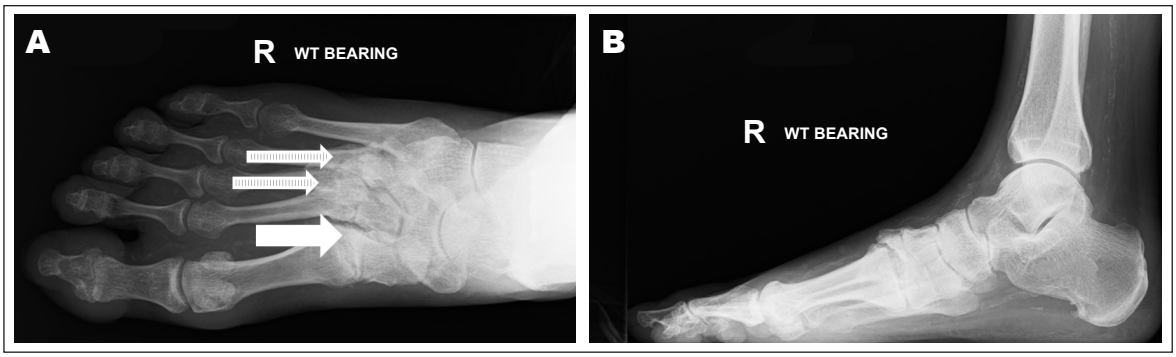

Fig. 2. Right foot anteroposterior (*A*) and lateral (*B*) radiographs demonstrating erosive arthropathic changes of the tarsometatarsal joints, particularly the first. Joint space is reduced and sclerosis is present (solid arrow). In addition, there are ununited fractures at the base of the third and fourth metatarsals (striped arrows).

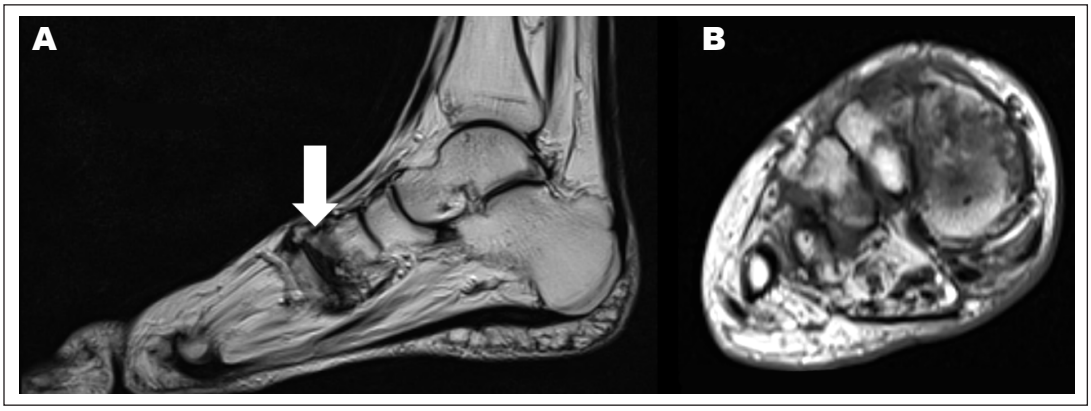

Fig. 3. Left foot magnetic resonance image of the second digit, sagittal (*A*) and axial (*B*) views. Destructive arthropathy of the common tarsometatarsal joint can be seen resulting in pes planus (solid arrow). There is marrow edema and severe erosive changes in the midfoot consistent with Charcot arthropathy. There is also collapse of the second metatarsal head.

regular systematic follow up of patients with DM undergoing SPKT with preexisting peripheral neuropathy.

While 1 previous case report described a case of CA 11 years after SPKT (9), to our knowledge this is the first report detailing the near simultaneous development of bilateral CA after SPKT. Our patient was lost to follow up when his diabetes went into remission after SPKT and there was no longer a need for dialysis. He did not receive regular foot care after that. His preexisting peripheral neuropathy and subsequent use of calcineurin inhibitors as part of the immunosuppressive regimen may have also contributed. Calcineurin inhibitors have direct effects on bone metabolism, and may also have neurotoxic effects (5,11).

CONCLUSION

This is the second reported presentation of CA occurring 11 years following SPKT, and the first to report bilateral occurrence. As this case demonstrates, there is no clearly defined time period beyond which we can assume a patient has no risk of developing de novo CA following SPKT. Therefore, despite normal glycemic control following transplantation, these patients should remain under lifelong specialist diabetes review. Patients and healthcare clinicians should maintain a high degree of clinical suspicion when presented with a hot swollen foot with a concurrent peripheral neuropathy.

DISCLOSURE

The authors have no multiplicity of interest to disclose.

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