Charcot arthropathy is a pattern of destructive changes that can impair joint function and stability. Since its original description by French physician Jean Marie Charcot, neuropathic arthropathy has been reported to affect nearly every joint in the body. The most accepted theory explaining the changes that occur in Charcot arthropathy centers around the cumulative effects of relatively minor traumatic events in an insensate joint. As the sum of these events accumulate, the joint surfaces are rapidly destroyed.

Due to their role in weight-bearing activities, the joints of the lower extremity are most commonly involved in this pathology. When neuropathic arthropathy of the upper extremity is observed, the shoulder is most frequently affected. Modern literature detailing cases of wrist involvement is limited to case reports from a myriad of different etiologies. To date, only one previous report of Charcot arthropathy of the wrist as a result of cervical spondylotic myelopathy exists. The purpose of this article is to describe a case of neuropathic arthropathy of the wrist secondary to cervical spondylotic myelopathy.

Case Report
A 72-year-old woman presented for evaluation of a progressive but painless right wrist deformity. The patient stated the...
deformity had developed over the preceding 6 months and denied previous trauma to the extremity. She noted that since the onset, the deformity had gradually increased despite a trial of nonsteroidal anti-inflammatory medication and activity modification. She denied loss of hand dexterity but had recently begun treatment with a urologist for bladder incontinence of unknown origin. The patient’s past medical history included hypertension, chronic obstructive pulmonary disease, and hyperlipidemia. She reported no known history of sexually transmitted infection, diabetes mellitus, stroke, spinal pathology, rheumatoid arthritis, or any other autoimmune arthropathy.

Examination revealed an obvious deformity of the right wrist. The carpal bones appeared to be translated dorsal and ulnar in relation to the distal radius. The skin overlying the wrist was normal with no erythema. There was full painless motion of the wrist in flexion, extension, and radial and ulnar deviation that produced palpable crepitus in all directions. Examination of the shoulder, elbow, and other joints of the hand revealed full motion and no obvious deformity. There was a near full range of cervical motion with negative Spurling’s test and no Lhermitte’s phenomenon. Neurological examination revealed diminished sensation to light touch bilaterally in the upper and lower extremities in all dermatomes. She had full strength in all major muscle groups in the bilateral upper and lower extremities. She demonstrated hyperreflexia bilaterally in the upper and lower extremities. A positive Hoffman’s sign and inverted radial reflex were noted bilaterally. Babinski test revealed down-going toes. Her gait was widened, and she used a walker outside of the home.

Radiographs of the right wrist revealed advanced destructive changes of the radiocarpal joint (Fig. 1). Radiographs of the cervical spine revealed diffuse subaxial spondylosis associated with anterior spondylolisthesis of C4 on C5 (Fig. 2). Cervical lordosis was maintained, and no gross instability was noted on lateral flexion-extension radiographs. Magnetic
resonance imaging of the cervical spine demonstrated concomitant spinal cord deformation in the subaxial spine at multiple levels (►Fig. 3). There was no evidence of syringomyelia. White blood cell count and erythrocyte sedimentation rate were normal. The case was presented in grand rounds to the orthopedic teaching staff at our institution. Given the unique presentation of painless radiocarpal joint destruction, most other etiologies were ruled out. There were no other features suggestive of a seropositive joint arthropathy, and given the normal laboratory studies, septic arthropathy was not likely. In the absence of a syrinx, the most common etiology of a neuropathic joint was also ruled out. Given the neurological examination and the presence of spinal cord compression in the subaxial spine secondary to cervical spondylosis, the most likely etiology was myelopathy.

The patient underwent posterior C3–C7 decompressive laminectomies and instrumented posterior spinal fusion without complication (►Fig. 4). Although she was offered a fusion of her wrist joint by our hand surgeon, she declined because her wrist was not painful and her upper-extremity and hand functions were not limited. Her wrist deformity was treated in a removable wrist splint.

At 6-month follow-up, the patient had no progression of her preoperative myelopathic symptoms. In fact, there was moderate improvement in her urinary incontinence with regards to frequency and bladder emptying. She also demonstrated an improved gait, although she continued to use a walker outside the home. All other preoperative long-tract signs remained.

Discussion
Charcot arthropathy is a cascade of destructive changes that can affect joints of both the axial and appendicular skeleton. First described in detail by French neurologist Jean Marie Charcot in 1868, the most commonly accepted theory regarding the development of this condition centers around the accumulation of minor traumatic events after the loss of normal joint sensation.1–3 The most frequently cited cause of Charcot arthropathy of the upper extremity is syringomyelia, although pathologies such as diabetes mellitus, tabes dorsalis, leprosy, and other disorders effecting the nervous system have been reported to lead to this condition. Neuropathic arthropathy involving the wrist is a rare phenomenon with fewer than 20 published reports in modern literature. Of these reports, most have been attributed to tabes dorsalis, diabetes mellitus, or leprosy.4–6 In 1983, Mossman and Jestico published a report of two patients with cervical spondylotic myelopathy who presented with disassociated sensory loss.7 Among the subjects presented, one had manifestations of Charcot arthropathy of the wrist. According to the authors’ report, radiographs and myelography obtained in this patient demonstrated retrolisthesis at the level of C4–5 and C5–6 with maximal cord compression occurring at C4–5. Though the other subject presented had no signs of neuropathic arthropathy, the authors did note impaired proprioceptive sensation in the
wrist and finger joints from compression at C4–6 on cervical myelography. The common location of spinal pathology in these two cases (C4–6), and the one reported here may suggest a predilection for wrist involvement when spondylotic myelopathy preferentially disturbs the spinothalamic tracts at these levels.

Charcot arthropathy of the wrist is rare condition with a broad spectrum of potential causes. To our knowledge, this presentation represents the second reported case of neuropathic arthropathy of the wrist secondary to cervical spondylotic myelopathy. Although the mechanism of this disorder is not completely understood, the similar levels of spinal cord compression in this and the previously reported case may offer valuable insight into further investigations on this topic. Evaluation of the cervical spine should be considered when evaluating new cases of neuropathic arthropathy of any joint in the appendicular skeleton without other obvious etiologies.

Notes
The views expressed in this manuscript are those of the authors and do not reflect the official policy or position of the Department of the Army, Department of Defense, or the U.S. Government.

Disclosures
Keith Jackson, None
Uma Ramadorai, None
Brian Abell, None
John DeVine, None

References
1 Eloesser L. On the nature of neuropathic affections of the joints. Ann Surg 1917;66:201–207
2 O’Connor BL, Visco DM, Brandt KD, Myers SL, Kalasinski LA. Neurogenic acceleration of osteoarthrosis. The effects of previous neurectomy of the articular nerves on the development of osteoarthrosis after transection of the anterior cruciate ligament in dogs. J Bone Joint Surg Am 1992;74:367–376
3 Alpert SW, Koval KJ, Zuckerman JD. Neuropathic arthropathy: review of current knowledge. J Am Acad Orthop Surg 1996;4:100–108
4 Nagano J, Tada K, Masatomi T, Horibe S. Arthropathy of the wrist in leprosy—what changes are caused by long-standing peripheral nerve palsy? Arch Orthop Trauma Surg 1989;108:210–217
5 Wróbel M, Szymborska-Kajanek A, Skiba M, et al. Charcot’s joint of the wrist in type 2 diabetes mellitus. Exp Clin Endocrinol Diabetes 2007;115:55–57
6 Tatlow RW. Charcot disease of the wrist and the carpus. Clin Orthop Relat Res 1966;46:115–119
7 Mossman SS, Jestico JV. Central cord lesions in cervical spondylotic myelopathy. J Neurol 1983;230:227–230