

A Severe Case of Neurogenic Myositis Ossificans in a Patient with Thoracic Spinal Cord Injury

Pulkit S. Bose MD; Veronica Chehata MD; Natasha Romanoski DO

Penn State Health, Department of Physical Medicine and Rehabilitation

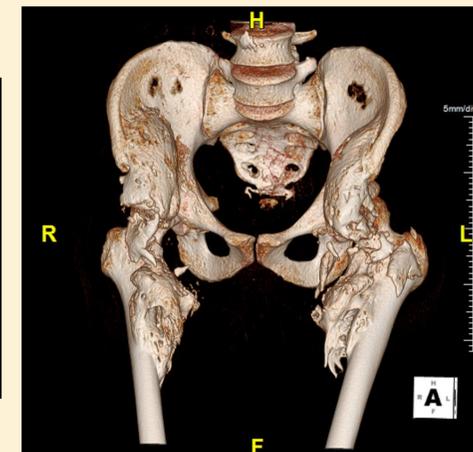
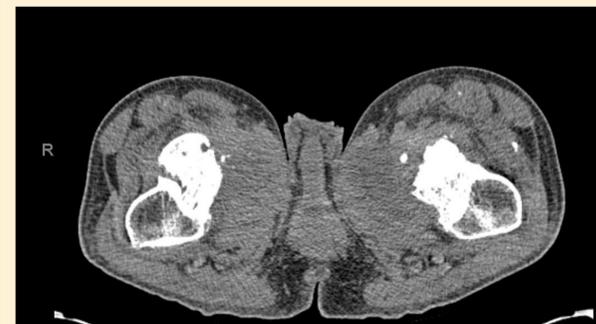


Introduction

Neurogenic myositis ossificans (NMO) is a subset of heterotrophic ossification [1] characterized by the formation of ectopic bone in soft tissue in spinal cord injury (SCI) patients. Although the precise pathophysiology of this complication in SCI is not fully known, autonomic dysregulation, prolonged immobilization, neuro-immunological and neuro-humoral changes play a role in inflammatory osseous cartilaginous matrix deposition and ectopic bone formation.[2] NMO may present as an incidental finding on imaging or as progressive limitations in the range of motion, and in advanced cases, ankylosis of the peripheral joints. Clinical findings can include a reduction in hip joint motion, peri-articular edema, increased spasticity and thus consequent loss of adequate sitting posture leading to decubitus ulcers and pain in patients who have sensory sparing. NMO can be diagnosed by radiography, but MRI is the preferred imaging modality for soft tissue, and CT scan is better at identifying calcifications. Since NMO can greatly compromise a patient's ability to transfer and severely impacts activities of daily living and quality of life, the primary goals of non-surgical treatment are to relieve symptoms and improve function. Surgical excision is indicated when non-surgical treatments fail in cases of intractable pain, advancing disease with lesions compressing critical neurovascular structures, or reduced range of motion, and impaired functionality.[3]

Case Description

A 27-year-old prior modified independent male with T6 ASIA A SCI presented a year after injury with severe abdominal and hip flexor spasticity. His symptoms began 10 months after SCI resulting in functional decline, including need for assistance with transfers. He was found to have bilateral iliopsoas and recti femoris NMO on bone scan and CT scan. Spasticity was treated with abobotulinumtoxinA injections with some relief. He was not treated with bisphosphonates. He declined intrathecal baclofen pump for spasticity and preferred to have surgery given the severity of his symptoms. Surgical resection of heterotopic bone was recommended; however, the procedure was postponed due to the coronavirus pandemic. Patient continued on botulinum toxin injections, reducing problematic spasticity and allowing him to regain independence with lateral transfers.



CT Pelvis: Coronal (left), axial (center), reconstructed (right) views: Extensive heterotopic ossification bilaterally extends from the medial wall of the iliac bone along the anterior soft tissues of the hip to the proximal femoral diaphysis.

References

- 1) Meyers C, Lisiecki J, Miller S, Levin A, Fayad L, Ding C, Sono T, McCarthy E, Levi B, James AW. Heterotopic Ossification: A Comprehensive Review. *JBMR Plus*. 2019 Feb 27;3(4):e10172. doi: 10.1002/jbm4.10172.
- 2) van Kuijk AA, Geurts AC, van Kuppevelt HJ. Neurogenic heterotopic ossification in spinal cord injury. *Spinal Cord*. 2002 Jul;40(7):313-26. doi: 10.1038/sj.sc.3101309.
- 3) Walczak BE, Johnson CN, Howe BM. Myositis Ossificans. *J Am Acad Orthop Surg*. 2015 Oct;23(10):612-22. doi: 10.5435/JAAOS-D-14-00269. Epub 2015 Aug 28.
- 4) Ausk BJ, Gross TS, Bain SD. Botulinum Toxin-induced Muscle Paralysis Inhibits Heterotopic Bone Formation. *Clin Orthop Relat Res*. 2015 Sep;473(9):2825-30. doi: 10.1007/s11999-015-4271-4.

Discussion

Neurogenic myositis ossificans after SCI, a subset of heterotopic ossification (HO), refers to formation of heterotopic bone in the periarticular soft tissues of large joints and commonly occurs in the iliopsoas and quadriceps femoris muscles, resulting in severe ankylosis. Definitive treatment is surgical. To our knowledge, only one study shows that botulinum toxin may mitigate the development of HO in rat femur fracture models by reducing osteogenesis [4]; however, the role of botulinum toxin in NMO is not defined. We present a case of severe NMO that resulted in functional dependence and severe spasticity. We show that botulinum toxin injections may be effective in providing relief from spasticity due to NMO.

Conclusion

We present a case of severe NMO in a young male patient with thoracic SCI to point out the necessity of prompt recognition and management of this condition that may significantly impair function. We note that managing this issue amidst the coronavirus pandemic further complicates care. We show that botulinum toxin injections may provide symptomatic relief until definitive treatment is obtained. Further research on the role of botulinum toxin in NMO, including the possibility of slowing progression, is necessary.

