Spinal Intradural Extramedullary Bizarre Parosteal Osteochondromatous Proliferation of Bone (Nora’s Lesion): First Case Report

Abstract
Bizarre parosteal proliferation of bone (Nora’s lesion) is a known bony lesion that affects mainly hands and feet. In this article, we present the first case of spinal intradural extramedullary Nora’s lesion along with the management. Radiologically, the tumor was initially diagnosed as a meningoima. However, histopathological analysis confirmed bizarre parosteal proliferation of bone. It was successfully managed by surgical resection followed by physical rehabilitation.

Keywords: Bizarre parosteal proliferation of bone, intradural tumors, Nora’s lesion, spinal cord compression, spinal tumors

Introduction
Nora’s lesion or bizarre parosteal osteochondromatous proliferation (BPOP) of bone is one of several described types of osteochondromas. It is an exophytic bony outgrowth consisting of bone, cartilage, and fibrous tissue that typically has continuation with the underlying periosteum.[1,2] In addition to Nora’s lesion, osteochondromas include solitary osteochondromas, postirradiation osteochondroma, multiple osteochondroma, epiphyseal osteochondroma, subungual exostosis, and para-articular osteochondroma.[3] It was first described in small bones of hands and feet by Nora et al. in 1983 followed by several cases reports.[2,4] There are more than 160 reported cases of BPOP mostly in the long bone and other parts of the bony skeleton.[2,4] In this report, we present the first case of spinal intradural extramedullary Nora’s lesion.

Case Report
A 61-year-old female, with an unremarkable past medical history, presented to our emergency department complaining of progressive right lower limb weakness started 15 days before presentation associated with back pain around the right mid-thoracic region. The back pain started 4 months before presentation. No lower limb pain was reported. There was a negative history of fever, trauma, corticoid use, or malignancy. There was no urinary/fecal incontinence or retention.

On physical examination of the lower limbs, she was found to have a mild hypertonic muscular tone bilaterally. The power of the right and left lower limbs was 3/5 and 5/5, respectively. Patellar and Achilles tendon reflexes were brisk 3/4 bilaterally, Babinski sign was equivocal, and gait was unsteady. Sensory examination showed diminished light touch and pinprick sensations on and below the T4 level. Diminished proprioception marked mainly at the right side. Rectal examination showed preserved anal tone. The upper limbs’ neurologic examination was normal.

Investigations
Laboratory analyses for complete blood count, electrolytes, erythrocyte sedimentation rate, and C-reactive protein were within normal range.

Gadolinium-enhanced magnetic resonance imaging (MRI) of the spine showed homogeneously enhanced oval intradural extramedullary lesion at the thoracic level measuring 12 mm × 14 mm located at the T4–T5 level. The lesion is exerting a significant local mass effect, causing marked cord compression. The lesion was hypointense on T2-weighted image [Figure 1]. On computed tomography scan, the lesion showed calcifications associated with osteosclerosis of the right lamina and pedicle [Figure 2].

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Differential diagnosis of the lesion included mainly a calcified meningioma followed by other primary or secondary spinal tumors. Less likely differentials were infectious or inflammatory processes.

**Operative management**

The patient was managed operatively through a laminectomy at the level of T4 and T5. The paraspinal muscles and spinal ligaments were intact. However, the spinous processes and the right T4 lamina were looking abnormal. The outer dural layer was attached to the lamina. However, the dura was easily detached from the lamina and found intact after the laminectomy was done. The dura was opened in a midline longitudinal fashion. Once opened, a white, nonhypervascular, hard tumor was seen. It had stony consistency with calcifications forming a hard shell-like structure. The tumor was attached to the dura and nerve root [Figure 3]. With careful dissection under the microscope, we were able to remove the tumor in a piecemeal fashion [Figure 4]. After complete removal of the tumor, dural, subcutaneous tissue, and skin closures were done in the routine fashion.

**Histopathology**

Histopathological analysis of the tumor showed a disorganized proliferation of fibrous, cartilaginous, and bony tissues. At some locations, the cartilaginous component showed irregular groups of enlarged binucleated and atypical chondrocytes. Immunodetections with anti-MDM and Ki67 antibodies showed no immunolabeling. The Ki67 was about 1%. The histopathological features of the tumor were consistent with a BPOP of bone (Nora’s lesion).

**Postoperative course, outcome, and follow-up**

Corticosteroid was given. No central nervous system infection or cerebrospinal fluid leakage occurred. Rehabilitation started 2 weeks after the operation. The patient was allowed to do walking exercises. At the 6-month follow-up, her right lower limb showed a significant improvement in power, grade of about +4/5. She was able to walk without any difficulty. No clinical or radiological signs of recurrence were noted. Follow-up MRI of the spine showed completely resected tumor without signs of recurrence [Figure 5].

**Discussion**

Nora’s lesion is a formed by heterotopic ossification.[1] It is an exophytic bony outgrowth consisting of bone, cartilage, and fibrous tissue that typically has continuation with the underlying peristeum.[2] In our case, although the tumor was attached to the dura, which in turn was attached to the lamina, the tumor itself was completely intradural with no apparent attachment to the lamina.

In the literature, there is one reported case of spinal intradural extramedullary chondroma and around 20 cases of cranial intradural chondroma.[6,7] Histopathologically, Nora’s lesion – in contrast to osteochondroma – has less organized microscopic appearance and nuclear atypia with atypical chondrocytes.[8] It may present hypercellularity and mitotic activity.[8] To our knowledge, this is the first reported case of spinal intradural extramedullary BPOP of bone (Nora’s lesion).
In bony lesions, Nora’s disease has a tendency to recur locally with no metastases and almost no malignant transformation was reported.[1,2,4] The initial recurrence rate is up to 51% after the first resection and 22% after the second one.[5,9] Recurrence is usually within the first 2 years.[5,9] We are managing the patient postoperatively as if the tumor has similar behavior. However, whether this hypothesis is true or not will be determined with long-term follow-up of the patient and will be reported in future communications.

**Conclusion**

This is a first case report of spinal intradural extramedullary bizarre parosteal proliferation of bone (Nora’s lesion). The patient was successfully managed with surgical resection and physical rehabilitation. Close follow-up is being done for possible recurrence based on known tumor behavior in the bony skeleton.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

**Conflicts of interest**

There are no conflicts of interest.

**References**