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*Case Report*

# Foramen magnum osteochondroma causing myelopathy in a patient with hereditary multiple exostoses

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## ABSTRACT

**Background:** Osteochondromas are commonly occurring benign bone tumors which may be either a solitary lesion or occur due to association with hereditary multiple exostoses (HMEs). There have been several reported cases of spinal osteochondromas, but intracranial lesions are rare.

**Case Description:** A 51-year-old male with a history of multiple osteochondromas presented with myelopathy. He had an exostosis arising from the foramen magnum causing compression of the cervical spinal cord that was successfully removed. Genetic testing revealed that he had HMEs.

**Conclusion:** Osteochondromas of the skull are extremely rare. However, parts of the foramen magnum ossify in cartilage and can give rise to an osteochondroma. Here, we present a patient with HMEs who developed cervical myelopathy due to an osteochondroma arising from the foramen magnum. Due to the cartilaginous ossification of the foramen magnum, clinicians should be aware that osteochondromas can occur in this location and potentially give rise to cervical myelopathy.

**Keywords:** Exostoses, Osteochondroma, Myelopathy

## INTRODUCTION

Osteochondromas are benign bone tumors occurring in 3% of the general population; they account for 30% of all benign bone tumors.[6] However, intracranial osteochondromas are rare (0.1–0.2% of all intracranial tumors).[7] Of the 31 cases of intracranial osteochondromas reported in the literature, only 1 arose from the foramen magnum.[1,2,4,5,7-9,11,12,14] Here, we present a patient with a foramen magnum/skull base osteochondroma causing spinal cord compression attributed to underlying hereditary multiple exostoses (HMEs).

## CASE DESCRIPTION

A 51-year-old male presented with a 12-year history of difficulty climbing stairs, 12 months of clumsiness of both hands, and 9 months of shooting pain into the radial aspect of his left forearm, along with right-handed weakness/grip. He had historically had osteochondromas removed from his right iliac crest and left scapula, 12 and 11 years ago, respectively. He also gave a history of a bony growth on his forearm which had been previously removed.

### Neurological examination

On examination, he was 5 foot 4 inches in height with bowing of both forearms and legs, and exaggerated curvature of the medial border of both feet. He exhibited a scissoring gait with spasticity (i.e., no motor deficit but hyperactivity of reflexes with bilateral Babinski responses) more right sided along with right medial thigh atrophy. The sensory examination was intact.

### Diagnostic studies

Plain X-ray of the cervical spine [Figure 1] showed an exostosis at the posterior aspect of the craniovertebral junction; this finding was confirmed on CT scan [Figure 2]. The cervical MR showed severe cord compression from the posteriorly located exostosis, and there was a high signal in the cord on the T2-weighted image [Figure 3].

### Surgery

The patient underwent removal of the C1 lamina *en bloc* laminectomy; it revealed a bony exostosis covered with a cartilaginous cap arising from the posterior lip of the foramen magnum that was drilled away achieving good decompression of the dura surrounding the spinal cord [Figure 3a and b]. Postoperatively, the patient had complete relief from his arm pain, and his spasticity also improved; he was discharged on the 5$^{th}$ postoperative day. Six months later, he continued to do well.

### Histopathology

The histopathological report confirmed the diagnosis of osteochondroma [Figures 4]. The patient was subsequently sent for genetic analysis which confirmed he had hereditary multiple exostosis (i.e., also called diaphyseal aclasis).

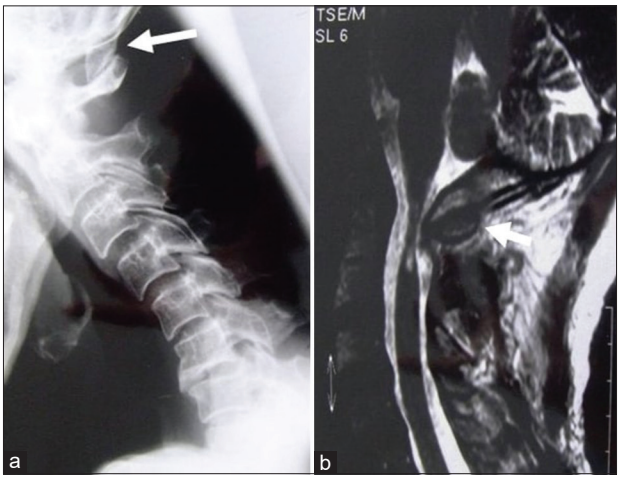


Figure 1: (a) Lateral cervical spine X-ray shows an exostosis at the posterior part of the craniovertebral junction (white arrow). (b) Sagittal T2 WI MRI shows a bony spur from the lip of the foramen magnum (white arrow) pressing on the spinal cord and causing signal changes.

## DISCUSSION

Osteochondroma is the most common benign bone tumor. It is a cartilage-tipped exostosis and can be sessile or pedunculated with a cancellous structure that is well formed with a complete cortex. The stalk of an exostosis

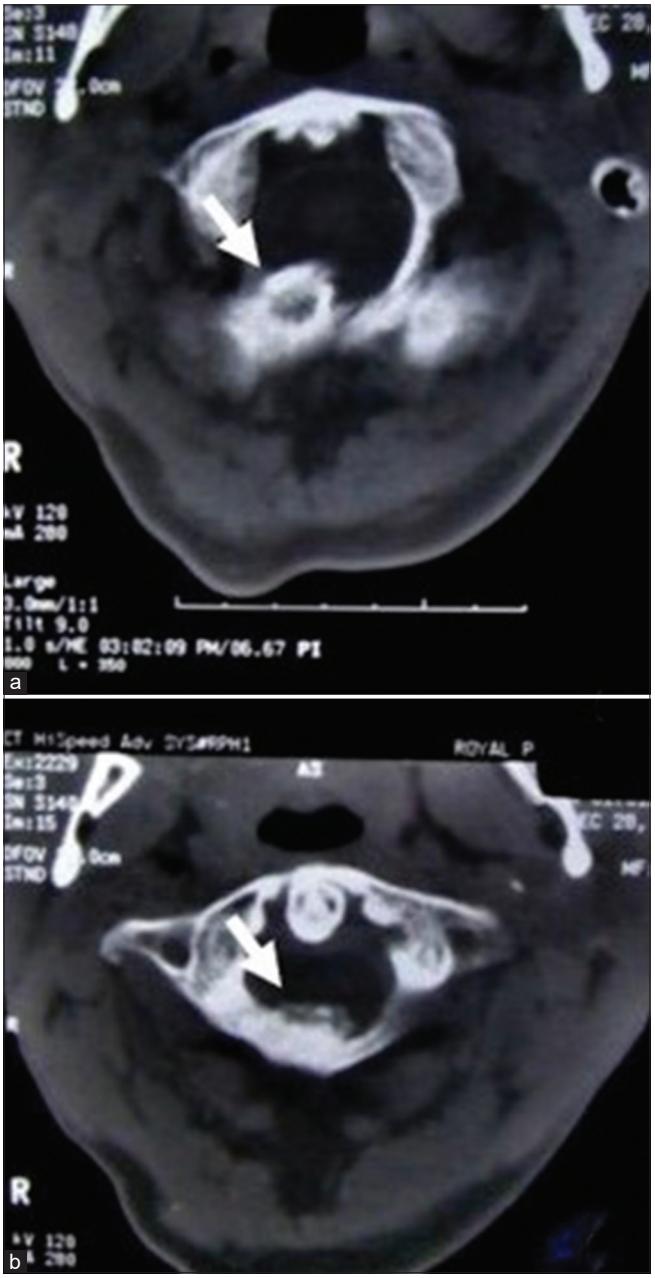


Figure 2: Axial CT scan shows the osteochondroma protruding into the cervical canal (white arrow), (a) axial view of foramen magnum, (b) axial view C1.

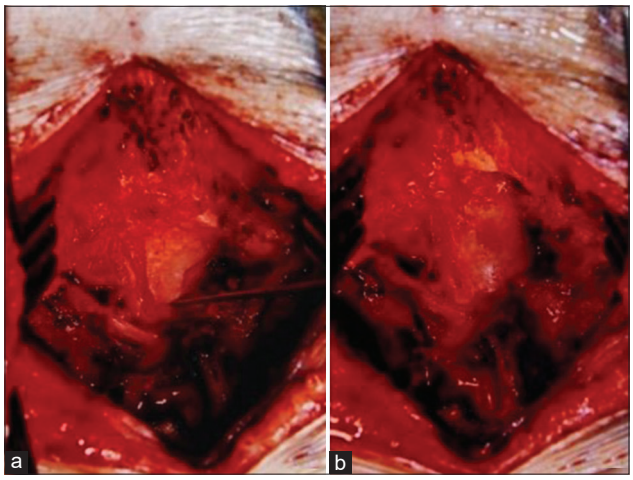


**Figure 3:** (a) Intraoperative photograph after removing the posterior arch of C1 lamina shows the pointer identifying the tip of the exostosis arising from the posterior lip of the foramen magnum. (b) Intraoperative photograph after removing the osteochondroma shows the decompressed cervical spinal cord.

must be in direct continuity with the underlying cortex and medullary canal to be considered a true osteochondroma.[10] It can occur as a solitary lesion or as part of HME. Any bone which develops endochondral cartilage is susceptible to osteochondromas; they most commonly occur on the lateral side of active growth plates within long bones, but can also occur on the knee, scapulae, pelvis, tarsal, and carpal bones. In patients with HME, osteochondromas tend to be larger and highly irregular.[3,10]

Intracranial osteochondromas are very rare, accounting for 0.1–0.2% of all intracranial tumors.[7] Lotfinia *et al*. (2012) reported a similar case in which a 73-year-old male presenting with quadriparesis and gait difficulties underwent complete and successful excision of an osteochondroma originating from the foreman magnum.[9]

Hongo *et al*. (2015) and an additional seven cases (including our report) demonstrated that 43.3% of these lesion originating from the skull convexity, with the remainder originating from the falx cerebri (13.3%), parasellar (10%), posterior clinoid (10%), foramen magnum (6.7%), sella turcica (6.7%), middle fossa (3.3%), petrous bone (3.3%), and suprasellar (3.3%) regions.[1,2,4,5,7,12,14] Venkata *et al*. (2011) expressed that complete excision of an intracranial osteochondroma is curative.[13]

## CONCLUSION

Here, we report a foramen magnum osteochondroma in a patient with HME. Spinal surgeons should be aware that osteochondromas can arise from this location precipitating the onset of cervical myelopathy.

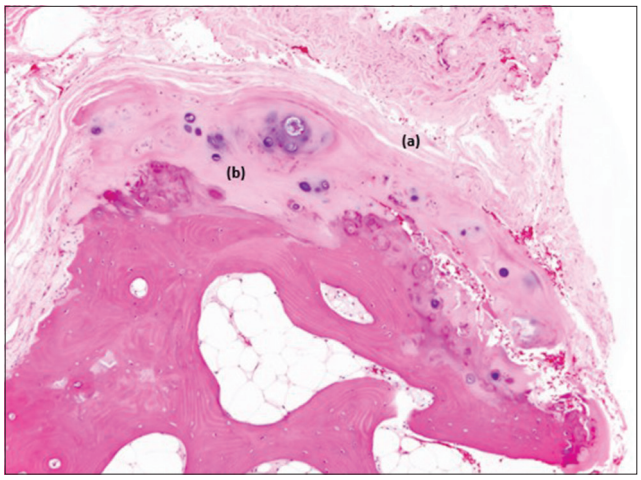


**Figure 4:** Microscopic histology of the osteochondroma lesion sample during the procedure, (a) the perichondrium, (b) the cartilage cap.

### Declaration of patient consent

Patient's consent not required as patients identity is not disclosed or compromised.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

## REFERENCES

1. Amita R, Sandhyamani S, Easwer H, Nair S, Praveen A, Kapilamoorthy T. Giant intracranial osteochondroma: A case report with review of literature. Indian J Neurosurg 2017;3:169-70.
2. Beck DW, Dyste GN. Intracranial osteochondroma: MR and CT appearance. AJNR Am J Neuroradiol 1989;10:S7-8.
3. Beltrami G, Ristori G, Scoccianti G, Tamburini A, Capanna R. Hereditary multiple exostoses: A review of clinical appearance and metabolic pattern. Clin Cases Miner Bone Metab 2016;13:110-8.
4. Hongo H, Oya S, Abe A, Matsui T. Solitary osteochondroma of the skull base: A case report and literature review. J Neurol Surg Rep 2015;76:e13-7.
5. Hori YS, Ebisudani Y, Aoi M. Joint capsule-like intracranial osteochondroma mimicking cystic meningioma. World Neurosurg 2017;108:985.e9-11.
6. Kitsoulis P, Galani V, Stefanaki K, Paraskevas G, Karatzias G, Agnantis NJ, *et al*. Osteochondromas: Review of the clinical, radiological and pathological features. *In Vivo* 2008;22:633-46.
7. Kumar S, Shah A, Patel A, Shah U. CT and MR images of the flat bone Osteochondromata from head to foot: A pictorial essay. Indian J Radiol Imaging 2006;16:589.

8. Lotfinia I, Vahedi A, Aeinfar K, Tubbs RS, Vahedi P. Cervical osteochondroma with neurological symptoms: Literature review and a case report. Spinal Cord Ser Cases 2017;3:16038.
9. Lotfinia I, Vahedi P, Tubbs RS, Gavame M, Vahedi A. Basioccipital bone osteochondroma growing into the foramen magnum. Surg Neurol Int 2012;3:21.
10. Murphey MD, Choi JJ, Kransdorf MJ, Flemming DJ, Gannon FH. Imaging of osteochondroma: Variants and complications with radiologic-pathologic correlation. Radiographics 2000;20:1407-34.
11. Padhya TA, Athavale SM, Kathju S, Sarkar S, Mehta AR. Osteochondroma of the skull base. Otolaryngol Neck Surg 2007;137:166-8.
12. Sullivan JC, Goldsmith J, Rojas R, Varma H, Kasper EM. Intracranial dural parafalcine chondroma: Case report and systematic review of the literature. World Neurosurg 2019;122:1-7.
13. Venkata R, Garikaparthi S, Parvatala A, Kakarala S, Duttaluru S, Chinnam A. Giant intracranial osteochondroma: A case report and review of the literature. Surg Neurol Int 2011;2:118.
14. Zanotti MC, Melamed I, Diomin V, Walter E, Baraf L, Frenkel M, *et al*. A multidisciplinary approach for the treatment of young patients with suprasellar osteochondroma. Childs Nerv Syst 2018;34:559-63.

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