

Multiple hereditary exostoses and stroke due to vertebral artery dissection.

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Abstract

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Vascular complications related to multiple hereditary exostoses are uncommon. We present a 39-year-old male patient with multiple exostoses in the upper and lower limbs with an associated positive familial history of such lesions. He experienced a sudden onset of left-side ataxia and hypoesthesia secondary to a left lateral medullary infarction, which was due to a stenotic-pattern vertebral artery dissection (V1-V4). This complication is very rare as a differential diagnosis in the vertebro-basilar dissection spectrum, and a non-specific relation has been found.

MHE	Multiple hereditary exostoses
AT	angiogramography
VAD	vertebral artery dissection
CAD	cervical artery dissection
OI	osteogenesis imperfecta

Key words

Multiple hereditary exostoses; osteochondroma; vertebral artery dissection; medullary ischemic stroke; skeletal dysplasias

Introduction

Multiple hereditary exostoses (MHE) is an autosomal dominant disorder manifested by multiple lesions that are frequently associated with characteristic skeletal deformities.^{1,2} It is characterized by multiple cartilage-capped bony protuberances, called osteochondromas or exostoses, that project from the metaphyses of long bones.³ Although osteochondromas are benign, they can cause several secondary complications, including compression of nerves, tendons and blood vessels. Here, we report a case of a male patient with MHE who devel-

oped a left medullary infarction due to vertebral artery dissection.

Case report

A 39-year-old right-handed man was diagnosed with multiple bone deformities in the upper and lower limbs at birth and had no other relevant medical history. His family history was positive in three of his daughters (three of five had similar bone deformities). The patient was admitted after a sudden onset of vertigo, right-sided

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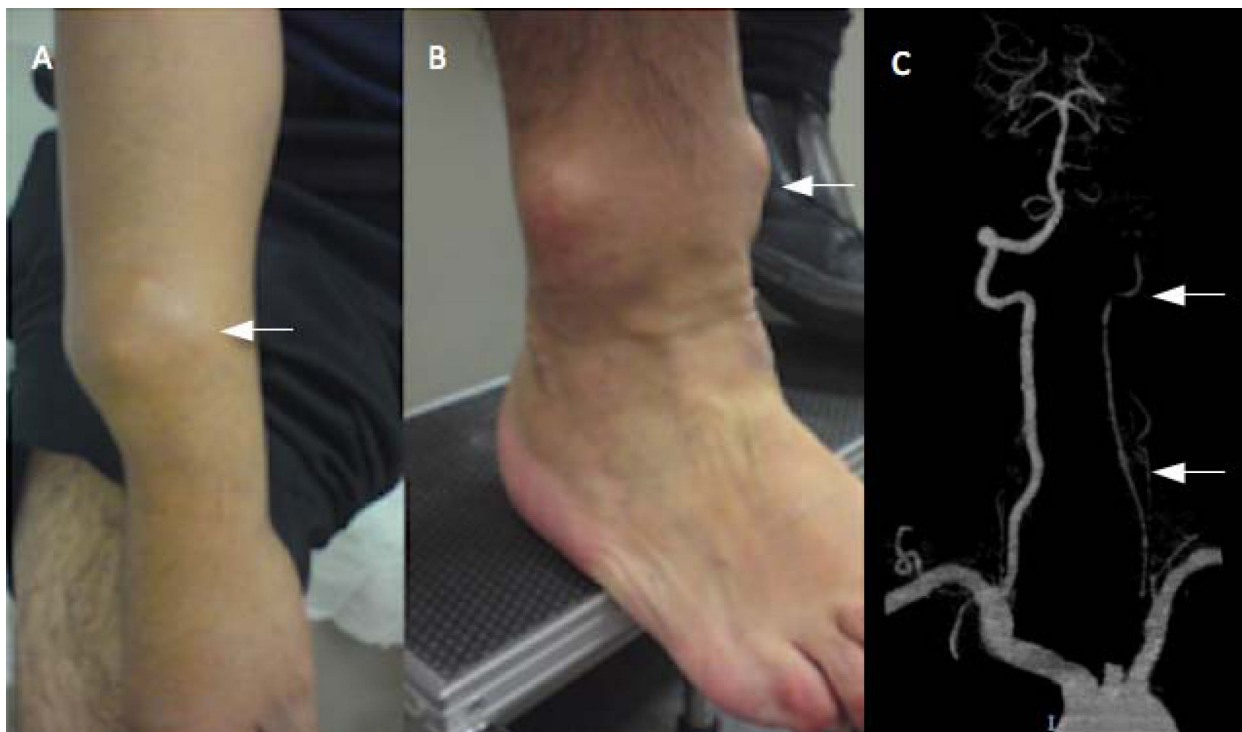


Fig. 1. A,B Large osteochondromas in the upper and lower limbs (white arrows) C Vertebro-basilar angiogram showing a left vertebral stenotic dissection from the V1–V4 segments (white arrows).

hypoesthesia, left-sided ataxia, and gait disturbance. There was no antecedent of trauma, neck manipulation, or previous infection. A general physical examination showed short stature and confirmed multiple bone deformities in the epiphyses of the long bones, a short neck and narrow shoulder girdle (Fig. 1 A,B).

Neurological findings were consistent with left cerebellar syndrome, right hemihypoesthesia to temperature and vibration, and bilateral horizontal nystagmus. Magnetic resonance imaging of the brain showed a left lateral medullary infarction and hyper-intensity at the left vertebral artery origin on a T2 sequence. Angiotomography (AT) of cervical arteries revealed a long segment of dissection in the cervical and intracranial segments of the left vertebral artery (Fig. 1 C). Bone series radiographic studies showed exophytic lesions in all epiphyses of long bones without involvement of the diaphysis, important bilateral radial shortness and bowing, and reduced curvature in both ulnae. No exophytic lesions were found on the cervical bones. The family pedigree showed two successive affected generations, consistent with the pattern of inheritance of this disease.

Even though we were unable to find specific treatment guidelines, the patient exhibited a good recovery status

(modified Rankin score: 1) following the treatment strategies of dissections of other etiology. At the six-month follow-up evaluation, the patient was completely recovered, and a control AT showed no recanalization of the dissected vertebral artery.

Discussion

MHE is a rare skeletal disorder that primarily affects endochondral bone during growth.³ Exostoses can affect almost every bone in the body and can cause both neurologic and vascular problems through extrinsic compression of nerves and vascular structures.^{3,4} The prevalence of vascular compression secondary to exostoses has been reported to be as high as 11.3%.⁵ Pseudoaneurysm, vascular compression, arterial thrombosis, aneurysm and venous thrombosis were the most commonly reported complications in a series of 97 cases of vascular complications stemming from osteochondromas.³ Movement or repetitive trauma causes the osteochondroma to abrade and finally lacerate the adjacent vessel wall. However, in our case and in previously reported vertebral artery dissection (VAD) cases in patients with heritable bone disease, no evidence of exostosis in the cervical vertebra was documented.^{4,6} Similar to patients with osteogene-

sis imperfecta (OI), genetic diathesis of connective tissue has been proposed as a possible explanation of VAD in these cases.⁶ Most patients with OI have a mutation in one of the two genes that encode the alpha chains of collagen type I,^{7,8} which may explain other clinical signs such as bone fractures, aortic root dilatation, and cervical arterial dissection (CAD).

Patients with CAD often seem to have a predisposing arterial wall weakness, as suggested by various concomitant structural and functional arterial abnormalities.⁹ Although the notion of an underlying arteriopathy and a trigger are universally accepted concepts, some researchers have proposed that dissection is a product of an underlying (genetic) predisposition, triggered specifically by risk factors associated with environmental exposure, with or without trivial trauma.¹⁰ Our case observation supports previous findings of a possible relationship among CAD and heritable bone diseases. It is possible that abnormalities in the structural proteins common to bone and blood vessels predispose the arterial wall to weakness and dissection.

References

1. Stickens D, Clines G, Burbee D, et al. The *Ext2* multiple exostoses gene defines a family of putative tumor suppressor genes. *Nat Genet* 1996;14:25–32.
2. Black B, Dooley J, Pyper A, Reed M. Multiple hereditary exostoses: an epidemiologic study of an isolated community in Manitoba. *Clin Orthop* 1993;287:212–217.
3. Stieber J, Dormans J. Manifestation of hereditary multiple exostosis. *J Am Acad Orthop Surg* 2005;13:110–120.
4. Vasseur M, Fabre O. Vascular complications of osteochondromas. *J Vasc Surg* 2000;31:532–538.
5. Wicklund CL, Pauli RM, Johnston D, Hecht JT. Natural history study of hereditary multiple exostoses. *Am J Med Genet* 1995;55:43–46.
6. Hill MD, Czechowsky D, Forsyth P, Perry JR. Heritable bone disease and stroke due to vertebral artery dissection. *Cerebrovasc Dis* 2001;12:73–74.
7. Hans-Jürgen G, Kühnlein P, Ludolph A, Roman H. Connective tissue disorders in dissections of the carotid or vertebral arteries. *J Clin Neurosci* 2008;15:489–494.
8. Tonarelli S, Benavente O. Heritable connective tissue disorders and stroke. *Semin Cerebrovasc Dis Stroke* 2005;5:2–12.
9. Schievink WI. Spontaneous dissection of the carotid and vertebral arteries. *N Engl J Med* 2001;344:898–906.
10. Debette S. Pathophysiology and risk factors of cervical artery dissection: what have we learnt from large hospital-based cohorts? *Curr Opin Neurol* 2014;27:20–28.