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Melorheostosis: an unusual cause of dactylitis

[1]N Kamath, [2]R Mootoo, [3]ASM Jawad
[1]ST2 Doctor; [2]Consultant Physician and Rheumatologist, Homerton University Hospital; [3]Consultant Rheumatologist, The Royal London Hospital, London, UK

ABSTRACT A 17-year-old boy presented with a six-month history of spontaneous pain and stiffness in his right index finger. On examination there was mild diffuse swelling and tenderness of the right index finger, particularly over the metacarpophalangeal and proximal interphalangeal joints. A plain radiograph provided the diagnosis of melorheostosis, clearly showing the flowing candle wax-like appearance over the second and third metacarpals and the phalanges of the index and middle fingers.

KEYWORDS Dactylitis, melorheostosis

DECLARATION OF INTERESTS No conflict of interests declared.

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Correspondence to ***ASM Jawad, The Royal London Hospital, Bancroft Road, London E1 4DG, UK***

tel. ***+44 (0)20 8223 8408***
fax. ***+44 (0)20 8223 8807***

e-mail ***alismjawad1@hotmail.com***

Melorheostosis is one of the extremely rare sclerosing mesenchymal disorders of bone. It is non-hereditary. The condition was originally described by Leri and Joanny in 1922.[1] The term 'melorheostosis' is derived from the Greek *melos* (limb) and *rhein* (to flow). This is due to the characteristic appearance of this condition on plain radiographs, described as 'flowing candle wax'.[2,3]

We report the case of a teenager whom we diagnosed with melorheostosis.

CASE REPORT

A 17-year-old boy was seen in our rheumatology clinic following referral by his GP due to pain and stiffness in the index finger of his right hand. The patient had noticed the symptoms appearing insidiously over the preceding six months. There was no history of trauma or injury. He was otherwise well, suffering from no other medical conditions. On examination there was mild diffuse swelling and tenderness of the right index finger particularly over the metacarpophalangeal and proximal interphalangeal joints. The patient was unable to make a complete fist due to loss of flexion of the right index finger. No other joints were affected. The rest of the clinical examination was normal. Full blood count, electrolytes, liver function tests, vitamin D level, calcium and phosphate were all normal. The patient's antinuclear antibody test was negative, his erythrocyte sedimentation rate was 1, and his rheumatoid factor was <20.

A plain radiograph, however, provided the diagnosis of melorheostosis, clearly showing the flowing candle wax-like appearance over the second and third metacarpal and the phalanges of the index and middle fingers (Figure 1). The patient and his father refused further imaging to show whether other parts of the skeleton were affected. The patient is currently well and has not had progression of his symptoms. He has not developed any new symptoms.

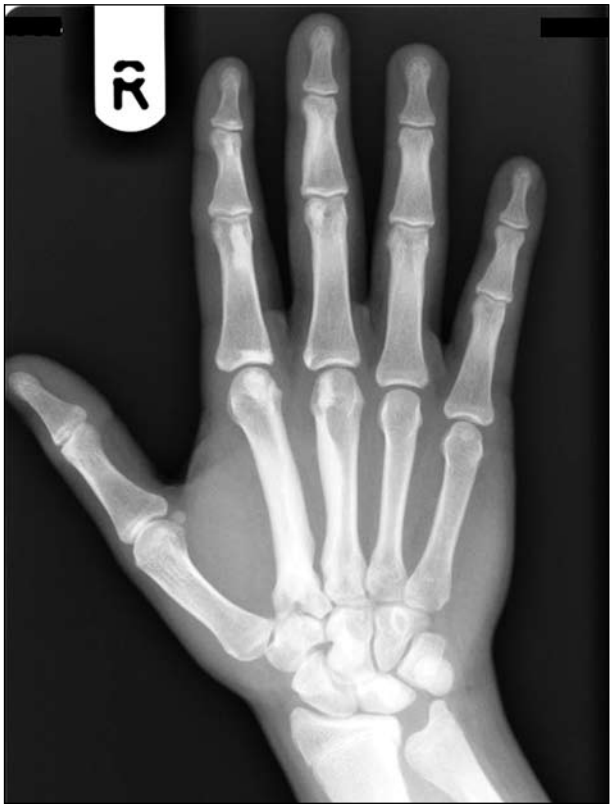

FIGURE 1 A 17-year-old male presented with a six-month history of a painful, stiff index finger of the right hand. A plain radiograph of the right hand clearly shows the flowing candle wax-like appearance over the second and third metacarpals and the phalanges of the index and middle fingers.

DISCUSSION

Melorheostosis may affect one bone or a number of adjacent bones causing hyperostosis. It is usually the long bones of the limbs that are affected.[4] The condition is not limited to bone and may affect surrounding soft tissues causing restriction of movement due to contractures or fibrosis. There have also been cases of soft tissue ossification.[5]

Clinically, the condition can manifest as any of the following: pain, stiffness, limitation of joint movement, swelling, deformity and soft tissue contracture. The bone dysplasia of melorheostosis usually occurs in early childhood, with around 50% of those affected developing symptoms by the age of 20.[6,7] There does not appear to be a sex predilection.

The characteristic radiographic finding in melorheostosis is dense, irregular and eccentric hyperostosis of both the cortex and the adjacent medullary canal of a single bone or several adjacent bones. Any bone may be affected, but the lower extremities are most commonly involved. The affected bone has increased blood flow and avidly accumulates radionuclide during bone scanning.

Histologically, the affected bone shows endosteal thickening during infancy and childhood and the periosteal new bone formation during adult life.[2]

Previously very little was known about the aetiology of melorheostosis. However, recent studies indicate that a loss-of-function mutation in the *LEMD3* gene (also known as *MAN1*) may be implicated in sclerotic bone disorders such as osteopoikilosis, Buschke-Ollendorf syndrome and melorheostosis.[8] LEMD3 is an inner nuclear membrane protein which blocks the transmission of signals that bring about bone formation. Bone morphogenic proteins (BMPs) and TGF-beta normally bind to the cell membrane leading to the activation of SMAD proteins in the cell cytoplasm. It is these SMAD proteins that have a role in the activation of the genes involved in bone formation. It is also these proteins that the LEMD3 protein binds to, thus blocking the signalling pathway and preventing excessive, uncontrolled formation of bone.[8]

A Portuguese group investigated *LEMD3* in a three-generation family with osteopoikilosis from the Azores, an affected father and daughter from Ireland with osteopoikilosis (the daughter also had melorheostosis) and two other individuals from the UK with isolated melorheostosis.[9] They found a novel C to T substitution at position 2032 bp (cDNA) in exon 8 of *LEMD3*, resulting in a premature stop codon at amino acid position 678. This mutation co-segregates with the osteopoikilosis phenotype in both the Azorean and the Irish family. It was not detected in any of the six unaffected family members or in 342 healthy Caucasian individuals. No *LEMD3* mutations were detected in the two patients with sporadic melorheostosis. The *LEMD3* mutation reported was clearly the cause of osteopoikilosis in the two families, but its relationship to melorheostosis in one of the family members is still unclear. No *LEMD3* mutations were found in peripheral blood-derived DNA from the two other individuals with sporadic melorheostosis. This is confirmed by other studies.[10] The nature of the additional genetic and/or environmental influences necessary for the development of melorheostosis in those with osteopoikilosis requires further investigation.

Melorheostosis progresses insidiously with a slow progression of symptoms interspersed with exacerbations. Due to the rarity of this condition, there are no proven specific medical treatments. Its management, therefore, involves symptom control such as analgesia and physiotherapy. Surgical intervention usually has a poor outcome.

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KEY POINTS

- The purpose of reporting this case is to increase awareness of this rare condition that is easily diagnosed by plain radiography and to avoid over-investigation once a diagnosis is made.
- Clinically, the condition can manifest as any of the following: pain, stiffness, limitation of joint movement, swelling, deformity and soft tissue contracture.
- The characteristic radiographic finding is the flowing candle wax-like appearance.

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