CASE REPORT

AS, DISH or something else?

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SUMMARY

A 68-year-old farmer presented with progressively worsening pain in multiple joints associated with stiffening for 9 months. Locomotor examination revealed grossly restricted movement of the axial skeleton. There were no neurological deficits. Radiological evaluation demonstrated diffuse bone densification and extraspinal calcification with bony ankylosis reminiscent of ankylosing spondylitis. Laboratory tests subsequently yielded the true diagnosis. The patient was counselled accordingly and started on appropriate therapy.

BACKGROUND

Endemic fluorosis is a known complication of chronic fluoride intoxication and a major public health problem affecting an estimated 62 million people across India alone.¹ Skeletal fluorosis constitutes a distinct subset of endemic fluorosis that results from contamination of groundwater water sources with excess fluoride. Once consumed, fluoride rapidly binds to hydroxyapatite, replacing the hydroxyl ion and producing fluoroapatite.² The ensuing alteration in bone structure results in increased bone density, osteopetrosis and extraskeletal calcification predominantly involving the interosseous ligaments and tendinous insertions. In severe cases, bony ankylosis can result in neurological deficits due to compression of nerve roots as well as pathological fractures due to the abnormal brittle bone. In many ways, such advanced cases can mimic ankylosing spondylitis and diffuse idiopathic skeletal hyperostosis (DISH). This case is being reported to highlight the similarity in presentation between these diseases, and increase awareness among physicians regarding this preventable disorder.

CASE PRESENTATION

A 68-year-old farmer presented with progressively aggravated pain in multiple joints for the past 9 months. The pain affected mainly the axial skeleton including the cervical and lumbar spine, as well as the shoulders, hips and knees bilaterally. It was accompanied by stiffening, which had worsened to the point where he was no longer able to stoop for the past 2 months due to stiffness in his back. He was otherwise able to carry out daily activities albeit with some difficulty due to pain in his hips and knees. There were no associated symptoms of weakness or paraesthesiae in his limbs, and no symptoms suggestive of cranial nerve dysfunction. Bowel and bladder habits were normal. He denied any history of substance abuse. There were

no systemic symptoms of fever or weight loss. He had no significant medical history and no family history of joint disease.

General physical examination including skin and ocular examination was entirely normal. Locomotor examination did not reveal any signs of inflammation in the affected appendicular joints, but did show grossly restricted movement of the axial skeleton. Schober's test was positive (2 cm). Tests for sacroiliitis including forced adduction of the flexed thighs and lateral compression of the pelvis were negative. Maximal chest expansion was reduced (1 cm). Examination of other systems including neurological examination was normal.

INVESTIGATIONS

Routine laboratory tests including complete blood counts, erythrocyte sedimentation rate (ESR), random blood glucose, renal function tests and serum electrolytes were normal (creatinine 0.9 mg/dL, calcium 9.2 mg/dL, phosphate 3.3 mg/dL). Serum alkaline phosphatase was elevated (330 IU/L). Serum parathormone levels were slightly elevated. Vitamin D levels were low normal (26 ng/mL). C reactive protein (CRP) was low (<6 mg/L). X-rays of the cervical and lumbar spine, and of the chest showed diffusely increased bone density with bony ankylosis and calcification of the longitudinal ligaments (figure 1A–D). X-rays of the patient's forearms revealed calcification of the interosseous membranes (figure 2). Urinary levels of fluoride were also elevated (2.2 mg/L; fasting morning urine sample (normal <1.5 mg/L)), confirming a diagnosis of skeletal fluorosis. Genotyping for HLA-B27 was negative. Spinal MRI was refused by the patient in view of financial constraints and the low probability of ankylosing spondylitis.

DIFFERENTIAL DIAGNOSIS

- ▶ Endemic skeletal fluorosis without fracture or neurological deficit;
- ▶ Ankylosing spondylitis;
- ▶ DISH.

TREATMENT

The patient was counselled regarding the need to consume only water drawn from deep bore wells. He was also treated with calcium (500 mg elemental calcium orally twice daily) and vitamin D (2000 IU orally twice daily) supplementation.

OUTCOME AND FOLLOW-UP

On follow-up after 3 months, the patient reported improvement in pain, but persistent immobility of his neck and lower back. He was advised to

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Figure 1 X-rays of the lumbar spine (anteroposterior view, A; lateral view, B) showing extensive bony ankylosis, osteophyte formation and calcification of the longitudinal ligaments with densification of the vertebral bodies. X-ray of cervical spine (lateral view, C) showing bony ankylosis. Note similarity to diffuse idiopathic skeletal hyperostosis. X-ray of chest (posteroanterior view, D) showing diffusely increased bone density.

continue the same treatment and also to undergo physiotherapy. The patient was subsequently lost for follow-up.

DISCUSSION

Skeletal fluorosis has been graded on the basis of various radiological criteria into classes ranging from mild to severe.² Crippling fluorosis is a term used to describe severe disease with deformities that render the patient bedridden or otherwise unable to care for themselves. Up to 10% of such advanced cases are associated with neurological deficits arising from compression of nerve roots or the spinal cord itself,³ producing myeloradiculopathies and even paraparesis. The deformities of skeletal fluorosis arise from calcification of ligaments and other

extraskeletal tissue that limit joint mobility and ultimately lead to bony ankylosis. Unfortunately, primary presentation with crippling fluorosis is not uncommon owing to the insidious and protracted nature of the disease.¹

Although skeletal fluorosis has been described in several community-based studies dealing with individuals from affected villages,^{2 4 5} an encounter with a sporadic case in the setting of a busy practice can be confusing, especially when features of crippling fluorosis are present. The broad distribution of fluorosis affected regions can make it difficult to diagnose this disorder on the basis of geographic origin alone. In this instance, ankylosing spondylitis and DISH were both considered as differential diagnoses and were ruled out only on the basis of interosseous membrane ossification and elevated urinary fluoride. Other supportive biochemical findings included an elevated alkaline phosphatase level and low levels of inflammatory markers such as ESR and CRP. Pertinently, there was no clinical evidence of sacroiliitis. The radiological evidence also did not fit the classical pattern of flowing calcification along the sides of contiguous vertebrae, seen in DISH.⁶

A number of tests have been suggested for confirming a diagnosis of skeletal fluorosis, including serum fluoride levels,⁵ fasting morning urine fluoride estimation and 24 h urine fluoride estimation.⁷ The two methods of urine sampling have now been established to be almost equivalent,⁷ and the fasting method was preferred in this case for convenience of administration.

Although therapeutic interventions such as calcium and vitamin D supplementation have been proposed in the management of skeletal fluorosis,² elimination of the source of fluoride intoxication remains the mainstay of treatment. Consumption of ground water contaminated with excess fluoride constitutes the principal source in the Indian subcontinent.² Concentrations of fluoride greater than 1.5 mg/L in drinking water are known to produce fluorosis¹; these levels are frequently exceeded in endemic areas of the country. The patient described in this report hailed from the district of Davangere in the southern Indian state of Karnataka, lying within the endemic fluorosis belt. Indeed a large community-based study conducted in this district demonstrated rates of dental fluorosis approaching 100% among adolescents in some parts of the district.⁸

While dramatic clinical and radiological responses have been reported with medical management in combination with physiotherapy, the bony ankylosis and extraosseous calcification characteristically seen in crippling fluorosis are typically irreversible.² Surgical correction is a promising option in such cases³ and was offered to our patient who refused it after considering the risks and expenses involved.

Figure 2 X-ray of both forearms showing calcification of the interosseous membranes.

Learning points

- ▶ Patients with endemic skeletal fluorosis can present with features of crippling fluorosis.
- ▶ Advanced skeletal fluorosis can mimic ankylosing spondylitis and diffuse idiopathic skeletal hyperostosis.
- ▶ Absence of clinical and/or radiological evidence of sacroiliitis and demonstration of interosseous membrane ossification are useful clues to differentiating between these conditions.

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Competing interests None.

Patient consent Obtained.

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REFERENCES

- 1 Arlappa N, Qureshi A, Srinivas R. Fluorosis in India: an overview. *Int J Res Dev Health* 2013;1:97–102.
- 2 Teotia SPS, Teotia M, Singh KP. Highlights of forty years of research on endemic skeletal fluorosis in India. Dahi E, Rajchagool S. eds. *Proceedings of the 4th International Workshop on Fluorosis Prevention and Defluoridation of Water; 2004 Mar 2–6; Colombo, Sri Lanka*. Thailand: ISFR, EnDeCo & ICOH, 2004:107–25.
- 3 Wang W, Kong L, Zhao H, *et al*. Thoracic ossification of ligamentum flavum caused by skeletal fluorosis. *Eur Spine J* 2007;16:1119–28.
- 4 Shivashankara AR, Shankara YMS, Rao SH, *et al*. A clinical and biochemical study of chronic fluoride toxicity in children of Kheru Thanda of Gulbarga district, Karnataka, India. *Fluoride* 2000;33:66–73.
- 5 Xiang QY, Chen LS, Chen XD, *et al*. Serum fluoride and skeletal fluorosis in two villages in Jiangsu province, China. *Fluoride* 2005;38:178–84.
- 6 Zhang C, Ruan D, He Q, *et al*. Progressive dysphagia and neck pain due to diffuse idiopathic skeletal hyperostosis of the cervical spine: a case report and literature review. *Clin Interv Aging* 2014;9:553–7.
- 7 Opydo-Szymaczek J, Borysewicz-Lewicka M. Urinary fluoride levels for assessment of fluoride exposure of pregnant women in Poznan, Poland. *Fluoride* 2005;38:312–17.
- 8 Chandrashekar J, Anuradha KP. Prevalence of dental fluorosis in rural areas of Davangere, India. *Int Dent J* 2004;54:235–9.

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