Puffy hands and periosteal hyperostosis from inhalant abuse

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DESCRIPTION
A 37-year-old man presented to his primary care physician with several weeks of diffusely puffy hands (figure 1). Two months previously, he had visited the emergency department for a minor burn to the right hand; he had a normal radiograph of the right hand and no swelling noted on examination at that time. At the present visit, he had tenderness over his middle and distal phalanges with no digital clubbing, joint swelling, skin thickening or rashes. He had no recent infections or hand trauma and had not started any new medications. Hand radiographs showed periosteal new bone formation at several phalanges (figure 2A). Laboratory testing was notable for alkaline phosphatase of 597 U/L (normal <94) with a bone fraction of 84%. His thyroid-stimulating hormone was 2.29 (normal 0.55–4.78) and his chest radiograph showed evidence of pulmonary venous congestion with no nodules or masses. He revealed that he had been inhaling up to 10 cans of compressed gas duster daily for 3 months. Subsequently, a serum fluoride level was obtained and found to be 1.6 mg/L (normal <0.13), supporting a diagnosis of skeletal fluorosis from inhalation of compressed gas duster containing 1,1-difluoroethane. He continued to abuse up to 24 cans of duster daily over the next year. Repeat hand radiographs 14 months later showed progression of periosteal new bone formation at the phalanges and metacarpal bones (figure 2B).

Skeletal fluorosis is a metabolic bone disease caused by excess fluoride intake. Swollen hands with underlying symmetric periosteal hyperostosis are a common manifestation of this condition and can develop rapidly, as this report demonstrates.1

Learning points
► Compressed gas duster contains fluoride; its abuse is an increasingly recognised cause of fluoride toxicity.
► Consider skeletal fluorosis on the differential diagnosis when symmetric periosteal hyperostosis is seen in the hands.
► The additional finding of digital clubbing is inconsistent with skeletal fluorosis and should prompt consideration of thyroid acropachy or hypertrophic osteoarthropathy.

Patient’s perspective
It was a frightening and dangerous experience. My hands were hurting and I couldn’t make a fist. I hope this can help someone in the future.

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However, digital clubbing is not seen with skeletal fluorosis and its presence is more consistent with hypertrophic osteoarthropathy or thyroid acropathy. Other musculoskeletal manifestations of skeletal fluorosis include tubular bone and axial skeleton osteosclerosis, joint ankylosis and ligament calcification. Fluoride stimulates formation of bone that lacks normal structure and strength through several possible mechanisms including alteration of bone crystal structure, delaying of bone mineralisation and conversion of hydroxyapatite to fluorapatite which is more resistant to acid dissolution.3

Compressed gas dusters are used to clean electronic equipment and commonly contain fluorocarbon compounds for ease of compressibility. Abuse of these dusters is an increasingly recognised cause of skeletal fluorosis.3 4 Other causes include consumption of well water containing high levels of fluoride, exposure to industrial processes such as coal burning, chronic use of medications containing a fluoride moiety such as voriconazole and excess ingestion of fluoride-containing tea or toothpaste.4 The clinical and radiographic manifestations of skeletal fluorosis may be slowly reversible over years to decades after cessation of fluoride intake.3 This patient eventually sought inpatient treatment and has abstained from further inhalant abuse for several months.

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