

Guitar Player Acro-Osteolysis

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Abstract. Acquired acro-osteolysis (AOL) has been associated with a spectrum of agents and diseases. This case demonstrates AOL as an unusual complication of repeated mechanical stress in a young guitar player. Pathophysiologic correlation with the other acquired forms of AOL is discussed.

Key words: Acro-osteolysis – Osteolysis – Phalanges.

Acro-osteolysis (AOL) is the term used to describe a transverse lytic band through distal phalangeal shafts while the tufts and bases remain preserved [4]. In 1977, Young et al. reported phalangeal tuft fractures of the left thumb and index finger and the right middle finger in an eight-year-old guitar player with juvenile rheumatoid arthritis [15]. The selective location of these fractures was attributed to mechanical stress. We report acro-osteolysis in fingers of the left hand of a young guitar player.

Case Report

An 18-year-old male college student presented to his family physician because of distal finger swelling in the left hand of several years duration. The finger-tips were painful during the winter months, but not enough to affect his physical activities. He reported no other symptoms characteristic of Raynaud Syndrome, and had no significant past medical history, no drug or occupational exposure, and no family history of musculoskeletal disease. He smoked less than one pack of cigarettes per day.

His mother described him as a very meticulous, and sensitive young man who found emotional release by playing a guitar. During the eight years he practiced the guitar, he progressed from a standard instrument to one with steel strings. Each practice session was intense as he tried to imitate rock groups, and he reportedly pressed the steel strings very firmly.

Physical examination showed widening and shortening of the left fingers beyond the distal interphalangeal joints. The nail bases were elevated with resultant loss of the normal nail angle; the soft tissues were otherwise normal. Both thumbs and the right fingers were entirely normal. All laboratory tests were normal.

Radiographs showed transverse lytic bands in the distal phalanges of the index through to the little fingers (Fig. 1) with sparing of the thumb. The index finger transverse band was located in midshaft, and each succeeding band was more distal. No other areas of bone destruction or production were present. Radiologic soft tissue swelling and flattening of the nail angle were similar to the physical findings.

When the patient learned of the bone findings shown on his radiographs, he stopped playing the guitar and has never resumed. Approximately one year later, because of persistent local pain, the middle finger tuft was biopsied. Microscopic examination showed only fragments of normal bone and fibrous tissue. Follow-up radiographs, obtained nearly three years after initial presentation, showed widening of the index finger lytic band, surgical absence of the middle finger tuft, and early reossification along the apposing margins of the ring and little finger osteolytic bands.

Discussion

Acro-osteolysis (AOL) may be idiopathic and occur as one feature of a more generalized skeletal disorder, or it may be acquired [4]. Many acquired forms are known and associated with a spectrum of agents and diseases (Table 1).

Of the acquired forms, most is known about occupational AOL in the vinyl chloride industry [1, 3, 5, 9, 11]. The health hazards seem directly related to inhalational exposure of vinyl chloride monomer [5]. Occupational AOL is a triad of Raynaud Syndrome, sclerodermatous skin changes, and osteolysis. The natural history can be divided into a prolonged first stage characterized by fingertip swelling and cold induced Raynaud syndrome which always precedes the second stage manifested by osteonecrosis. AOL begins as small cortical erosions which enlarge to produce transverse defects in the terminal phalangeal shafts. The isolated phalangeal tuft may then fragment and resorb [5]. If occupational exposure is elimi-

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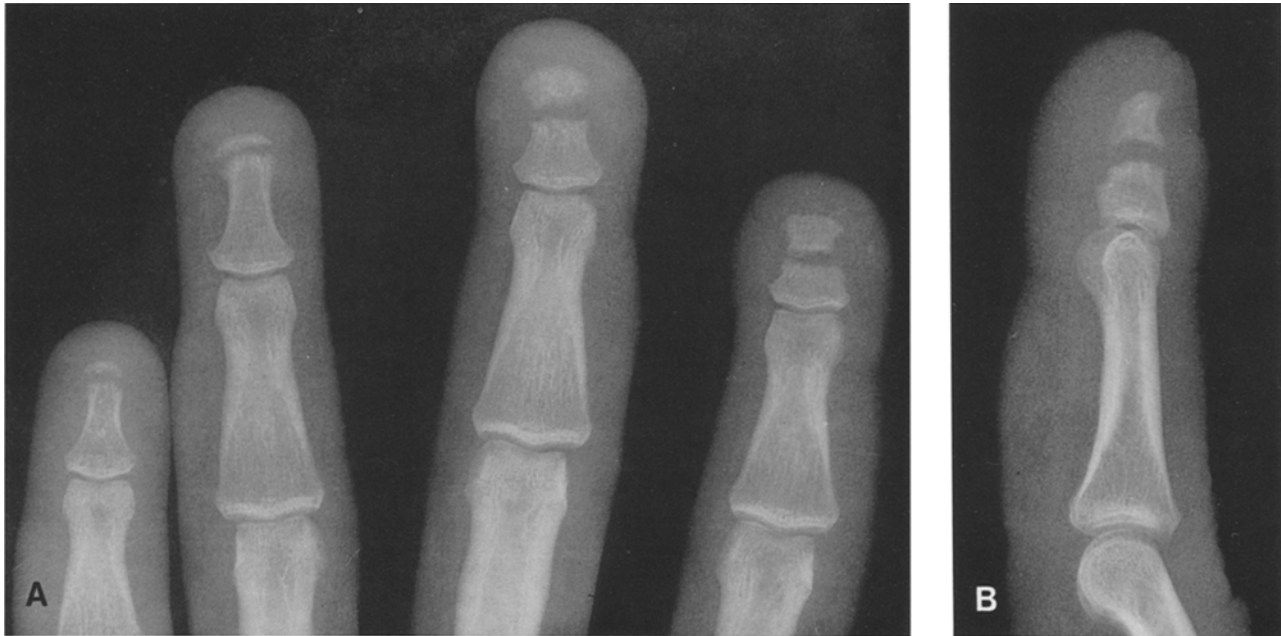


Fig. 1A and B. **A** Posteroanterior view of fingers at initial evaluation shows linear bands through the distal phalanges of each finger. Note that each osteolytic band is progressively more distal from index to little finger. **B** Lateral view of index finger shows osteolytic band and soft tissue swelling with elevation of the finger nail base and resultant “clubbing”

Table 1. Acquired acro-osteolysis

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|-------------------------------|
| 1. Vinyl chloride exposure |
| 2. Connective tissue diseases |
| 3. Thermal injuries |
| 4. Neuropathic diseases |
| 5. Hyperparathyroidism |
| 6. Nutritional deficiencies |
| 7. Psoriasis |
| 8. Biomechanical stress |

nated, the third stage, or healing phase, may occur with remineralization of a shortened distal phalanx.

The current theory for vinyl chloride AOL is that exposure initiates an immune complex disease whose final common pathway is vascular occlusion. Direct and indirect immunologic tests support this theory [5]. Hand arteriography of several patients with occupational AOL has shown proper digital vessel occlusion and small vessel hyperemia at sites of osteonecrosis [1, 3, 5]. A survey of vinyl chloride workers by *in vivo* wide-field capillary microscopy showed frequent microvascular abnormalities [9]. One patient followed for five years by serial radiography, radionuclide bone scans, and capillary microscopy after being removed from vinyl chloride exposure demonstrated healing of the lytic bands, decreased phalangeal focal radionuclide accumulation, and improved capillary morphology and blood flow [11]. Local pressure or other mechanical stress may potentiate vascular compromise leading to osteolysis [3, 5, 11].

Other acquired forms of terminal phalangeal osteonecrosis have been termed acro-osteolysis, but are predominantly phalangeal tuft lysis, sometimes accompanied by soft tissue loss. Transverse AOL of the phalangeal shafts is only occasionally seen. These examples of distal digital osteonecrosis are almost certainly mediated through vascular mechanisms. For example, AOL has been associated with Raynaud syndrome, rheumatoid vasculitis [13], and psoriasis [10]. Hand arteriography in seven patients with various connective tissue diseases and severe, persistent acronecrosis showed proper digital artery occlusions, predominantly at sites of mechanical stress adjacent to joints [6]. Thermal acromutilation has also been attributed to mechanical and vascular injury [1, 12, 14].

Post-traumatic osteolysis at the acromioclavicular joint begins as subcortical demineralization of the distal clavicle, followed by focal erosion. Later, the apposing articular surface of the acromion may be involved [7]. The associated trauma may be direct [7], vibratory as in pneumatic tool workers [8], or biomechanical as in weight lifters [2]. No unifying pathophysiologic theory has been put forward. However, we feel the most likely mechanism is vascular compromise followed by avascular necrosis and subsequent healing.

Acro-osteolysis in our patient was clearly related to finger placement and pressure on the steel guitar strings. We feel AOL resulted from focal mechanical

compromise of vasculature, followed by avascular necrosis.

It seems likely that many forms of acro-osteolysis or distal digital osteonecrosis are initiated by vascular occlusion. The differences among them result from the different causes of vascular occlusion, be it immunologic, thermal, or biomechanical. Hence, the pattern of osteonecrosis will be variable. Biopsies done after radiologic changes are well established should show evidence of healing, primarily vascular and fibrous tissue proliferation.

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