

# A Case of Atypical Synovitis-Acne-Pustulosis-Hyperostosis-Osteitis (SAPHO) Syndrome Presenting With Osteomyelitis of the Clavicle

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## ABSTRACT

Synovitis-acne-pustulosis-hyperostosis-osteitis (SAPHO) syndrome is considered after exclusion of infection and arthritis; however, microbial infection may be present in osteoarticular lesions of these patients. Chronic osteomyelitis and associated bacterial infection were detected in a recurrent osteoarticular lesion in an adolescent patient with a history of clavicle pain, who complained of recurrent swelling in the left clavicle. Most pediatric case reports of SAPHO syndrome describe patients with associated skin conditions. This case report describes a patient diagnosed with SAPHO syndrome with no associated skin condition. Although SAPHO syndrome is characterized by dermatological and osteological symptoms, this acronym describes a collection of recurring symptoms. Complete patient medical history and thorough testing, including radiology and biopsy, are critical for prompt diagnosis and treatment of this condition, particularly in pediatric patients with persistent skeletal pain.

## INTRODUCTION

Although one-third to one-half of cases with symptoms of osteomyelitis are culture negative, a variety of microbes have been isolated in culture positive cases.<sup>1,2</sup> *Staphylococcus aureus* (*S aureus*) has been identified as a major cause of acute hematogenous osteomyelitis (AHOM) in children.<sup>1</sup> The incidence of osteomyelitis in the United States is increasing with the emergence of community-acquired Methicillin-resistant *S aureus* (CA-MRSA).<sup>3</sup> We present a case of chronic osteomyelitis associated with *Propionibacterium acnes* (*P acnes*) as an atypical presentation of synovitis-acne-pustulosis-hyperostosis-osteitis (SAPHO) syndrome in an adolescent patient.

## CASE REPORT

A 14-year-old female presented with swelling of her left clavicle. She had been seen several years prior with complaints of pain in the left clavicle after an accidental fall. The initial radiograph at

the time of injury indicated a fracture in the medial left clavicle. Three months later, she presented at pediatrician's office due to worsening pain, and follow-up radiography revealed marked homogeneous cortical thickening of the proximal two-thirds of the clavicle. Laboratory evaluation was unremarkable except for elevation in erythrocyte sedimentation rate (ESR) at 34 mm/hr (reference range 0-14 mm/hr). Magnetic radiographic imaging (MRI) revealed an expansile mass around the medial half of the clavicle. After MRI findings, patient

was referred to orthopedic specialist. She had an open biopsy of the left clavicle, which revealed a healing fracture with sterile aerobic and anaerobic bacterial cultures, but DNA sequencing was not performed. The patient apparently recovered from this injury, but had persistent swelling in the area with minimal pain. This persisted unchanged, but did not interfere with daily activities.

Four years after the initial injury, the patient described increased pain at the site of the previous fracture but reported no new injury. She continued to reside on the same central Wisconsin farm where she lived 4 years earlier, and actively cared for her family's livestock. She reported no travel or known exposure to blastomycosis other than living in an endemic region. She denied any tobacco, alcohol, or substance use, or sexual activity. With the exception of an elevated ESR at 25 mm/hr, the laboratory evaluation was again normal. Physical examination was notable only for swelling over the head of the left clavicle and mild comedonal acne. MRI was repeated and revealed a possible Brodie's abscess within the medial one-third of the left clavicular shaft with a thin sinus tract communicating with the skin surface, suggestive of chronic osteomyelitis of the clavicle. A biopsy for culture was obtained from the left clavicle, and the patient subsequently underwent debridement surgery for the chronic osteomyelitis. Anaerobic culture of the biopsy specimens grew *P acnes*. Histopathology was performed and revealed fragments of acute and chronic inflammatory granulation tissue with giant cells extending to underlying bone. A peripherally

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inserted central catheter (PICC) was placed to facilitate delivery of ceftriaxone. After improvement, the patient was switched to a 1-year course of doxycycline after 2 weeks of parenteral antibiotic treatment. Her pain and swelling improved, and she currently is taking nonsteroidal anti-inflammatory drugs. She reported resurgence of her comedonal acne after going off the doxycycline.

## DISCUSSION

SAPHO syndrome is a cluster of cutaneous and osteoarticular manifestations, originally described in 1967 in a patient with osteomyelitis of the clavicle, which consists of symptoms of palmoplantar pustulosis, nodular cystic acne, and osteoarticular involvement.<sup>4</sup> Bony lesions are characterized by sclerosis and hyperostosis with or without synovitis. The association with sterile osteomyelitis has been frequently reported, but low levels of microbial infection, particularly with *P acnes*, may be present in some cases.<sup>5-7</sup> Although symptoms frequently are seen together, there are reports of skeletal involvement separated temporally from cutaneous manifestations, sometimes by years.<sup>5</sup> With the exception of a 2015 retrospective patient study by Kaiser and colleagues,<sup>8</sup> most pediatric and adolescent case reports of SAPHO describe patients with associated skin conditions.<sup>8-11</sup> Benhamou et al<sup>12</sup> devised a commonly used set of clinical criteria for SAPHO that consist of 4 inclusion criteria:<sup>13</sup> (1) osteoarticular manifestations in acne conglobata, acne fulminans, or hidradenitis suppurative; (2) osteoarticular manifestations in palmoplantar pustulosis; (3) hyperostosis (of the anterior chest wall, limbs, or spine) with or without dermatosis; (4) chronic recurrent multifocal osteomyelitis involving the axial or peripheral skeleton with or without dermatosis. The presence of only 1 of the 4 inclusion criteria is sufficient to arrive at a diagnosis of SAPHO syndrome.<sup>14</sup> Overall, biopsy results and radiographic features are the most critical components necessary for correct diagnosis of this condition. Our patient met the inclusion criteria but lacked the severe cutaneous manifestation, which therefore qualifies her for a diagnosis of atypical SAPHO syndrome. The anatomic location, organism recovered, and response to nonsteroidal anti-inflammatory drugs also supports the diagnosis of SAPHO syndrome.

In contrast, chronic osteomyelitis typically is characterized by chronic infection with devitalized bone, and often arises as a result of unrecognized or undertreated aerobic bacterial or fungal osteomyelitis. Chronic osteomyelitis lacks cutaneous findings. Anatomic location will mirror that of acute osteomyelitis, with long bones, hands, and feet being the primary locations in children. Acute vertebral osteomyelitis is also high risk for progressing to chronic osteomyelitis. Chronic osteomyelitis of the clavicle is uncommon.

## CONCLUSION

Our case demonstrates that SAPHO syndrome should be considered in cases where inflammatory bone lesions fail to heal or recur, and highlights the importance of anaerobic cultures when

obtaining biopsies of bone for culture, as presence of *P acnes* can suggest the diagnosis. The association of SAPHO syndrome with sterile osteomyelitis has been reported frequently. Whereas the index patient<sup>4</sup> met the Benhamou criteria<sup>12</sup> for SAPHO syndrome, our patient lacked the cutaneous manifestation of this condition and, therefore, was diagnosed with an atypical presentation of SAPHO syndrome. In our case, bone culture results and radiographic features of the infected clavicle were vital to confirming the diagnosis of SAPHO syndrome. In the primary care setting, skeletal pain that worsens or fails to improve despite conservative measures may suggest a diagnosis of SAPHO or other inflammatory bone disease, and should prompt radiographs. Inflammatory or hyperostotic lesions could suggest the diagnosis. Familiarity with this condition will aid clinicians in early diagnosis and appropriate treatment selection for resolution of the underlying infectious processes in pediatric patients with persistent skeletal pain of indeterminate origin.

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