Osteomyelitis of the Thumb in a 21-Year-Old Chiropractic Patient: A Case Report

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ABSTRACT

Objective: The purpose of this case report is to describe the presentation of a patient with osteomyelitis of the thumb.

Clinical Features: A 21-year-old man presented with painful, red, and edematous thumb pain over the anterior and posterior surface for a duration of 4 days. The patient reported no trauma or recent operation. The patient was treated conservatively for capsulitis. The patient's symptoms worsened within 2 days, and he was referred for additional imaging consisting of a bone scan. The bone scan showed increased uptake, resulting in a change of diagnosis to suspected osteomyelitis. The patient was referred to a medical doctor for care that consisted of antibiotics and physiotherapy.

Intervention and Outcome: Despite treatment, the patient had some mild permanent damage to the range of motion of the joint and soft tissue volume loss.

Conclusion: This case demonstrates the importance of considering osteomyelitis as a differential diagnosis. Amputation was avoided for this patient because of the early recognition and referral. (J Chiropr Med 2018;17:201-205)

Key Indexing Terms: *Chiropractic; Osteomyelitis; Thumb*

INTRODUCTION

Thumb pain is a common musculoskeletal condition. While it can have multiple etiologies, the common causes include trauma, osteoarthritis, and tendinosis. Other less frequent causes are fractures and rheumatological diseases.^{1,2} Osteomyelitis is not a common presentation in clinical practice. The most common cause of osteomyelitis of the metacarpal and phalangeal bones is posttraumatic (57%), followed by postoperative (15%), hematogenous (13%), spread from contiguous infection (9%), and unidentified (6%).³ The rate of osteomyelitis in adults is 2.6 per 100 000 person-years in the United Kingdom and is nearly equal in males and females. The incidence is lowest in the 30 to 44 age group, followed by the 15 to 29 age group. The highest risk is in the 75 plus cohort, followed by the 65 to 74 age group.⁴ The rate is higher in children.⁵ Five percent of acute infections will become chronic, even with appropriate care.⁶

The most common pathogens depend on the patient's age. *Staphylococcus aureus* is the most common pathogen in acute

and chronic hematogenous osteomyelitis in adults and children. Group A streptococcus, *Streptococcus pneumoniae*, and *Kingella kingae* are the next most common infectious organisms in children. Group B streptococcal infections are the most common organism in newborn infants. In adults, *Staphylococcus aureus* is the most common organism found in bone and prosthetic joint infections. There is a marked increase in methicillin-resistant *Staphylococcus aureus*.⁷ Cultures of the osteomyelitic hands of 46 patients were positive in 74% and test gram positive in 35% mixed in 35%, 12% fungal and 3% mycobacterial. The overall amputation rate was 39% (18 of 46 patients). A delay in diagnosis is associated with an increased rate of amputation.³ Early stage osteomyelitis can be difficult to diagnose because of the vague symptoms such as in this case. A delay of 4 days in diagnosis increases the risk of long term sequelae.⁸ Adults typical present with pain and loss of motion of the joint. A temperature of greater than 39°C is usually found in about 40% of cases.⁹

Since this is not a common condition, few case reports have been published regarding osteomyelitis presentation to doctors of chiropractic. As far as the authors are aware, no case reports have been published on the presentation of osteomyelitis in the hand to a doctor of chiropractic. Therefore, the purpose of this case report is to describe the presentation of a patient with osteomyelitis of the thumb.

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Paper submitted November 8, 2016; in revised form September 22, 2017; accepted October 17, 2017.

1556-3707

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<https://doi.org/10.1016/j.jcm.2017.10.009>

CASE

A 21-year-old white man presented with pain in the left thumb. He denied recent or past trauma to the hand and

thumb. In addition, he denied any previous surgery related to this pain or prior history of pain.

His thumb pain began gradually for 4 days prior to presentation. No prior diagnostic or clinical assessment was initially made elsewhere. A review of systems and previous medical history was positive for family history of diabetes. Other than smoking cigarettes, he had no related health behaviors related to the chief complaint. The patient reported that his pain increased on movement of the thumb in flexion and extension ranges. He noted less pain with rest, although some pain was still present. The pain was described as a 5 out of 10 on a numeric pain scale and was “aching with episodes of sharp pain on movement.” He has no previous treatment to his thumb, and his vitals were normal.

EXAMINATION

The thumb appeared edematous and red on the anterior and posterior surfaces. There was point tenderness at the interphalangeal joint and mild limitation of motion at the interphalangeal joint in flexion and extension.

A radiological examination of the left hand was ordered, and 3 views of the hand were taken. Radiographs revealed no signs of fracture or soft tissue signs relative to the presentation. Laboratory tests included complete blood counts with differential, erythrocyte sedimentation rate, serum glucose, and hemoglobin A1C, which were all negative. Because of these findings, the initial, working diagnosis was acute capsulitis of the thumb.

INITIAL TREATMENT

For suspected capsulitis, the patient was advised to use ice twice daily for 20 minutes and to consider ibuprofen. He was instructed to call if pain increased or did not abate in 3 days. However, the patient returned to the office 2 days later with worsening of symptoms. He reported that the pain in the thumb was 7 out of 10 on a numeric pain scale, and the inflammation and erythema had increased. No other changes from previous exam was noted, and he was still afebrile.

ADDITIONAL DIAGNOSTIC IMAGING AND MANAGEMENT

Because of the worsening of his signs and symptoms, a nuclear bone scan was ordered and performed the following day to assess for osteomyelitis (Fig 1). It was positive for increased uptake in the left thumb. The working diagnosis was updated to suspected osteomyelitis. He was referred to his family medical doctor.

His medical physician placed him on 500 mg of ciprofloxacin, a fluoroquinolone antibiotic, to treat the suspected bacterial infection. This was later confirmed by needle biopsy and culture. A consultation with an infectious

Fig 1. Bone scan showing increased uptake on left thumb.

disease specialist was also ordered because the authors were concerned about the possible aggressive nature of osteomyelitis. The infectious disease specialist’s examination of the ears, sinuses, pulmonary, gastrointestinal, and cardiac system was negative. The patient remained afebrile with normal vital signs. However, oxacillin-sensitive *Staphylococcus aureus* infection of the face was later noted, and its spread to the thumb was confirmed by needle insertion in the area of the thumb pain, revealing a fluid that cultured positive as a 1+ *Staphylococcus aureus* infection.

Additional radiological and laboratory examinations were ordered. No periosteal elevations or osseous erosions were noted. The patient was admitted to the hospital for surgical incision and drainage of the thumb, and a Hickman catheter was placed to deliver long-term antibiotics therapy. A complete blood count revealed mild elevation of white cell count to 11.63, of which 86.9% were neutrophils, and lymphocytes were considered low at 6.0. The remainder of the complete blood count was within the normal range. Later, a culture of the aspirate revealed 3+ *Staphylococcus aureus* that was sensitive to cefazolin, cinnamycin, erythromycin, and oxacillin. The patient had additional drainage performed and was placed on Vancomycin during recovery. He also received whirlpool therapy while in the hospital. The patient was discharged within 2 days and was provided antibiotic infusion and nutritional home care with instructions to wash the affected area with soap and water every 12 hours.

The patient recovered over the next few weeks. However, he had residual, but mild loss of distal thumb soft tissue volume (Fig 2), even at 3 years. The patient gave consent to have this case study published.

DISCUSSION

This study presents the case of osteomyelitis of the thumb in a young man with no history of recent surgery or

Fig 2. *Diminished soft tissue volume of left thumb.*

trauma. In this patient, it was suspected that his osteomyelitis was secondary to a facial skin infection, with hematogenous spread to the thumb. This diagnosis was challenging because of the limited physical, laboratory, and radiological clues. A high degree of suspicion was needed early in the case to avoid amputation and long-term treatment, knowing that the earlier the diagnosis was made, the less risk the patient had of permanent disability.

In this patient, local pain and loss of joint motion was reported, but he had no elevated temperature. In children, the presenting symptoms are similar, but 57% of children have fever, and the lower extremity is most likely involved.¹⁰ The diagnosis of osteomyelitis can be difficult in that no inexpensive tests are available to confirm it, and many of the tests have a poor sensitivity. A good starting point to making the correct diagnosis is to consider the factors that increase the likelihood of osteomyelitis. This includes diabetes, peripheral vascular disease, recent surgery, history of trauma, history of drug use, sickle cell anemia, and chronic granulomatous disease.^{7,11-13} In this case, the patient had a family history of diabetes only.

For the patient in this case, there was no current trauma, diabetes, vascular disease, recent surgery, or other red flags that would have increased suspicion for osteomyelitis in this case. Initial working diagnosis was acute capsulitis and possible rheumatoid arthritis. He was not a high risk for degenerative joint because of his age and trauma history. Inflammatory etiology was possible, so the authors elected to screen for it with sedimentation rate and radiographs. The authors screened for diabetes because of family history. It was suspected that the patient had some acute joint inflammatory condition that would resolve in a short time. When the patient returned with worsening symptoms,

further evaluation was clearly warranted. It would seem logical that an acute capsulitis would not worsen and would likely improve.

The bone scan was ordered to rule out osteomyelitis. This was done because the possibility of osteomyelitis was high and the risk of permanent damage with this condition. Magnetic resonance imaging (MRI) was considered, but a bone scan was scheduled because of availability. With positive uptake over the thumb, osteomyelitis became the primary concern because of the aggressive nature of the disease. The specificity of a bone scan is approximately 56% for bone infections.¹⁴ A positive bone scan indicates pathophysiological changes of regional perfusion, permeability, white blood cell accumulation, and bone turnover.¹⁵ This would help us to consider osteomyelitis because the sensitivity to change in the bone is high. These pathophysiological changes show up on a nuclear bone scan before the morphologic changes are seen on radiography or computed tomography examination by several days, which helped to explain the negative radiographs. Less common risks factors for the development of acute infection include intravascular catheterization and hematogenous spread from distant foci of infection.

Common primary sites of infection in acute osteomyelitis are skin, urinary, and respiratory tract. The patient in this case had a skin infection of his face. This was the only physical clue that might have increased the suspicion of osteomyelitis at his presentation to this office. The authors did not appreciate this at the time of initial exam. A recent joint surgery in a patient with signs of osteomyelitis should also alert the physician to conduct further testing because there is an incidence of 1% to 2% of prosthetic joints being infected.¹⁴ The most common ways for infection to spread is hematogenous or direct extension from a penetrating wound.¹⁶ In this case, it was most likely an acute hematogenous spread from the skin infection of the face. Acute hematogenous osteomyelitis usually involves the metaphysis of a long bone. In adults, it is common for osteomyelitis to be secondary to a contiguous infection, for example, after trauma, surgery, or insertion of a joint prosthesis, followed by vascular insufficiency, as in diabetic foot. The incidence of hematogenous infection is on the decline, but the rate from contiguous focus is increasing.

The radiographic changes in osteomyelitis are initially destructive but lag behind the onset of symptoms by approximately 2 weeks. This makes radiographs of limited diagnostic use in osteomyelitis, when the plain films are negative early in the course of the disease. In this case, both the first set of radiographs and the second, taken after the positive bone scan, were negative. The early destructive signs on radiographs are soft tissue swelling, periosteal thickening or elevation, and focal osteopenia. At least 30% of trabecular bone must be destroyed before the lytic changes show up on plain films.¹⁷ A radionuclide scan may

detect a bone infection as early as 2 days after the onset.¹⁸ A positive bone scan does not specifically make the diagnosis but does measure the increase blood flow and reactive new bone formation seen in osteomyelitis.¹⁹ Bone scans have a high sensitivity and a poor specificity. If the bone scan would have been negative, it is likely the authors would have treated this as a soft tissue injury. It is rare, but a negative bone scan has been reported in a documented case of osteomyelitis because of decreased blood flow.²⁰

Magnetic resonance imaging can differentiate between bone and soft tissue infection, which is a problem with radionuclide studies.²¹ Acute osteomyelitis displays as a localized area of abnormal bone marrow signal, with decreased signal on T1-weighted images and increased signal intensity on T2-weighted images. In acute osteomyelitis, about 70% of cases show a replacement of marrow with a fluid containing residual fat signal. None of the subacute or active chronic cases of osteomyelitis had these bone marrow changes.²² Magnetic resonance imaging has an 84% to 100% sensitivity and 49.2% specificity for the diagnosis of osteomyelitis, as long as Short TI Inversion Recovery images are done.^{23,24} The specificity is increased to 79.7% with T1 spin echo use and 83.1% with gadolinium contrast added.²⁴ In this case, if an MRI had been available, it would have been a better choice. A problem does exist for patients with metallic prosthetic implants. These produce artifacts on an MRI, particularly at higher magnet strengths, that make a bone scan essential in these patients.²⁵ If an area of infection is suspected around a joint prosthesis, then a combination agent for detecting infection, such as Gallium citrate (Ga 67), and a metabolic agent (99mTc-methylene diphosphonate) enables an infection and an area of increased metabolic activity to be found.²⁶ Sonography can detect fluid collection in a joint and in the extra articular soft tissue, but it is not specific for infection.²⁷

The white blood cell count may be elevated in acute infections, but it is usually not in chronic infections. The erythrocyte sedimentation rate is usually elevated in acute infections.²⁸ However, C-reactive protein is more sensitive to early disease, but it is not sensitive enough to exclude osteomyelitis.²⁹ There appears to be no single blood test that will definitively rule out or confirm a suspected diagnosis of osteomyelitis. However, an elevated white blood cell count, erythrocyte sedimentation rate, and positive C-reactive protein test should raise suspicions in a nontraumatic case. In this case, the initial complete blood count and sedimentation rate parameters were within normal limits. In retrospect, a C-reactive protein test should have been ordered. If elevated, it may have led to a quicker diagnosis. The second complete blood count after the bone scan did have a mild white blood count elevation. According to a literature review by Harris et al, in a patient with low clinical suspicion of osteomyelitis, a normal erythrocyte sedimentation rate, and normal C-reactive protein, the treating physician should be reassured that no

further testing is indicated. However, a normal erythrocyte sedimentation rate and C-reactive protein in a patient with high risk factors and clinical suspicion of osteomyelitis cannot rule out the disease.³⁰ According to Hartwig, the gold standard for osteomyelitis is microbiological isolation of the organism through biopsy of the affected bone or aspiration of the affected joint.³¹

Typical medical treatment for most bone infections include initial treatment with parenteral antibiotics, then changed to oral antibiotics. Most treatment requires at least 6 weeks. The antibiotic of choice is based on the cultured organism.^{32,33} Vancomycin and ciprofloxacin were used in the case presented here.

Limitations

The case presented here may not be typical of early osteomyelitis, and other cases may present in different ways.

CONCLUSION

This case demonstrates the importance of considering osteomyelitis as a differential diagnosis. Amputation was avoided for this patient because of early recognition and referral.

FUNDING SOURCES AND CONFLICTS OF INTEREST

No funding sources or conflicts of interest were reported for this study.

CONTRIBUTORSHIP INFORMATION

Concept development (provided idea for the research): R.E.B.

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Critical review (revised manuscript for intellectual content, this does not relate to spelling and grammar checking): G.M.G.

Practical Applications

- The patient did not present with the typical history of osteomyelitis in that he did not have trauma or surgery to his thumb.
- By making an early referral for medical care, tissue damage was minimized and there was a successful outcome.

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