Undiagnosed Brodie abscess in a gymnast after surgical fixation of a tibial fracture

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Abstract

Objective: This study presents a case of a posttraumatic subacute osteomyelitis in a child with leg pain.

Clinical Features: A 10-year-old female gymnast with leg pain presented to a chiropractic clinic after having been treated over the previous year for a leg fracture. The patient had leg pain associated with prolonged use of her right leg, restlessness at night, and tenderness over the right tibia. The history did not suggest a mechanical cause of the patient's pain. All available radiographs were reviewed by the chiropractor; a diffuse lytic lesion with bone thickening and sclerosis was clearly visible in the area of the patient's chief complaint, representing a Brodie abscess.

Intervention and Outcome: The doctor of chiropractic sent the patient back to the hospital. She was treated first with oral antibiotics, which were not successful. She underwent surgery and recovered well.

Conclusion: Subacute osteomyelitis may have a diagnostic delay; thus, it is possible for a chiropractor to see this condition in the office. A good case history, examination, and radiographs are important for the diagnosis and to make a proper referral.

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Introduction

In general practice, serious infections in children have an incidence of 12.3 cases per 1000 patients per year, or 1 serious infection per 100 children per year. Of these, osteomyelitis affects 0.2 to 1.6 children per 1000

annually and is more common in boys than in girls (ratio, 2.5:1).^{1,2} Osteomyelitis has historically been categorized as acute, subacute, and chronic.²⁻⁵ Brodie abscess is a form of subacute osteomyelitis; but because the diagnostic delay ranges from a few weeks to up to several years, the distinction between subacute and chronic osteomyelitis is not clear.⁵⁻⁸ A 2003 survey of chiropractors by the National Board of Chiropractic Examiners indicated that osteomyelitis is virtually never encountered by chiropractors; but because

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referral is very important, the diagnosis is important to make.⁹ The delay in diagnosis makes it possible for patients to come to a chiropractor for a second opinion. This was the case with this patient, who came for further evaluation and treatment after she was dismissed from hospital after treatment of a tibial fracture.

Case report

A 10-year-old girl had leg pain. Her right lower leg was fractured when she was struck by a car 10 months earlier. She has had external fixation with pins, which, because of slow healing, were kept in place for a long time. Her mother remarked that she had a compartment syndrome. At the time of consultation, her leg only hurt with motion. The pain was described as a pulling and “lashing” sensation. She had a swelling on her right lower leg; and if she bumped her shin by accident, it was very tender. She had no fever, but her shin sometimes felt warm. She was a gymnast, but was not able to train because of her leg pain, which was the reason she was seeking care. A review of systems was unremarkable, except that she had restless sleep, was talking in her sleep, and wanted to sleep with the lights on in the hall outside her bedroom.

Physical examination revealed an erythematous and edematous area on her right lower leg, which was not on the level of the original fracture, but higher up, just below where the superior pin had been situated. This area was sensitive to touch. Examination of the knees comprised observation for swelling, palpation, evaluation of passive movement including rotation, and the anterior draw test. Examination of the ankles comprised palpation; passive movement in dorsiflexion, plantar flexion, as well as inversion and eversion; and joint play. There was no sensitivity to any of the movements; there were no further abnormalities detected, and she did not have pelvic joint restrictions.

The patient brought all of the radiographs that had been taken over the past year. The first one, from the year before, showed a comminuted tibial fracture and a simple fibular fracture on the right side. The radiological examination in the following month showed good healing of the fibula, but slow healing of the tibia. In the next month's film, an oval lytic lesion of 2-cm diameter was visible anterior and inferior to where the superior fixation device had been in the right tibia. In the following month, a minimal periosteal reaction was noted on further imaging; and 2 weeks later, there was thickening of the periosteum anteriorly. On radiographs taken 10 months after the initial film, there were bone

thickening and significant sclerosis. A diffuse lytic lesion was clearly visible; however, the fracture site had healed well (Fig 1A and B).

Comparison of the radiograph with the physical examination showed that the swelling was at the site of the lesion. The radiological report that accompanied the final radiograph mentioned consolidation in a good position. The diagnosis was a Brodie abscess, with a possible differential diagnosis of osteoid osteoma.

The medical practitioner and the hospital were contacted, and further imaging was done. She was prescribed oral antibiotics. When she was evaluated, it was determined that although the infection no longer existed, a splinter was left where the superior pin had

Fig 1. A, Anteroposterior view of the patient's leg showing sclerosis. B, Lateral view of the patient's leg showing thickening of the tibia.

come out. It was said that her body would not be bothered by the splinter. However, the infection returned; and the year after, a debridement surgery was done, after which the infection finally resolved.

Discussion

A 2003 survey of chiropractors by the National Board of Chiropractic Examiners has established that peripheral conditions make up 17.1% of chiropractic chief complaints, of which the lower extremity makes up more than half.⁹ A literature review by Hoskins et al found that there are numerous chiropractic publications on the management of lower extremity conditions.¹⁰ Because the focus of the review of Hoskins et al was the chiropractic management of lower extremity complaints, they excluded quite a few articles on the basis that they had patients that had red flags present or were referred out. The 2003 survey established that chiropractors most frequently refer patients to family practitioners, orthopedists, neurologists, and massage therapists.⁹ This suggests that chiropractors are proficient diagnosticians and are aware of the limitations of chiropractic management. It also shows that chiropractors can appropriately serve as primary care providers, as this case also shows.¹⁰⁻¹²

There are several ways of categorizing osteomyelitis. One way is the presentation based on the time of disease onset: acute (within 2 weeks after onset), subacute (within 1 to several months), and chronic (after a few months).²⁻⁵ In this case, the infection became apparent 2 months after the accident. The difference in this case in classifying it as subacute or chronic comes from the description of these terms. Chronic osteomyelitis often progresses from an uncontrolled acute septic infection, which does not seem to be the case with this child because the symptoms were never acute. Subacute osteomyelitis, or Brodie abscess, usually reflects a low-grade clinical course of a hypovirulent infection.^{2,4-6} This description would fit the case.

Another classification includes different types: type I metaphyseal (no cortical erosion), type II metaphyseal (cortical erosion), type III diaphyseal (localized cortical and periosteal reaction), type IV diaphyseal (periosteal reaction), type V epiphyseal, and type VI vertebral.^{6,13} In this case, the classification would be a type III because it was a diaphyseal lesion with a cortical lucency and a periosteal reaction.

In a study by Rasool,¹³ most cases were situated in the tibia and were diaphyseal, as in this case, whereas in general, these infections are mostly metaphyseal. This

is because the joint metaphysis has a rich blood supply, slow circulation time, and reduced phagocytic activity.^{2,4,5,7,14-16} The route of infection was most probably direct in this case and would explain the unusual placement of the infection. The treatment had consisted of external fixation of the fracture with pins in the diaphysis of the tibia, which stayed in for several months. With a hematogenous spread, it is likely that the metaphysis would be more involved.

The age range for osteomyelitis is bimodal, being younger than 2 years and between the ages of 8 and 12 years old.⁷ Being 10 years old, this girl fits the general characteristics found in the literature. The criteria for the subacute course include symptoms present for more than 2 weeks; mild to moderate localized pain of insidious onset with intermittent symptoms, usually described as a persistent ache; localized erythema and edema of the affected area; little or no functional impairment; few or no systemic manifestations (low-grade fever and malaise); negative blood cultures; and positive findings on plain radiographs. The pain is frequently exacerbated after a period of unusual activity.^{2,3,6-8,13,15-17} This exactly fits this case. This patient had increasing pain when doing sports; an erythematous, edematous, tender area on her right lower leg; and not much of a limp when not exacerbating the pain. The night symptoms (restless sleep, more difficulty getting to sleep, talking in her sleep, and wanting to sleep with the lights on outside her bedroom), however, are symptoms that can be precipitated by febrile illness.¹⁸

The radiological findings that are reported for Brodie abscess in the literature are a well-defined round or ovoid radiolucency, measuring 1 to 4 cm in diameter, with thick surrounding sclerosis, periosteal reaction (also onion skin reaction), and possible sequestration of necrotic bone fragments.^{2,3,5,7,8,13,16} Subacute osteomyelitis and osteomyelitis from a direct source of infection show a mixed picture radiologically because the generally protracted course of the infection induces endosteal and periosteal reactions.^{5,8,16} This may mimic osteoid osteoma and malignant tumors such as Ewing sarcoma. The radiographs in this case showed an ovoid radiolucency, without sclerosis, which is similar to the study by Yoshikawa et al¹⁴; however, further on in the course, there was substantial bone thickening and periosteal reaction in the case presented here. Furthermore, the night symptoms may also be present in osteoid osteoma. This was a differential diagnosis in this case¹³; but because of the obvious probable cause and course of the complaint, an infection was more likely.

Diagnosis of this condition is traditionally based on the radiological findings.^{2,5-8,16} Further imaging studies include the use of scintigraphy, computed tomography, and magnetic resonance imaging (MRI).^{2,3,5-7,15,19} Scintigraphy is useful when there is a suspicion of a multifocal infection, which was not the case in this patient.^{2,5-7,15,19} Computed tomographic and magnetic resonance imaging studies are very good when surgical intervention is considered.^{2,3,5,7,17,19} Magnetic resonance imaging is useful in determining the extent of the infection and gives a more detailed resolution.^{3,5,7,8,15-17,19} This last study was done for this patient to verify the diagnosis and to decide on the therapy.

Traditionally, the treatment of this condition is surgical. However, the literature is divided over this subject. More recent studies advise to first administer a course of antibiotics; and when conservative treatment fails, then surgery is the next option.^{2,3,6,7} This girl was first treated with antibiotics. When the symptoms of the infections returned, she was treated surgically, after which the infection resolved.

Conclusion

Subacute osteomyelitis may have a diagnostic delay; and therefore, it is possible for a doctor of chiropractic to see this condition in the office. A good case history, examination, and availability of radiographs are important for the diagnosis and to make a proper referral.

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