

# Osteomyelitis of the pubic symphysis in athletes: a case report and literature review

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## ABSTRACT

KARPOS, P. A. G., K. P. SPINDLER, M. A. PIERCE, and H. J. SHULL, JR. Osteomyelitis of the pubic symphysis in athletes: a case report and literature review. *Med. Sci. Sports Exerc.*, Vol. 27, No. 4, pp. 473-478, 1995. Groin pain is a common problem in athletes. Osteitis pubis, a chronic inflammatory condition involving the pubic symphysis, is a rare cause, and pyogenic osteomyelitis of the pubis is seen even more rarely in healthy athletes. We report one of four cases of pyogenic osteomyelitis of the pubis seen at our institution, review our experience with all four cases, and present a review of the literature (7 cases). The diagnosis is established by the presence of extreme pain, point tenderness at the pubic symphysis, fever, and either a positive culture of blood, needle aspiration, or open biopsy of the pubis. White blood cell count, erythrocyte sedimentation rate, and the results of bone scan and computerized tomography may initially be normal and therefore cannot exclude the diagnosis. Prompt treatment with intravenous (IV) antibiotics effective against *Staphylococcus aureus* (causative organism in all documented cases—9/11) should initially be administered and then guided by culture and sensitivity information. Oral antibiotics should be given if the infection is responsive to IV antibiotic treatment. Prompt recognition and treatment with antibiotics may obviate the need for surgical debridement. All athletes who returned to sports activity did so by 6 months after diagnosis.

GROIN PAIN, INFECTION, BLOOD CULTURE,  
*STAPHYLOCOCCUS AUREUS*, IV ANTIBIOTICS,  
DIAGNOSTIC PITFALLS

Groin pain is a common problem in athletes, sometimes requiring evaluation by medical personnel. Usually, muscle strains or direct trauma are responsible and the player can soon return to competition. Occasionally, groin pain can be attributed to osteitis pubis, a chronic inflammatory condition involving the pubic symphysis which can inhibit participation in athletics for prolonged periods of time (9,14,19,24). Rarely, however, pyogenic osteomyelitis of the pubis has been reported in healthy athletes (16,21,29). The purpose of our case report and review of the literature (including

three patients from this institution) is to highlight the diagnostic pitfalls and provide a recommended diagnostic and treatment plan for this entity.

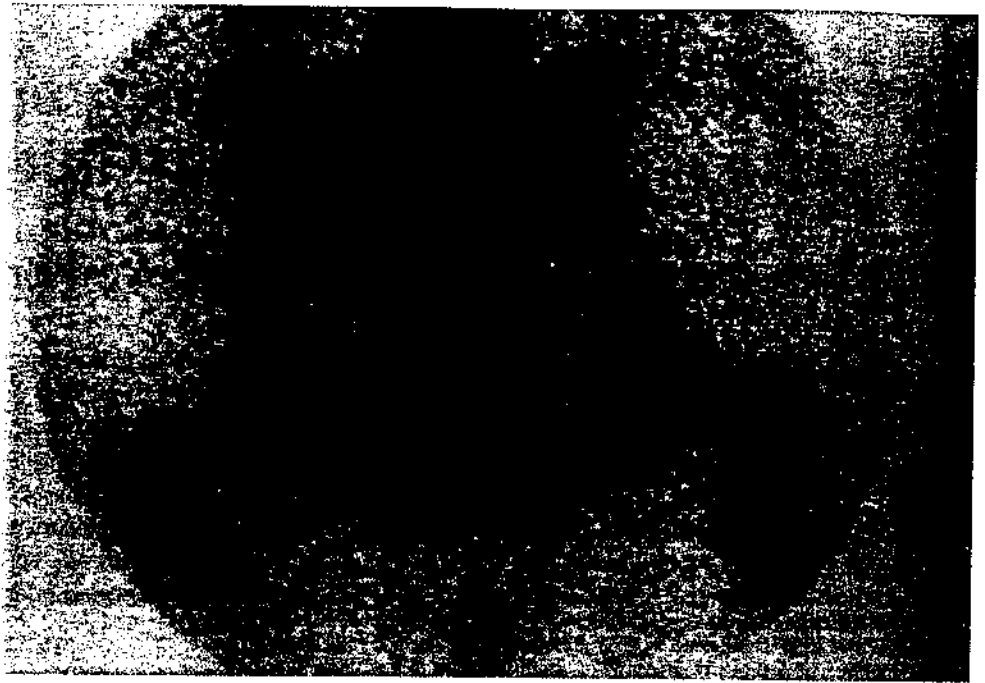
## CASE REPORT

A healthy, 21-yr-old starting collegiate linebacker in the Southeastern Conference awoke with acute, bilateral (L > R) groin pain. There was no history of extraordinary trauma or muscle strain, immune deficiency, or dysuria. The patient had a waddling gait, pubic tenderness to palpation, and intense groin pain with active adduction, but no hip irritability. Musculoskeletal, abdominal, and genitourinary findings were otherwise normal. He experienced no relief with a 24-h trial of rest and nonsteroidal anti-inflammatory medication.

The following day, he experienced increased groin pain and inability to walk and developed a temperature of 102.6°F (39.2°C). He was admitted to the hospital, where blood cultures were obtained. Laboratory results revealed a normal urinalysis, white blood cell (WBC) count of  $12,100 \cdot \text{mm}^{-3}$  with 85% neutrophils, and a normal erythrocyte sedimentation rate (ESR) of  $19 \text{ mm} \cdot \text{min}^{-1}$ . Radiographs showed bilateral sclerosis at the pubic symphysis only. Three-phase bone scan (Fig. 1) and pelvic CT scan were obtained to rule out an infectious process of the pelvis or hip region but were normal.

On hospital day 2, the patient remained bedridden and febrile. Blood cultures revealed pansensitive, coagulase positive *Staphylococcus aureus*. The patient was started on intravenous nafcillin ( $2 \text{ g} \cdot \text{h}^{-1}$ ). He remained febrile ( $104.5^\circ$ ) on day 3; therefore, to identify a source of infection or pelvic abscess, an MRI was obtained, which demonstrated fluid on T2-weighted images within the symphysis pubis and the left obturator internus muscle (Fig. 2, A-C). A gallium scan confirmed increased uptake in the pubis and obturator internus. A CT-directed biopsy of the symphysis pubis (anterior approach) and left obturator internus muscle (posterior approach) was then performed (Fig. 3, A and B). Cultures from the

Figure 1—Normal bone scan: inlet view of the pelvis to avoid obstruction from radioisotope in the bladder.



obturator internus were negative; however, cultures from the symphysis pubis grew *S. aureus* with the same sensitivities as the blood isolate. Since the biopsy results were negative from the obturator internus and no abscess was seen within the pubic symphysis, surgical debridement was not performed.

By day 4, the patient slowly defervesced and his clinical examination findings gradually improved. On day 15, he was afebrile, ambulating normally, and discharged. Based on *S. aureus* culture and sensitivity results, 3 wk of parenteral therapy (inpatient: nafcillin 2 g·4 h<sup>-1</sup>; outpatient: vancomycin 1 g·12 h<sup>-1</sup>) and 3 wk of oral antistaphylococcal therapy (dicloxacillin 1 gm QID plus Probenecid 500 mg QID) were administered. Adequate serum bactericidal titers were confirmed on oral therapy.

The patient began a supervised, graduated rehabilitation program for the next 6 months. He returned to running in 4 months and to full participation in football by 6 months. At 2-yr follow-up he has completed an entire season without any problems and remains asymptomatic. Serial x-rays showed no evidence of sequestrum formation. However, the early follow-up x-rays demonstrated a 1-cm erosion of the left superior pubis (Fig. 4A) and the most recent x-rays reveal new bone formation in this region (Fig. 4B). The initial radiographs were not diagnostic of an infectious process but the erosion of bone followed by bone formation was consistent with active then resolved osteomyelitis.

## LITERATURE REVIEW

The literature was searched for cases of pubic osteomyelitis occurring in healthy athletes. Osteitis pubis in athletes

was also studied to identify patients who may in fact have had osteomyelitis. Only 10 cases were discovered, two with very limited information. The details of the cases are summarized in Table 1, with emphasis on diagnosis, treatment, and outcome. Of note, cases 1-4 (2-4 previously reported (29)) were all treated at this institution.

Nine of 10 athletes (90%) were febrile on presentation. Fifty-five percent had an elevated WBC, while 70% had an elevated ESR. Blood cultures were positive in 71% of cases. A variety of contact and noncontact sports were represented. Only 55% showed lytic lesions on initial x-rays, and only 50% had abnormal bone scans.

Two of three aspirations were positive (the negative case was performed after several days of IV antibiotics). In all cases, the identified or presumed organism was *Staphylococcus aureus*. Treatment included surgical debridement 30% of the time after failure to eradicate infection with antibiotics alone. The duration of antibiotic treatment varied from 4 wk to 6 months. Finally, little information exists on return to sport, but ranged from 4.5 to 6 months when available.

## DISCUSSION

Osteomyelitis of the pubis accounts for less than 1% of all acute hematogenous osteomyelitis cases. It has been well described in children, parenteral drug abusers, and in elderly patients after genitourinary procedures. The most common causative organisms in these risk groups are *S. aureus*, *Pseudomonas aeruginosa*, and mixed gram negative bacteria, respectively (4,5,7,10,17,25,26). Pubic osteomyelitis has also been reported after blunt trauma, abortion, cardiac catheterization, and suprapubic bladder puncture (1,8,13,18). The cases reviewed make it appar-

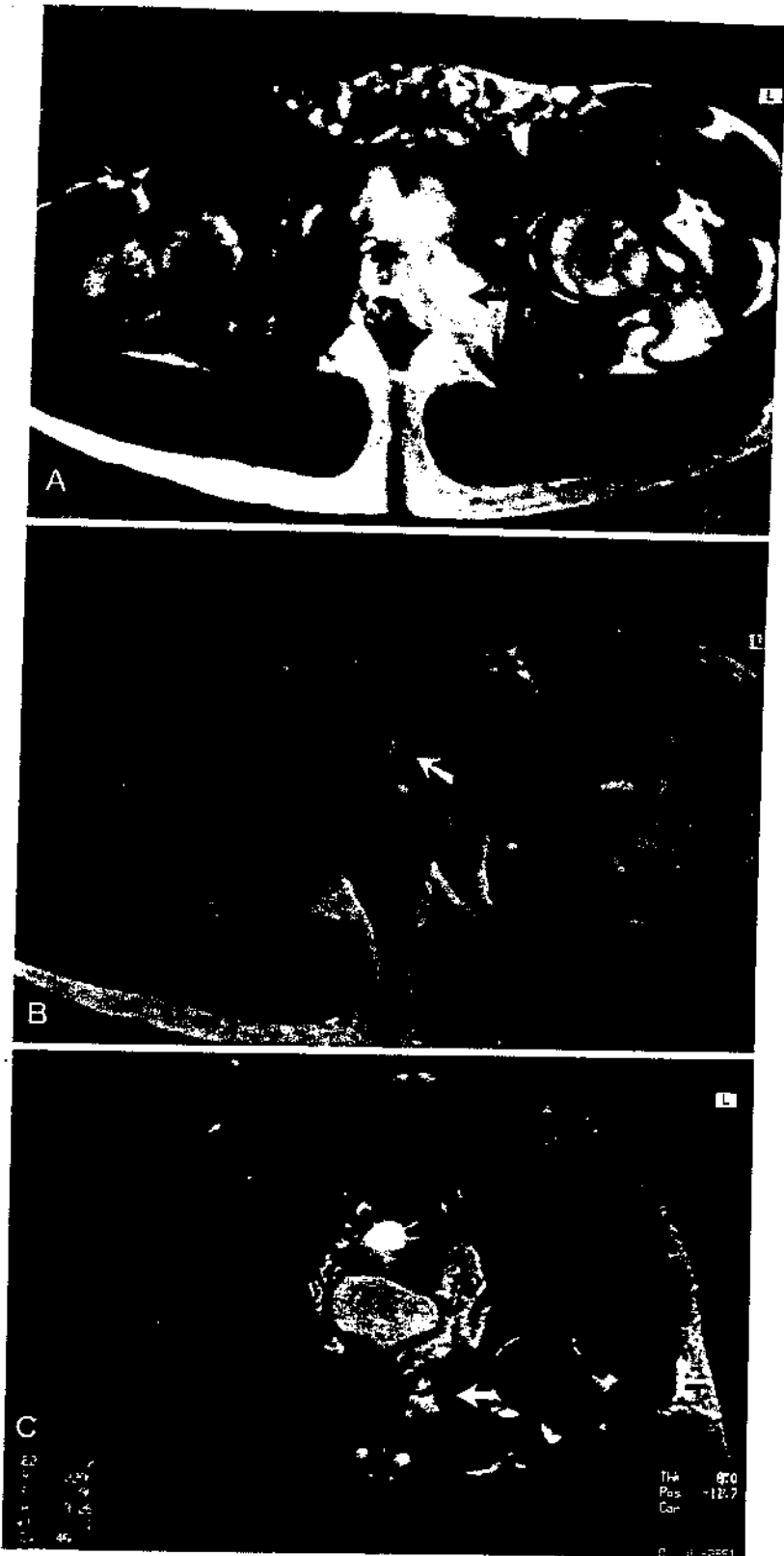


Figure 2—A) T2-weighted ( $T_E/T_R = 45/2200$ ) axial MRI of pelvis demonstrating increased signal in left obturator internus muscle representing edema. B) T2-weighted ( $T_E/T_R = 90/2200$ ) MRI of pelvis demonstrating increased signal and fluid in the symphysis pubis. C) T2-weighted ( $T_E/T_R = 90/2200$ ) coronal MRI of pelvis.

ent, however, that osteomyelitis of the pubis may occur in healthy individuals with vigorous athletic activity as the only risk factor. For this reason, we feel it is important that those who treat athletes be able to recognize, evaluate, and treat this rare entity.

The precise etiology of osteomyelitis of the pubic symphysis is unknown (28). In parenteral drug abusers, an infected synchondritis of the pubic symphysis is felt to be the primary lesion (7). In other risk groups, however, bacterial seeding of the pubis, a metaphyseal-equivalent

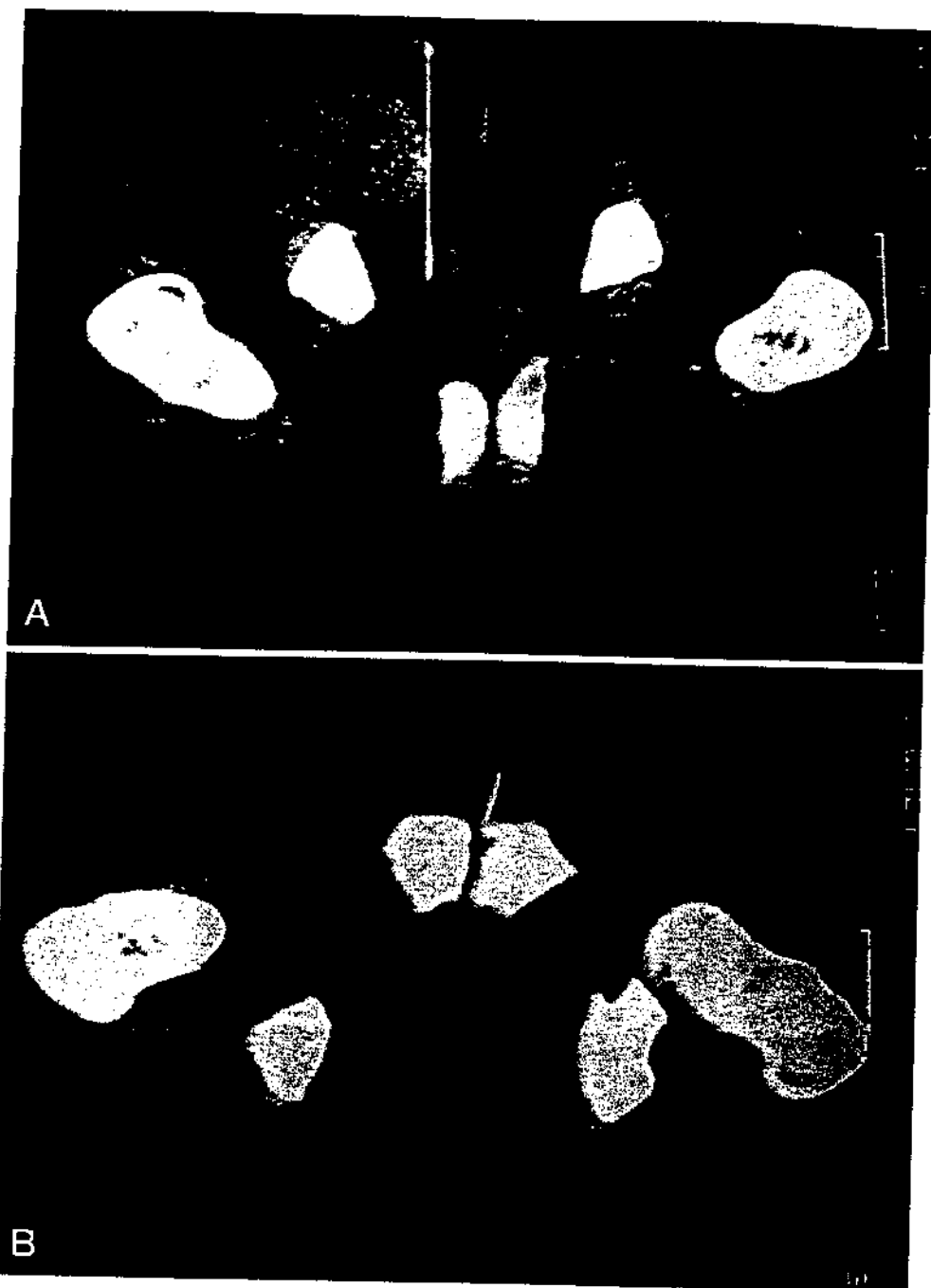


Figure 3—A) CT-directed aspiration of left obturator internus via posterior approach. B) Anterior aspiration of pubis.

bone, is felt to occur via transient bacteremia. Bacteremia without sepsis has been shown to be present after procedures of the colon and urinary tract, as well as after childbirth and tooth brushing. In addition, outbreaks of staphylococcal disease have been reported in young adults engaged in vigorous physical activity (29). Experimentally, it is established that local trauma lowers the threshold for osteomyelitis. It is hypothesized that in athletes activity-related microtrauma may predispose the pubis to bacterial seeding.

Perhaps one reason osteomyelitis of the pubis has been infrequently reported is its similarity to osteitis pubis. First described by Beer in 1928, osteitis pubis is a chronic

inflammatory rather than an acute infectious process (2). However, before 1961, the terms "osteitis pubis" and "osteochondritis of the pubic symphysis" also referred to cases of pyogenic osteomyelitis. Not until 1961 did Coventry and Mitchell (6) distinguish osteomyelitis from osteitis pubis, a view reiterated by others (25). Osteitis pubis is classically described after gynecologic and urologic surgery; however, it is also well described as a cause of groin pain in athletes.

The initial clinical presentation of both osteitis pubis and osteomyelitis are remarkably similar. Signs and symptoms of both include point tenderness over the pubis, rectus abdominus insertion, inguinal ligament inser-

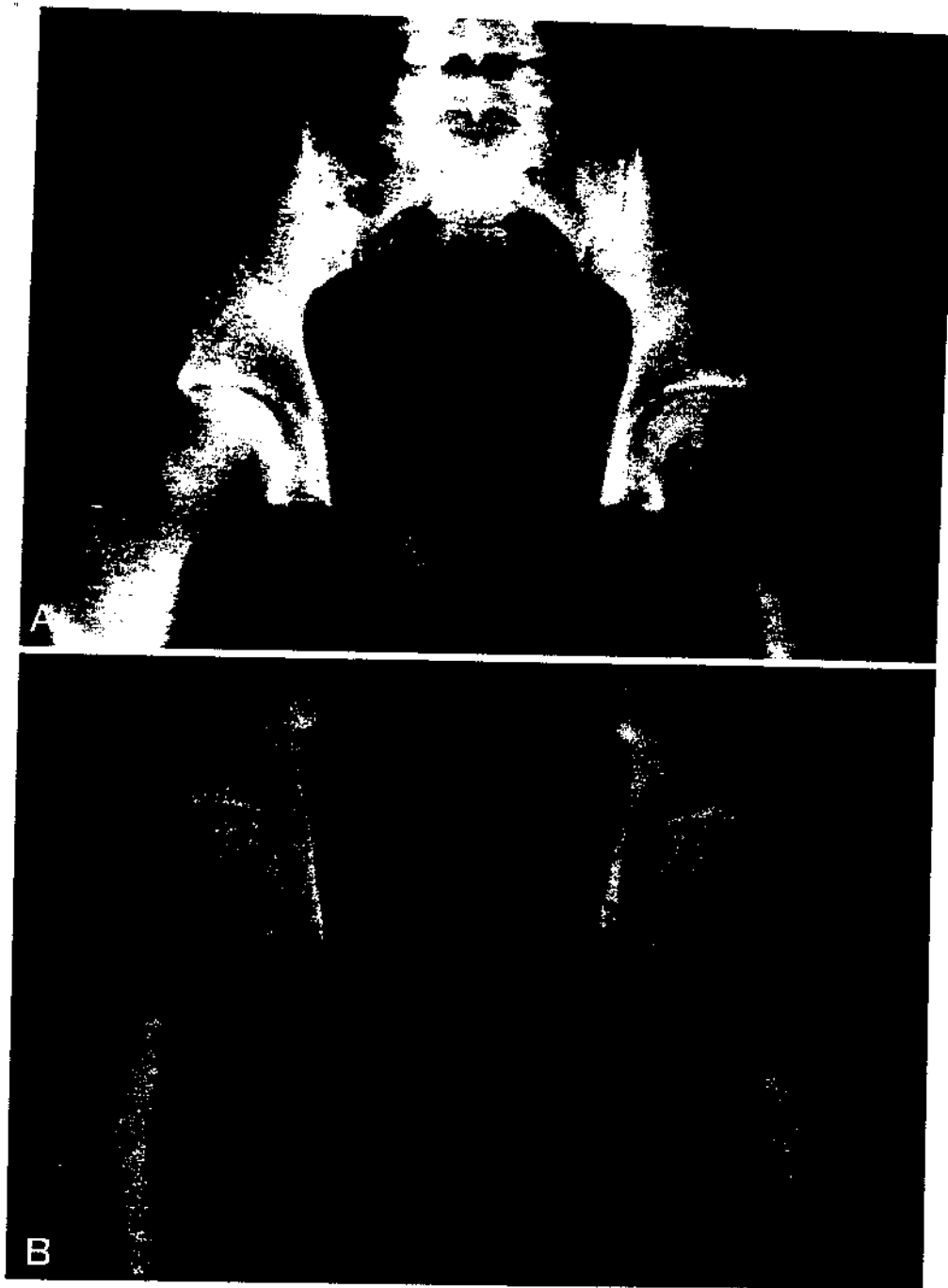


Figure 4—A) AP pelvis radiograph at 3 wk after presentation demonstrating erosion in the left superior pubis. B) AP pelvis radiograph demonstrating new bone formation in this region at 3-month follow-up.

tions, and adductor muscle origin (11). There is pain with active adduction as well as with direct and lateral compression of the pelvis. Patients often have a waddling, antalgic gait. Typically, the symptoms of osteitis pubis are chronic and low grade, whereas those of osteomyelitis are more fulminant with an acute onset and high grade symptoms (7,10).

The literature is confusing regarding the differential diagnosis of osteomyelitis from osteitis pubis. Clearly, the first differentiating point in osteomyelitis of the pubis is fever and chills. In this series, this finding was 90% sensitive, while fever in osteitis pubis is unusual (9). Both entities have been reported to produce elevated white

blood cell counts and erythrocyte sedimentation rates. However, these studies are nonspecific and of low sensitivity, as documented in Table 1.

Some have argued that plain radiographs can differentiate the two entities. In osteitis pubis, there is a varying degree of sclerosis, rarefaction, erosion, cyst formation, or symphyseal widening which is bilateral and symmetric (9). Conversely, osteomyelitis may show sequestrum formation. However, controlled studies have shown that irregularities of the pubic symphysis with reactive sclerosis are common in normal athletes (15). Cases of pubic osteolysis representing neither osteitis pubis and osteomyelitis are also reported (23). In addition, the localized

TABLE 1. Reported cases of pubic osteomyelitis in athletes.

Patient No.	Reference	Age	Gender	Sport	Temp in °C (*F)	WBC ×1000-mm <sup>-3</sup>	ESR mm·min <sup>-1</sup>	Blood Culture	X-Ray	Bone Scan	CT/MRI	Aspiration	Organism	Treatment	Return to Sport
1		21	M	Football	39.2 (102.6)	12.1 K	19	<i>S. aureus</i>	Reactive sclerosis, pubic symphysis	1) Neg. 2) Gallium pos.	1) CT nl 2) MRI = edema pubis and obturator internus	+	<i>S. aureus</i>	1) IV abx × 3 wk PO abx × 3 wk	6 months
2	27	21	M	Football	38.7 (101.7)	8.4 K	61	NP	Irregularity R pubic symphysis	Multiple defects, pelvis	Irregularity R. pubis	+	<i>S. aureus</i>	1) IV abx × 3 wk 2) PO abx × 4 mo Recurrence → 3) I&D 4) IV abx × 4 wk 1) IV abx × 6 wk	N/A
3	27	43	M	Runner	39.4 (102.9)	6.9 K	31	<i>S. aureus</i>	N/A	1) Neg. 2) Indium pos. R. pubis →	Neg.	NP	<i>S. aureus</i>	1) IV abx × 6 wk	N/A
4	27	31	M	Runner	39.4 (102.9)	13.1 K	94	Neg.	1) Neg. 2) Day 17 = pubic erosions	1) Neg. 2) ↑ pubis at day 17	NP	NP	Presumed <i>S. aureus</i>	1) IV abx × 8 wk	N/A
5	14	35	M	Soccer	40.6 (105.1)	10.2 K	1)19 2)115 (day 5)	<i>S. aureus</i>	1) Lytic R. pubis 2) Neg.	Neg.	NP	Neg.	<i>S. aureus</i>	1) IV abx × 1 wk 2) PO abx × 6 mo	6 months
6	14	24	M	Handball	38.5 (101.3)	nl	27	<i>S. aureus</i>	Neg.	↑ uptake symphysis	NP	NP	<i>S. aureus</i>	1) IV abx × 1 wk 2) PO abx × 6 mo	4.5 months
7	19	22	M	Soccer	38.7 (101.7)	13.2 K	102	<i>S. aureus</i>	Lytic lesion L. pubis	↑ uptake bilateral pubis	NP	NP	<i>S. aureus</i>	1) IV abx × 4 wk	N/A
8	19	14	F	Tennis	37.3 (100.1)	12.1 K	100	NP	Osteopenia bilateral pubis	↑ uptake bilateral pubis	NP	NP	Presumed <i>S. aureus</i>	1) IV abx × 4 wk	N/A
9	1	18	M	Runner	nl	NP	19	NP	Lytic lesion bilateral pubis	NP	NP	NP	<i>S. aureus</i>	1) IV abx × 2 mo 2) I&D	N/A
10	18	20	M	N/A	38.5 (101.3)	17.4 K	34	Neg.	Lytic lesion R. pubis	NP	NP	NP	<i>S. aureus</i>	1) I&D of abscess 2) IV abx × 1 wk 3) PO abx × 5 wk	N/A

Age (yr), Gender (M = male, F = female), °C = degrees centigrade, °F = degrees Fahrenheit; WBC = white blood cell; ESR = erythrocyte sedimentation rate; IV abx = intravenous antibiotics; NP = not performed; NL = normal; N/A = not available.

bony changes of osteomyelitis usually are not seen until 2–4 wk after the onset of symptoms.

Technetium<sup>99</sup> bone scan may be useful to confirm the diagnosis of osteomyelitis. However, the bone scan has been shown to be less than 80% accurate in the diagnosis of acute hematogenous osteomyelitis (12). In addition, special attention must be paid to imaging the pubis without obstruction from radioisotopes in the bladder (29). Of note, needle aspiration does not alter the bone scan (3). Gallium scanning localizes to white blood cells, and may therefore be more specific; however, it requires at least 24–36 h for an adequate study (12). Other studies, such as CT, MRI, and tomograms, may localize an abscess or sequestrum, but should be considered diagnostic adjuncts.

The definitive diagnosis must therefore be established by other means. Upon presentation, blood cultures should be obtained, especially if fever is present. If blood cultures are negative, bone culture is necessary. In the case presented, this was accomplished by CT-guided aspiration using a large bore spinal needle (22). If needle biopsy is negative, open biopsy may be considered.

Antimicrobial therapy is guided by the microbiological information obtained from cultures. If no other risk factors are present and the index of suspicion is high, consideration should be given to beginning antistaphylococ-

cal coverage empirically after cultures are obtained. All documented cases in the literature involved *S. aureus*. The optimal duration of therapy is not well established; however, most feel that at least 4 wk of treatment is necessary. As in hematogenous osteomyelitis in children, the length of parenteral vs oral antibiotics is controversial. If a patient does not respond to treatment, sequestrum formation must be suspected, tomograms obtained, and surgical debridement considered. As serial radiographs may demonstrate worsening sclerosis while the patient's symptoms are improving, response should be based primarily on clinical and laboratory evaluation.

Pubic osteomyelitis is a debilitating disease, with rapid return to sport unlikely. The cases in the literature in which this was noted averaged 5 months. However, we feel a supervised rehabilitation program is crucial. In the case presented, this consisted of no lower extremity (LE) impact loading or lifting until all symptoms resolved (approximately 3 months). Conditioning focused on non-impact aerobic exercise, i.e., bicycling, water running, and StairMaster use. LE lifting focused on full active range of motion, flexion/extension, and abduction/adduction with Nautilus equipment. Gradually, agility work and free weightlifting were introduced. Finally, the patient was allowed to train with the football team and he returned to full participation 6 months after the onset of symptoms.

## SUMMARY

Although rare, *S. aureus* osteomyelitis of the pubis must be suspected in athletes with unexplained, acute groin pain. The disease is felt to represent hematogenous seeding during transient bacteremia of areas of preexisting subacute trauma. Those involved in the care of athletes should be aware of this entity, as well as the aggressive diagnostic and treatment measures required. Prolonged antibiotics are felt necessary for cure, and

early treatment may prevent sequestrum formation and obviate the need for surgical debridement.

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