

Sacroiliac joint pain due to bacterial infection: a report of two cases

SH Burns, DC, FCCS(C)*

DR Mierau, DC, MSc (Orth), FCCS(C)*

E Howlett, MD, LMCC**

Isolated infection of the sacroiliac joint is a rare cause of low back pain. Delayed diagnosis can result in significant morbidity. The diagnosis may be missed initially if physicians do not consider the possibility of infection. The clinical index of suspicion should increase in the presence of certain historical and examination findings. These include intravenous drug use, immunosuppression, recent infection elsewhere, fever and warmth or swelling over the sacroiliac joint. Two cases of sacroiliac joint pain due to Staphylococcus aureus infection are presented, with an overview of the etiology, diagnosis and management of the disorder.
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KEY WORDS: sacroiliac joint, pyogenic infection, diagnosis, chiropractic, manipulation.

Une douleur en bas du dos est rarement due à une infection isolée du sacro-iliaque mais un mauvais diagnostic d'un tel état peut avoir des conséquences néfastes sur la santé du patient. Le médecin sera plus susceptible de poser le mauvais diagnostic s'il oublie la possibilité d'une infection, et certains points de l'anamnèse et de l'examen du patient devraient lui mettre la puce à l'oreille. Ces éléments sont, entre autre, l'injection de drogue, une immuno-suppression, toute infection récente, une fièvre, une chaleur ou enflure à l'articulation sacro-iliaque. Deux cas de douleur sacro-iliaque due à une infection de staphylocoque aureus sont présentés avec étiologie, diagnostic et traitement.
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MOTS-CLÉS: articulation sacro-iliaque, infection pyogène, diagnostic, chiropraxie, manipulation.

Introduction

Sacroiliac (SI) joint pain is a common complaint among chiropractic patients. The origin of SI joint pain is usually non-pathological (i.e. sprains, mechanical dysfunction, etc.). Morbid causes are not commonly encountered in the chiropractic clinic setting. Therefore, chiropractic practitioners may become complacent about considering serious pathology when examining and diagnosing patients with sacroiliac joint pain. Bacterial infection is one such rare, but serious cause of SI joint pain. Early diagnosis is important in these cases because rapid and permanent bone destruction may occur if the infection is not treated quickly. Patients with SI joint infection have historical features, objective clinical findings, radioimaging changes and laboratory findings which implicate infection as the cause of symptoms. The case histories of two patients with

infective sacroiliitis, seen in a chiropractic clinic within a one year period, demonstrate the features of this condition.

Case one

A 39-year-old female was referred to the chiropractic clinic by a rheumatologist. Her history was nine months of left-sided back and buttock pain of insidious onset. Her family doctor had sent her to the rheumatologist after the fourth month of symptoms because she had warmth and swelling over the left sacroiliac joint, as well as radiographic changes showing peri-articular sclerosis around the left SI joint (Figure 1). A computerized tomography (CT) scan had shown evidence of partial fusion of the joint (Figure 2). The right SI joint appeared normal in both studies. The rheumatologist first prescribed tolmetin sodium (an NSAID). When the patient did not improve after four weeks of this treatment he injected the joint with hydro-cortisone. The symptoms abated for two days. Following that they returned, more severe and accompanied by fever and chills. Two weeks later the patient was referred for chiropractic manipulation of the left SI joint. At the time the accompanying diagnosis was "sacroiliitis likely due to ankylosing spondylitis".

On examination at the chiropractic clinic, the patient appeared distressed and pale. Her skin was warm and moist. Forward flexion of the lumbar spine was painful and limited to 50

* Private practice, Associated Chiropractic Clinics, 9 - 119 4th Avenue South, Saskatoon, Saskatchewan, Canada S7K 5X2.

** Private practice, Pleasant Hill Plaza Medical Clinic, 1623 20th Street West, Saskatoon, Saskatchewan, Canada S7M 0Z9.
Submit reprint requests to Dr. S. Burns, Associated Chiropractic Clinics, 9 - 119 4th Avenue South, Saskatoon, Saskatchewan, Canada S7K 5X2.

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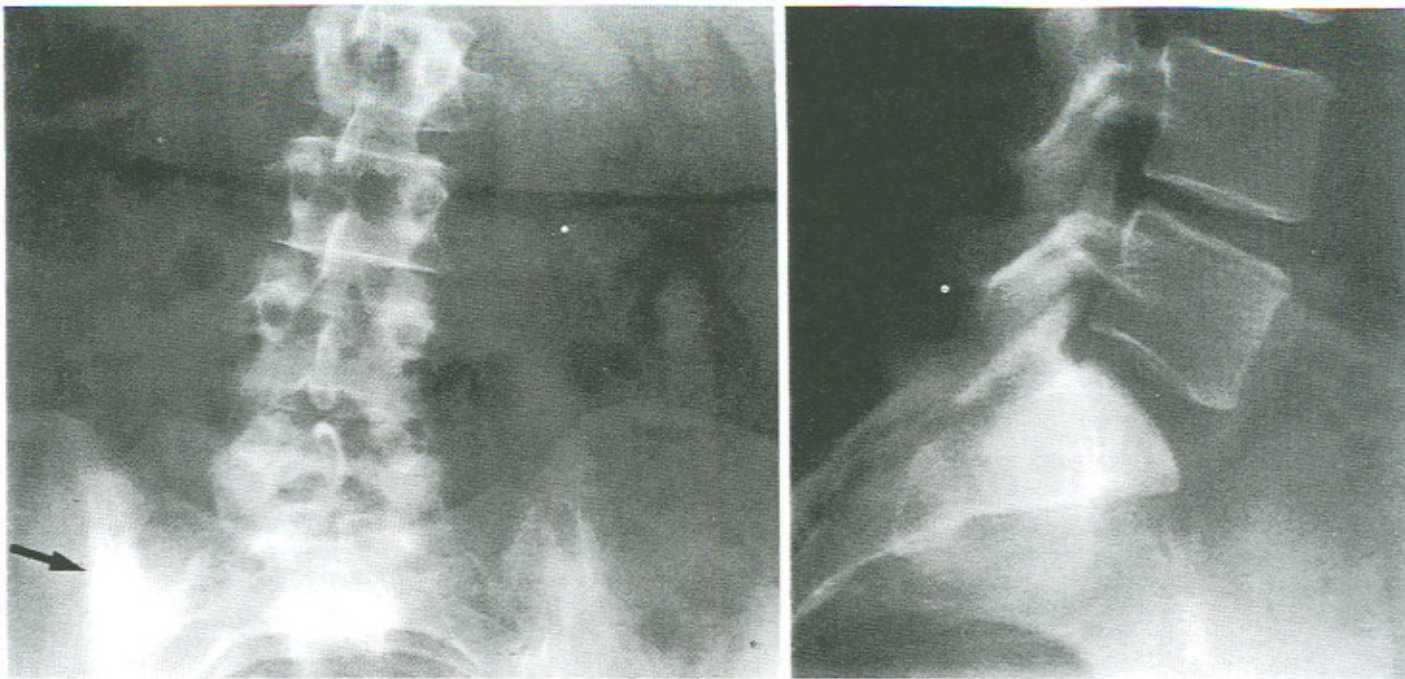


Figure 1 Radiographs (AP and lateral) of a 39-year-old female (case one), taken four months after the onset of left-sided sacroiliac (SI) joint pain. Note the sclerotic changes around the left SI joint (arrow).

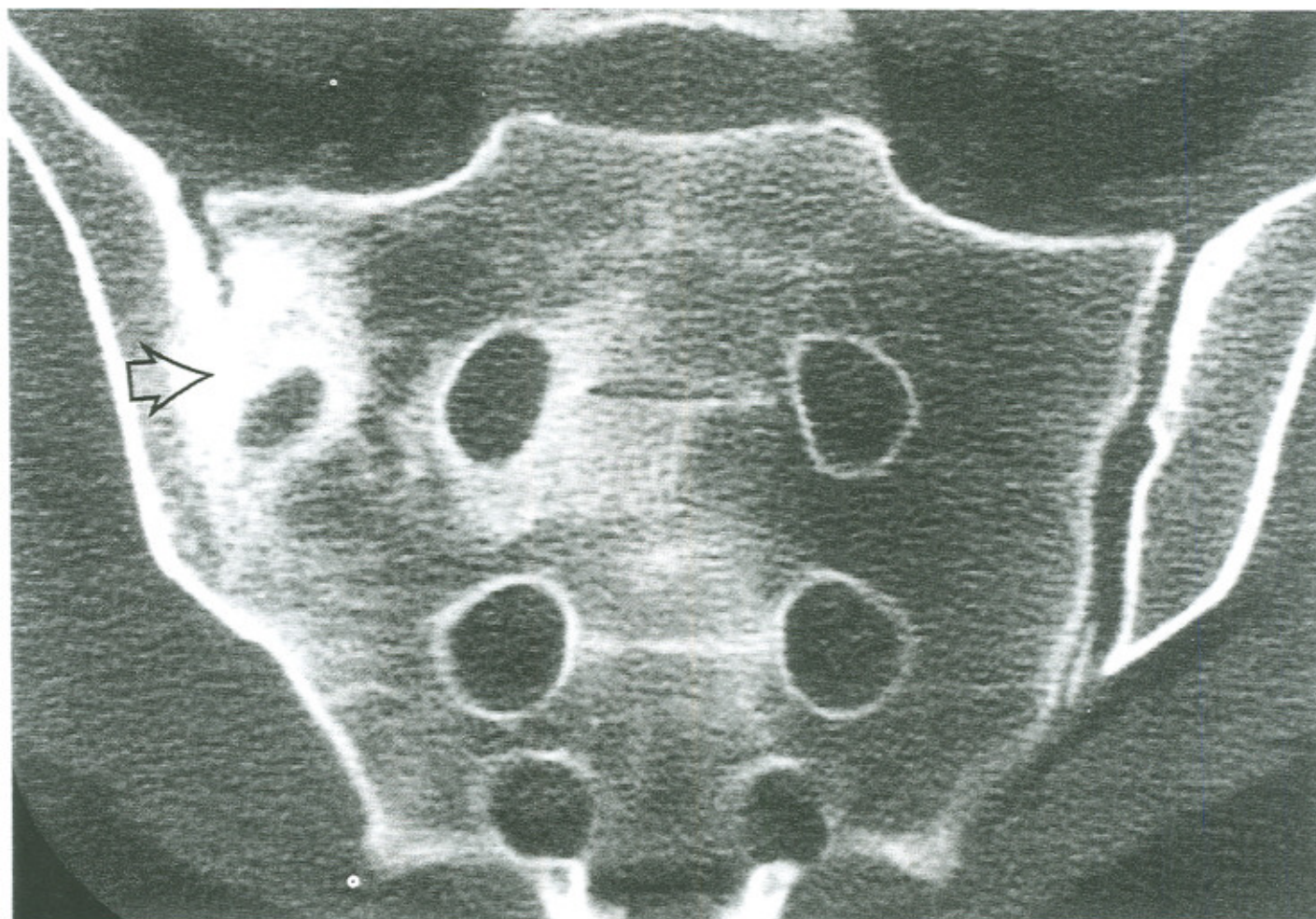


Figure 2 Computed tomography (CT) image of the sacroiliac (SI) joints of patient in case one. The left SI joint (arrow) shows partial fusion, an attempt at bony repair secondary to long standing infection.

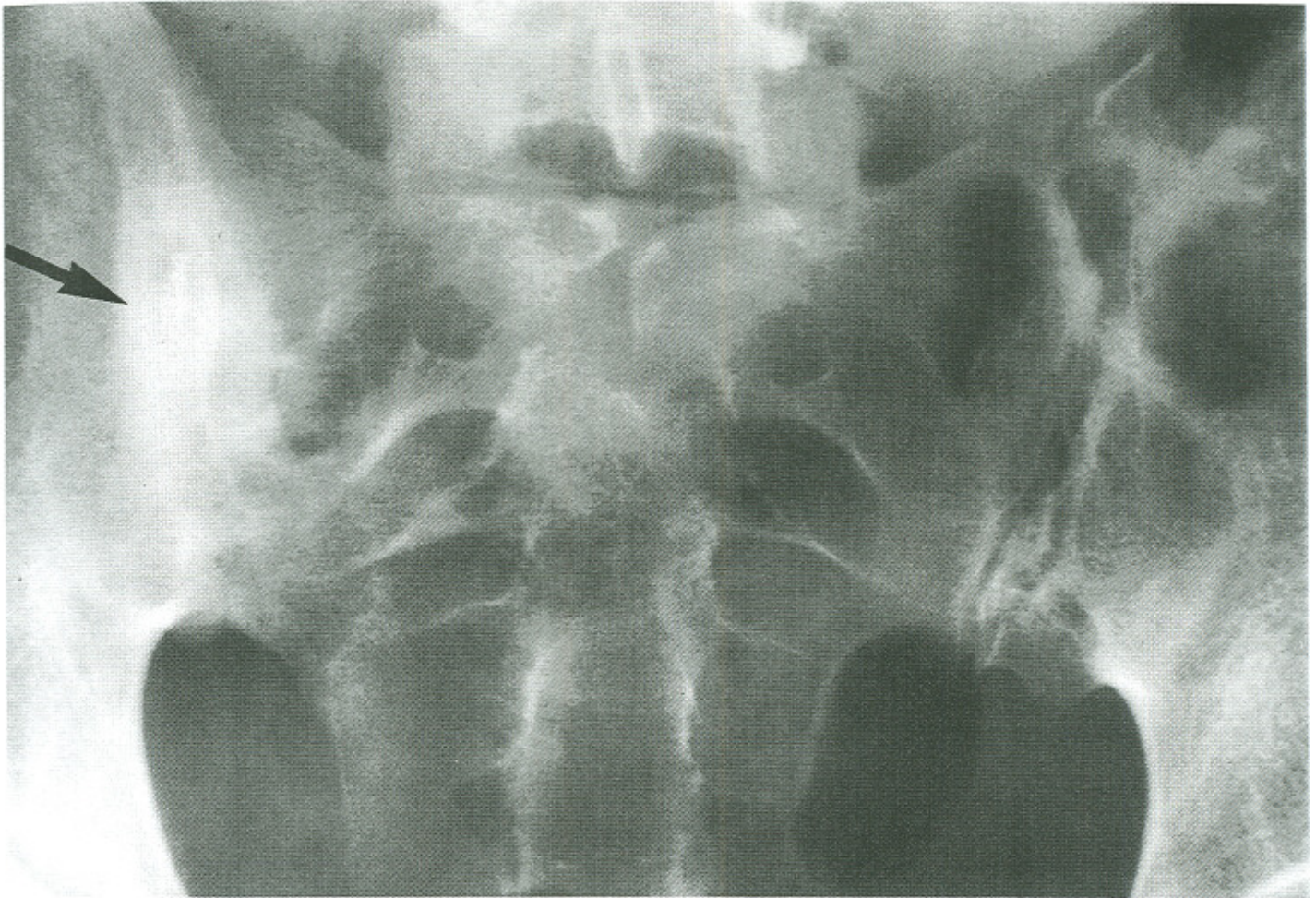


Figure 3 Ferguson's view radiograph of the SI joints of patient in case one, when seen at the chiropractic clinic, five months after the radiograph in Figure 1 was taken. Painful symptoms had been present for nine months at the time of this image. There is sclerosis affecting both sides of the infected joint and partial fusion (arrow). The right SI joint is normal.

percent of normal. The left SI joint was tender to pressure. There was fullness and warmth of the overlying soft tissue. Sacroiliac joint stress tests, including Patrick's, Gaenslen's and lateral pelvic compression were positive on the left side for SI joint pain. Straight leg raising was full on the right but limited to 70 degrees on the left by SI joint pain. A small scar was noted over the left sacroiliac joint. She explained that pus had drained from the area for two days during the previous month. Examination of the right sacroiliac joint was normal.

A Ferguson's view radiograph of the sacroiliac joints ordered that day was subsequently reported as demonstrating sclerosis around the left sacroiliac joint "consistent with septic arthritis" (Figure 3).

Based on a tentative diagnosis of SI joint sepsis, arrangements

were made for her to be admitted to hospital the next day. On admission her oral temperature was 40 degrees C, suggesting sepsis. Intravenous antibiotics were started immediately. A Technetium [^{99m}Tc] bone scan done two days later showed increased uptake of the radionuclide around the left SI joint (Figure 4). This was followed shortly by a Gallium 67-citrate (^{67}Ga) scan which showed similar uptake characteristics (Figure 5). She remained on antibiotics for 19 days. Following that a surgical debridement of the joint and surrounding bone was undertaken. Tissue cultures did not produce an organism. However, subsequent blood cultures grew *Staphylococcus aureus* bacteria. The medical imaging findings and positive blood cultures confirmed the diagnosis of sepsis, suggesting a chronic infection of the left sacroiliac joint. She remained on intravenous

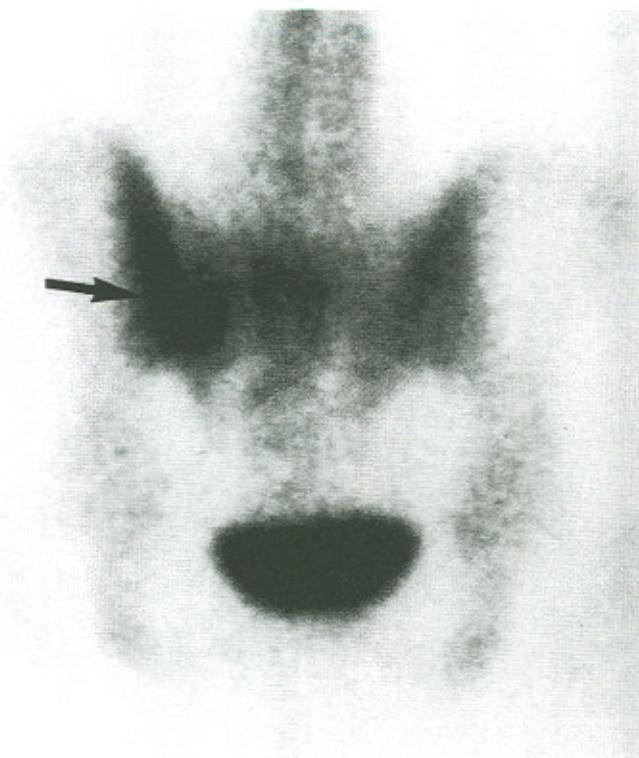


Figure 4 Technitium [Tc 99m(^{99m}Tc)] bone scan of case one patient after admission to hospital. There is increased uptake of the tracer substance in the area of the left sacroiliac joint (arrow).

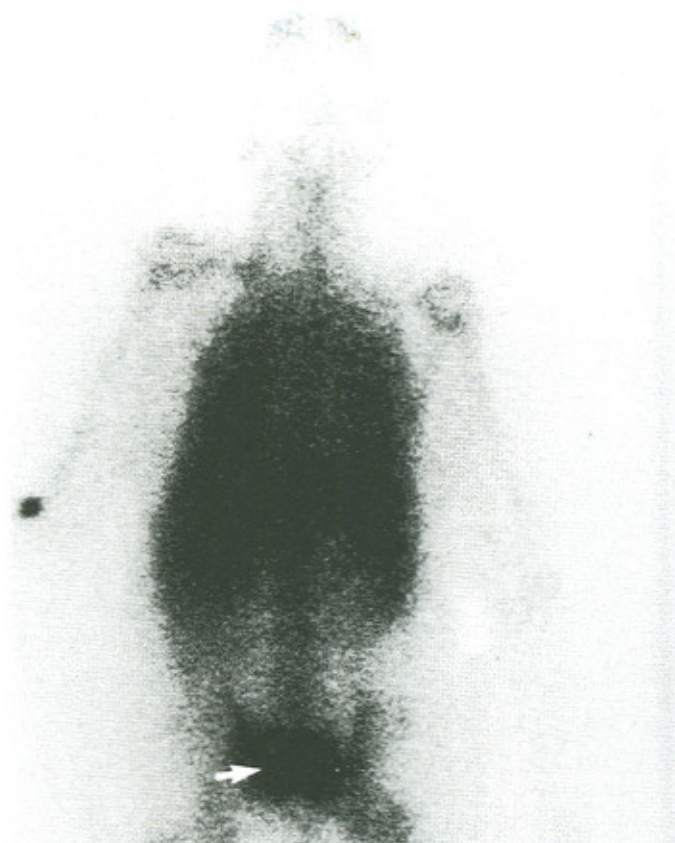


Figure 5 Whole body Gallium 67-citrate (67Ga) bone scan image of case one patient. There is increased uptake of the radio-tracer at the left sacroiliac joint (arrow). This indicates increased white blood cell activity, suggestive of infection in the area.

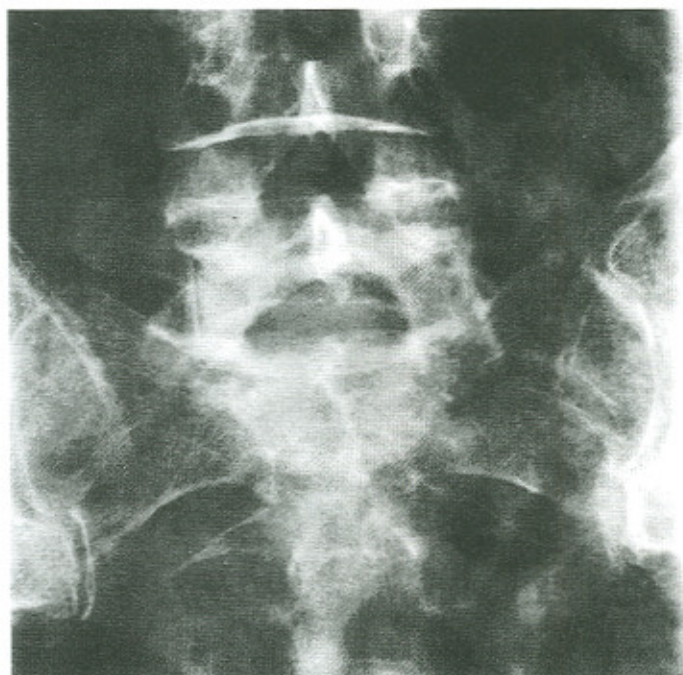


Figure 6(a) Radiograph showing the SI joints of a 70-year-old female (case two) ten days after the onset of left sacroiliac joint pain. Note that both SI joints appear normal at this stage.

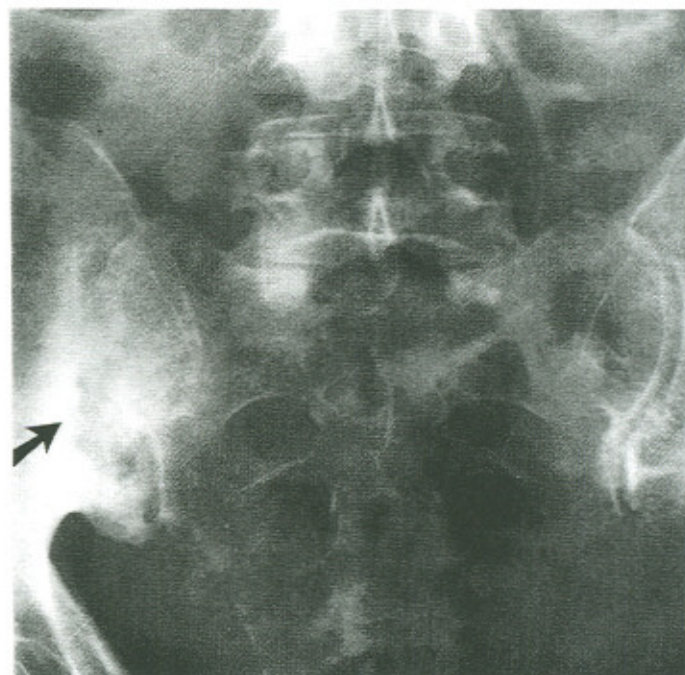


Figure 6(b) Radiograph of SI joints of same female, two years after that shown in Figure 6(a). Her condition is now chronic. Note the erosion of joint margins, joint space widening and peri-articular sclerosis which are now apparent at the left sacroiliac joint (arrow). The right side remains normal.

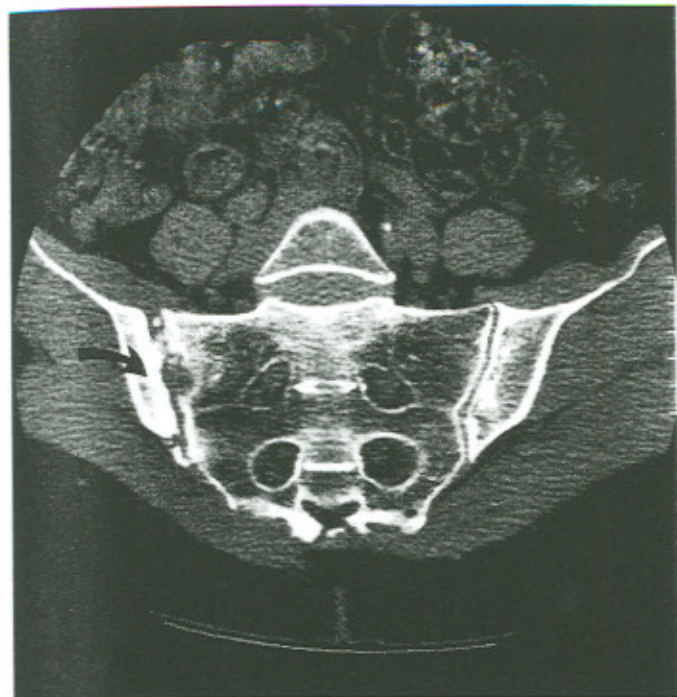


Figure 7 CT scan showing the sacroiliac joints of patient in case two, approximately 2 years after the onset of symptoms. There is extensive erosion of the margins of the left SI joint (arrow). Again, the right joint appears normal.

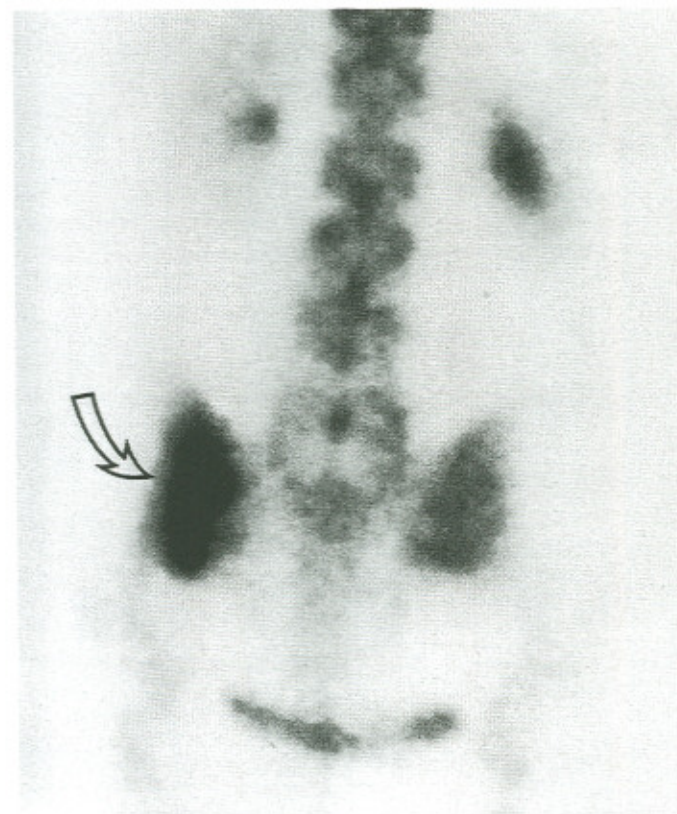


Figure 8 Technetium [Tc 99m(^{99m}Tc)] bone scan of patient in case two. Symptoms have been present about two years at the time of this scan. There is increased uptake of the radionuclide tracer in the area of the left SI joint (arrow).

antibiotics for one month. After six weeks she was discharged from care, symptom-free and with negative blood cultures.

Case two

A 73-year-old female, complaining of two years of pain located over the left sacroiliac joint was seen at the chiropractic clinic. She remembered no precipitating factor, but the pain was severe enough to make walking difficult. Her past history revealed that a few days after the initial onset of pain a chiropractor had radiographs taken of her lumbar spine. These radiographs showed moderate degenerative changes in the lumbar spine but normal appearing SI joints (Figure 6a). At the time a presumptive diagnosis of left sacroiliac joint syndrome was made and she underwent a series of sacroiliac manipulations. The treatment failed to relieve her pain. She obtained some relief with aspirin and local application of ice. Aside from her presenting complaint she reported that her health was good. Her systems review was normal.

On examination she had full range of motion of the lumbar spine with some increase in pain over the left SI joint on full forward flexion. There was tenderness to pressure over the left sacroiliac joint. The Patrick test increased the left SI joint pain. The remainder of the physical examination was unremarkable.

Lumbar spine and sacroiliac joint radiographs demonstrated erosive changes of the left sacroiliac joint, including widening of the joint space and peri-articular sclerosis of the surrounding bone. (Figure 6b).

Based on her radiographic findings, a tentative diagnosis of infection of the left sacroiliac joint was made. An orthopaedic consultation was arranged. A CT scan demonstrated erosion and reactive sclerosis at the left SI joint (Figure 7). A Technetium [Tc 99m(^{99m}Tc)] bone scan showed increased uptake at the left SI joint (Figure 8). A subsequent Gallium scan did not demonstrate abnormality at the left sacroiliac joint or elsewhere in the body. A culture from tissues taken from an open biopsy of the joint grew *Staphylococcus aureus*. Cloxacillin sodium (an oral antibiotic) was prescribed and continued for 12 weeks until the symptoms abated. Follow-up blood tests were normal and a repeat CT scan demonstrated no further destructive changes. She has remained pain free for three years.

Discussion

Isolated sacroiliac joint infection is rare. Between 1878 and 1990, only 166 cases were documented in the English literature.¹ Although the exact prevalence is unknown, pyogenic sacroiliitis is estimated to account for 1%–2% of cases of septic arthritis or bone infections.² It most commonly occurs, with equal predilection for gender, in the 20 to 40 year old age group. Because it is uncommon, infection is often overlooked for several weeks or months as a cause of SI joint pain.^{3–7} Delayed diagnosis results in an increased risk for permanent bone destruction and/or septicemia.

Bacterial infection of the SI joint is thought to occur most commonly by hematogenous spread. Batson⁸ described the venous plexus system that drains the paravertebral and pelvic areas. Blood flow in this system is sluggish, a factor believed to increase the likelihood of blood-borne bacteria establishing a host site in the pelvic area, including the SI joints. Others have shown that subchondral circulation in the ilium is slow, and have hypothesized that because of this, infections are more likely to begin on the iliac side of the SI joint.⁹ Methods of infection other than vascular seeding include penetrating wounds (including intra-articular steroid injections), contiguous osteomyelitic rupture into the joint, or direct contact from infected sites in nearby viscera such as the genitourinary tract or retroperitoneum. Once an infective site is established within the joint destructive changes occur quickly. In experimentally induced bacterial arthritis (animal studies) there is vascular congestion and polymorphonuclear (PMN) cell infiltration within one to two days.¹⁰ After about seven days, irreversible changes develop, including hyperplasia of synovial lining, generation of granulation tissue and abscess formation.¹¹ These are the pathophysiological events responsible for the clinical features of joint tenderness and swelling. Cartilage and bone are then destroyed when PMN cells release various proteolytic enzymes. This destruction can be demonstrated histologically by the tenth day following inoculation with some types of bacteria.¹⁰ Once established, SI joint infections may drain in multiple directions. After filling the iliac fossa, exudate can follow the tendon of the iliopsoas muscle and eventually infect the hip or lower spinal joints.⁶

Pyogenic infection should be suspected in the presence of certain historical, clinical, imaging or laboratory findings. In a patient with unexplained sacroiliac pain, a carefully taken history may identify predisposing factors, including intravenous drug use, oropharyngeal trauma (such as dental work) or infections of the skin or genitourinary tract.^{2,12-14} These can all introduce bacteria that can result in SI joint infection. Conditions such as pregnancy, immuno-suppression, unexplained fever, or any bone or soft tissue infection elsewhere can predispose patients to SI infection.^{1,15} However, none of these risk factors were identified in nearly half of all recorded cases.¹ Therefore, infection as a cause of SI joint pain cannot be completely ruled out based on a lack of these risk factors alone.

Physical examination findings vary according to the nature of the infection. Acute or fulminating cases have a more dramatic clinical appearance than chronic conditions. Nearly all cases are unilateral, affecting either joint equally. Cases of aggressive SI infection often have signs of infection including fever, chills, general malaise and damp or clammy skin. One of the cases presented had warmth and swelling over the affected joint. Sacroiliac stress tests such as Patrick's test, Gaenslen's test (hip extension) and lateral pelvic compression test can reproduce the SI joint pain.^{6,16,17} Although these tests are not specific for SI infection, they help confirm the anatomical site of the pain. Straight leg raising can be limited in cases of

SI infection.^{2,3} The suggested mechanism for this is stretching of inflamed sacral nerve roots that traverse in a swollen anterior sacroiliac joint capsule.^{2,6} Infection can spread from the sacroiliac joint to the surrounding tissues either by direct contract or venous dissemination. Therefore, nearby and distal joints should be examined in any suspected case of SI infection. Unfortunately, some or all of these physical findings may be absent in chronic or low grade infections. The cases reported here demonstrate the variability of clinical findings with SI joint infections. Although both cases were chronic by the time they were seen at the chiropractic clinic, their presentations were quite different. The patient in case two had few clinical findings. Case one patient had findings more typical of acute or fulminating infections including fever, nausea and joint swelling. One explanation for this is that an injection of hydrocortisone into an infected joint can suppress local white blood cell activity resulting in rapid unchecked bacterial growth. This would explain the increase in symptoms shortly before the patient presented.

Several imaging modalities are useful in the diagnosis of suspected cases of infective sacroiliitis. The earliest changes on plain film radiography are blurring and erosion of the joint margins and widening of the joint space.^{3,5,12} These changes are not visible before two weeks after the onset of symptoms because considerable bone destruction is required before changes are seen on plain films. Therefore, false negative radiographs are common in acute cases and care should be taken not to rule out recent infection based on a normal appearing initial images. The major radiographic finding in long standing or chronic infection of the SI joint is peri-articular sclerosis affecting both the iliac and sacral sides of the joint.¹⁴ Computerized tomography (CT) allows better joint visualization and may show cartilage and bone erosion. In chronic cases, CT imaging can demonstrate partial fusion; a finding thought to result from attempts at local bone repair.¹⁷⁻¹⁹ Technetium [^{99m}Tc] radionuclide scanning is the most sensitive imaging modality for infection. Increased uptake of the radionuclide in the sacroiliac region can occur as early as two to seven days into the illness.^{4,16,18,20-22} Therefore, a positive bone scan result in cases of suspected pyogenic infection of the SI joint can prevent delays in diagnosis and appropriate treatment. Although highly sensitive for infection, the specificity of bone scanning is low. Several other conditions are known to result in increased radiotracer uptake in bone. These include: metastatic disease, fractures, Paget's Disease, osteomyelitis and inflammatory arthritis. In cases of suspected sacroiliac infection the Technetium scan should be followed by a Gallium-67 citrate (⁶⁷Ga) scan. This radiopharmaceutical has an affinity for polymorphonuclear leucocytes (PMNs) and is therefore useful for detecting infections.²³ More recently, MRI scanning has been used as a diagnostic imaging tool in cases of suspected pyogenic sacroiliitis.²⁴ SI joint infection can spread into near-by muscles, especially the iliopsoas, and MRI scanning has the advantage of clearly imaging these soft tissues. There is an accepted sequence for

Table 1 The progression of imaging tests that leads to a diagnosis of infective sacroiliitis

Imaging study	Typical findings	Differential diagnosis
Radiography	Unilateral periarticular sclerosis, joint widening, erosion.	<ul style="list-style-type: none"> - Degenerative - Inflammatory arthritis - Tumor - Infection
↓		
Computerized Tomography	Cartilage or bone destruction, partial fusion. Does not determine if process is active or quiescent.	<ul style="list-style-type: none"> - Inflammatory arthritis - Tumor - Infection
↓		
Technetium Scan	Increased uptake of tracer at joint if process is active. Indicates bone turnover.	<ul style="list-style-type: none"> - Inflammatory arthritis - Tumor - Infection
↓		
Gallium Scan	Increased uptake of tracer at joint if process is active. Indicates increased WBC (neutrophil) activity.	<ul style="list-style-type: none"> - Most likely infection

Table 2 Findings in pyogenic infections of the sacroiliac joint

History	Clinical findings	X-ray findings (unilateral)	Lab findings	Treatment
<ul style="list-style-type: none"> - Unrelenting unilateral SI joint pain. - Chills/fever/general malaise. - Immunosuppressed? - IV drug user? - Pregnant? - Recent dental work? - Previous skin/bone or urinary tract infection? 	<ul style="list-style-type: none"> - Warm/swelling over joint? - Positive SI stress tests. - Fever. - SI pain with SLR test. 	<p>* EARLY</p> <ul style="list-style-type: none"> - Joint margin erosion. - Widened joint space. <p>LATE</p> <ul style="list-style-type: none"> - Periarticular sclerosis around SI joint. - Partial ankylosis. 	<ul style="list-style-type: none"> - Increased ESR. - Increased WBC - 80% due to <i>Staphylococcus aureus</i>. 	<ul style="list-style-type: none"> - 4-6 wks antibiotic (often IV) - Resistant infections = surgical debridement + antibiotics.

ordering the various imaging studies in cases of suspected SI joint infection. This sequence, outlined in Table 1, helps to determine the cause of a patient's symptoms by progressively narrowing the diagnostic possibilities. In both cases presented, this progression of imaging tests was followed and helped determine the etiology.

Only laboratory testing can identify the organism of infection. Tests include erythrocyte sedimentation rate (ESR), white blood cell count, blood cultures, joint aspirate or biopsied tissue from the infected area. In acute or fulminating cases, the erythrocyte sedimentation rate (ESR) is elevated, sometimes as high as 100 mm/hour or more.^{1,6,15} White blood cell counts can also be elevated in both acute and chronic infections.^{2,6} Cultured media that grow bacteria often identifies the specific infective organism. This information can be used to determine those antibiotics to which the bacteria is most sensitive. Sometimes, as in one of the cases presented, blood cultures will grow the infective organism. Another method is to obtain sample material from the joint using needle biopsy or open surgical exposure.^{6,20} Although antibiotic medication should be started immediately when a patient is suspected of having infective sacroiliitis, the use of these drugs for several days before laboratory work increases the rate of false negative test results. This may explain the failure of surgically obtained cultures to grow an organism in our first case. When an organism can be isolated, the most commonly identified agent is *Staphylococcus aureus*. This bacteria accounts for more than 80 percent of identified SI joint infection cases.^{2,5,14,19} Other agents include *Staphylococcus epidermidis* and *Group B Streptococcus*. *Pseudomonas aeruginosa* is sometimes seen in SI infection cases where the patient is an intravenous drug user and in HIV positive patients.^{12,13}

Sacroiliac joint infections must be treated urgently. Patients should be hospitalized quickly. Intravenous antibiotic medication should be started immediately to avoid serious morbidity. Infective sacroiliitis can be resistant to antibiotic medication, so surgical debridement of the joint is sometimes necessary. Untreated pyogenic infections have a high mortality rate, a sequela still seen occasionally in underdeveloped countries. The cases presented are typical of most because several weeks of antibiotic therapy, combined with surgical debridement, were necessary to obtain a cure.

Summary

Isolated infection of the sacroiliac joint is rare and therefore frequently misdiagnosed. Most cases are unilateral. Positive imaging findings increase the suspicion but confirmation is usually obtained by tissue biopsy material or blood culture. *Staphylococcus aureus* is responsible for most infections. Pyogenic infection should be considered in patients with unilateral sacroiliac joint pain accompanied by warmth and swelling over the joint and systemic signs such as chills or fever. Table 2 summarizes the salient features of diagnosis and management of sacroiliac joint infections.

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