

# Glenohumeral Joint Sepsis Caused by *Streptococcus mitis*: A Case Report

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## Abstract

Septic arthritis of the shoulder girdle remains relatively uncommon, with *Staphylococcus aureus* and  $\beta$ -hemolytic streptococci the typical offending organisms in adult patients. Rare cases of *Streptococcus viridans*, an oral bacterium with low virulence, have been reported in the setting of septic arthritis, mostly involving the knee joint or the sternoclavicular joint.

In this article, we report a case of *Streptococcus mitis* infection of the glenohumeral joint that likely resulted from hematogenous spread after oral trauma in a patient with poor underlying dentition. Prompt diagnosis followed by arthroscopic irrigation and débridement of the glenohumeral joint resulted in a satisfactory clinical outcome.

Septic arthritis predominantly involves the weight-bearing joints of the hip and knee, which account for nearly 60% of cases.<sup>1</sup> In contrast, the shoulder joint is involved in 10% to 15% of cases, though this number may be higher among intravenous (IV) drug users.<sup>2</sup> The most common causative organisms are the *Staphylococcus* species, followed closely by  $\beta$ -hemolytic streptococci, with these 2 groups accounting for more than 90% of all cases.<sup>3</sup> The *Streptococcus viridans* group belongs to normal oral flora residing predominantly on the surface of teeth. Although well known for its ability to colonize heart valves and frequently cause bacterial endocarditis, this group has rarely been associated with septic arthritis. Furthermore, *Streptococcus mitis*, a subgroup of *S viridans*, has been implicated even less commonly.

In this article, we report a case of glenohumeral joint septic arthritis caused by *S mitis*. To our knowledge, such a case has not been previously reported in the English literature. Given the low virulence of this orally based bacterium, treating physicians must maintain clinical suspicion for the organism in the setting of persistent joint effusion and pain in association with periodontal disease or trauma. The patient provided written informed consent for print and electronic publication of this case report.

## Case Report

A right-hand-dominant 54-year-old man presented to Dr. Gruson with complaints of persistent right shoulder pain associated with worsening range of motion (ROM). Three weeks earlier, the patient reported being assaulted and noted progressive swelling about the right shoulder. He denied fevers, chills, or prior shoulder problems. Although his past medical history was remarkable for hepatitis C and diabetes, he was not taking any diabetic medications at that time. A review of systems was remarkable for poor dental hygiene, and the patient was missing several teeth, which he said had been knocked out during the assault. Physical examination revealed diffuse tenderness about the right shoulder and severe pain with all passive movement. The shoulder was pseudoparalyzed. There were no subcutaneous collections, wounds, or ecchymosis about the shoulder. Mild calor was noted on the right shoulder relative to the left. Radiographs of the right shoulder showed no acute osseous abnormalities.

Magnetic resonance imaging (MRI), which was urgently obtained to assess the integrity of the rotator cuff and the location of the effusion, showed a large subacromial and glenohumeral joint effusion as well as diffuse muscular edema (**Figures 1A-1C**). At follow-up, the patient reported having lost 10 pounds since his assault, as well

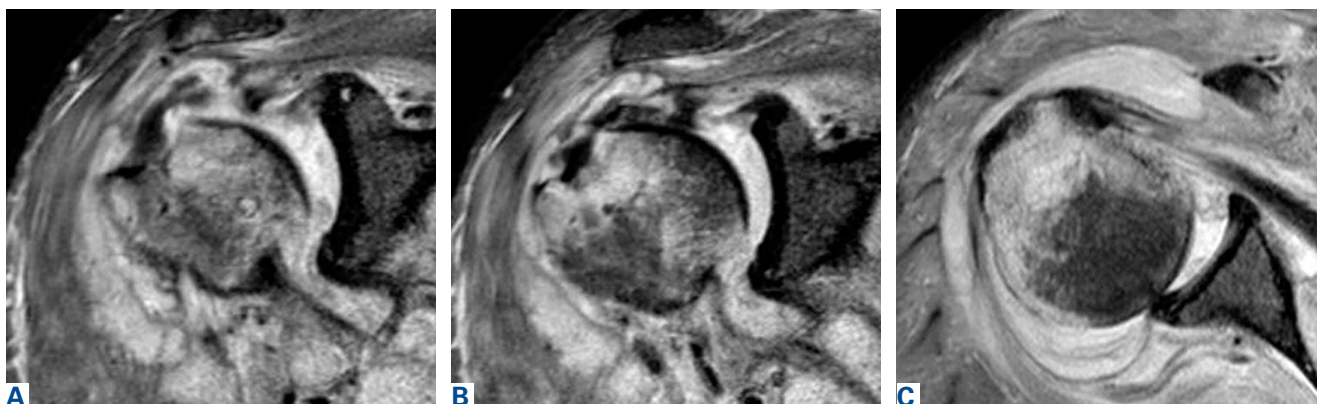
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as new-onset fevers and chills. C-reactive protein (CRP) level was 5.2 mg/dL (reference, <0.9 mg/dL), and erythrocyte sedimentation rate (ESR) was 48 mm/h (reference, <21 mm/h). White blood cell count was normal. Fluoroscopy-guided aspiration of the glenohumeral joint, performed under sterile conditions, yielded only 4 cc of hematoma. Gram stain was negative; though there was no growth on the primary plates, broth cultures grew *S mitis*. Repeat bloodwork demonstrated persistently increased CRP level (6.4 mg/dL) and ESR (55 mm/h).

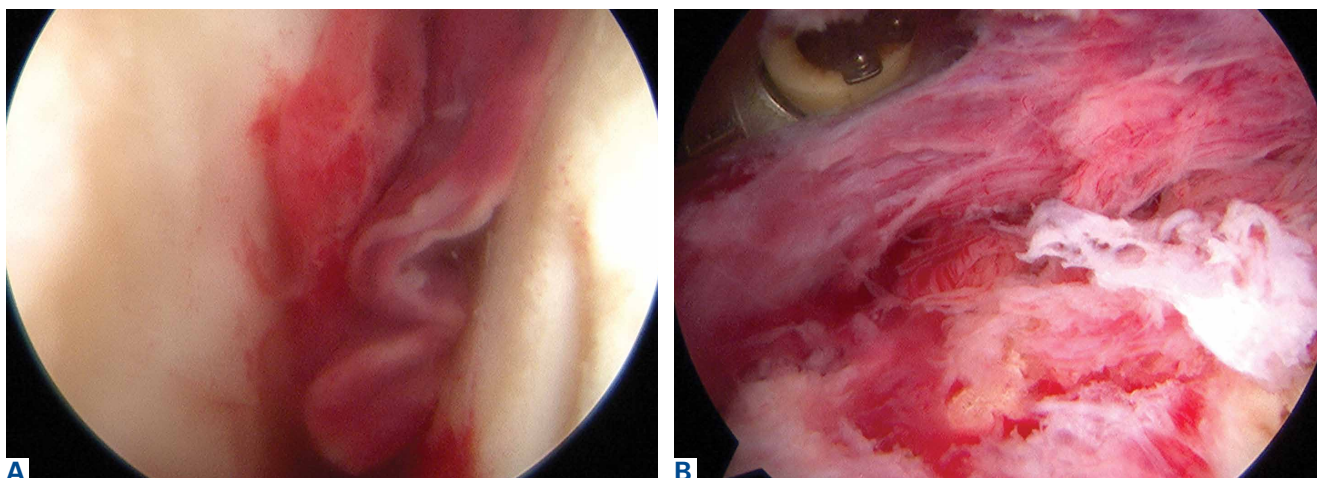
In light of the elevated infection findings of the laboratory tests and the positive culture, urgent arthroscopic irrigation and débridement of the right shoulder were indicated. Given the organism identified, transesophageal echocardiography was performed; there were no valvular vegetations. Creation of the posterior glenohumeral portal

resulted in egress of turbid fluid, which was sent for culture. The subacromial space and the glenohumeral joint were thoroughly lavaged and the copious hemorrhagic synovitis débrided (**Figures 2A, 2B**). Chondral surfaces appeared grossly intact. All cultures from the surgery ultimately yielded *S mitis*. A peripherally inserted central catheter line was started, as was a 4-week course of IV ceftriaxone, as recommended by an infectious disease consultant. At postoperative visits in the orthopedic clinic, a new-onset right axillary abscess consisting of purulent material and organized hematoma was drained. After the ceftriaxone regimen was completed, a 4-week course of oral amoxicillin was started.

The 8-week course of antibiotics normalized the patient's ESR to 13 mm/h. Follow-up MRI showed improvement in the soft-tissue edema. Clinically,



**Figure 1.** Proton density-weighted coronal oblique (A, B) and axial (C) magnetic resonance imaging shows large glenohumeral joint and subacromial space effusion with adjacent muscular edema. Rotator cuff appears thin but intact.



**Figure 2.** (A) Arthroscopic view from posterior portal demonstrating intact nature of articular cartilage with hemorrhagic synovitis overlying anterior capsule. (B) Arthroscopic view of subacromial space from lateral portal. Diffuse hemorrhagic bursitis overlying posterior-superior rotator cuff was extensively débrided.

the patient reported minimal shoulder pain. He was undergoing physical therapy to regain strength and ROM.

## Discussion

*Staphylococcus aureus* is the leading causative organism of septic arthritis, accounting for more than 60% of all cases.<sup>4</sup> Conversely, the *Streptococcus viridans* group is rarely implicated in septic arthritis, accounting for <1% of cases.<sup>4</sup> *S viridans* is part of the commensal oral flora and has low virulence. This heterogeneous group is subdivided into *S mitis*, *S salivarius*, *S anginosus*, *S mutans*, and *S bovis*. The *S mitis* group is further subdivided into *S sanguinis* (formerly known as *S sanguis*) and *S mitis*. Infection by an organism of the *S viridans* group usually occurs on a previously injured focus, and the organism is a causative agent of bacterial endocarditis.<sup>5</sup> Reported cases of septic arthritis caused by *S viridans* have predominantly involved the knee joint—with severe osteoarthritis, poor dental hygiene, and prior IV drug use identified as risk factors.<sup>5-7</sup> The shoulder joint is seldom involved in septic arthritis; estimated incidence is under 8%.<sup>8</sup> Although overall incidence may rise in an increasingly elderly patient population, incidence of shoulder infection remains low.<sup>2,9</sup>

The main routes for developing septic arthritis include direct inoculation secondary to penetrating trauma or hematologic spread.<sup>10</sup> Coatsworth and colleagues<sup>11</sup> reported on iatrogenic *S mitis* septic arthritis of a shoulder arthroplasty during ultrasonography-guided aspiration by a technician who was not wearing a mask. Our institutional policy is to perform joint aspiration under strictly sterile conditions, which were adhered to in the present case. We surmise our patient developed transient bacteremia from the loss of several teeth, particularly given his poor dentition. Yombi and colleagues<sup>5</sup> documented 2 cases of septic arthritis caused by *Streptococcus gordonii*, a relative of *S sanguinis*. One involved a previously replaced knee, and the other a native knee joint. Other cases of *S viridans* group septic arthritis have involved the knee,<sup>6,7,12,13</sup> the sternoclavicular joint,<sup>14-16</sup> and the acromioclavicular joint.<sup>17</sup> *S sanguinis*<sup>6,7,12,15,16</sup> and *S gordonii*<sup>5</sup> have been implicated in most cases, and an unspiciated *S viridans* in others.<sup>13,14,17</sup> Concomitant periodontal disease has been reported in most cases as well,<sup>6,7,12,15</sup> including our patient's case. In the English-language literature, we found no other reports of *S mitis* as the causative agent of acute septic glenohumeral joint arthritis from hematoge-

nous spread.

There should be no delay in diagnosing septic arthritis, and infected material should be removed from the joint. In animal models, complete joint destruction occurred only 5 weeks after inoculation with *Staphylococcus aureus*.<sup>10</sup> Garofalo and colleagues<sup>18</sup> reported a trend toward improved functional outcomes after earlier operative treatment. The choice of open surgical drainage vs repeat needle aspiration seems to be of little consequence, as both have good long-term outcomes, but open surgical drainage seems to result in better long-term functional ROM.<sup>2,9</sup> However, results of a recent study suggested surgical treatment is not always superior to medical treatment for septic arthritis in native joints.<sup>19</sup> In some cases involving *S viridans* species, treatment consisted of a combination of IV antibiotics and onetime or repeat aspiration;<sup>6,12-15</sup> treatment in the remaining cases was surgical débridement.<sup>5,7,16,17</sup> Given that *S viridans* is associated with bacterial endocarditis, echocardiography is essential if this organism is to be identified. Medical management and antibiotic treatment should be initiated after consultation with medical and infectious disease specialists.<sup>19</sup>

We have reported a case of septic shoulder caused by *S mitis*, a low-virulence organism seldom associated with joint infection. The patient's infection likely resulted from hematogenous spread from the oral cavity (dentition was poor). Urgent aspiration of the joint and baseline infection laboratory tests are recommended. MRI of the shoulder may show an effusion. Urgent arthroscopic irrigation and débridement can yield good clinical outcomes.

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