Acromioclavicular Septic Arthritis by *Staphylococcus argenteus*. Case Report

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ABSTRACT
Acromioclavicular septic arthritis is an extremely rare condition that usually occurs in highly vascular joints such as the hip, knee, and shoulder. The most frequently isolated pathogen is *Staphylococcus aureus*. In this presentation we describe a 56-year-old patient with septic arthritis at the acromioclavicular level, requiring emergency surgical intervention. As another peculiarity, the isolated germ was *Staphylococcus argenteus*, an extremely rare bacterium in this type of pathology.
Key words: Septic arthritis; acromioclavicular; *Staphylococcus argenteus*.
Level of Evidence: IV

Artritis séptica acromioclavicular por *Staphylococcus argenteus*. Reporte de un caso

RESUMEN
La artritis séptica acromioclavicular es un cuadro sumamente infrecuente que, por lo general, se presenta en articulaciones con alta vascularización, como cadera, rodilla y hombro. El microorganismo aislado con más frecuencia es *Staphylococcus aureus*. Describimos a una paciente de 56 años con artritis séptica acromioclavicular, que requirió una intervención quirúrgica de urgencia. Otra particularidad del caso es el germen aislado, *Staphylococcus argenteus*, una bacteria muy infrecuente en este tipo de enfermedad.
Palabras clave: Artritis séptica; acromioclavicular; *Staphylococcus argenteus*.
Nivel de Evidencia: IV

INTRODUCTION

Septic arthritis in the acromioclavicular joint is a condition scantly described in the literature; mainly case reports and small case series—to date, 32 cases—have been published.[1,2]

In general, it affects immunocompromised patients; however, it has also been detected in previously healthy patients.[3] Cases of septic arthritis are mostly caused by *Staphylococcus aureus*, followed by *Staphylococcus epidermidis*, streptococci, and gram-negative bacilli (Table).[4]

Table. Described cases of acromioclavicular septic arthritis

Staphylococcus aureus	13
Streptococcus viridans	2
Streptococcus pneumoniae	2
Salmonella	1
Cryptococcus neoformans	1
Haemophilus parainfluenzae	1

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Staphylococcus argenteus is a new species within the *S. aureus* complex.[5] The geographical distribution of this species is unknown, although many of the earliest reports come from Africa, Asia, and Australia.[6] Clinical features of *S. argenteus* infections include bacteremia and skin and soft tissue infections; although there is also a report of hip prosthesis infection.[7,8] At the time of writing, we found no documented history of infections caused by this pathogen in humans in Latin America.

We present a patient with acromioclavicular septic arthritis by *S. argenteus.*

CLINICAL CASE

A 56-year-old woman was undergoing a prolonged hospitalization for urogynecological oncological surgery. In the immediate postoperative period, she suffered an *Enterobacter cloacae* urinary tract infection and a superficial surgical site infection. She had also had 2/2 positive blood cultures for *Candida tropicalis* at the focus of the urinary tract infection. Initially, she was treated with IV ciprofloxacin 500 mg every 12 h; vancomycin 1 g, every 12 h; piperacillin-tazobactam 4.5 g, every 6 h; and fluconazole 100 mg daily.

During hospitalization, the patient began to report sudden-onset right omalgia, with pain upon palpation in the upper edge and the anterior side of the right shoulder, associated with fever between 38º C and 39.5° C for 48 h, which motivated our interconsultation.

Upon physical examination, we observed an increase in local temperature and erythema over the acromioclavicular joint, without crepitus (Figure 1).

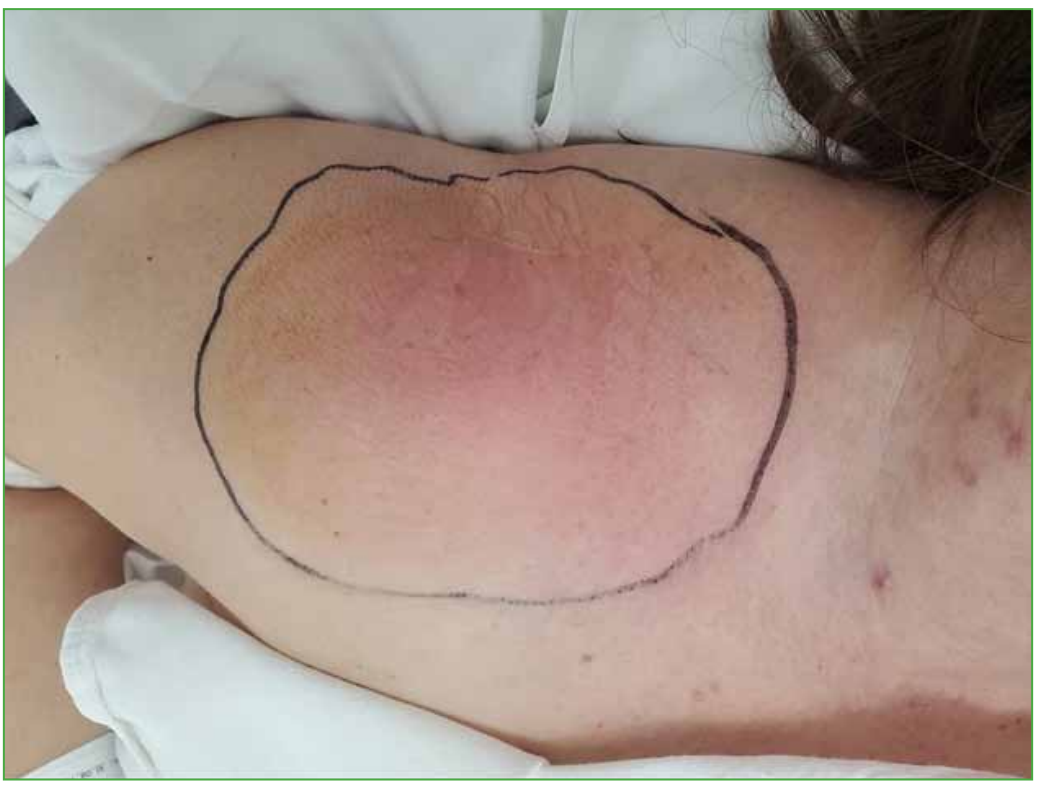

Figure 1. Erythema on the right acromioclavicular joint.

We requested anteroposterior and scapular axial radiographs of the right shoulder (Figure 2), in which radiopacity was observed in the supracromial region, and also an MRI that revealed irregularities in the articular surfaces of both the acromion and the clavicle, associated with small surrounding collections and edema of adjacent soft tissue (Figure 3).

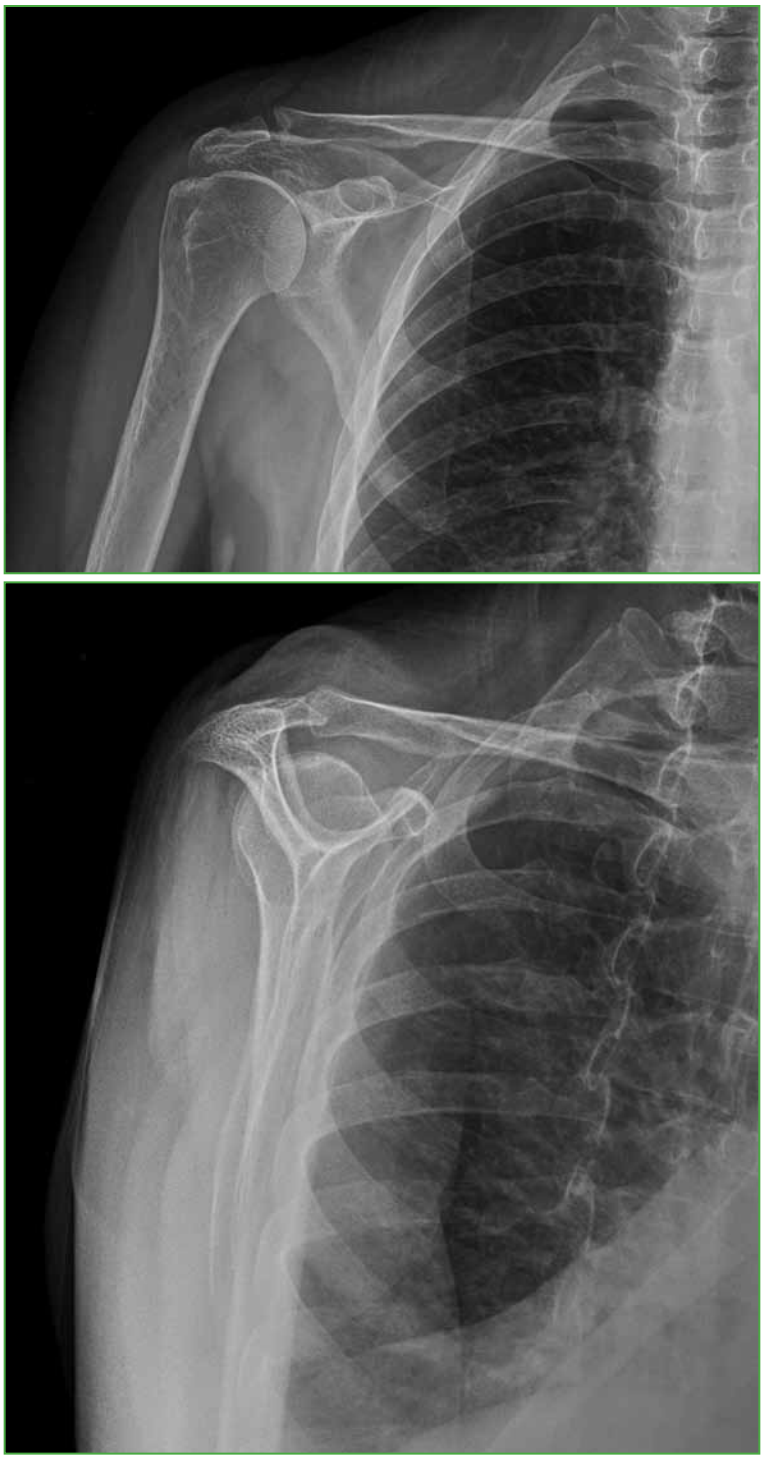

Figure 2. Anteroposterior and scapular axial radiographs of the right shoulder. Radiopacity is observed in the supracromial region, suggesting a soft tissue infection.

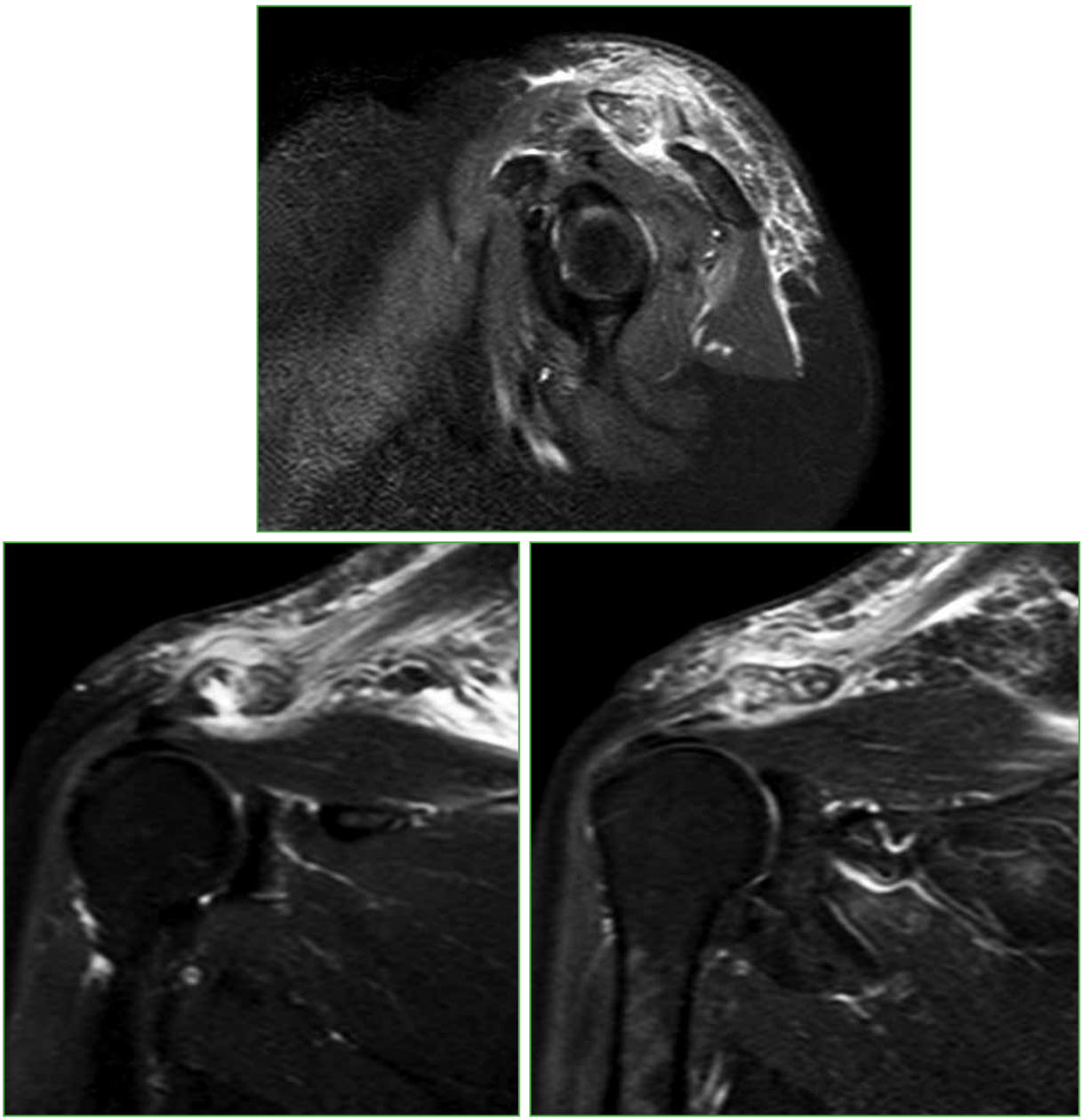

Figure 3. Right shoulder MRI, T2 sequence. Irregularities are observed in the articular surfaces of the acromion and clavicle, associated with small surrounding collections and edema of adjacent soft tissue.

Laboratory analyses showed altered values in leukocyte count (31,900 [normal value 4.5-11.0 × 10^9/l]), erythrocyte sedimentation rate (130 mm/h [normal value 0-20 mm/h]) and quantitative C-reactive protein (18.3 mg/dl [normal value up to 0.3 mg/dl]).

With these findings, a right acromioclavicular arthrocentesis was performed and turbid fluid was collected, whose analysis revealed pathological glycemia (36 mg/dl for a serum glycemia of 154 mg/dl), elevated total proteins 1,6 g/dl (normal value <1), and lactate dehydrogenase 7923 IU/l, its normal value should be similar to blood (3200 IU/l). The leukocyte count did not yield results due to a failure when taking the sample. With a presumptive diagnosis of acromioclavicular septic arthritis, emergency surgical intervention was decided.

Surgical technique: A supraclavicular approach focused on the acromioclavicular joint was used. After the skin incision, a superficial supraclavicular and retroclavicular abscess was observed, which was sent for analysis. The opening of the trapezius fascia was performed and necrotic muscle tissue and a focal purulent collection were found. All devitalized tissue was resected and samples were sent for bacteriological study. Next, an acromioclavicular arthrotomy was performed, and purulent intra-articular fluid was found, which was also sent for analysis. Likewise, a frank deterioration of the articular surface was verified, with free segments of articular cartilage of the clavicle and subchondral bone exposure. An acromioclavicular arthroplasty was performed by resecting the distal end of the clavicle (<1 cm) (Figure 4).

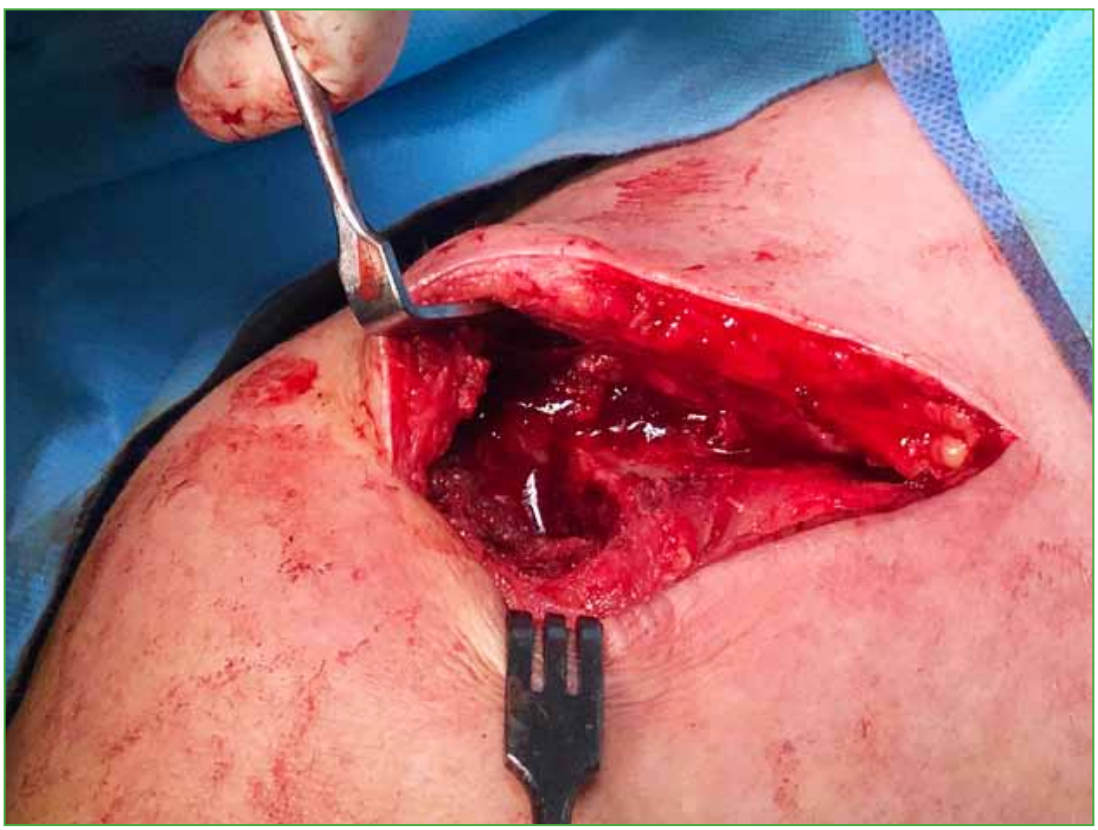

Figure 4. Acromioclavicular arthroplasty with resection of the distal end of the clavicle (<1 cm).

The remaining acromioclavicular ligaments were repaired and correct joint stability was verified. At the end of the surgery, the corresponding radiographic control was performed (Figure 5).

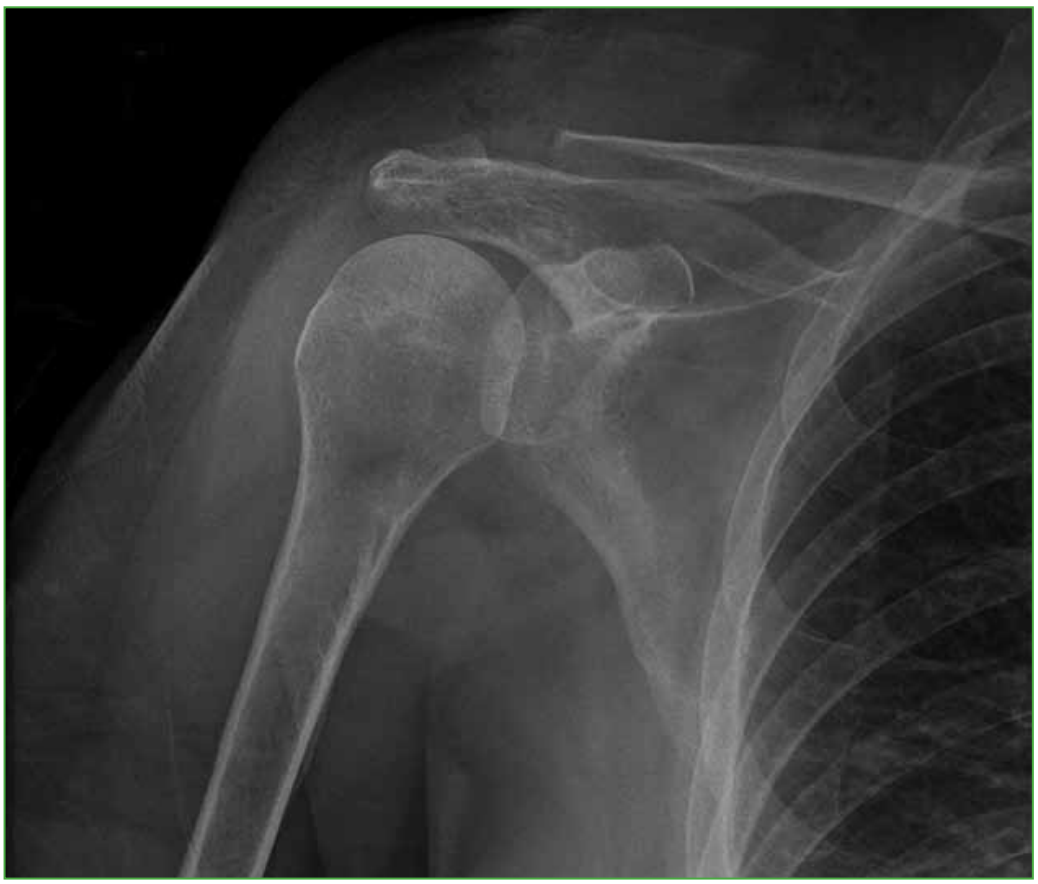

Figure 5. Postoperative anteroposterior and scapular axial radiograph of the right shoulder. Acromioclavicular arthroplasty is observed with resection of the distal end of the clavicle.

All samples taken during the surgical procedure were sent to the hospital's microbiology laboratory and seeded in different culture media (MacConkey agar, blood agar, eosin methylene blue agar, mannitol salt agar, Baird Parker agar, Sabouraud agar, urea broth, and SIM medium).

The patient began intravenous antibiotic treatment with vancomycin 1 g every 12 h and piperacillin-tazobactam 4.5 g every 6 h for 48 h. On the third day of surgery, with the automated detection method VITEK® 2 AST (bioMérieux), *S. argenteus* was detected in the samples of intra-articular fluid, supraclavicular deep abscess, and joint capsule. Blood culture samples were also 2/2 positive for *S. argenteus.* When blood cultures were positive, a transthoracic echocardiogram was performed to rule out endocarditis; this study showed that the chambers had a normal size, the four valves were structurally normal, and no pathological regurgitation, reflux, or vegetation were detected. Antibiotic sensitivity tests indicated resistance to gentamicin and sensitivity to beta-lactams (minimum inhibitory concentration for vancomycin of 0.8 µg/ml); therefore, the patient received 1 g cefazolin, every 8 h, for 14 days and then cephalexin 1 g, every 12 h, orally, until six weeks were completed. After this period, a new laboratory analysis was performed that yielded the following results: leukocytes 6900 $\times 10^9$/l, erythrocyte sedimentation rate 12 mm/h, and quantitative C-reactive protein 0.3 mg/dl. Six months after surgery, no bacterial growth was observed in a control blood culture.

Currently, after one year of follow-up, the patient practices sports (swimming) and performs activities of daily living without any limitation, with a normal shoulder range of motion.

DISCUSSION

The *Staphylococcus* family is by far the most common cause of all septic arthritis.[9] Within them, almost half are caused by *S. aureus*. *Staphylococcus argenteus* was first described in 2009 as part of the *S. aureus* clonal complex (CC) 75,[10] but was formally named in 2015 and, together with *Staphylococcus schweitzeri,* forms the *S. aureus*-related complex. *S. argenteus* is distributed globally and has been isolated from both humans and animals.

Septic arthritis frequently occurs in the knee, hip, and shoulder, apparently because of their rich blood supply; therefore, hematogenous spread is the cause in most cases.[11]

Septic arthritis of the shoulder is common, accounting for about 5-10% of all cases. In many cases, sternoclavicular arthritis is recorded together with glenohumeral arthritis, so it is not possible to know its real incidence.[12,13] It is possible that, in many of the series of septic arthritis published, something similar occurs with infectious arthritis of the acromioclavicular joint, generating an underestimation of its frequency.

Despite its low frequency, septic arthritis in the acromioclavicular joint is rapidly destructive. It usually affects immunosuppressed patients or patients with an altered immune response, but even in this group, it is unusual.[2]

In 2014, Hashemi-Sadraei et al. described one case of bilateral acromioclavicular septic arthritis with a literature review.[1] Following the publication of that article and to date, two other cases have been reported.[2,14]

Most patients were successfully treated using intravenous antibiotics and additional surgical procedures (joint aspiration, lavage, and surgical debridement).

Regarding *S. argenteus* joint infections, there is only one reported case of hip prosthesis infection in Sweden.[8] Different possibilities were raised about the origin of arthritis, the hematogenous route being the most likely, although we should not rule out that clavicular osteomyelitis could have contaminated the joint by contiguity.

In this case, the standard treatment for septic arthritis with a surgical lavage including the debridement of all necrotic tissue, associated with regulated antibiotic therapy was effective in curing the infection.

CONCLUSIONS

Septic arthritis of the acromioclavicular joint is a rare condition, so it requires a high index of suspicion. Clinical signs should be considered along with laboratory values and advanced imaging studies to reach a diagnosis. Treatment consists of joint debridement and lavage along with antibiotic management for at least 4-6 weeks. It is also essential to manage the patient's predisposing comorbidities to eradicate the infection.

Conflict of interests: The authors declare they do not have any conflict of interests.

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