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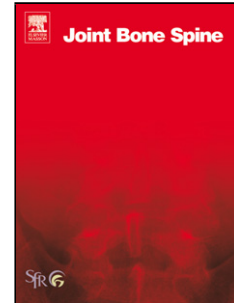


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# Journal Pre-proof

Septic arthritis of the facet joint is also a severe vertebral infection: a multicenter retrospective study of 65 patients

Cadiou Simon Tuil Rachel Le Goff Benoît Hoppé Emmanuel  
Mulleman Denis Langbour Camille Le Pabic Estelle Charret Laurie  
Cormier Helene Lecomte Raphael Arvieux Cédric Guggenbuhl  
Pascal



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Septic arthritis of the facet joint is also a severe vertebral infection: a multicenter retrospective study of 65 patients

Cadiou Simon <sup>1</sup>, Tuil Rachel <sup>1,2</sup>, Le Goff Benoît <sup>3</sup>, Hoppé Emmanuel <sup>4</sup>, Mulleman Denis <sup>5</sup>, Langbour Camille <sup>5</sup>, Le Pabic Estelle <sup>6</sup>, Charret Laurie <sup>7</sup>, Cormier Helene <sup>8</sup>, Lecomte Raphael <sup>9</sup>, Arvieux Cédric <sup>10</sup>, Guggenbuhl Pascal <sup>1,11</sup>

With help from the CRIOGO (Centre de Référence des Infections Ostéo-articulaires du Grand Ouest) Study Team [Corporate Author] and the network of rheumatologists from the Grand Ouest “VICTOR HUGO” [Corporate Author]

<sup>1</sup> Department of Rheumatology, Rennes University Hospital, France

<sup>2</sup> Rennes University, Faculty of Medicine, Rennes, France

<sup>3</sup> Nantes university, Oniris, INSERM, Regenerative Medicine and Skeleton, RMeS, UMR1229, Nantes, France; Department of Rheumatology, Nantes University Hospital, Nantes, France

<sup>4</sup> Department of Rheumatology, Angers University Hospital, Angers, France

<sup>5</sup> Department of Rheumatology, Tours University Hospital, University of Tours, Tours, France

<sup>6</sup> Rennes University, INSERM, CIC UMR 1414, Rennes University Hospital, Rennes, France

<sup>7</sup> Rheumatology Department, Hospital of Vendée, La Roche-Sur-Yon, France.

<sup>8</sup> Department of Infectious Diseases, Angers University Hospital, Angers, France.

<sup>9</sup> Department of Infectious Diseases, University Hospital of Nantes; Centre d'Investigation Clinique 1413, INSERM, Nantes, France.

<sup>10</sup> Department of Infectious Diseases and Intensive Care Medicine, Rennes University Hospital, Rennes, France.

<sup>11</sup> University of Rennes, INSERM, INRAE, CHU Rennes, Institut NUMECAN (Nutrition Metabolisms and Cancer), Rennes, France;

**Corresponding author:** Simon Cadiou, Fax +33 299 26 71 90, telephone +33 299 26 71 40; email address: simon.cadiou@chu-rennes.fr

## Highlights

- Septic arthritis of the facet joints (SAFJ) is a severe infection, associated with infective endocarditis and neurological impairment
- *Staphylococcus aureus* and *Streptococcus spp* are the most frequent pathogens found in SAFJ.
- One-year mortality was estimated to be 9.2% in our study and reached respectively 18.5% and 23% in years two and three.

## Abstract

**Objective:** Septic arthritis of the Facet Joints (SAFJ) is a rare condition. Little data has been published on the subject. We aimed to describe the clinical, biological and imagery presentations, as well as the course of this rare infection.

**Methods:** We included patients hospitalized between January 1<sup>st</sup>, 2016 and December 31<sup>th</sup>, 2019, in the Departments of Infectious Diseases or Rheumatology in 5 French centres in the CRIOGO network. We defined septic arthritis according to Newman's criteria and facet joint arthritis using imagery.

**Results:** Sixty-five patients were included, predominantly males (64.6%), with a mean age of 68.1 years. The mean time to diagnosis was 25.0 days. The principal symptoms at diagnosis were acute back pain (95.2%) and fever (76.9%). Neurological symptoms were present for 60.7% of the patients, including 16.4% motor deficit or cauda equina syndrome. SAFJ was located on the lumbosacral spine (73.4%) and was rarely multifocal (4.7%). Bacteriological identification was performed by blood cultures in 84.4% of the cases, and the pathogen was mainly *Staphylococcus aureus* (49.2%). Infective endocarditis was present for 26.9% of patients assessed by echocardiography. On MRI, soft tissue abscess or inflammation, epiduritis and epidural abscess were present in 87.1%, 66.7% and 33.9% of cases, and the pathogen was significantly more frequently *Staphylococcus aureus*. Mortality reached 9.2%, 18.5% and 23% at one, two, and three years respectively.

**Conclusion:** SAFJ is a rare but severe disease. Microbiological diagnosis is primarily made on blood cultures, and *S. Aureus* was the main pathogen. Our results highlight the fact that SAFJ is associated with high morbidity and mortality, and with infective endocarditis.

**Keywords:** septic arthritis; vertebral infection; facet joint; infective endocarditis.

## 1. Introduction

Osteoarticular infections are rare, but they are serious diseases that can occur in any joint. The spine can be affected at different locations. Vertebral osteomyelitis (VO) accounts for approximately 3% to 5% of all cases of osteomyelitis annually [1]. Septic Arthritis of the Facet Joints (SAFJ) is a rare event, accounting for only 1.1% of osteoarticular infections, excluding vertebral osteomyelitis, with a higher risk among injected drug users (IDUs) [1,2].

Among spinal infections, the frequency of SAFJ varies according to studies, ranging from 4% to 20% [3–7]. Differences in prevalence can be explained by the absence of a specific classification code among other spinal infections in the International Classification of Diseases (“Other specified infection of vertebra”, FA90.Y in the recent ICD 11<sup>th</sup> version). The increasing use of imagery in spinal disorders, especially MRI which is more accurate than CT [6], could explain the increasing proportion of SAFJ among spinal infections. Indeed, the clinical presentation of SAFJ is not as specific as VO [4].

The first case of Septic Facet Joint infection was described in 1987 [8]. Since then, 87 case reports concerning adults have been published, mainly case reports, and only nine series of four or more SAFJ cases (**materials S1**). The largest study reported

on 16 patients with SAFJ among 1465 cases of native joint septic arthritis [2]. Ross *et al.* analysed the characteristics of septic arthritis among people with or without injected drug abuse. They found that SAFJ was more likely to occur among IDUs (3% vs. 0.8% of all cases of septic arthritis,  $p < 0.05$ ). Nevertheless, the impact in terms of mortality and morbidity of SAFJ and its association with endocarditis remains unclear.

Thus, our objective was to describe the clinical, biological and imagery characteristics of this rare osteoarticular infection.

## 2. Methods

### 2.1 Study sample

We studied patients hospitalized between January 1<sup>st</sup>, 2016 and December 31<sup>th</sup>, 2019 in the departments of Infectious Diseases or Rheumatology in five hospitals that are Referral centres for complex osteoarticular infections in the west-of-France (CRIOGO network). We defined the diagnosis of septic arthritis according to Newman's criteria [9]: grade A when an organism is isolated from the joint; grade B when an organism is isolated from other areas; grade C when no organism is isolated but with histological or radiological evidence of infection or turbid fluid aspirated from the joint without any other explanation. Patients also underwent computed tomography (CT) or magnetic resonance imagery (MRI) showing facet joint arthritis, which was considered as the date of diagnosis.

Patients under 18 years of age or with spinal infection following surgery, and arthrodesis material or vertebral osteomyelitis at the same vertebral level as the SAFJ, were excluded. An information letter was sent to all participants. The patients' opposition to study participation could be expressed orally or in writing to the authors. The Ethics Committee of Rennes University Hospital approved this study.

In the absence of a specific coding for SAFJ in the patients' medical records, we selected keywords linked to SAFJ in hospital coding (CIM-10) and we conducted a textual search using the following keywords: ("arthritis" OR "septic" OR "infection") AND ("facet joint" OR "zygapophyseal joint" OR "interapophyseal joint"). We then manually analysed each file to identify cases of SAFJ. The same methodology was used in each participating centre. In the Rennes centre, we also used the Big Data Hub to refine the search [10].

### 2.2 Data collection

We collected demographic data: gender, age, Body Mass Index (BMI) and significant comorbidities usually associated with joint infections (diabetes, severe chronic kidney disease with estimated glomerular filtration rate (GFR)  $< 30$  ml/min, cirrhosis, smoking, alcohol abuse or injected drug use, co-infection with Human Immunodeficiency Virus (HIV) and immunosuppression (chemotherapy, immunosuppressant drugs, active blood disease).

Clinical data was recorded at the time of admission: fever, acute back pain and stiffness. We focused on neurological symptoms at diagnosis, and in the course of the evolution, we divided them into minor signs (sensory deficit, nerve root pain and abolition of tendon reflexes) and major signs (motor deficit and cauda equina syndrome). The use of painkillers and non-steroid anti-inflammatory drugs (NSAIDs)

was recorded as was the development of sensory or motor deficit and sequellae. Mortality data was collected in May 2023 using the French public death register, ensuring that no data was censored over the three years after diagnosis as a result of loss-to-follow-up.

Biological data was collected: C-reactive protein (CRP) levels (normal : CRP, < 0,5 mg/dl), leucocytes (normal rate 4-10 G/L) and neutrophils levels (normal value 1,5-7 G/L). Bacterial identification using blood cultures, biopsies (guided with CT, ultrasound or by surgery) and antibiotic therapies were recorded. We also collected data on echocardiography assessments and the presence of infective endocarditis.

MRIs were reviewed at each center. The following information was recorded: SAFJ level, side and unilateral or bilateral involvement, facet joint effusion, presence and extent of bone oedema, epiduritis, epidural and soft tissue abscesses, spinal cord signal abnormalities and subdural compression.

### 2.3 Statistical analysis

Quantitative variables are reported with mean  $\pm$  SD. Statistical analyses for quantitative variables were performed with Student's t-test or the Mann-Whitney-Wilcoxon test as appropriate. Qualitative variables were reported as percentages and analysed using Fisher's exact test or Chi-square test. A p value < 0.05 was considered statistically significant. Binary prognosis factors were studied using logistic regression and presented as ORs (Odds Ratios) with a 95% CI.

Prognosis factors for mortality were assessed using a Cox regression analysis and are presented with hazard ratios (HRs) or odds ratios (ORs) with a confidence interval of 95%. Variables significant at 0.10 were included in a multivariate model, and a step-by-step top-down selection was performed. The statistical analysis was conducted using SAS, v.9.4® (SAS Institute, Cary, NC, USA).

### 3. Results

We included 65 patients, mainly males (64.6%) with a mean age of  $68.1 \pm 11.1$  years (**table 1**). The principal comorbidities were diabetes (21.5%) and obesity (40.3%). No patient presented HIV infection. Four of the 15 patients treated with NSAIDs before admission had pre-existing spinal pain. Data regarding medical prescription or self-medication of NSAIDs was not available. The mean time lapse between the first symptoms and diagnosis was  $25.0 \pm 38.8$  days. The time lapse to diagnosis was shorter when fever was present (mean period of 15.1 vs. 58.1 days,  $p < 0.01$ ). Pre-existing back pain was associated with a longer mean diagnosis time lapse (36.6 vs. 21.6 days, non-significant). For other clinical characteristics at admission, including motor deficit, pain, or use of painkillers, the time to diagnosis was not different. Most patients used painkillers (87.3%) and half of them had used morphine or oxycodone at baseline. Neurological examination at admission was abnormal for only 60.7% of patients, with 16.4% presenting major signs. Three patients did not have back pain at admission, but only fever.

All patients but one had a diagnosis of facet arthritis via MRI (the remaining patient was diagnosed by positron emission tomography scan). **Table 2** summarizes the main imagery and biological characteristics. The lumbosacral spine was the most

frequent localization (76.9%). SAFJ at multiple spine locations was present for 26.6% of the patients. Epidural abscesses and epiduritis were found for a third and two thirds of the patients, respectively.

Regarding bacteriological diagnoses, blood cultures were performed, and 54/64 patients had positive blood cultures (blood culture was not performed for one patient). Among the 11 patients without bacteriological documentation at the start of medical care, nine underwent facet joint biopsy or synovial fluid aspiration. Four of these procedures enabled bacteriological identification. One bacteriological identification was derived from surgery without a prior biopsy, because of an epidural abscess. Only one patient presented SAFJ presumed to be due to *Mycobacterium tuberculosis*, because of a sterile psoas abscess. A CT-guided puncture did not show any crystal deposits. The cultures were sterile and polymerase chain reaction for *M. tuberculosis* was negative. Because the patient had a history of tuberculosis contact in childhood, and given the positive interferon-gamma releasing assay, anti-tuberculosis therapy was initiated, and clinical improvement followed (**materials S2**). Lastly, no bacteriological identification was established for four patients, but they were classified as having SAFJ on the basis of Newman's criterion C (6.2%).

Methicillin-sensitive *Staphylococcus aureus* was the most frequently identified pathogen (49.2%) followed by *Streptococcus spp.* (27.7%). Echocardiography was not performed for 13 patients (20%) despite seven cases of SAFJ caused by *S. aureus* or *Streptococcus spp.*, three of which had positive blood cultures. Among the population evaluated with echocardiography, infective endocarditis was present in 26.9% of cases: eight *Staphylococcus aureus* (57.2%), five *Streptococcus spp.* (35.7%), and one *Enterococcus faecalis* (7.1%). Concerning *Staphylococcus aureus*-related SAFJ, compared to other species, univariate analysis showed a higher risk of soft tissue inflammation and/or abscess (OR 9.13 [1.05;79.53],  $p < 0.05$ ), epiduritis (OR 3.89 [1.23;12.29],  $p < 0.05$ ) and epidural abscess (OR 5.33 [1.62;17.55],  $p < 0.01$ ). There were no other differences between *S. aureus* and other pathogens in univariate analysis, in relation to different aspects, including motor deficit and fever.

New and/or more severe neurological symptoms occurred for 14.3% of the patients during follow-up, and surgery was performed for 18.3% of patients, mainly in the first two weeks (83.3% of cases). The evolution of SAFJ is summarized in **table 3**.

The mortality curve is shown in **figure 1**. Mortality rates at one, two and three years were 9.2%, 18.5% and 23% respectively. Two patients died during hospitalization in the first month after diagnosis. In univariate analysis, we noted that multifocal SAFJ was more frequent among patients who died after one year of follow-up than among other patients (4/6 (66.7%) versus 13/58 (22%),  $p < 0.05$ ). Two of the three patients without back pain at diagnosis died in the follow-up year.

Three-year mortality was higher among patients with cervical infection (6/15 (40%) versus 4/50 (8%),  $p < 0.001$ ) and bilateral SAFJ (5/11 (45.5%) versus 9/51 (17.6%),  $p < 0.01$ ). Age at diagnosis was numerically associated with increased mortality (HR 1.05 per year [1.00;1.10], non-significant) as well as bone marrow oedema of the vertebral body (6/15 (40%) versus 7/41 (17%), non-significant). There was no significant association between mortality and clinical, bacteriological, or imagery characteristics. Multivariate analysis on mortality was performed but not found relevant.

#### 4. Discussion

To our knowledge, this is the largest study on SAFJ, based on data from five different French centres. The general characteristics were similar to those of other studies [4,5] for the mean age at diagnosis (68.3 years) and the proportion of predisposing diseases (diabetes mellitus, severe chronic kidney disease, alcohol abuse, and cirrhosis). These predisposing factors are also classically found in vertebral osteomyelitis [11].

Ross *et al.* conducted a study on native joint septic arthritis among injected drug users and non-users. They found 16 patients with SAFJ, 6 of which (37.5%) were IDUs. This prevalence is higher than the 7.3% observed in our study [2]. These epidemiological differences could be due to the different prevalence of IDUs in their study populations, particularly in the context of the opioid epidemic in the United States of America.

In previous case series, the symptoms of vertebral infection were present at diagnosis for the majority of patients, such as back pain, spine stiffness, and fever (around 80% in previous studies on SAFJ). One-sided pain is frequent [4,12], but André *et al.* reported its presence in less than 20% of their patients. In our study, 48.2% of the patients experienced a one-sided pain. This observation could point clinicians to SAFJ when VO with side pain is suspected. Neurological impairment at admission has been reported to concern from 0 to 10% in previous studies [4,5]. In our study, we observed more severe neurological symptoms (16.4%). Considering the retrospective design of our study and the clinical data collection methods, we cannot rule out the possibility of a potential underestimation of neurological complications. Surprisingly, only a third of the patients had rigid bracing. It is half the proportion in the SPONDIMMO study [13] (spine bracing in vertebral osteomyelitis), despite a similar prevalence of major neurological complications (9.2%) and a lower prevalence of minor neurological complications (25.6%). The role of immobilization in spinal infections is therefore open to question.

In our study, the mean time lapse between symptom onset and diagnosis was 25 days, which is consistent with other studies reporting periods ranging from 12 to 42 days [3–5,12], and quite similar to VO, where the mean time lapse ranges from 11 to 59 days [14]. A shorter time to diagnosis might have been expected in SAFJ compared to VO, notably because fever occurs less frequently in VO (60% [14] versus 77% in our study) and because of the rare occurrence of non-pyogenic infections in SAFJ, especially mycobacterial infections. *Mycobacterium tuberculosis*-related SAFJ is rarely described, with only four case reports (**materials S1**). Clinicians should be aware of the absence of fever in approximately a quarter of cases, and the association of this absence with a longer time to diagnosis.

We observed a predominance of lumbosacral SAFJ (76.9%) consistent with the findings by André *et al.* and Narvaez *et al.* (63.3% and 81%, respectively). This phenomenon is also known in VO [15]. It could be explained by the greater mobility of the lumbar spine and a preferential localization of degenerative changes, leading to local hypervascularization in cases of osteoarthritis. This hypervascularization could



promote osteoarticular infections [11,16], especially in the presence of bacteremia, which was particularly frequent in our study.

In previous studies, *Staphylococcus aureus* was the most commonly occurring bacteria, in about 80% of SAFJ cases [4,17]. However, André *et al.* [5] questioned this prevalence and found *S. aureus* in only 36.4% of SAFJ cases. We also found that *S. aureus* was not as predominant as in previous studies, occurring in about 50% of cases, with a more frequent presence of *Streptococcus spp.* and Gram-negative bacilli.

Identifying the causative bacteria can be challenging in osteoarticular infections. We found that bacteriological identification for SAFJ was most often possible from blood cultures. Similar results have been reported in previous studies, with a robust association with bacteremia [2,5,7]. Positive blood cultures appear to be more frequent in SAFJ than in VO, where the proportions range from 25 to 50% [11,18]. However, one of the interesting points of our study was the 6.2% of SAFJ without documented bacteriological evidence. This is much less than in other osteoarticular infections (7 to 34% [19–22]) and VO (9 to 35% [23–25]). One explanation could stem from difficulties in synovial fluid aspiration in the absence of effusion or abscess, and the challenges associated with performing synovial or bone biopsies on these small joints. We cannot rule out the possibility that cases without bacteriological identification were not diagnosed and hence not included in our study.

Except for some diagnoses performed with 99m-Technecium bone scintigraphy [26,27], MRI has mostly been used for diagnosis. It appears to be the most sensitive and specific diagnostic tool and can be considered as a gold standard for confirming facet arthritis and assessing complications such as epiduritis or abscess [28]. The prevalence of epiduritis in our study was consistent with previous reports [16]. Epidural abscesses are a major local complication, leading to significant morbidity, such as major neurological symptoms and the need for surgery [17,29–32]. In our study, SAFJ caused by *Staphylococcus aureus* was significantly associated with epiduritis and epidural abscess but not with surgery, perhaps because of limited statistical power. In any case, these results should alert clinicians when identifying *S. Aureus*, and stress the need for careful neurological assessment.

Infective endocarditis was found for 26.9% of our patients evaluated with echocardiography. Our study presents certain limitations regarding the assessment of infective endocarditis: 20% of the patients did not have echocardiography. Of these, two patients died in the three-year follow-up period (on day 23 and day 179). The possibility of infective endocarditis cannot be completely ruled out for patients without an echocardiographic assessment. In other SAFJ case series, the frequency of endocarditis ranged from 0 to 16,7%. Our result was quite similar to infective endocarditis in VO, with rates ranging from 12% [33] to 21.4% [13] in recent publications. It also seems to be more frequent in SAFJ than in peripheral arthritis, estimated by González-Juanatey *et al.* at 6,3% [34]. Murillo *et al.* [7] showed that infective endocarditis was more frequent when a spine infection occurred (VO and SAFJ) compared to peripheral septic arthritis. Our results seem consistent with these findings. The high rate of bacteremia and relatively high rate of infective endocarditis in our study could explain multifocal SAFJ as a possible risk factor for mortality in univariate analysis, similar to septic polyarthritis in peripheral septic arthritis [35].

Given the potential severity of infective endocarditis, our study highlights the seriousness of SAFJ.

One of the most important results of our study is the one-year mortality rate. Previous studies on SAFJ have shown mortality ranging from 0 to 17% [4,5,12] but without standardized follow-up. In peripheral septic arthritis, the mortality rate has been estimated at 6 to 7% three months after diagnosis [36,37], which is close to the 4.6% after three months in our study. Increased mortality in the 2 to 4 years following peripheral septic arthritis has been described among geriatric patients [38]. Our data suggests similar results, with a three-year mortality rate of 23%. Mortality in SAFJ also appears to be similar to VO, with one-year mortality between 6 and 13.6% [13,39,40].

Septic arthritis of facet joints is a rare but severe disease. Bacteriological identification primarily relies on blood cultures and *Staphylococcus aureus* is the most common pathogen identified. The clinical presentation is not specific, but neurological symptoms, epiduritis, abscesses and sequellae are frequent. Our study has highlighted the fact that SAFJ is a severe disease, with high morbidity and one-year mortality reaching 9.2%. Further research is needed to gain a better understanding of the increased mortality in SAFJ, particularly in cases involving cervical spine and bilateral infections. The prevalence of bacteremia and infective endocarditis also require further investigation.

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### **Competing interest**

The authors have no relevant financial or non-financial interests to disclose.

### **Author contributions**

All authors contributed to the study conception and design. Rachel Tuil, Simon Cadiou, were in charge of material preparation. Simon Cadiou, Rachel Tuil, Emmanuel Hoppé, Hélène Cormier, Raphael Lecomte, Laurie Charret and Camille Langbour and the CRIOGO network conducted the data collection. Estelle Le Pabic, Rachel Tuil and Simon Cadiou performed the data analysis. Simon Cadiou and Rachel Tuil wrote the first draft of the manuscript and all authors commented on the previous versions of the manuscript. All authors have read and approved the final manuscript.

**Availability of data and materials**

The datasets generated during and/or analysed during the current study are not publicly available because individual privacy could be compromised but they are available from the corresponding author on reasonable request.

**Ethics approval**

This study was conducted in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of Rennes University Hospital (number 20.49 on 10<sup>th</sup> may 2020).

**Consent to participate**

Informed consent was obtained from all individual participants included in the study

**Consent to publish**

The authors confirm that all participants provided informed consent for publication, and especially the patient on supplementary data 2.

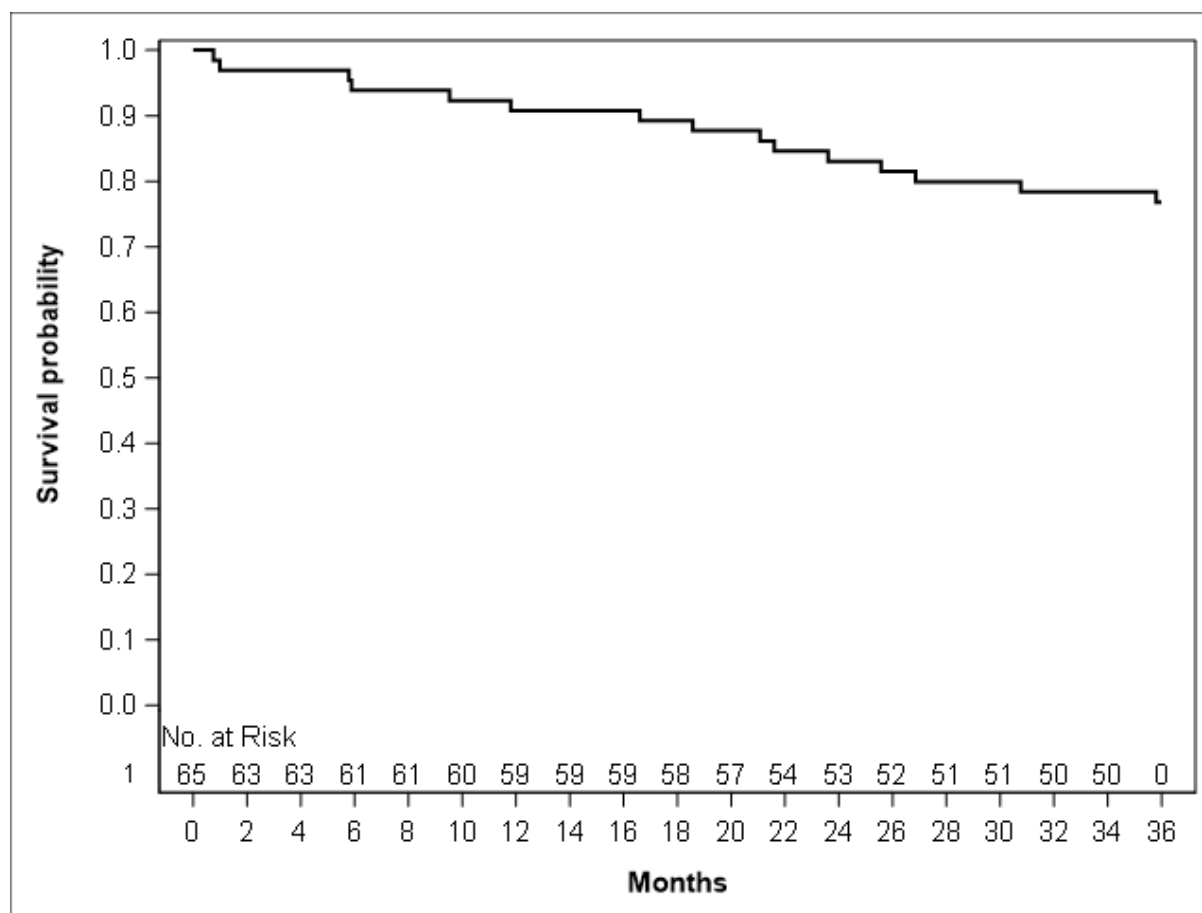
**Online material. Supplementary data**

Supplementary data associated with this article can be found in the online version at ...

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**Figure 1.** Kaplan-Meier survival curve at three years.

**Table 1:** General characteristics of the 65 patients with SAFJ

<b>PATIENTS HISTORY</b>	
Sexe (male)	64.6 %
Age (years), mean (SD)	68.1 (11.1)
Diagnosis delay in days, mean (SD)	25.0 (36.5)
Significant comorbidity	
• Chronic Kidney Disease <sup>1</sup>	3.1 %
• Cirrhosis	6.2 %
• Diabetes	21.5 %
• Alcohol abuse	15.4 %
• Injection drug users	6.2 %
• Immunosuppressive condition <sup>2</sup>	4.6 %
Smoking (weaned or not), n = 60	38.3 %
BMI <sup>3</sup> , mean in kg/m <sup>2</sup> (SD), n = 61	29.3 (6.8)
• Obesity (BMI > 30)	40.3 %
Pre-existing back pain, n = 64	25.0 %
History of spine surgery	6.2 %
<b>DATA AT DIAGNOSIS</b>	
Fever	76.9 %
Back pain	
• Acute pain n = 63	95.2 %
• Side back pain, n = 59	49.2 %
• Stiffness, n = 43	83.7 %
Neurological examination at diagnosis (n = 61)	
• Minor neurological symptoms	51.7 %
○ <i>Sensory deficit</i>	10.0 %
○ <i>Nerve root pain</i>	41.7 %
○ <i>Abolition of tendon reflexes</i>	18.3 %
• Major neurological symptoms	16.4 %
○ <i>Motor deficit</i>	11.5 %
○ <i>Cauda equina syndrome</i>	8.2 %
Use of pain killers, n = 55	
• <i>None</i>	12.7 %
• <i>1<sup>st</sup> grade</i> <sup>4</sup>	10.9 %
• <i>2<sup>nd</sup> grade</i> <sup>5</sup>	21.8 %
• <i>3<sup>rd</sup> grade</i> <sup>6</sup>	54.5 %
Prior use of NSAIDs <sup>7</sup>	23.1 %
WBC <sup>8</sup> count in G/L, mean (SD)	12.2 (5.6)
C-Reactive Protein (mg/dL), mean (SD)	18.7 (1.2)

SD: Standard Deviation; <sup>1</sup> Glomerular filtration rate <30 mL/min/1.73 m<sup>2</sup>; <sup>2</sup>

Chemotherapy, use of immunosuppressive drug or active blood disease; <sup>3</sup> Body Mass Index (kg/m<sup>2</sup>); <sup>4</sup> paracetamol; <sup>5</sup> codeine, tramadol and nefopam; <sup>6</sup> oxycodone and morphine; <sup>7</sup> Non-steroidal anti-inflammatory drugs; <sup>8</sup> White Blood Cell Count

**Table 2:** Microbiologic and imaging characteristics of the 65 patients with SAFJ

<b>IMAGING</b>	
Mean time between first symptoms and diagnosis, days (SD)	26.6 (37.7)
Levels of SAFJ, n = 64	
• Cervical spine	15.6 %
• Thoracic spine	10.8 %
• Lumbar and lumbosacral spine	76.9 %
• Multifocal SAFJ (excluding bilateral SAFJ)	26.6 %
Unilateral involvement *	82.3 %
Epiduritis *	66.7 %
Epidural abscess *	33.9 %
Soft tissues abscess and/or inflammation *	87.1 %
Abnormal spinal cord signal *	6.5 %
Dural sac compression *	25.8 %
Presence of facet joint effusion, n = 59	66.1 %
Bone marrow edema	
• Vertebral arch and process, n = 49	49 %
• Vertebral body, n = 56	26.8 %
<b>MICROBIOLOGY</b>	
Bacteria	
• <i>Staphylococcus aureus</i>	49.2 %
• <i>Streptococcus spp.</i>	27.7 %
• <i>Enterococcus faecalis</i>	7.7 %
• <i>Escherichia coli</i> and other Gram-negative bacilli	3.1 %
• <i>Mycobacterium tuberculosis</i> **	1.8 %
• Other or multiple bacterial findings	4.6 %
• No bacterial identification (Newman C criteria)	6.2 %
Bacteriological identification	
• Blood cultures positivity, n = 64	84.4 %
• Percutaneous biopsy positivity, n = 11	54.5 %
○ CT-guided biopsy, n (%)	7 (63.6 %)
○ Ultrasound-guided biopsy, n (%)	4 (36.4 %)
• Surgical biopsy positivity, n = 15	86.7 %
Echocardiography performed	
• Infective endocarditis, n (%)	14/52 (26.9 %)
○ <i>Staphylococcus aureus</i>	8/14
○ <i>Streptococcus spp.</i>	5/14
○ <i>Enterococcus faecalis</i>	1/14

SD= Standard Deviation ; \* on 62 patients ; \*\* presumed, no microbiological identification



**Table 3:** Treatment and evolution of the 65 SAFJ

<b>TREATMENTS</b>	
Duration of antibiotics therapy in days, mean (SD), n = 56	49 (24)
• Intravenous, mean (SD)	28 (19)
• Oral, mean (SD)	31 (23)
Bracing, n = 62	32.3 %
• Rigid bracing, n = 20	90 %
• Time of immobilization in days, mean (SD)	48.9 (55.3)
Surgery, n = 60	20 %
Mean time between admission and surgery in days (SD)	7.9 (7.3)
<b>EVOLUTION</b>	
New and / or worsened neurologic symptoms, n = 56	14.3 %
• Minor neurological symptoms, n = 54	9.3 %
○ <i>Sensory deficit</i>	1.9 %
○ <i>Nerve root pain</i>	3.7 %
○ <i>Abolition of tendon reflexes</i>	6.1 %
• Major neurological symptoms, n = 55	7.3 %
○ <i>Motor deficit</i>	1.8 %
○ <i>Cauda equina syndrome (complete or not)</i>	5.6 %
Time of clinical follow up (days), mean (SD)	255 (340)
One-year mortality	9.2 %
Sequels, n = 50	48 %
• <i>Chronic back pain</i>	40 %
• <i>Chronic nerve root pain</i>	10 %
• <i>Lasting motor deficit</i>	4 %

*SD= Standard Deviation*