

# Managing native shoulder septic arthritis in dialyzed patients is not so easy: report of two cases

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## SUMMARY

Native joint septic arthritis is frequent in dialyzed patients, because of comorbidities and immune system impairment. Nevertheless, its diagnosis and treatment can be challenging due to different clinical presentations, difficult pathogen isolation and risk of infection despite surgical irrigation and debridement procedures. We report herein two cases of native glenohumeral joint septic arthritis, discussing in depth the difficulties met during the diagnostic and therapeutic process.

**Key words:** septic arthritis, shoulder joint, dialysis, immunocompromised host, debridement

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## Introduction

Septic arthritis of the native joint (SANJO) involves the shoulder in 8-21% of cases <sup>1</sup>. Diabetes mellitus, hemodialysis, intravenous drug use, and immune compromise are well-recognized risk factors <sup>2</sup>. The pathogenesis is most often due to hematogenous spreading from distant sites (77%), followed by diffusion from a contiguous site and direct inoculation (shoulder infiltration) <sup>1</sup>. The treatments described vary from articular open or arthroscopic irrigation and debridement (I&D) to proximal humeral resection, possibly followed by staged arthroplasty <sup>3</sup>. Although native gleno-humeral joint septic arthritis (NGHJSA) is often associated with severe systemic symptoms (fever, chills, local inflammatory signs), leukocytosis, increased erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP), in the frail patient they are not always present <sup>1</sup>. This makes diagnosis of NGHJSA quite challenging in the population that is most subject to this disease. We present two cases of NGHJSA in dialyzed patients, discussing the challenges related to diagnosis and management.

## Description of the cases report

### Case 1

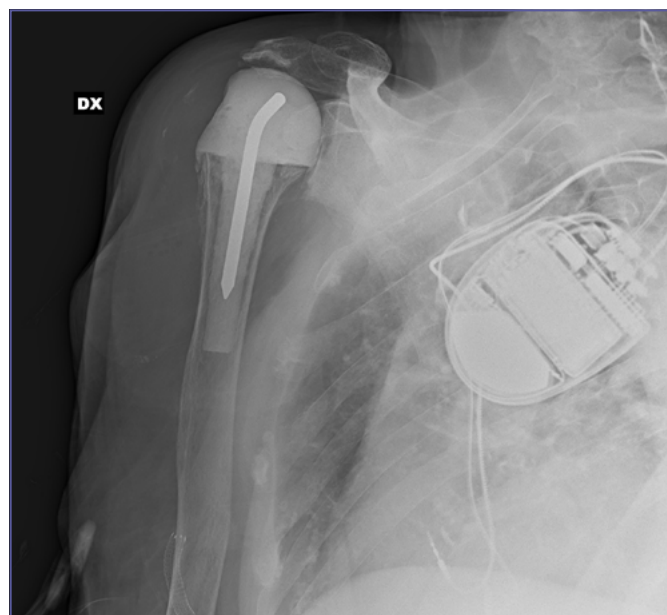
A 66-year-old woman, affected by end-stage chronic kidney disease of unknown origin undergoing peritoneal dialysis and with concomitant hypertension, hypothyroidism, psoriasis, hypokinetic cardiopathy, paroxysmal supraventricular tachycardia, a bicameral implantable cardioverter defibrillator (ICD) carrier and allergic to vancomycin, beta-lactams, and cephalosporins, presented to our emergency department complaining of severe right shoulder pain and limited function. The pain started 20 days earlier after a minor shoulder distraction and was resistant to NSAIDs. The patient was afebrile, and her shoulder showed a moderate effusion and warmth, without local redness, with a reduced active range of motion (pseudo-paralysis). Suspecting an acute massive rotator cuff tear, she was initially treated with two intraarticular injections of methylprednisolone 7 days apart along with empiric antibiotic therapy with ciprofloxacin 500 mg daily for 6 days, while waiting for CT scan (the presence of ICD contraindicated standard magnetic resonance imaging). The CT scan confirmed a massive rotator cuff tear. Nevertheless, due to pain and effusion persistence, she returned to the emergency room one week after the second injection. Her blood exams showed increased CRP (17 mg/dl), and shoulder arthrocentesis revealed a purulent drainage, with negative cultures. Therefore, NGHJA was diagnosed, and the patient underwent arthrotomic irrigation and debridement (I&D) and broad-spectrum antibiotic therapy (i.v. amoxicillin clavulanate 875+125 mg TID and rifampicin 600 mg daily, then with i.v. metronidazole 500 mg TID and oral rifampicin 600 mg daily), because the intraoperative biopsy cultures were negative. The initial clinical response (CRP persistently elevated) was followed by a relapse involving both shoulders after 1 month. An ICD-compatible MRI revealed a bilateral synovitis without bone involvement. The patient underwent a bilateral open I&D, with implantation of gentamycin-loaded calcium sulphate beads (Stimulan<sup>®</sup>), followed by antibiotic therapy with ciprofloxacin 500 mg daily. The intraoperative cultures of biopsies from both shoulders resulted negative, although the research was also extended to mycobacteria. The histopathologic exam of both shoulders revealed non-specific inflammatory findings; the amyloid research was negative. The treatment was successful for the left shoulder, but after 2 months a new relapse occurred on the right shoulder, with fever, pain and persistently elevated (18 mg/dl) CRP. The patient underwent a new I&D and antibiotic therapy with cotrimoxazole 160+800 mg twice a day and rifampin 600 mg daily, with the development of a sinus tract through the surgical wound scar. Due to persistence of infection, the patient underwent an open joint debridement, proximal humeral resection and implantation of gentamycin-loaded polymethylmethacrylate (PMMA) spacer and calcium-sulphate beads (Stim-

ulan<sup>®</sup>) (Fig. 1). The intraoperative bone biopsy cultures were positive for a multidrug-resistant *Corynebacterium striatum* (sensitive only to vancomycin and linezolid among the tested antibiotics). The patient started antibiotic therapy initially with linezolid for two weeks and then with daptomycin for a month. After two weeks of antibiotic holiday, before the programmed surgery of spacer removal and reverse shoulder arthroplasty, the patient showed a clinical recurrence, with a new increase in CRP and synovial fluid leukocyte esterase strip test ++, with negative cultural exams. 18FDG-PET showed septic involvement of the residual proximal metaphyseal humerus and glenoid. The spacer was removed, a new bone and joint debridement was performed involving the glenoid and the proximal humerus, that was further resected, and the patient was treated again with daptomycin for 30 days (Fig. 2). The patient was considered no longer eligible for arthroplasty, given the high risk of prosthetic shoulder infection.

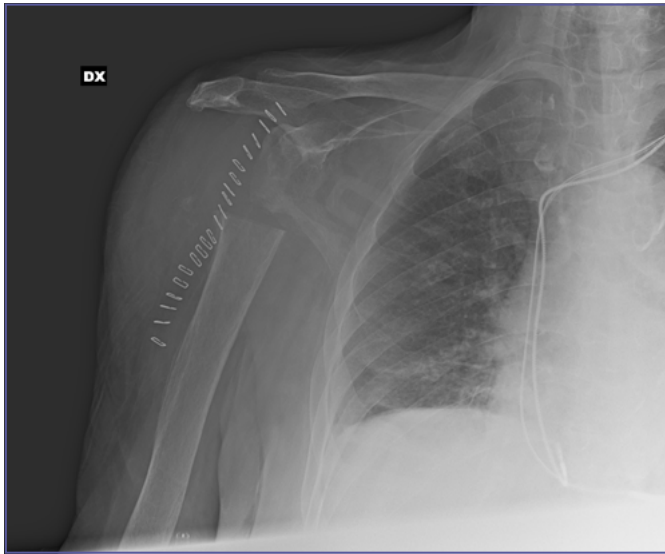
Twenty-four months after the final surgery, the patient shows no signs of infection, reporting rare episodes of shoulder pain. She can actively move her right upper limb on the horizontal plane, and she is autonomous in personal hygiene, needing help in heavy activities, reporting a DASH score of 42.

### Case 2

An 85-year-old woman, affected by hypothyroidism, atrial fibrillation, hypertension, cryoglobulinemia, and end-stage chronic kidney disease on hemodialysis, presented to our emergency department complaining of left shoulder pain and functional limitation after a fall 7 days before, without direct

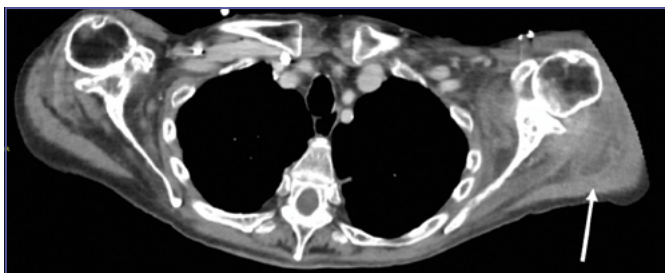


**Figure 1. Case 1: shoulder radiograph showing humeral resection and PMMA spacer implantation.**

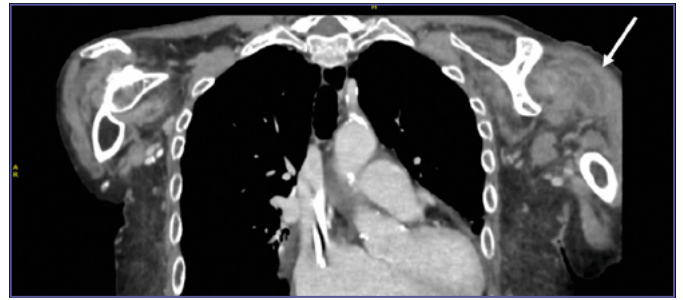


**Figure 2. Case 1: shoulder radiograph after spacer removal.**

shoulder trauma. The patient was afebrile and had had no fever in the previous days. Nevertheless, she had started empiric antibiotic treatment with amoxicillin-clavulanate since the day before upon advice of her family physician for a non-specified infection. The shoulder showed warmth and severe effusion, but radiographs showed only undisplaced posterior fractures of the VII-VIII-IX left ribs. Ultrasound and contrast-enhanced CT scan of the shoulder revealed an intraarticular multilocular fluid collection (Figs. 3-4). Blood exams showed elevated CRP (177 mg/l) without leukocytosis and procalcitonin of 2.02 ng/ml. A joint aspiration was performed, revealing a leukocyte esterase strip ++, 76,530 synovial leukocytes/ul with 92% polymorphonucleates, but negative synovial cultures. A culture negative NGHJSA was diagnosed. The patient was hospitalized and underwent urgent articular open I&D and antibiotic therapy, initially with vancomycin and piperacillin tazobactam for 10 days. During the postoperative days the NGHJSA progressive-



**Figure 3. Case 2: axial contrast-enhanced CT scan showing the multilocular intraarticular left shoulder fluid collection.**



**Figure 4. Case 2: coronal contrast-enhanced CT scan showing the multilocular intraarticular left shoulder fluid collection.**

ly resolved with a return to a normal pain-free function, but the patient frequently had fever. Intraoperative cultures and the several blood cultures performed during fever episodes were all negative. A transesophageal echocardiography revealed a septic vegetation on the central vein catheter used for hemodialysis, that was subsequently substituted, and the antibiotic therapy was shifted to vancomycin and meropenem for 4 days and meropenem alone for another 14 days, with definitive resolution of the pyretic episodes.

## Discussion

NGHJSA affects especially immune-compromised patients. Among them, dialyzed patients are particularly subject to this disease, because of comorbidities, defective immunity and the several invasive procedures on the urinary tract and blood vessels they are exposed to, which may lead to bacteraemia and, subsequently, to hematogenous NGHJSA<sup>4</sup>.

Furthermore, diagnosis and treatment may be challenging in dialyzed patients. Their reduced immune reactivity may lead to a NGHJSA with a low-grade presentation with no or minimal increase in body temperature and moderately pathologic blood exams<sup>4</sup>. The frequent antibiotic therapies administered during dialytic treatments may influence the symptoms as well as the microbiologic results (often negative). Furthermore, the shoulder itself has a peculiar cutaneous flora, with indolent slow-growing bacteria that, when involved in the septic arthritis pathogenesis, are intrinsically difficult to be isolated.

Few reports dealing with SANJO in dialyzed patients have been published, and the specific features of the shoulder involvement have not been analyzed in depth. Al-Nammari et al. reported a series of 15 SANJO, with 2 NGHJSA, in hemodialyzed patients: all SANJO presented with pain, decreased joint range of motion and increased CRP, while fever and leukocytosis were inconsistent. The mean number of surgeries performed was 2.64. Mathews et al. reported on 4 cases of shoulder septic involvement in hemodialyzed patients, including glenohumeral, acromioclavicular and sternoclavicular septic

arthritis: all patients except one presented with fever and severe local symptoms, but no data regarding blood count, CRP and synovial fluid analysis were reported <sup>5</sup>.

Herein, two challenging cases of NGHJSA are presented. In the first, beyond the difficult pathogen isolation (positivity of bone samples cultures only) and subsequent several cycles of ineffective broad-spectrum antibiotic therapy, the *Corynebacterium striatum* caused a persistent shoulder septic arthritis that, notwithstanding bone involvement, always manifested with a low-grade presentation. The persistent NGHJSA could have been due to the delayed diagnosis and surgical treatment at the beginning, when the symptoms were still compatible with an acute synovitis after traumatic rotator cuff tear and the patient was treated with steroid intra-articular injections. This septic arthritis did not resolve after several I&D surgeries and showed persistence even after the first proximal humeral resection, likely due to biofilm growth on the retained spacer. Although staged arthroplasty is a recognized treatment for persistent shoulder septic arthritis in the immune competent host, it should be probably avoided in immune-compromised patients <sup>3</sup>. The last debridement with spacer removal finally brought the infection into remission.

The second patient had a moderate initial presentation of a hematogenous septic arthritis, showing fever only in the following days, probably due to continuous septic embolization from the vegetation on her central venous catheter. Despite the several episodes of bacteriemia, all cultures from synovial fluid, intraoperative biopsies and blood cultures resulted negative. Nevertheless, the shoulder objectivity, CRP increase, and synovial fluid exams suggested the diagnosis, and the septic arthritis resolved after a single I&D surgery. Broad-spectrum antibiotic therapy and central venous catheter removal were needed to completely resolve the systemic sepsis.

## Conclusions

NGHJSA should be always suspected in dialyzed patients with shoulder pain and functional impairment, even in the absence of fever or leukocytosis, if CRP is increased. Joint arthrocentesis and synovial fluid analysis are fundamental diagnostic

tools: an elevated synovial leukocyte count ( $\geq 50,000/\text{ul}$ ) and synovial polymorphonucleate percentage (90%) should lead to urgent surgical I&D even in case of culture negative infections.

### Conflict of interest statement

The authors declare no conflict of interest.

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### Author contributions

The authors contributed equally to the work.

### Ethical consideration

The research was conducted ethically, with all study procedures being performed in accordance with the requirements of the World Medical Association's Declaration of Helsinki.

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