



## Case Report: *Pseudomonas aeruginosa* Native Joint Arthritis Complicating Chronic Wound Healing in Three Old Immunocompetent Patients

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### Abstract

*Pseudomonas aeruginosa* (PA) is frequently responsible for severe acute iatrogenic infection, particularly in critically ill or immunocompromised patients, and sometimes after articular implant surgery. Native joint infection with PA has been described in intravenous drug users, but apart from those, it remains a rare condition with only few cases described, and a probably poorest outcome than arthritis due to *Staphylococcus aureus*.

**Keywords:** *Pseudomonas aeruginosa*; Arthritis; Negative Wound Pressure Therapy; Peripheral Nerve Catheter; Necrotic Angiodermatitis; Chronic wound

### Case Series

We report three cases of patients with chronic wounds who developed knee infection caused by PA on the same leg. Colonization of the wound was not proven beforehand. The 3 cases occurred in a quite narrow timeframe (between 2017 and 2018) in our centre. However, PA serotypes were different, ruling out the hypothesis of a particularly virulent epidemic germ. The potential of this bacterium to complicate wound care with nearby arthritis has not yet been described to our knowledge.

#### Case 1

The first patient was an autonomous 79 y-o man, followed for a recurrent necrotic angiodermatitis of the lateral malleolus of the left leg. He had a history of type 2 diabetes, and high blood pressure. He was admitted for a digging, inflammatory, necrotic, highly painful wound on the outer surface of the left leg. The arterial Doppler was normal. Negative Wound Pressure Therapy (NPWT) with naropein instillation was used for 14 days. This process was successful and permitted to perform a skin graft, which finally resulted in the complete healing of the wound. Despite this favorable evolution, the patient suddenly complained about his left knee, 18 days after the beginning of NPWT, and 29 days after admission. Diagnosis of *Pseudomonas aeruginosa* arthritis was made on joint fluid aspiration. Blood cultures were sterile. This infection recovered with adapted antibiotic treatment: Ceftazidime combined to ciprofloxacin for two weeks, then ciprofloxacin alone for the next four weeks.

#### Case 2

The second patient was an 83 y-o man with a history of necrotic angiodermatitis of both legs, high blood pressure, atrial fibrillation, chronic heart failure, non-alcoholic steatohepatitis, and type 2 diabetes. Necrotic angiodermatitis was treated with NPWT for 21 days, followed by a skin graft, with good results. Notably, he had an episode of PA skin infection with bacteremia, which improved rapidly under antibiotics, 2 months before NPWT and skin graft. There was no joint infection noticed at this time. After a stay in a rehabilitation centre, he was readmitted for an episode of hepatic encephalopathy, successfully treated with lactulose. Then he reported pain and swelling of the right knee, with PA on joint fluid aspiration, 72 days after NPWT initiation. Blood cultures were sterile. The strains of *Pseudomonas* found in the first episode of bacteremia and in the joint infection months later had different antibiograms. He was treated with ceftazidime and ciprofloxacin for two weeks, then ciprofloxacin alone for the next four weeks and underwent a surgical arthroscopic lavage. The arthritis improved, but the patient died 77 days after the diagnosis of joint infection,

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because of uncontrolled heart failure and decompensated liver disease.

### Case 3

The third case was a frail 79 y-o women, known for venous insufficiency, a cauda equina syndrome with sphincter disorders, nephrolithiasis, and pyelonephritis. The nurses who provided home care asked for a hospitalization because of the deterioration of the general status, with an inflammatory syndrome. She reported an unbearable pain of both legs, which were affected by circumferential necrotic venous ulcers. As classic analgesics were insufficient, a Peripheral Nerve Catheter (PNC) was implanted on both lower limbs for infusion of naropein for 19 days. The arterial Doppler was normal. With appropriate care, the ulcers healed progressively, but a pain and swelling of the left knee suddenly appeared, together with a worsening of the inflammatory syndrome and fever, 6 days after perineural catheter implantation and 13 days after admission. Articular fluid aspiration retrieved a PA sensible strain. Blood cultures were sterile. The patient underwent an articular lavage and was treated with ceftazidime plus ciprofloxacin for three weeks, then ciprofloxacin alone for the next three weeks. This strategy permitted to cure the arthritis. The patient died 307 days after this episode, because of multiple complications of malnutrition, pneumonia, and worsening of her ulcers.

### Discussion

In our three patients, the infection itself was cured with standard treatment. Death of cases 2 and 3 occurred a long time after the infection's onset and was the result of the accumulation of other diseases [1]. Our patients displayed well-known risk factors of PA infection, among which older age and diabetes [2]. However, additional peculiarities might also partly explain the occurrence of PA arthritis and deserve to be discussed [3]. First, two of our patients were undergoing NPWT [4]. This technique is widely used on chronic wounds and in acute scars as well. To our knowledge, few complications are related to this procedure. Local changes in tissue perfusion, among other phenomena that contribute, may have contributed to the regional dissemination of an opportunistic pathogen [5]. Second, the implantation of a PNC in our third patient might have also enhanced the risk of infectious complication [6].

This procedure is used for pain management, with introduction of a catheter in the close proximity of the nerve trunk, and injection of a local anesthetic in continuous infusion. PNC infection is rare (between 0 and 3%) [7], but might be enhanced in case of close chronic wound. Third, two of our three cases suffered from necrotic angiodermatitis, a severe form of ulcer, associated with high blood pressure and due to a tissue ischemia provoked by atherosclerosis of small vessels. The treatment can require adrenocorticosteroids which could together with local skin ischemia increase the risk of bacterial colonization and translocation.

### Conclusion

*Pseudomonas aeruginosa* arthritis is rare in non-immunocompromised and non-drug user patients but may complicate chronic wound care in patients with multiple comorbidities. Clinician must be aware of this risk, which might be enhanced in case of NPWT or PNC use. We can suppose that the poor observed outcome is due to the extreme frailty, rather than PA arthritis severity itself.

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