Monomicrobial necrotising soft tissue infection of the hand caused by a Panton-Valentine leukocidin-negative *Staphylococcus aureus* strain in a 66-year-old patient with diabetes

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DESCRIPTION

A 66-years-old man, with a history of poorly monitored type 2 diabetes was admitted to the emergency room because of general weakness. At admission, he was hypothermic at 34°C, with stable haemodynamic and neurological status. Clinical examination revealed erythematous swelling of the back of the right hand that had appeared 2 days earlier according to the patient, without any history of trauma or injury. Laboratory tests showed diabetic ketoacidosis, a haemoglobin A1c level at 12% as well as a biological inflammatory syndrome with C reactive protein plasmatic level at 360 mg/L and hyperleucocytosis with a neutrophil count at 28 giga/L. Insulin therapy and intravenous amoxicillin-clavulanate were started. Right-hand injury worsened over 48 hours, with the formation of necrotic areas and secretory wounds on the back of the right hand (figure 1A). In parallel, he developed monoarthritis of the right knee. Urgent surgical debridement of the right hand was performed with large excision of necrotic skin and subcutaneous tissues (figure 1B), subsequent tenosynovectomy of extensor tendons and abundant washing (figure 1C). Admission blood cultures and intraoperative samples recovered a methicillin-sensitive *Staphylococcus aureus* (*S. aureus*). Antibiotic treatment was switched to intravenous cefazolin, single-dose gentamicin and oral ofloxacin for 4 weeks and finally switched to oral rifampin and ofloxacin, with a total duration of antibiotic treatment of 6 weeks. Six surgeries

over 2 weeks were required to clear the right hand. Subsequent wound care required a Negative Pressure Wound Therapy System (VAC), followed by the application of a dermal regeneration template (INTEGRA membrane). Finally, a skin graft was performed 3 weeks later. Persisting septic arthritis despite appropriate antibiotic treatment required surgical joint drainage by arthrotomy of the right knee, yielding the same *S. aureus*. Toxin gene profiling of the *S. aureus* strain revealed the presence of the enterotoxin gene cluster *egc* but did not show the evidence for the *lukPV* locus encoding the Panton-Valentine leukocidin (PVL). There were no other secondary septic foci and cardiac echography did not show any signs of endocarditis. Patient's general condition improved and 4 months after discontinuation of antibiotic treatment, he progressively regained use of his right hand (figure 1D).

Necrotising skin and soft tissue infections (SSTIs), rapidly spreading infections which may extend from the skin to the musculature, are responsible for high mortality and morbidity.¹ The most common comorbid condition consists of diabetes mellitus.² Necrotising SSTIs mostly result from polymicrobial synergistic infections, especially caused by streptococci, *S. aureus*, enterobacteriaceae and anaerobes. Group-A streptococcus is the most common cause of monomicrobial necrotising SSTIs, and SpeB is a crucial virulence factor that facilitates tissue invasion.¹ The present case is of particular interest as it was a

Figure 1 Necrotising skin and soft tissue infection of the back of the right hand caused by methicillin-susceptible PVL-negative *Staphylococcus aureus*. Appearance before (A) and after (B) surgical debridement, after tenosynovectomy of extensor tendons (C) and 4 months after a skin graft was performed (D). PVL, Panton-Valentine leukocidin.

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monomicrobial *S. aureus*-associated necrotising SSTI, due to a PVL-negative strain. *S. aureus* alone could be responsible for necrotising SSTIs, but in the cases reported in the literature, the strains usually harboured the genes encoding the PVL. This toxin is a pore-forming toxin that has the ability to induce skin necrosis in animal models and is usually involved in patients with furunculosis.³ Based on the case presented here, PVL-negative *S. aureus* could be involved in monomicrobial necrotising SSTIs. As described in other patients with necrotising SSTIs, diabetes is probably a major risk factor, and aggressive surgical

debridement done in an emergency is the cornerstone of the treatment.¹

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Learning points

- ▶ *Staphylococcus aureus* is an uncommon cause of monomicrobial necrotising skin and soft tissue infections (SSTIs), and is considered to be associated with Pantone-Valentine leukocidin (PVL) production.
- ▶ Nevertheless, PVL-negative *S. aureus* could also be responsible for monomicrobial necrotising SSTI, especially in patients with diabetes mellitus.
- ▶ Management of monobacterial necrotising SSTIs includes aggressive surgical debridement and antibiotherapy.

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