Implant-associated ESBL-*Klebsiella pneumonia* producing small colony variant bone and joint infection in a healthy 40-year-old man

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DESCRIPTION

A 40-year-old man underwent a bifocal fracture of the left leg in Senegal. An intramedullar rod was implanted to obtain consolidation. At 7 months, the patient was admitted to our institution as the distal fracture had not consolidated (figure 1A). There was no clinical sign of infection. A 1-stage exchange of the rod was performed. No abscess or suspected tissue was detectable during the surgery. Systematic peroperative test of samples were performed, and revealed *Klebsiella pneumonia* producing extended-spectrum β-lactamase (ESBL), and some colonies expressed the small colony variant (SCV) phenotype in the culture (with the same antibiotic susceptibility), which was also identified to be *K. pneumonia* (figure 1 B and C). An early new intervention was required due to local abscess formation, the rod was explanted, the tibia was immobilised with a cruro-pedal cast and negative pressure therapy on the skin defect was instaured. Peroperative bacteriology always showed *K. pneumoniae* in culture. Antibiotics with meropenem (6 g/day) and colimycine (colistimethate sodium, 6 MUI/day) were started, and skin and soft tissue flap was performed to cover the exposed bone of the proximal tibia. At 3 months of antimicrobial therapy (no adverse event occurred), the fracture had consolidated as seen on the X-ray (figure 1 D and E) and the antibiotics were stopped. The outcome was favourable, and the patient is walking now without pain and without any sign of infection.

Enterobacteriaceae could be responsible for bone and joint infection (BJI), but are most of time responsible for acute postoperative or haematogenous infections. The SCV phenotype corresponds to a reversible switch of the metabolism of bacteria, leading to slow-growing forms that are associated with intracellular persistence and pin point colonies on blood agar.[1] Most of the BJIs associated with the expression of the SCV phenotype are chronic implant-associated staphylococci BJI.[1 2] To the best of our knowledge this is the first case of *K. pneumonia* SCV description, especially in a BJI. Gram-negative SCV are well described with *Pseudomonas aeruginosa* or *Stenotrophomonas* spp. in cystic fibrosis, but less is known in BJI. Sendi *et al* reported that *Escherichia coli* SCV could be detected on tissues and sonication fluid in patients with chronic prosthetic-joint infection. Biochemical reactions were modified in variants, but some were restored after passage on culture medium. This study concludes that with Gram-negative rods expressing the SCV phenotype, biochemical modifications lead to mis-identification or non-identification with routine bacteriological methods.[3] A combination antimicrobial therapy is usually proposed to treat BJI due to multidrug-resistant pathogens, to avoid a relapse with acquisition of further resistance.

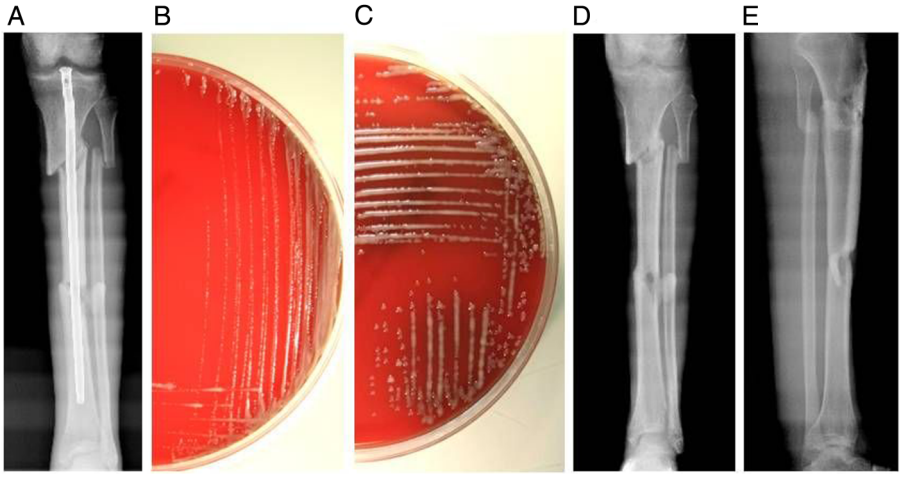

Figure 1 (A) X-ray of the tibia at admission, showing the unconsolidated bifocal fracture and the tibial nail; (B) Pinpoint colonies on blood agar of ESBL *Klebsiella pneumonia* from peroperative samples corresponding to the SCV phenotype; (C) Classical phenotype on blood agar of the ESBL *K. Pneumonia* from the same peroperative samples; (D) and (E) X-ray of the tibia (face and profile) 6 months after the end of the antimicrobial therapy showing consolidation, in a patient walking without any pain. ESBL, extended-spectrum β-lactamase; SCV, small colony variant.

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Learning points

- *Klebsiella pneumonia* could express the small colony variant (SCV) phenotype in patients with implant-associated bone and joint infection (BJI).
- Implant removal and a 3 months course of targeted antimicrobial therapy facilitate the cure of SCV in implant-associated BJI.
- Gram-negative SCV could express biochemical modifications that may lead to mis-identification or non-identification with routine bacteriological methods.

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