

Allergy to implants in lumbar screw fixation mimics postsurgical wound infection

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Dear Editor,

We report the case of a 44-year-old female patient with lumbo-ischiatic pain projecting to dermatomes S1. Conservative treatment was unsuccessful and the pain progressed until the patient was unable to walk. After lumbar computed tomography (CT) evaluation, a radicular compression due to listhesis could be seen in the level L5/S1 (Meyerding Grade I, Fig. 1a). Radicular decompression and screw fixation from L5 to S1 followed. The post-operative CT shows good screw position and dural decompression (Fig. 1b).

At this point it is important to mention that the patient had allergies against sodium thiosulphate (dental products), 1,3-diphenylguanidine (rubber) and nickel (II) sulphate. No titanium allergy.

Immediately post-surgery, the patient still complained of lumbo-ischiatic pain with a 7/10 visual analogue scale (VAS) score. Because of pain, ambulation was impossible (despite good postoperative results on CT). Inspection of the wound showed oedema, redness and hyperthermia resembling the clinical signs of wound infection. After microbiological screening (*Staphylococcus epidermidis*, *Streptococcus oralis*, *Streptococcus faecalis* and *Staphylococcus haemolyticus* positive), we started antibiotic treatment even in absence of leucocytosis or increased C-reactive protein. The pain persisted and a lumbar magnetic resonance imaging (MRI) 2 weeks post-surgery failed to

show signs of post-operative infection. Irrespective of absence of inflammatory proteins in the serum and/or leucocytosis and under antibiotic treatment, there was putrid wound excretion. Surgical wound debridement followed. Intraoperatively there was no dislocation of the screws. There were no signs of infection under the skin (i.e. epidural or lumbar bone). After wound-debridement there was still no improvement of pain (VAS 6/10). C-reactive protein was normal. Because of persistence of symptoms, another lumbar CT followed 7 weeks post-surgery. No signs of screw dislocation were seen, but at this time there was subcutaneous air identifiable (subcutaneous infection?). MRI and serum failed to show infection. In a second wound debridement, granulation tissue was removed epidurally. The whole time the patient received antibiotic treatment. After two wound revisions we performed an epicutaneous allergy test. A titan screw like the ones used for fixation in the patient's case was adhered for 48 h on the patient's upper arm. After 48 h the patient exhibited an allergic reaction of the type IV (allergic contact dermatitis) (Fig. 2). Steel and PEEK cage did not resemble allergic reactions on the patient's skin. In a third revision we changed the titanium screws with steel screws and a PEEK cage was placed in the intervertebral space L5/S1. Histopathologically, fat and muscle tissue from the wound showed lymphocytic inflammation and chronic inflammatory infiltrates.

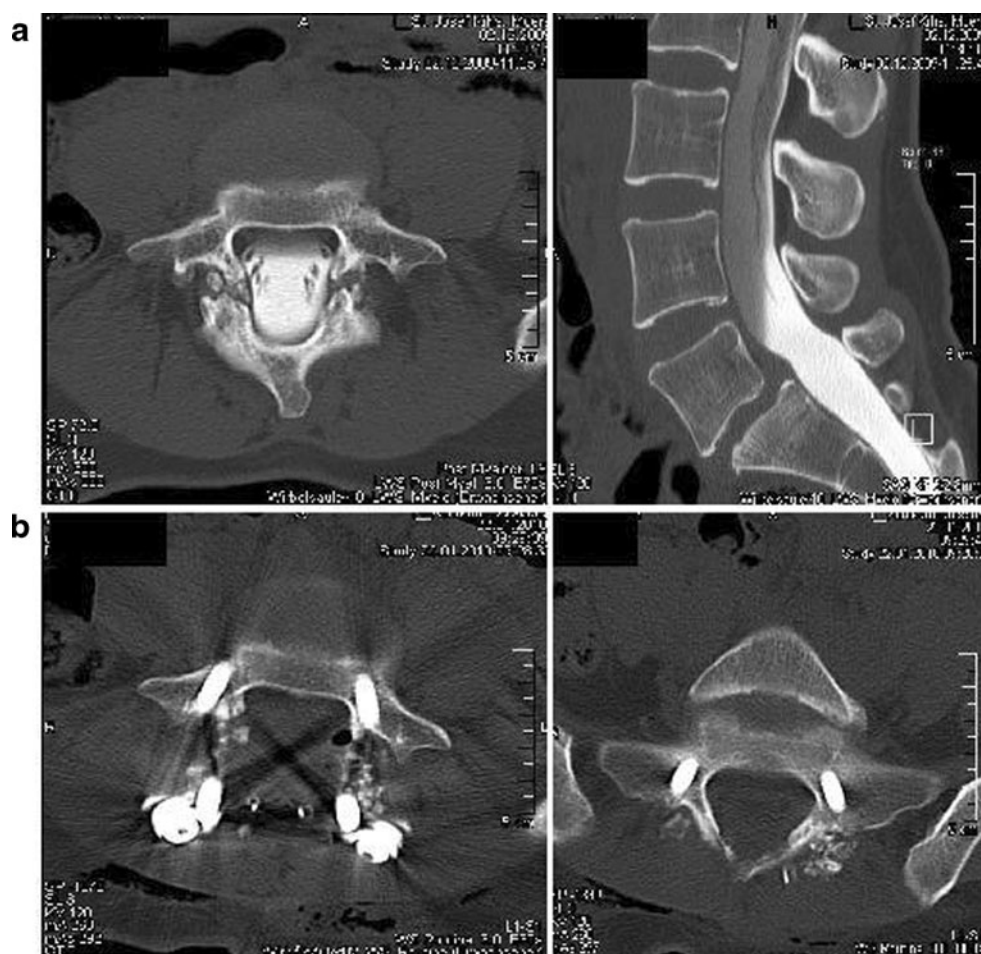
Immediately after the replacement of the titanium screws the patient showed an improvement of her symptoms (VAS 1/10), and could be discharged with minimal postoperative pain.

In the MELISA (Memory Lymphocyte Immunostimulation Assay) test and the lymphocyte transformation test, no

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Fig. 1 Spondylolisthesis with neuroforaminal compression. **a** Preoperative lumbar CT myelography. **b** Postoperative lumbar CT showing the fixed screws in L5 and S1



allergy against titanium or the alloys of the screws, aluminum or vanadium was diagnosed. The stimulation index for nickel though was 15-times higher than normal. Nickel was

contained in small amounts in the metal alloy. Even these small amount of nickel caused maximal symptoms to the patient's health, misleading us to the diagnosis of wound infection.

Since there are only few cases of titanium allergy, this diagnosis is often forgotten in differential diagnosis of wound inflammation after osteosynthesis. In one report there was an impairment of fracture healing and eczema localised in the perioperative area after titanium osteosynthesis, caused by titanium allergy [3]. In our case, the lymphocyte transformation test was negative for titanium but it should always be kept in mind that the fixation screws have different kinds of alloys, which can be a reason for contact dermatitis. According to a literature review, all forms of contact dermatitis due to metallic implants can occur [1]. The most frequent symptoms are eczemas, bullous dermatitis and different inflammatory reactions. Patients can become symptomatic even after several years; it is difficult to diagnose this kind of dermatitis since cutaneous lesions can be distant from the implant area and it is difficult to distinguish this dermatitis from



Fig. 2 Contact dermatitis to a fixation screw. After adhering a similar screw to the one used for the fixation, the patient showed a late allergic dermatitis

other inflammatory reactions or even from sepsis [1]. In an experimental study on guinea pigs sensitised to nickel and other fixation screw alloys, the animals showed signs of contact dermatitis, although the screws were fixed to the bone without any signs of dislocation and similar to our presented case, an absent bone reaction [2].

In the present case, we report a rare differential diagnosis of eczematous lesions in the wound area after internal screw fixation. A contact dermatitis caused by the metal implant material or one of the implant alloys can mimic a wound infection and lead to wound debridement without any improvement of the patient's condition. The only treatment in such cases is implant removal.

Conflicts of interest None.

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