

A case of nickel allergy after endovascular aortic repair

Yohei Kawatani, Hirotsugu Kurobe, Yoshitsugu Nakamura and Takaki Hori

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Abstract

A 78-year-old man with no history of allergy, underwent endovascular aortic repair for abdominal aortic aneurysm rupture. Postoperatively, he had low-grade fever and persistently raised white blood cell counts, but tests showed no infection. A skin rash appeared on the trunk and upper arms; we suspected a drug allergy. Despite withdrawal and/or change of medications, the symptoms remained. Finally, a patch test for nickel showed a strongly positive result. Oral prednisone 5 mg·day⁻¹ was started, and the clinical findings resolved thereafter. No recurrence of allergy, infection, or exacerbation of the treated abdominal aortic aneurysm was noted at the 2-year follow-up.

Keywords

Aortic aneurysm abdominal, Blood vessel prosthesis, Dermatitis, allergic contact, Endovascular procedures, Nickel

Introduction

Endovascular therapy has become a standard treatment for vascular disease. The shape-memory alloy used in endovascular devices is nitinol which is an alloy of nickel and titanium.¹ Nickel is a common material that can cause contact allergy.² There are only a few reports of nickel allergy after endovascular aortic repair.

Case report

A 78-year-old man with no history of chronic occupational exposure to metal, an allergy to any material, or atopic dermatitis was transported to our emergency room with abdominal pain and low blood pressure. He was diagnosed with a ruptured abdominal aortic aneurysm (diameter 61 mm; Figure 1). Endovascular aortic repair with stent-grafts was performed successfully (Endurant II bifurcated device 23 × 13 × 166-mm, Endurant limbs 16 × 13 × 124-mm, 16 × 20 × 93-mm, and 16 × 20 × 82-mm; Medtronic, Santa Rosa, CA, USA). After the operation, the patient had prolonged fever (Figure 2). We initially suspected infection and administered antibiotics (piperacillin-tazobactam 4.5 mg·day⁻¹). However, contrast-enhanced computed tomography, blood culture, culture of sputum, cerebrospinal fluid examination and culture, and ⁶⁷Ga-citrate

scintigraphy showed no evidence of infection (Figure 3). Three weeks after the operation, the patient presented with an itchy eczematous skin rash on the trunk and both upper arms, which did not resolve with topical antihistamine treatment. We suspected a drug allergy and stopped administering or changed all drugs, but the skin rash persisted. Finally, we suspected nickel allergy because nickel is a common allergen and it is used in endovascular devices. We performed a skin patch test for nickel sulfate, and the result was strongly positive (Figure 4). The patient was started on oral prednisone 5 mg·day⁻¹ on postoperative day 79, and both the itchy skin rash and low-grade fever resolved thereafter. At the 2-year follow-up, he remained well. No recurrence of the skin rash or sign of infection was observed. The abdominal aortic aneurysm where the stent-graft had been placed did not show any increase in diameter.

Department of Cardiovascular Surgery, Chiba-Nishi General Hospital, Matsudo, Japan

Corresponding author:

Takaki Hori, Department of Cardiovascular Surgery, Chiba-Nishi General Hospital, 107-1 Kanegasaku Matsudo-Shi, 2702251 Chiba-Ken, Japan.
Email: hori@tokushima-cvs.info

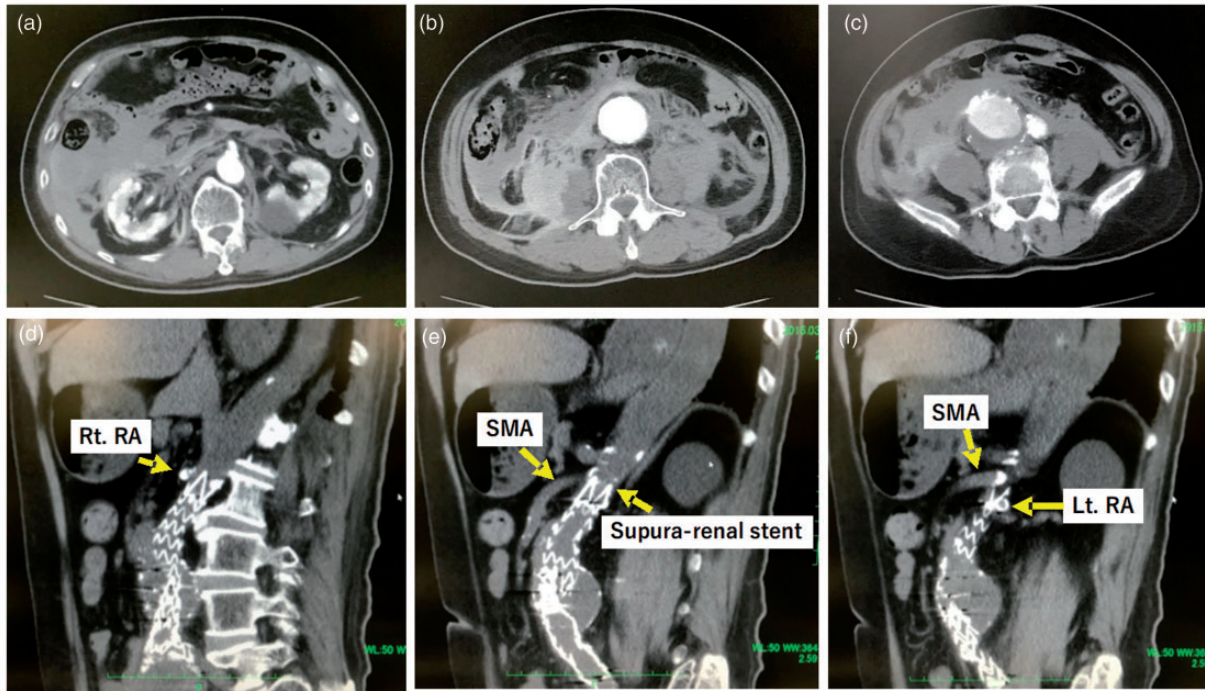


Figure 1. (a–c) Enhanced computed tomography axial images. We observed extravasation in the retroperitoneal space. Our diagnosis was abdominal aortic aneurysm rupture (diameter 61 mm). (d–f) Postoperative nonenhanced computed tomography sagittal images. The suprarenal stent was placed higher than the bilateral renal arteries (RA), and as high as the superior mesenteric artery (SMA).

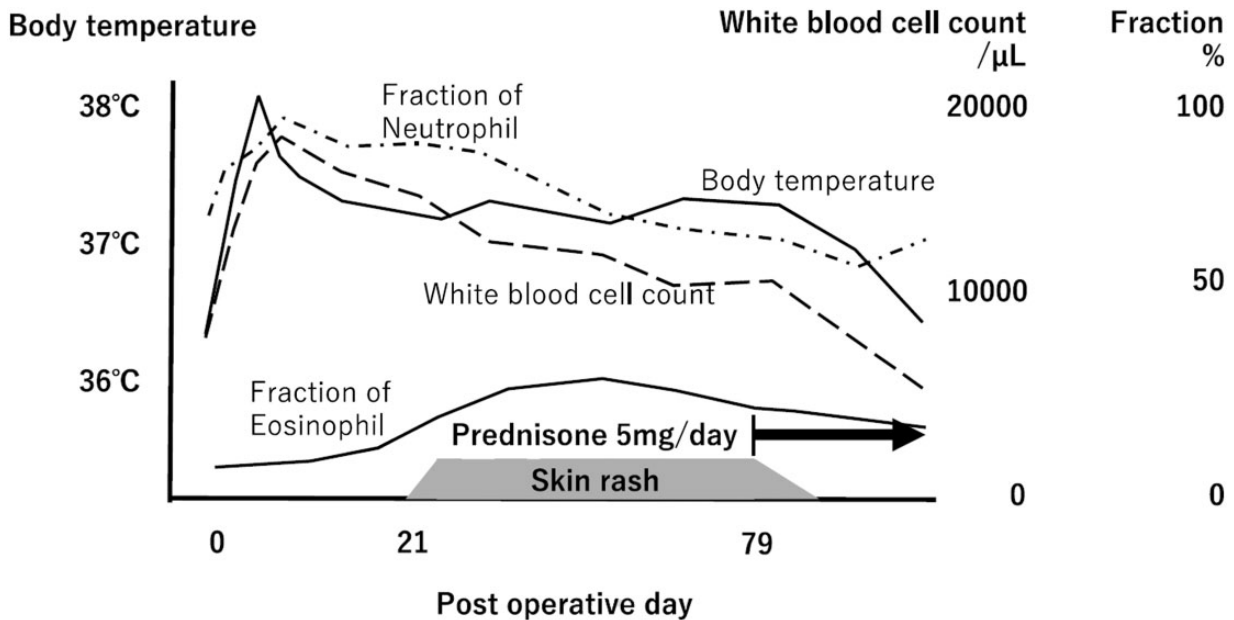


Figure 2. Low-grade fever persisted postoperatively. A skin rash appeared on postoperative day 21. At almost the same time, the eosinophil fraction increased to 16.9% from only 2.3% immediately after the operation. After oral prednisone treatment, the skin rash soon resolved. The fever and increased white blood cell count also resolved.

Discussion

The cause of an allergy is difficult to detect. The final diagnosis of nickel contact allergy with a systemic

reaction was based on the clinical features, nickel implant, patch test result, and absence of recurrence after the treatment.³ Not only the device used in this

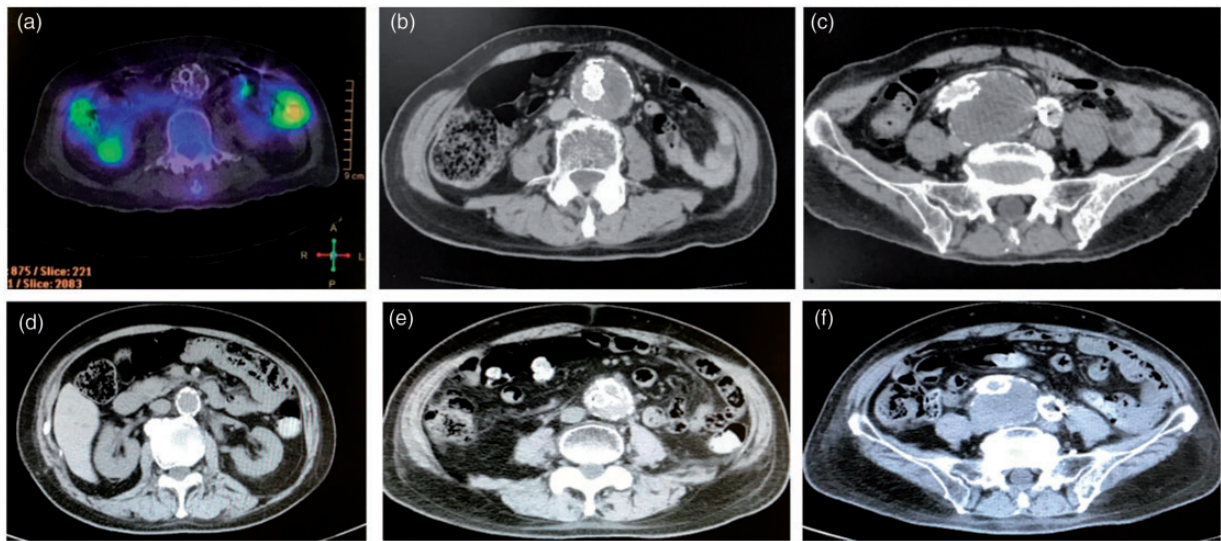


Figure 3. (a) No high signal was observed on scintigraphy, except in the intestine, which was assumed to be physiological accumulation. (b, c). Contrast-enhanced computed tomography axial image on postoperative day 31. There was no sign of infection or endoleak, and the post-peritoneal hematoma had disappeared. (d–f) Contrast-enhanced computed tomography axial image 2 years after the operation.

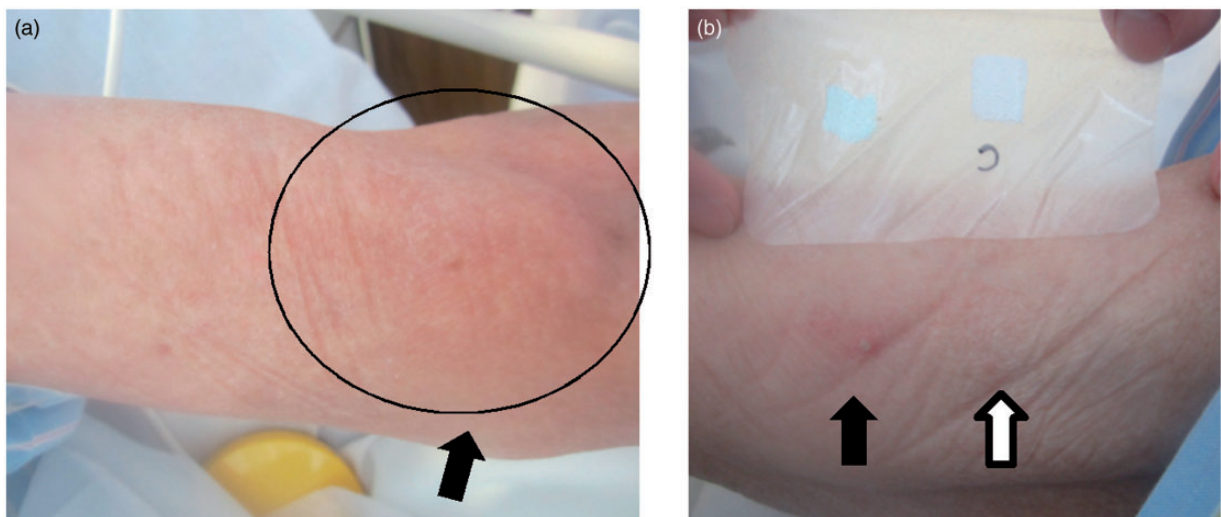


Figure 4. (a) Skin rash on the right upper arm (black arrow). A similar skin lesion was also observed on the left arm and the trunk. (b) The result of the skin patch test for nickel. Epicutaneous patch testing was strongly positive for nickel, showing red, itchy, edematous, bullous skin. White arrow: control (patch with saline); black arrow: nickel-exposed skin (patch with nickel sulfate).

case but also almost all other endovascular stents, manufactured by many companies, contain nickel. Therefore, with the increasing use of endovascular treatment, we have to be aware of the possibility of nickel allergy. There are some reports of a contact allergy to nickel after percutaneous coronary intervention, showing a possible relationship between intrastent restenosis and nickel allergy.⁴ However, the diameter of a stent-graft for treatment of aortic disease is larger, so the risk of stenosis is assumed to be low. Notably, in endovascular aortic repair, the device is placed in

vessels that are exposed to high blood pressure and flow. In addition, inflammation can occur at the site where a nickel-based stent is placed. Lai and colleagues⁵ reported a case of pericarditis resulting from local inflammation after placement of a nickel-containing device for closure of an atrial septal defect. The reaction possibly weakened the aortic wall, which exacerbated the aneurysm.

The gold-standard treatment for contact allergy is removal of the causative material. Guerra and Kirkwood⁶ reported that nickel contact allergy led to

severe generalized dermatitis after stent placement in the superficial femoral artery, but the symptoms resolved after removal of the stent. However, we could not simply remove the device from our patient because it was used to treat a ruptured aorta, and it involved replacement of the ruptured aorta with a thoracoabdominal aortic clamp because the stent-graft has a suprarenal stent. Considering the invasiveness of the operation, the severity of the patient's background disease, and his advanced age, we chose medical therapy with close observation. Giménez-Arnau and colleagues⁷ reported a case of nickel allergy after placement of a self-made stent-graft; they treated the patient without device removal. In our case, after the failure of topical antihistamine to resolve the symptoms, we administered oral prednisone, which was effective. There is no consensus regarding systemic steroid therapy dosage and duration. In occupational metal allergy, after resolution of symptoms, the steroid dose is decreased after 1 or 2 weeks if there is no symptom recurrence. However, in our case, despite the disappearance of symptoms, the occurrence of local inflammation on the part of the aorta in contact with the device was a concern; hence we continued the steroid therapy through the two-year follow-up period.

Declaration of conflicting interests

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