

# Long-term follow-up of vasculitis with metal allergy after cerebrovascular coil embolization

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## Abstract

Interventional treatment using catheters, particularly coil embolization, is a common therapy for cerebral aneurysms. While generally safe, complications such as allergic vasculitis due to metal allergies can occur. We report the case of a 57-year-old Japanese woman who developed vasculitis after undergoing coil embolization for a cerebral aneurysm. Two days post-procedure, she presented with left-sided facial paralysis, paresis, and hearing loss. MRI revealed multiple small lesions, and vasculitis due to metal allergy was suspected. Treatment with steroids led to improvement, and steroid therapy was tapered off within a year. Allergy tests performed post-treatment identified a positive reaction to the GDC coil and potassium dichromate but not to nickel or platinum. Unfortunately, recurrent vasculitis lesions were detected following the patch test. This case highlights the importance of considering metal allergies before coil embolization and the potential risks of allergy testing after the procedure.

**Keywords:** allergy; radiology; neurology; catheter

## Introduction

Interventional treatment using catheters is a standard therapy for aneurysms and stenoses of blood vessels in various parts of the body. Among these, cerebral aneurysms are a condition where the blood vessels within the brain swell and form an aneurysm, which, if ruptured, can lead to fatal hemorrhage. Treatment typically involves either surgical clipping or endovascular coiling, with the latter being widely used for aneurysms located in anatomically challenging areas. In interventional treatment, coil embolization involves inserting a metal coil into the aneurysm to induce thrombosis, thereby preventing rupture. While generally considered safe, complications such as allergic vasculitis caused by nickel allergy have been reported [1, 2]. Allergic vasculitis is an inflammatory condition of the blood vessels triggered by an excessive immune response to an allergen. Although rare, allergic vasculitis can lead to neurological deficits, skin lesions, and systemic symptoms.

We report our experience with the very interesting case that caused an allergy to metal after the catheterization.

## Case report

A 57-year-old Japanese woman came to our neurosurgery hospital. She had a cerebral aneurysm of 8 mm in C4 of the left carotid knee, and was treated by coil embolization. Two days later, she returned to the hospital with left facial paralysis. She also experienced paresis and numbness in the left half of the body, as well

as left hearing loss. The left curtain sign was positive. Multiple small nodular lesions of high signal intensity on T2-weighted images were revealed by magnetic resonance imaging (MRI) in the peripheral portion of the artery with coil (Fig. 1). Vasculitis with metal allergy was strongly suspected, which was treated with prednisolone administered at 60 mg/day. The patient's paralysis improved, although slight paralysis continued to be observed after treatment. Without recurrence of the vasculitis, the steroid dose was slowly tapered off, and, by approximately one year, treatment was discontinued. The lesions were improved on MRI scans.

After steroid discontinuation, we performed various allergy tests on the patient. Three kinds of coil (GDC coil: Boston Scientific Corp., CASHIMERE Complex coil: micrus Corp., ED coil: TRANVAS Corp.) were used for the embolization, which consisted mainly of platinum and tungsten, with other unknown component metals. Thus, a patch test for the three coils and a lymphocyte transformation test (LTT) for the contrast medium were performed. The results were interpreted by three dermatologists using International Contact Dermatitis Research Group criteria [3]. Only potassium dichromate was positive, whereas 17 other metals, including platinum and Nickel, were negative. Only the GDC coil (Boston Scientific Corp., No. 3461030-SR) was positive by the patch test. The contrast medium was negative by LTT. After this patch test, recurrence vasculitis lesions were detected in the peripheral artery out of the coil by MRI (Fig. 2). She didn't have any symptom by vasculitis with metal allergy of her cerebellum for the next ten years.

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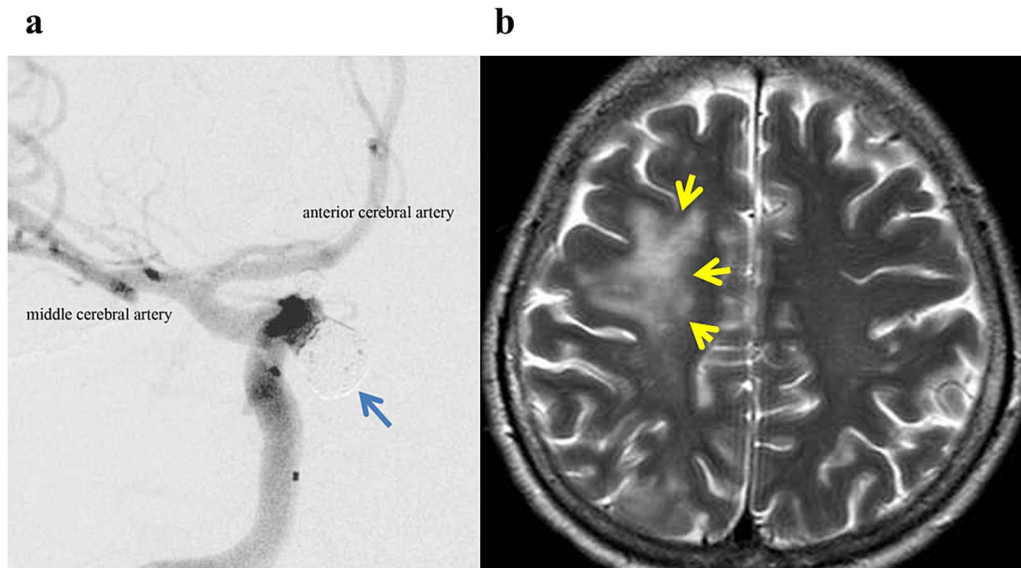


Figure 1. **Vasculitis with metal allergy after cerebrovascular coil embolization.** (a) Vascular contrast image of the right internal carotid artery. A cerebral aneurysm of 8 mm was evident in C4 of the left carotid knee (↑). The cerebral aneurysm was treated by coil embolization. (b) T2 weighted magnetic resonance image shows multiple small nodular high intensity lesions (↑) were seen at the peripheral portion of the artery with the coil.

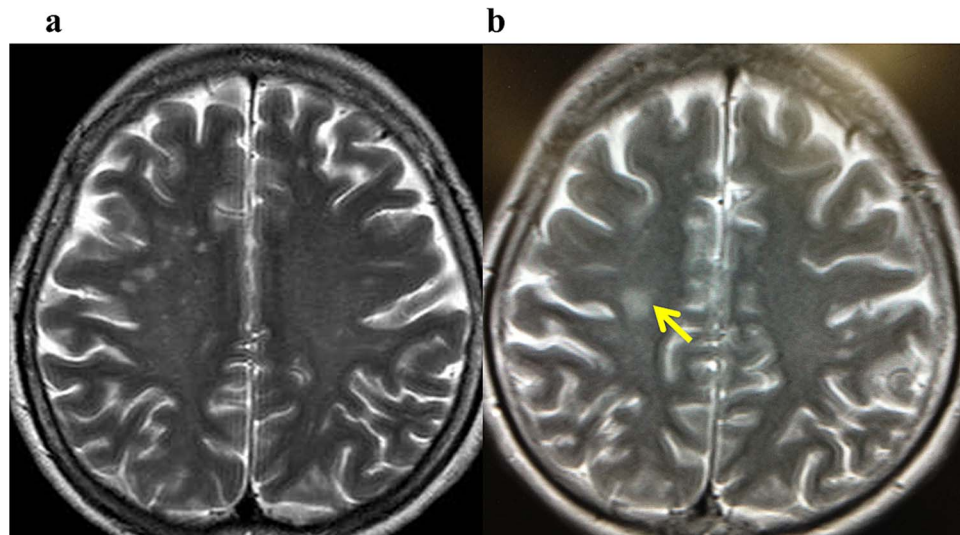


Figure 2. **Recurrence vasculitis with metal allergy after the patch test.** (a) T2 weighted magnetic resonance image after treatment with steroid before the patch test. (b) T2 weighted magnetic resonance image shows small nodular high intensity lesions (↑) as recurrence vasculitis with metal allergy after the patch test.

## Discussion

Coil embolization involves the insertion of a metal coil into a cerebral aneurysm. This treatment has recently become popular for various types of aneurysm [4]. It is thus necessary for physicians to be aware of complications such as those described in the present case. Generally, it is difficult to prove that the cause of vasculitis is an allergy to the coil. The report of Ulus et al. showed that an allergy for nickel was suspected [5]. Wertman et al. argue that adverse events associated with Nickel allergy in patients undergoing percutaneous atrial septal defect or patent foramen ovale closure [6]. However, there was not allergy for nickel in this patient. Furthermore, it is difficult to resect the coil when such an allergy has occurred. High dose steroids are necessary for the treatment of vasculitis with metal allergy.

The present patient had been working with stained leather for more than 20 years. Because metal complex dye is used for the

staining of leather, she may have been exposed to metal causing allergy for many years. Therefore, confirmation of the presence or absence of an allergy to metal prior to coil embolization may prevent the occurrence of similar cases. Coil embolization should be performed with caution in patients with a possible allergy to metal. After the discontinuation of steroid therapy, allergy to the coil was proved by a patch test in the present patient. Unfortunately, new vasculitis lesions in cerebrovascular developed after the patch test. We must therefore consider the risk of vasculitis being induced anew by an allergy test, especially after the cessation of steroid treatment.

The metal coil used for coil embolization may induce vasculitis. When performing metal coil embolization in patients with an allergy to the coil, serious sequelae may occur. Therefore, we recommend allergic testing for the metal prior to the procedure in patients highly suspected to have the allergy. However, the

reaction in response to the metal allergy test may exacerbate vasculitis when allergy to a coil has already occurred. Therefore, we do not recommend the test in patients with prior coil embolization.

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## Conflict of interest

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## Ethical Approval

No ethical approval is required for case report in our institution.

## Consent

Informed consent for publication of their details was obtained from the patient.

## Guarantor

Seido Ooka is the guarantor of this case report and takes responsibility for the integrity and accuracy of the data presented.

## Contributors

Yukiko Takakuwa contributed to manuscript writing.

Seido Ooka gave initial treatment and determined the treatment strategy.

Nobuyuki Endo did hospitalized management of this patient and determined the treatment strategy in the hospitalization.

Kimito Kawahata did management of this patient and determined the treatment strategy in entire duration.

Hisao Nakamura summarized an evaluation and the standardization of all images as a radiologist.

Tatsuro Okano and Tomomitsu Miyagaki summarized an evaluation and the standardization of all allergy test as a dermatologist.

Takafumi Kadono made direction about the allergy test of all periods.

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