



Case illustrated

Post-vaccination subcutaneous aluminum granuloma

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ABSTRACT

Vaccination is a successful and cost-effective public health intervention. Aluminum-containing adjuvants are used worldwide to improve the immune response of vaccines. Side effects of aluminum-containing adjuvants in skin and subcutis are usually accompanied by persistent itch, and it may be challenging to diagnose asymptomatic cases. Here we present a case of a 1-year-old girl with asymptomatic subcutaneous nodules. Magnetic resonance imaging (MRI) revealed subcutaneous lesions: 16 mm on the upper right and 4 mm on the upper left arms. Histological examination revealed a granulomatous reaction with lymphoid follicle-like structures in the subcutis, accompanied by a considerable number of macrophages with PAS-positive granular cytoplasm. Moreover, the granules stained positive with aluminon staining, which revealed the existence of aluminum. These findings indicate post-vaccination aluminum granuloma. Due to the benign nature of aluminum granuloma and the benefit of routine vaccination, we decided to recommend that the patient continue taking the routine vaccination.

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A 1-year-old girl presented to the dermatology clinic for an asymptomatic subcutaneous nodule on the right upper arm, which her parents recognized incidentally. On examination, the skin surface showed only slight eczema (Fig. 1A); however, ultrasonography revealed a hyperechoic lesion in the subcutis without clear demarcation from the surrounding fatty tissue. Magnetic resonance imaging (MRI) showed a 16 mm subcutaneous lesions on the upper right arm, and coincidentally revealed another 4 mm subcutaneous lesion on the upper left arm (Fig. 1B). Both nodules showed low signal intensity on T1- and T2-weighted images and high signal intensity on fat-suppressing short TI inversion recovery (STIR) sequence images. The MRI findings were consistent with multiple subcutaneous granulomas, but malignancies such as Langerhans cell histiocytosis were also suspected.

The nodule on the upper right arm was resected for histological examination. Hematoxylin-eosin staining (Fig. 2A) revealed a granulomatous reaction with lymphoid follicle-like structures and mixed inflammatory cell infiltration in the subcutis, accompanied by a considerable number of macrophages with PAS-positive granular cytoplasm (Fig. 2B). Moreover, the PAS-positive granules

stained positive with aluminon staining [1], which revealed the existence of aluminum (Fig. 2C). These findings indicate post-vaccination subcutaneous aluminum granuloma. Continuing or restricting further vaccination is still controversial because there is no large population study investigating additional granuloma risk following further vaccination [2,3]. Due to the benign nature of aluminum granuloma and the benefit of routine vaccination, we decided to recommend that the patient continue taking routine vaccination [3,4].

Vaccination is a successful and cost-effective public health intervention. Aluminum-containing adjuvants are used worldwide in many vaccines, including vaccinations for diphtheria, tetanus, pertussis, invasive pneumococcus disease, human papillomavirus, and hepatitis B virus [4,5]. Side effects of aluminum-containing adjuvants are usually accompanied by persistent itch, and it may be challenging to diagnose asymptomatic cases. The incidence of post-vaccination aluminum granuloma is unknown but may be considerably underdiagnosed [2,3]. Until another adjuvant replaces the aluminum's role, physicians should be aware of this benign complication to be confident in patients' care.

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Fig. 1. Subcutaneous aluminum granuloma.

A. Right upper arm with slight eczema.

B. MRI shows high signal intensity subcutaneous lesions on the fat-suppressing STIR sequence image on both upper arms (arrows).

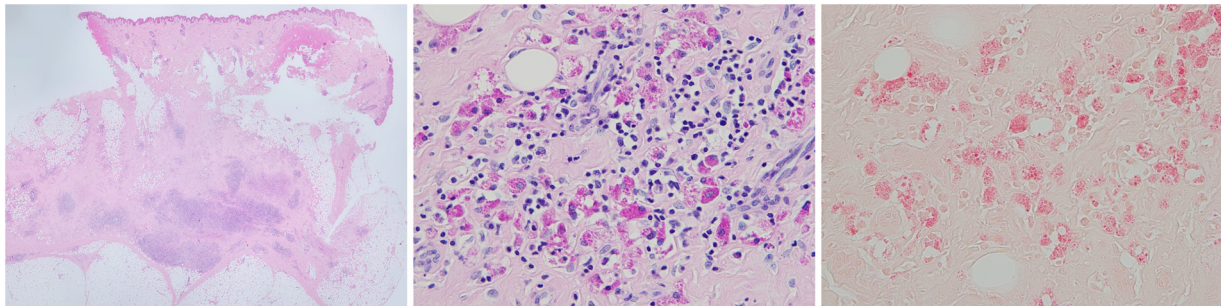


Fig. 2. Histological findings of aluminum granuloma.

A. Hematoxylin-eosin staining shows a granulomatous reaction with follicle-like structures in the subcutis (low magnification).

B. Considerable number of macrophages with PAS-positive granular cytoplasm (high magnification).

C. Aluminon staining shows the existence of aluminum (high magnification).

Authors' contributions

Hideaki Miyachi wrote the original manuscript. Both authors were involved in the care of the patient and commented on the manuscript during the drafting process.

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Declaration of Competing Interest

The authors have no conflict of interest to disclose.

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