

CONTACT POINT

Aluminium Sensitization After Vaccination: Report of Three Adult Cases

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Post-vaccination aluminium granulomas at vaccine injection sites are relatively common in children receiving aluminium-adjuvanted vaccines. However, such cases remain rarely documented in adults. We report three cases of post-vaccination aluminium sensitization in adult patients.

1 | Case Reports

1.1 | Case 1

A 25-year-old woman with atopic dermatitis presented with pruritic, infiltrated, pigmented plaques on the proximal outer aspects of both arms (Figure 1A) and buttocks (Figure 1B). The eruption appeared several months after multiple vaccinations, including Engerix in the arms and Boostrix and Harix in the buttocks. She also reported axillary rashes after using certain deodorants. Patch testing with the European baseline series, antiseptics series, and aluminium chloride hexahydrate 2% in petrolatum (pet.) (Chemotechnique Diagnostics, Vellinge, Sweden) was performed. After 2-day (D) occlusion, readings on D2 and D3/D4 followed ESCD guidelines. Only aluminium chloride hexahydrate was positive (++ on D4) (Figure 1C). Following several weeks of treatment with mometasone furoate 0.1% cream without significant clinical improvement, betamethasone dipropionate 0.05% cream was prescribed.

1.2 | Case 2

A 19-year-old woman with atopic dermatitis developed persistent pruritic lesions on both shoulders (Figure 1D) after multiple aluminium-containing vaccines (Gardasil 9, Bexsero, DTP). She reported pruritus 1–2 days after several vaccines and, a few months later, indurated pruritic subcutaneous nodules at injection sites with localized hyperpigmentation. She also reported pruritus with certain aluminium-containing deodorants, but none with aluminium-free products. Patch testing with aluminium chloride hexahydrate 2% pet. was performed using the same procedure as in Patient 1 and showed a positive reaction (+ on D4). Because of her persistent pruritus impairing her quality of life, two intralesional injections of triamcinolone acetonide were performed with improvement.

1.3 | Case 3

A 25-year-old woman without atopic history presented with pruritic, hyperpigmented subcutaneous nodules on both arms, preceded by an erythematous phase (Figure 1E). Lesions corresponded to previous hepatitis B vaccination sites. Patch testing with aluminium chloride hexahydrate 2% pet. was negative, whereas a second test with aluminium hydroxide 10% pet. was positive (+ on D3). After several weeks of topical corticosteroid therapy without clinically meaningful improvement, gabapentin

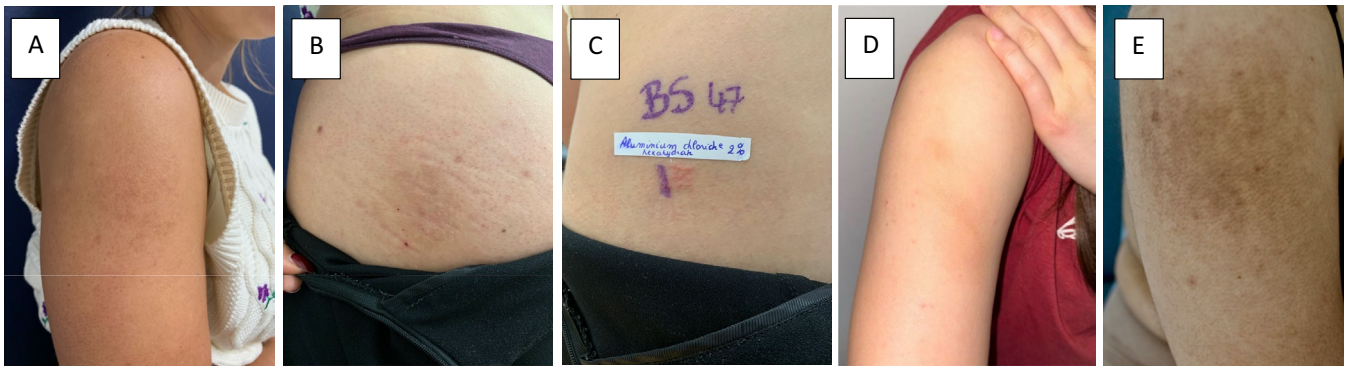


FIGURE 1 | Pruritic, infiltrated, pigmented macular plaques on the right arm (A) and the buttocks in Patient 1 (B). Positive reaction on D4 to aluminium chloride hexahydrate 2% in petrolatum in Patient 1 (C). Indurated, pruritic subcutaneous nodules at injection sites on the shoulders, associated with localized hyperpigmentation in Patient 2 (D). Pruritic, hyperpigmented subcutaneous nodular plaques on the right arm in Patient 3 (E).

was initiated at a dose of 200 mg/day. Since then, no additional clinical information has been available.

2 | Discussion

Aluminium salts (aluminium hydroxide, aluminium phosphate, potassium aluminium sulphate) are widely used as a vaccine adjuvant to potentiate the antigen-specific immune responses and demonstrate a well-established safety profile. However, aluminium sensitization may occur in a subset of individuals and cause cutaneous reactions. The most typical presentation consists of persistent, intensely pruritic subcutaneous nodules at injection sites, histologically corresponding to granulomatous inflammation. Reported sensitization rates vary from 5% to 26% in selected paediatric populations undergoing patch testing [1], whereas adult cases appear uncommon (<1%) [2]. Although the underlying mechanisms and clinical implications seem similar in both groups, this discrepancy likely reflects age-related exposure differences, as sensitization may decline over time with fewer vaccine injections.

Subcutaneous nodules develop weeks to months after exposure and may persist for prolonged periods before spontaneous resolution. However, in some cases, symptoms can be severe and difficult to manage, as illustrated by some of our patients.

In addition to nodular lesions, less common manifestations such as pseudo-cellulitic reactions, Wells syndrome-like eruptions or localized hypertrichosis have been reported [3, 4].

Diagnosis mainly relies on patch testing. Aluminium chloride hexahydrate is commonly recommended, although optimal concentrations remain debated (2% in children, up to 10% in adults if 2% is negative) [5, 6]. Our third case illustrates variability in test sensitivity depending on the aluminium salt used, with a negative reaction to aluminium chloride but a positive response to aluminium hydroxide. Complementary testing with aluminium hydroxide may therefore be useful in cases of strong clinical suspicion despite negative aluminium chloride hexahydrate results. Late readings should be performed 1 week after application to avoid missing 15%–20% of delayed reactions [5].

It is important to realize that aluminium sensitization is not a contraindication to subsequent vaccination [1, 7], and the risk of developing new pruritic nodules later in life appears low. Sensitized patients should nonetheless avoid aluminium-containing products such as deodorants, toothpaste, and sunscreens [1].

In conclusion, we report three adult cases of vaccine-related aluminium sensitization. Although more commonly described in paediatric populations, this condition also occurs in adults and may be underrecognized.

Author Contributions

Marie de Broqueville: writing – original draft. **Nadia Raison-Peyron:** writing – review and editing, conceptualization, investigation, supervision, methodology. **Florence Libon:** writing – review and editing, supervision. **Juliette Caron:** writing – review and editing, supervision. **Axel De Greef:** investigation, conceptualization, writing – review and editing. **Anne Herman:** writing – review and editing, conceptualization, investigation, methodology, supervision.

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Consent

Patients in this manuscript have given written informed consent to the publication of these case details.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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