

Arthus Reaction After DTaP-IPV Booster Vaccination Mimicking Cellulitis in a Four-Year-Old Girl: A Case Report

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Case Report

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Abstract

Introduction:

Arthus reaction is a rare type III hypersensitivity reaction most commonly associated with tetanus- and diphtheria-toxoid-containing vaccines.

Case Presentation:

We report a previously healthy 4-year-old girl who developed progressive erythema, swelling, and pain at the injection site approximately 12 hours after receiving a booster dose of the combined diphtheria, tetanus, acellular pertussis, and inactivated poliovirus vaccine (Tetraxim®, Sanofi Pasteur). She presented 48 hours after vaccination with an erythematous and edematous plaque measuring approximately 5 cm in diameter on the right upper arm. No fever, pruritus, malaise, or other systemic symptoms were present. No laboratory investigations or skin biopsy were performed, and the patient received no medical treatment. At follow-up on day 5, marked spontaneous regression of erythema and edema, decreased tenderness, and complete recovery of arm mobility were observed.

Conclusions

This case illustrates the characteristic presentation and self-limited course of vaccine-associated Arthus reaction and emphasizes the importance of distinguishing this uncommon reaction from bacterial cellulitis to avoid unnecessary antibiotic therapy.

Introduction

Arthus reaction is a rare type III hypersensitivity reaction characterized by localized immune complex-mediated vasculitis following re-exposure to an antigen in a previously sensitized individual [1]. It has most commonly been described after administration of tetanus and diphtheria toxoid containing vaccines and typically presents with pain, swelling, erythema, and induration at the injection site [1, 2]. Clinical manifestations usually develop within hours of vaccination, peak within 12–36 hours, and resolve spontaneously over the following days [2].

Herein, we report a four-year-old girl diagnosed with Arthus reaction following a booster dose of the combined diphtheria, tetanus, acellular pertussis, and inactivated poliovirus vaccine (Tetraxim®, Sanofi Pasteur).

Case Presentation

A previously healthy four-year-old girl received a booster dose of Tetraxim intramuscularly in the right deltoid region as part of the national immunization schedule. Approximately 12 hours after vaccination,

she developed progressive erythema, swelling, and pain at the injection site. She presented to our clinic 48 hours after vaccination. The exact dates of previous vaccine doses were not available. There was no fever, pruritus, malaise, or any other systemic symptom. Dermatological examination revealed an erythematous plaque measuring approximately 5 cm in diameter on the right upper arm, accompanied by surrounding edema (Fig. 1a). The lesion was tender on palpation, and arm movements were partially restricted because of pain. Given the absence of systemic findings and the characteristic clinical presentation, no laboratory investigations or skin biopsy were performed. The patient did not receive antibiotics, antihistamines, corticosteroids, analgesics, or any other medical treatment. The patient was managed conservatively with clinical observation alone. At follow-up on day 5, marked spontaneous improvement was observed. Physical examination showed substantial regression of erythema and edema, decreased tenderness, and complete recovery of arm mobility (Fig. 1b). No ulceration, tissue necrosis, secondary infection, or other complications developed during follow-up.

Conclusions

Arthus reaction is a localized immune complex-mediated inflammatory response that occurs in the presence of pre-existing circulating IgG antibodies directed against vaccine antigens [1, 3]. Antigen–antibody complex formation activates the complement cascade, resulting in vascular inflammation and localized tissue injury [3]. Clinically, the reaction is characterized by pain, swelling, induration, edema, and erythema, whereas systemic manifestations such as fever are rarely reported [2, 4]. In some cases, ulceration or tissue necrosis may occur [3]. Because of its rarity, no universally accepted diagnostic criteria for Arthus reaction currently exist, and diagnosis often relies on expert clinical judgment [4]. In our patient, the temporal relationship strongly supported the diagnosis. Symptom onset approximately 12 hours after booster vaccination is consistent with the typical timeframe reported for Arthus reactions associated with tetanus- and diphtheria-containing vaccines. Furthermore, the marked spontaneous improvement observed within a few days without any treatment is in keeping with the self-limited natural course of this reaction.

The most important differential diagnosis is bacterial cellulitis [5]. Cellulitis is a common infection of the skin and subcutaneous tissues caused predominantly by gram-positive organisms and is frequently associated with systemic signs of infection [6]. In contrast, Arthus reactions occur within hours after vaccination in previously sensitized individuals and may closely mimic cellulitis. Awareness of this entity is therefore essential to prevent misdiagnosis and unnecessary antibiotic treatment [4]. Vaccine-associated Arthus reaction remains an uncommon adverse event. In their systematic review, Peng et al. identified only 30 published cases, the majority of which occurred following booster immunizations. More than half of the reported cases involved children younger than six years of age. Tetanus-, hepatitis B-, and diphtheria-containing vaccines accounted for a substantial proportion of cases and were among the vaccines most frequently implicated in this reaction [3]. Nevertheless, more recent data suggest that Arthus reactions following tetanus toxoid-containing vaccines are exceedingly rare in contemporary practice, with only a small number of cases reported after Tdap vaccination [1].

In conclusion, this case illustrates the characteristic clinical presentation and self-limited course of an Arthus reaction following DTaP-IPV booster vaccination. Recognition of this uncommon vaccine-related adverse event may facilitate timely diagnosis, prevent misdiagnosis as bacterial cellulitis, and help avoid unnecessary antibiotic therapy.

Declarations

Conflicts of interest/Competing interests:

The author declares no competing interests.

Ethics approval:

Institutional ethical approval was waived due to the nature of a single case report.

Consent to participate:

Written informed consent was obtained from the patient's parent/legal guardian.

Written Consent for publication

Written informed consent for publication of the patient's clinical details and images was obtained from the patient's parent/legal guardian.

Large Language Model (LLM) use

AI-assisted language editing was used exclusively to improve grammar and readability of the manuscript. The author takes full responsibility for the scientific accuracy and originality of the content.

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Author Contribution

BG was responsible for the clinical evaluation and management of the patient, collection and interpretation of the clinical data, literature review, conception and drafting of the manuscript, critical revision of the manuscript, and approval of the final version.

Availability of data and material:

Not applicable.

Code availability:

Not applicable.

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Figures



A



B

Figure 1

a. Erythematous and edematous plaque measuring approximately 5 cm in diameter on the right upper arm, observed 48 hours after administration of a DTaP-IPV booster vaccine; **b.** marked spontaneous regression of erythema and swelling on day 5 without any medical treatment