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Research Letter7
5 Panniculitis Associated With the Diphtheria-Tetanus-Pertussis Vaccine8
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To the Editor,11
Q2 Adjuvants are commonly incorporated into licensed vaccines to
12 enhance the host immune response to their antigens. Aluminum salts,
13 first introduced as vaccine adjuvants in 1926, remain widely used.
14 Although generally safe, aluminum-containing adjuvants have been
15 rarely linked to complex local adverse reactions, presenting with diverse
16 clinical features and histologic patterns. These events are reported more
17 often after subcutaneous or intradermal administration than after deep
18 intramuscular injection.¹ We describe a rare case of panniculitis in a 5
19 year-old child that occurred 5 days after administering the diphtheria-
20 tetanus-pertussis (DTP) vaccine with an atypical extension.21
Case report22
A 5-year-old patient, with no past medical history, and up-to-date
23 immunizations per the national schedule presented to our department
24 with a newly developed erythematous subcutaneous nodule. The lesion
25 was located over the deltoid region at the site of the 2nd DTP booster
26 injection, extending posteriorly along the ipsilateral shoulder to the
27 upper back. Skin examination revealed the presence of an erythematous,
28 indurated, and infiltrated plaque on the lateral area of the left arm
29 with extension to the back (Fig. 1). Histologic examination revealed a
30 non-specific inflammatory infiltrate within the hypodermis, involving
31 both septa and lobules, consistent with a mixed panniculitis. The patient
32 was put on dexamethasone 2 mg twice a week. The course of the disease
33 was favorable with confirmed improvement 1 month into therapy and
34 complete resolution of the lesion 2 months into therapy with minimal
35 residual atrophy and pigmentary changes.36
Discussion37
DTP vaccine is one of the vaccines containing aluminum salts.² The
38 latter are known to work through depot formation at the injection site
39 leading to antigen persistence, and improved attraction of and uptake
40 by APCs (antigen-presenting cells) which increase the effectiveness of
41 vaccines by potentiating the immune response.² Side effects seem to be
42 due to the overactivation of immune responses leading to the processing
43 and release of pro-inflammatory type I cytokines, such as IL-1, TNF-
44 alpha, IFN- beta, IFN-gamma, IL-6, and IL-8.²

Fig. 1. Erythematous, indurated, and infiltrated plaque on the lateral area of the left arm with spread toward the back.

45
Several local reactions have been reported following DTP vaccine
46 such as local pain, pruritus, erythema, cysts, sterile abscess and sub-
47 cutaneous nodules.^{1,2} Although aluminum allergy has been proposed
48 by some authors, the exact cause of these cutaneous reactions to DPT
49 and other aluminum-containing vaccines remains unclear. Intramuscular
50 injections are less likely to cause this type of reaction vs subcutaneous
51 injections.¹ The interval between vaccination and the onset of cutaneous
52 signs ranges from several days to a few weeks after immunization.³ In
53 some cases, however, a much longer latency has been reported, extending
54 from months to even years.^{1,4} In a series of 14 cases on the different
55 histological aspects of post-vaccine nodules containing aluminum salts,
56 several variants were described namely panniculitis, pseudolymphoma,
57 necrotizing granuloma and lupus profondus-like.⁵ The typical histological
58 appearance found in all cases was the presence of histiocytes with
59 violaceous granular cytoplasm, as in our patient.60
The particularity of our case was the spread of the lesions toward
61 the back, at a distance from the injection site of the vaccine. We can

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62 probably explain this loco-regional extension of the inflammatory pro-
63 cess by the spread of proinflammatory cytokines through the lymphatic
64 or blood circulation.²

65 Since the benefits of these vaccines are far higher than the risks
66 involved, aluminum-containing vaccines continue to be used. Therefore,
67 to minimize the risk of these effects, deeper intramuscular injections are
68 more recommended.

69 Author contributions

70 All authors have read and confirm final version of the article.

71 Statement of ethics

72 The patient's consent was obtained for the pictures and eventual
73 publication.

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Conflicts of interest

The authors have no conflicts of interest to declare.

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