

Vaccination site reaction or bacterial cellulitis?

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QUESTION

A four-year-old boy was given his preschool booster dose of diphtheria, tetanus, pertussis and inactivated polio vaccine (DTaP/IPV) yesterday, and today, he has extensive redness and swelling at the injection site. Could this be bacterial cellulitis? Should I admit him for intravenous antibiotic therapy? Is another disease mechanism responsible?

ANSWER

This situation is not rare; the Immunization Monitoring Program ACTive surveillance network of Canadian paediatric centres has detected 16 admissions since 2002 for similar events, all among children four to five years of age receiving the preschool booster vaccination. Of note, two of the 12 Immunization Monitoring Program ACTive centres accounted for 88% of the case reports, implying that some paediatricians manage such cases more conservatively than others. All of the patients received antibiotics in hospital, but none had a positive blood or lesion culture.

Paediatricians are generally aware that the DTaP/IPV vaccine can cause large local inflammatory reactions, especially after the fifth (preschool) dose. Particularly large reactions invite confusion with bacterial cellulitis. Studies (1,2) of the preschool DTaP/IPV booster dose documented that 19.3% to 33% of children have a large local reaction (redness and/or swelling 50 mm in diameter or greater), and 1% to 2% have extensive limb swelling from shoulder to elbow. The inflammatory changes become evident a few hours after vaccination, peak 24 h to 48 h afterward and resolve within one week. Tenderness is usually greatest during the first few hours and subsides as the reaction enlarges. Limitation of motion is uncommon. Systemic symptoms are infrequent, including fever (1-4). Ultrasound studies by Marshall et al (5) suggested that reactions involved angioedema rather than inflammatory cellulitis. Exact pathogenesis is uncertain but cellular immunity to vaccine antigens may contribute (6). The frequency of large reactions can be reduced by using vaccines with reduced antigen content (not yet approved for routine use) (2).

Cellulitis caused by *Streptococcus pyogenes* can evolve rapidly, becoming extensive within 12 h to 24 h, whereas cellulitis caused by other organisms usually evolves over days (7). Diagnosis is based on the four cardinal signs of infection: erythema, pain, swelling and warmth, usually accompanied by systemic signs of fever and toxicity. It is important to note that vaccination rarely introduces bacteria into the tissues in the modern setting of single-dose vials and single-use injection supplies. We could not identify a single case report in the

literature since 1998 that described bacterial cellulitis as a complication of DTaP/IPV vaccination.

SUMMARY

Large inflammatory reactions are relatively common after preschool boosters, whereas injection-related bacterial cellulitis is vanishingly rare. By taking note of the minimal tenderness, fever and toxicity present with the former, paediatricians should be able to avoid unnecessary antibiotic treatment for the latter and reassure parents of the likelihood of spontaneous resolution over several days. However, to avoid missing an instance of bacterial cellulitis at an early stage, it would be prudent to ask parents to report any unexpected progression in fever, toxicity or lesional discomfort so that the situation can be reassessed.

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