A rare case of cellulitis after tetanus toxoid (TT) vaccination

Tala K. AlBassri¹, Saleh AlShaibi¹, Fahad Khan², Nazish Masud³,⁴

¹Medical Interns, College of Medicine, King Saud Bin Abdulaziz University for Health Sciences Riyadh, ²Department of Medicine, Khyber Teaching Hospital, Peshawar, Pakistan, ³Research Unit, College of Medicine, College of Medicine King Saud Bin Abdulaziz University for Health Sciences Riyadh, ⁴King Abdullah International Medical Research Center Riyadh, Riyadh, Saudi Arabia

ABSTRACT

Cellulitis is a bacterial infection of the deeper layers of the skin, namely, the dermis and the subcutaneous tissue. The most common organisms involved in causing cellulitis are group A β-hemolytic streptococci and Staphylococcus organisms. Rare causes include Pseudomonas aeruginosa in case of puncture wounds, anaerobes, Eikenella, Viridans streptococci in human bites. Cellulitis is mainly a clinical diagnosis but blood counts and ESR can be done to confirm its occurrence. Risk factors for cellulitis include breaks in the skin which allow an entry point for the bacteria, other risk factors include immune deficient states such as HIV/leukemia, conditions that affect the vascular system, and skin conditions such as eczema and psoriasis. Vaccination is an extremely rare cause of cellulitis with no cases of cellulitis reported since 1998 due to complication of vaccination. In our case, patients presented signs and symptoms of cellulitis 2 days after receiving the tetanus prophylaxis vaccine. He was treated with broad-spectrum antibiotics after admission and discharged once the condition settled.

Keywords: Case report, cellulitis, complication, TT, vaccination

Introduction

Bacterial cellulitis is defined as an infection of cutaneous and subcutaneous tissues. Gram-positive cocci such as Streptococcus and Staphylococcus aureus are the most prominent causes of cellulitis.[1] Serological studies suggest group A streptococcal infection as an important factor for culture-negative cellulitis.[3] Redness, swelling, and hotness are the hallmark of cellulitis with severity ranging from localized erythema to sepsis. Diagnosis is mainly clinical but blood counts and erythrocytes sedimentation rate (ESR) can be done for confirmation. Risk factors for cellulitis include breaks in the skin which allow bacteria at the entry point, other causes include immune deficient states such as HIV/leukemia, conditions that affect the vascular system and skin conditions. Several cases reported in the literature of cellulitis post-anesthesia, needle break, and fine-needle aspiration in thyroid patients.[3,⁴] In 1993, a study reported nine cases of children with pyogenic abscesses after tetanus toxoid (TT) and pertussis vaccine, where the main reason was needle contamination.[5] Even though the DTaP vaccine is known to cause large local inflammatory reactions there are no identified cases reported of bacterial cellulitis due to complication of vaccination since 1998.[⁶] Herein, we report a case of 9-year-old boy who developed cellulitis after prophylactic administration of TT vaccination.

Case History

A 9-year-old boy had open wound injury secondary to fall on a sharp object while playing. He had a 7 cm laceration on the...
upper lateral leg and another 5 × 3 cm wound on the lower lateral leg with no active bleeding. The wound was cleaned and sutured followed by TT given as prophylaxis in the left deltoid. However, 48 h later the patient returned to the hospital with a chief complaint of pain at the injection site and redness. The patient denied any history of scratching, insect bite, animal contact, or trauma to the injection site. Examination showed the patient’s left arm was warm to touch, and swollen measuring 7 × 5 cm approximately on the left upper arm [Image 1]. Blood and discharge were noticed when pressure was applied to the area. The skin at the site of injection had a raised induration. The nervous and vascular supply of the limb was intact. The patient was a known case of attention deficit hyperactivity disorder (ADHD) but not on any medications.

**Intervention and Management**

The patient was admitted for further diagnosis. Full blood count showed mild leukocytosis (14 × 10^3/μL) with high neutrophils count (10 × 10^3/μL). ESR was slightly high (17 mm/h). Ultrasound of the left arm showed soft tissue thickening measuring around 2.2 cm with no drainable abscess. Blood cultures were reported as negative. The patient was started on intravenous clindamycin 400 mg IV for 5 days with immediate improvement of pain and swelling. The antibiotics were switched to cephalexin oral suspicion 750 mg PO for 7 days as per recommendation. The patient was discharged after 5 days in good health.

**Discussion**

Cellulitis is the bacterial infection of the dermis and deeper layers of the skin. Cellulitis most commonly affects the lower limb but it can occur anywhere on the body if there is a break in the skin. Herein, we presented a case of a 9-year-old boy who developed cellulitis 2 days after administration of TT vaccine. While at times it is difficult to differentiate between bacterial cellulitis and immune response to vaccine administration at the injection site, bacterial cellulitis can be differentiated based on its onset after vaccine administration, systemic signs/symptoms, and response to antibiotics. Our case presented 2 days post vaccine administration with complaints pertaining to pain, redness, warmth, swelling and a raised induration around the site of injection. There was the aspiration of blood and discharge on the application of pressure. The signs and symptoms responded to antibiotic therapy which indicates that it was a bacterial infection rather than an immunological response to vaccine components. Some of the causes for the development of cellulitis, in this case, could be poor hygiene, scratching of the injection site, the poor technique of injection during vaccine administration, and the use of an alcohol swab exposed to air for too long. In our case lack of hygiene was identified as the most probable cause of development of bacterial cellulitis.

Among the routinely used vaccines in children, DTaP causes a large inflammatory reaction that can be sometimes confused with bacterial cellulitis. Studies found that booster doses of IPV/DTaP in preschool children caused a large reaction with redness greater than 50 mm in 19.3% to 33% of children who received the vaccine and rate of recipients developing extensive limb swelling was 1% to 2% with whole cell pertussis vaccine causing more reactions then acellular pertussis vaccine.[8] A study conducted in DuPont Hospital for children found Pneumococcal vaccine PS-23 to cause a local inflammatory reaction in 50% and a systemic reaction in 1% of children who received the vaccine with higher rates in those who had previously received a dose.[8] Among the vaccines not routinely administered to children Herpes Zoster vaccine-Zostavax was found to cause bacterial cellulitis in 0.7% to 1.2% of its recipients.[9]

In conclusion, cellulitis was observed in a 9-year-old child after TT vaccination at the injection site. The incidence of cellulitis in children caused by vaccination has decreased dramatically with few cases reported in recent times due to advancements in medicine and better techniques of vaccination and counseling of the parents on cleanliness and proper hygiene of the child.

**Implications for primary health care**

As vaccinations are done mostly at primary healthcare level, aseptic preparation of injection site and proper injection technique on part of vaccine administrators are crucial to avoid such cases. Although the efficacy of alcohol swabs is under debate, we still recommend using them.[10] Since, it is difficult to differentiate cellulitis from the immunological skin reaction caused by some vaccines, physicians should have it in their list of differentials when encountered with post vaccinations cases of skin reactions or rashes not to miss a diagnosis of cellulitis.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical findings to be reported in the journal. The patient understands that their names and initials will not be published.
Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

References
1. Sullivan T, de Barra E. Diagnosis and management of cellulitis. Clin Med (Lond, Engl) 2018;18:160-3.
2. Chambers HF. Cellulitis, by any other name. Clin Infect Dis 2013;56:1763-4.
3. Nicot R, Maes JM, Raoul G, Ferri J. [Head and neck cellulitis caused by a broken anesthesia needle]. Rev Stomatol Chir Maxillofac Chir Orale 2013;114:180-3.
4. Cesareo R, Naciu A, Barberi A, Pasqualini V, Pelle G, Manfrini S, et al. A rare and severe complication following thyroid fine needle aspiration: Retropharyngeal cellulitis. Int J Endocrinol Metab 2016;14:e39174.
5. Simon PA, Chen RT, Elliott JA, Schwartz B. Outbreak of pyogenic abscesses after diphtheria and tetanus toxoids and pertussis vaccination. Pediatr Infect Dis J 1993;12:368-71.
6. Lapphra K, Scheifele D. Vaccination site reaction or bacterial cellulitis? Paediatr Child Health 2009;14:245.
7. Halperin SA, Scheifele D, Mills E, Guasparini R, Humphreys G, Barreto L, et al. Nature, evolution, and appraisal of adverse events and antibody response associated with the fifth consecutive dose of a five-component acellular pertussis-based combination vaccine. Vaccine 2003;21:2298-306.
8. Yousef E, Mannan S. Systemic reaction to pneumococcal vaccine: How common in pediatrics? Allergy Asthma Proc 2008;29:397-9.
9. Vesikari T, Hardt R, Rümke H, Icardi G, Montero J, Thomas S, et al. Immunogenicity and safety of a live attenuated shingles (herpes zoster) vaccine (Zostavax®) in individuals aged ≥70 years: A randomized study of a single dose vs. two different two-dose schedules. Hum Vaccin Immunother 2013;9:858-64.
10. Wong H, Moss C, Moss SM, Shah V, Halperin SA, Ito S, et al. Effect of alcohol skin cleansing on vaccination-associated infections and local skin reactions: A randomized controlled trial. Hum Vaccin Immunother 2019;15:995-1002.