

CASE REPORT

Multiple Subcutaneous Abscesses Complicating *Staphylococcus aureus* Bacteremia associated with BCG Vaccination

Sang Hoon Chae¹, Do Hyun Kim¹, Ji Won Kim¹, Young Tong Kim², Joon Bum Kim³, Young Jin Choi⁴, Joon Soo Park¹

Departments of ¹Pediatrics, ²Radiology, ³Orthopedics, and ⁴Laboratory Medicine, Soonchunhyang University Cheonan Hospital, Soonchunhyang University College of Medicine, Cheonan, Korea

We report a case of 42-day-old girl with multiple abscesses in soft tissue sites and osteomyelitis caused by *Staphylococcus aureus* after an intradermal *Bacillus Calmette-Guerin* (BCG) vaccination. This may be an unusual complication of intradermal BCG vaccination.

Keywords: *Staphylococcus aureus*; Abscess; BCG vaccine; Intradermal injections

INTRODUCTION

Staphylococcus aureus (*S. aureus*) is one of the most common causes of pyogenic skin and/or soft tissue infections [1]. In bacterial infections, including staphylococcal infections, transient bacteremia are not rarely observed, in particular in febrile children with the infections, but occult severe infections such as sepsis, endocarditis, pneumonia, osteomyelitis, and disseminated multiple abscesses are uncommon in healthy children with bacteremia [2,3]. *S. aureus* bacteremia can be caused by various conditions including intramuscular injection. However, latter condition has been rarely described as a cause of staphylococcal abscesses and/or septicemia [4], and there are few case reports of bacteremia and subsequent multiple soft tissue abscesses that were originated from the intradermal injection site. We describe a case which had multiple subcutaneous abscesses on right anterior chest wall and osteomyelitis of left clavicle, caused by *S. aureus*, 1 week after an intradermal *Bacillus Calmette-Guerin* (BCG) vaccination.

CASE REPORT

A 42-day-old female admitted to the hospital with a one-day fever. She was born by Cesarean section at 38 weeks, weighing 3,200 grams. The patient had normal growth and development. One week

before admission, she had received an intradermal injection of BCG vaccine (BCG strain Danish-1331; Statens Serum Institute, Copenhagen, Denmark) to the left deltoid muscle at a public health center. Three days after the injection, she developed a fever and was administered antipyretics by a physician at a private clinic. Although the fever subsided 5 days after the vaccination, she showed grunting and anorexia. Six days after the vaccination, which was 1 day prior to admission, her left shoulder was swollen and the fever recurred. She was admitted to department of pediatrics via pediatric emergency center of Soonchunhyang University Cheonan Hospital.

Blood pressure on admission was 80/50 mm Hg, pulse rate 136/min, respiratory rate 48/min, and she was febrile with a temperature of 38.4°C. The patient had an acutely ill looking appearance and could not move her left shoulder or arm. The redness and swelling were not in the left deltoid at the BCG injection site but on the left supraclavicular area.

Blood test results were as follows: white blood cell count was 15,500/ μ L with 61% neutrophils and 24% lymphocytes, hemoglobin 8.9 g/dL, hematocrit 26.3%, thrombocytes 232,000/ μ L, erythrocyte sedimentation rate (ESR) 52 mm/hr, and C-reactive protein (CRP) 13.1 mg/dL (reference range, 0.01 to 0.3 mg/dL).

Empirical intravenous antibiotic therapy was initiated with cefotaxime and vancomycin. On day 3, the fever continued and a 3 × 3 cm sized mass had developed on the right anterior lateral chest

Correspondence to: Joon Soo Park
Department of Pediatrics, Soonchunhyang University Cheonan Hospital, Soonchunhyang University College of Medicine,
31 Suncheonhyang 6-gil, Dongnam-gu, Cheonan 330-930, Korea
Tel: +82-41-570-2163, Fax: +82-41-572-4996, E-mail: pjstable@schmc.ac.kr
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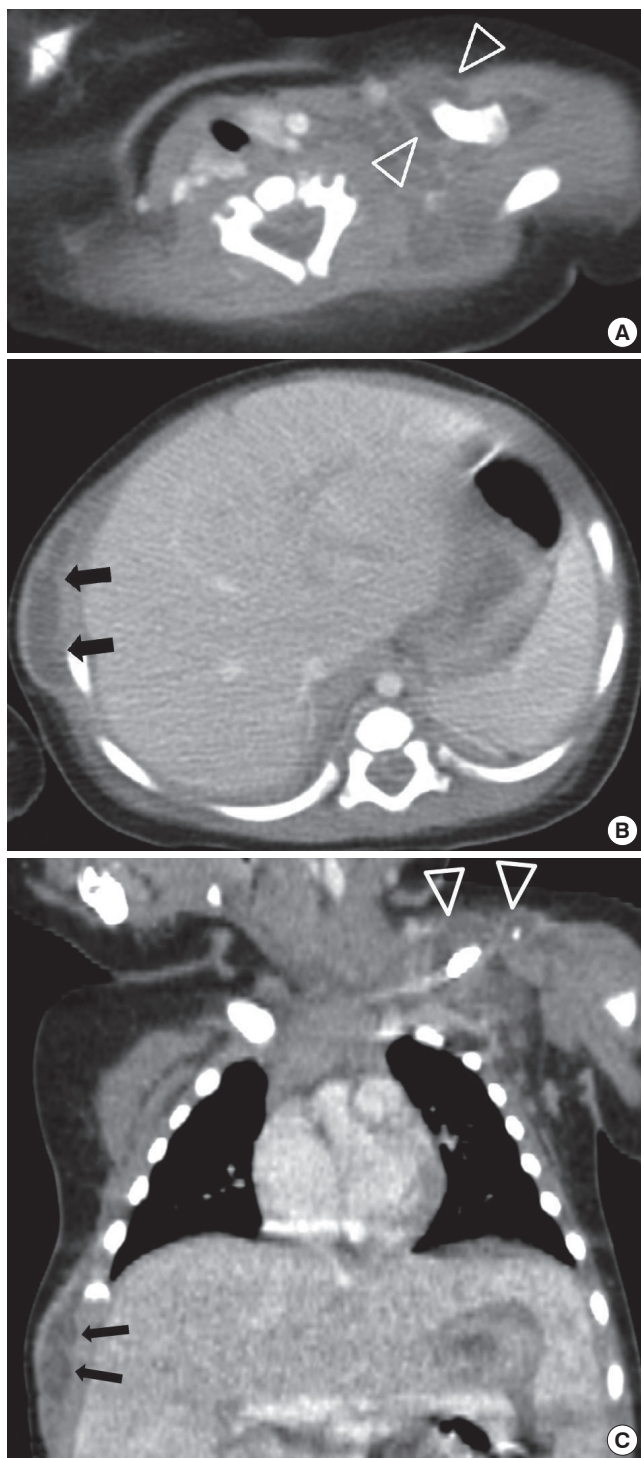


Fig. 1. Axial computed tomography scan shows multiple abscesses (open arrowheads and arrows) around the left clavicle (A and C) and right anterior chest wall (B and C).

wall. On day 5, sonogram and chest computed tomography (CT) scan showed multiple subcutaneous abscesses on the left supraclavicular area and right chest wall, respectively (Fig. 1A-C); thus, a

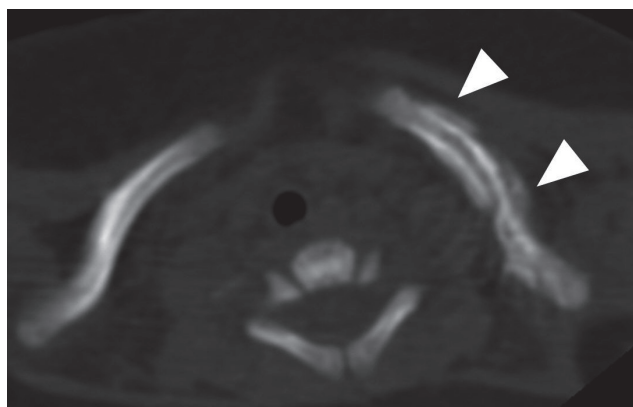


Fig. 2. Bone setting axial computed tomography scan 2 weeks after hospitalization shows periosteal reaction (arrowheads) surrounding the left clavicle suggesting osteomyelitis.

needle aspiration was performed at both sites. The chest CT also showed atelectatic changes on the posterior segment of the right upper lung and the superior segment of the right lower lung. All blood and abscess cultures yielded *S. aureus*. The strain was identified as methicillin-susceptible, so the previous antibiotics were substituted with intravenous nafcillin. On day 8, the fever subsided, and her left shoulder and arm began to move. On day 13, she could lift the arm above the shoulder. A follow-up chest CT on day 19 demonstrated a much improved abscess of the right anterior lateral chest wall as well as the subclavicular area, but the periosteal reaction and bony destruction of the left clavicle had developed (Fig. 2). We diagnosed the patient's case as multiple abscesses of the right upper anterior lateral chest wall, and left supraclavicular area including acute osteomyelitis of the left clavicle and pneumonia of the right lung.

A follow-up blood test on day 24 showed an improved inflammatory state: ESR 27 mm/hr, CRP 0.1 mg/dL, and a negative blood culture. She was discharged from the hospital on day 29. A follow-up simple X-ray at 4 months after discharge showed improved left clavicular bony destruction. A follow-up at 9 months after discharge, the patient was healthy and chest CT demonstrated an improved state of the destructive bony changes in the left clavicle and did not show the previous atelectatic changes in lungs and the abscess lesions at the left clavicular area and right anterior lateral chest wall.

DISCUSSION

Human mucous membranes and skin are effective barriers against external bacterial invasions. However, *S. aureus* can create local

abscesses if this shield is broken by injury. If bacteria proliferation overcomes local immune reaction such as phagocytosis, bacteria can spread throughout the body via lymphatic or blood vessels, manifesting severe complications cause by metastatic infections [2].

The clinical manifestations of our case such as multiple subcutaneous abscesses on the anterior chest walls and osteomyelitis in left clavicle might be associated with bacteremia, which was initiated from the site of intradermal BCG vaccination. Dommergues et al. [5] reported that among 2,435 children who received BCG vaccination, 2.5% of the patients developed a localized abscess, and about 30% of the abscesses occurred within 2 months following BCG vaccination. Although severe adverse reactions after the BCG vaccination are rare, among these reactions, osteomyelitis is most common (47.1%), followed by lymphadenitis or abscess formation (45.6%) [6].

The case of *S. aureus* multiple abscesses after intramuscular injections were reported [7], the subcutaneous injections such as insulin administration occasionally were reported to be causes an *S. aureus* abscess formation in diabetic patients [8]. Although intradermal injection is considered less-invasive, our case indicates that intradermal injection could also induce invasion of *S. aureus* on skin when the procedure of injection would be incorrect.

There are some limitations in this report. We did not study whether the skin flora and the pathologic *S. aureus* are molecular biologically same strain. Although the infant was recovered uneventfully during hospitalization and she remained healthy on follow-up, we did not performed immunological evaluations for chronic granulomatous disease and other immunodeficiencies [9].

In conclusion, our case showed that intradermal injections may

produce severe complications including bacteremia and abscesses. Therefore, maintenance of aseptic conditions is important for prevention of the risk of complications such as superficial or deep, localized or distant metastatic abscesses and osteomyelitis. Also, accurate diagnosis of BCG adverse reaction such as bacterial-origin abscesses can prevent needless anti-tuberculosis treatment.

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