Images in Clinical Tropical Medicine

Mycobacterial Arthritis at 19 Months after a Bacille Calmette–Guérin Vaccination

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A 20-month-old afebrile boy living in northern Taiwan presented with swelling of the right knee for 5 days. No other respiratory or gastrointestinal symptoms were associated. A bacille Calmette–Guérin (BCG) vaccination had been performed when he was 1 month of age. The X-ray showed no bony destruction, and the sonography revealed some fluid accumulation in the right suprapatellar pouch. Arthrocentesis was performed, and characteristically cream-colored pus was drained (Figure 1). The knee swelling persisted, and magnetic resonance imaging showed abscess formation in the right suprapatellar bursa (Figures 2 and 3). Furthermore, surgical debridement was performed, and histological examination revealed granulomatous inflammation with caseation necrosis. The pus culture yielded *Mycobacterium bovis*. The patient was immunocompetent and was administered with isoniazid and rifampicin. He recovered without complications.

Tuberculosis remains an important health threat and the live attenuated BCG vaccine was used to prevent childhood tuberculosis. In 2009, the annual incidence of tuberculosis in Taiwan was approximately 69 cases/100,000 persons, and the Tokyo-172 BCG vaccination was included in the national immunization program with a coverage rate of 97%.^{1,2} BCG-related arthritis and osteitis is a rare but severe complication.³ The lower extremities are most

FIGURE 2. The sagittal view of T2-weighted knee magnetic resonance imaging shows abscess formation in the right suprapatellar bursa (arrow). The anatomic structures are labeled—F = femur, H = hamstring muscles, P = patella, Q = quadriceps muscles, T = tibia.

FIGURE 1. Arthrocentesis was performed, and characteristically cream-colored pus was drained. The pus culture yielded *Mycobacterium bovis*.

FIGURE 3. The axial view of T2-weighted knee magnetic resonance imaging shows abscess formation in the right suprapatellar bursa (arrow). The anatomic structures are labeled—B = biceps femoris, F = femur, S = semitendinosus and semimembranosus muscles, P = popliteal artery and vein, Q = quadriceps tendon, SG = sartorius and gracilis muscles, VL = vastus lateralis, VM = vastus medialis.

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commonly involved.⁴ The estimated incidence rates of BCG-related osteitis/osteomyelitis vary with place, time, and vaccine strain; for example, two cases per million vaccinations in Japan and 30 cases per million vaccinations in Finland.^{4,5} In Taiwan, the incidence was 12.9 cases per million vaccinations during 2005–2007.² Pediatricians should remain alert for mycobacterial infections in children with BCG vaccination, including those administered long before presentation of arthritis, such as 19 months in the present patient. Early diagnosis and correct treatment are crucial for successful treatment.

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REFERENCES

1. Tsai KS, Chang HL, Chien ST, Chen KL, Chen KH, Mai MH, Chen KT, 2013. Childhood tuberculosis: epidemiology, diagnosis, treatment, and vaccination. *Pediatr Neonatol* 54: 295–302.
2. Jou R, Huang WL, Su WJ, 2009. Tokyo-172 BCG vaccination complications, Taiwan. *Emerg Infect Dis* 15: 1525–1526.
3. Khotaei GT, Sedighipour L, Fattahi F, Pourpak Z, 2006. Osteomyelitis as a late complication of bacille Calmett-Guerin vaccination. *J Microbiol Immunol Infect* 39: 167–172.
4. Kroger L, Korppi M, Brander E, Kroger H, Wasz-Hockert O, Backman A, Rapola J, Launiala K, Katila ML, 1995. Osteitis caused by bacille Calmette-Guerin vaccination: a retrospective analysis of 222 cases. *J Infect Dis* 172: 574–576.
5. Koyama A, Toida I, Nakata S, 2009. Osteitis as a complication of BCG vaccination [in Japanese]. *Kekkaku* 84: 125–132.