Neonatal Calcaneous Osteomyelitis Related to Contaminated Mineral Oil

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Contaminated mineral oil may have been associated with calcaneous osteomyelitis in a newborn. *Staphylococcus aureus* is viable for 1 month as a suspension in mineral oil.

Osteomyelitis is a rare but well-described complication of heel puncture in neonates (4, 7). Usually, the procedure is performed by preparing skin with alcohol and then piercing it with a micro-lancet or a scalpel blade. After puncture, some physicians apply a thin layer of mineral oil (liquid petrolatum) to the heel to facilitate continuous blood flow and pooling of the blood. *Staphylococcus aureus*, type 96, was recovered from an infant with calcaneous osteomyelitis. We investigated the possibility that this nosocomial infection was associated with the use of mineral oil.

A 2,523-g term infant girl was born to a 26-year-old woman by spontaneous breech delivery. At 2 days of age, she developed symptoms of hyperthyroidism. Multiple blood chemistry determinations were obtained via heel puncture by a mineral oil technique. At 27 days of age, an area of cellulitis with two raised pustules was noted on the left heel. The day after, this area drained purulent material that cultured *S. aureus*. The infant responded to 3 weeks of parenterally administered methicillin without apparent residua.

Seven bottles of mineral oil were found in the Special Care Nursery where this infant was a patient. These 6- to 32-ounce (ca. 180- to 960-ml) bottles were prepared by the hospital pharmacy for oral use by repackaging bulk mineral oil in washed, but not sterile, bottles. These were aseptically sampled by pipette for aerobic and anaerobic culture according to standard techniques. One of the seven bottles cultured *S. aureus*. Both the organism cultured from the child and the one cultured from the mineral oil were identified as phage-group 96 by the Center for Disease Control, Atlanta, Ga.

To assess the viability of *S. aureus* in mineral oil, overnight cultures of three clinical isolates were diluted to approximately 10^7 organisms per ml in Mueller-Hinton broth (Difco Laboratories,

TABLE 1. Survival of *S. aureus* in mineral oil

Days	Clinical isolate		
	1	2	3
0	3.8×10^5 ^a	5.0×10^4	4.0×10^4
1	7.4×10^5	8.9×10^5	1.9×10^5
2	1.9×10^7	2.4×10^6	5.0×10^6
4	5.0×10^5	2.0×10^5	1.0×10^5
16	1.2×10^3	1.0×10^3	2.0×10^2
33	3.4×10^2	1.4×10^2	1.2×10^2

^a Colony-forming units per milliliter.

Detroit, Mich.) and then diluted 1:100 in dry-heat-sterilized (143°C, 2 h) mineral oil (Standard Oil Co., Chicago, Ill.). Mineral oil cultures were maintained at room temperature. Viable organisms were quantitated by pour plate of serial 10-fold dilutions of mineral oil in Mueller-Hinton agar. The viability of these isolates of *S. aureus* in mineral oil is presented in Table 1. All three strains were viable for at least 1 month as a suspension in mineral oil.

Osteomyelitis of the calcaneous secondary to puncture wounds has been reported due to *S. aureus* (1, 2, 4, 5) and gram-negative bacilli (2, 5, 6). The long-term viability of microorganisms under a layer of mineral oil is well established (3), and we have demonstrated survival of a suspension of *S. aureus* in mineral oil for at least 1 month. Thus, the recovery of *S. aureus*, phage-type 96, both from a bottle of mineral oil and from this infant suggests either that contaminated mineral oil was used for the heel-stick procedure, that the mineral oil was inoculated with purulent materials from this infant, or that both the infant and the mineral oil were contaminated during handling. Whichever event occurred, this nosocomial infection emphasizes the importance of aseptic techniques and the use of sterile-unit dosage materials. This case serves as a reminder that even simple and commonly

performed procedures may be the source of serious nosocomial infection.

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