Skin Disease Presenting as an Outbreak of Pseudobacteremia in a Laboratory Worker

A. SIMHON,* G. RAHAV, M. SHAPIRO, AND C. BLOCK

Department of Clinical Microbiology and Infectious Diseases, Hadassah University Hospital, Ein Kerem, Jerusalem

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An outbreak of pseudobacteremia due to Streptococcus pyogenes (group A streptococci [GAS]) and methicillin-susceptible Staphylococcus aureus (MSSA) was traced to the venting procedure for aerobic bottles prior to their loading into the incubator of the BacT/Alert analyzer (Organon Teknika). Bacteria shed by a laboratory worker suffering from impetigo and cellulitis contaminated the aerobic bottles of 10 patients. All blood culture isolates, in addition to the isolates from the laboratory worker, were of the same GAS M and T types. All MSSA isolates from blood cultures and the index case’s hands had the same lytic phage profile. Procedural breakdowns were identified in the laboratory. Bottles were vented outside the biological safety cabinet, gloves were not worn, and unprotected needles were used for the venting procedure. The source of the aspirated bacteria that contaminated the bottles was identified and the index case was treated promptly.

Hadassah University Hospital, Ein Kerem, Jerusalem, is a 650-bed, tertiary-care teaching hospital. Blood cultures have been performed using the BacT/Alert system since 1995. Approximately 3,600 bottles (1,800 blood culture sets) are processed monthly. We describe an unusual episode of blood culture contamination which led to the diagnosis of severe skin infection in a laboratory worker.

Description of the incident. On day 1, a Friday, positive bottled blood cultures taken from 25 patients on the previous day were detected. Gram-stained smears revealed that the bottles for 11 patients harbored gram-positive cocci in chains, and 5 of these 11 patients also had gram-positive cocci in clusters.

The finding of streptococci in 11 patients was an extraordinary occurrence. All of the positive bottles had been loaded into the instrument the day before, and it was noticed that all streptococci were observed in aerobic bottles only. Aerobic bottles in the BacT/Alert system require venting immediately prior to being loaded in the instrument, so pseudobacteremia was suspected immediately. After a preliminary procedural review it was hypothesized that bottles had been contaminated during the venting procedure. Bottles are habitually underfilled at our institution, and so the remaining vacuum results in relatively large volumes of air being aspirated at venting. The cultures had been sent from different areas in the hospital. Despite the expectation that the likely contaminants would be viridans streptococci and coagulase-negative staphylococci, the infectious disease consultant on call contacted the wards. Two seriously ill patients were started on vancomycin. The parents of one pediatric patient discharged from the emergency room were contacted by phone and asked to return to the hospital for reevaluation.

On day 2, it was established that, contrary to our original assumption, the cultures contained a mixture of Streptococcus pyogenes (group A streptococci [GAS]) and methicillin-susceptible Staphylococcus aureus (MSSA) from 10 of the 11 patients. The time to positivity in the BacT/Alert ranged from 10.2 to 15.3 h. The bottle of one patient in hematology who was receiving vancomycin yielded Klebsiella pneumoniae in addition to GAS and MSSA. However, it could not be established whether the former was the cause of genuine bacteremia, since fever was concomitant with end-stage lymphoma. Streptococcus pneumoniae was recovered from the blood cultures of the remaining patient.

On day 3 (Sunday, the start of the working week), the procedure for venting blood cultures was reviewed, and major breakdowns were identified. It was established that gloves were not worn by two of the three laboratory workers who vented bottles on day 0 and that venting took place outside the biological safety cabinet. These precautions are included in the venting procedure, since regular needles for injection are used in our laboratory instead of the covered venting needles sold by the manufacturer of the BacT/Alert.

The infectious disease consultant interviewed the staff involved with reception of the blood cultures in the laboratory. One of the laboratory workers had an infected eczematous lesion evident on his hand and a large ulcerating cellulitic lesion on his left lower extremity. GAS and MSSA were recovered in cultures taken from all the lesions, and GAS was isolated from his throat. He was placed on sick leave and treated with an oral cephalosporin and mupirocin ointment.

Results and discussion. All blood culture isolates, in addition to the isolates from the laboratory worker, were sent to national reference laboratories for GAS M and T typing and staphylococcal phage typing. All GAS isolates from the blood cultures and the index case were typed as M3, T 3/13/B3264. All MSSA isolates from blood cultures and the index case’s hands were completely lysed by phages 95 and D11/HK2, while the MSSA from his leg lesion was phage type 79.

This outbreak of pseudobacteremia was most probably related to the faulty venting of aerobic bottles in the BacT/Alert blood culture system. The clinical impact of the event was substantial. Apart from the several hours of additional work...
for senior Infectious Diseases consultants and laboratory staff, two patients received vancomycin during the first 24 h of the incident and one patient was readmitted for observation and discharged shortly thereafter. Correct procedures for venting the bottles were immediately reinstated and laboratory staff were advised regarding health self-awareness. The incident was rapidly contained, and the index case was identified and treated within 48 h.

Pseudobacteremia with *S. aureus* and *S. pyogenes* has been described previously in association with a laboratory worker suffering from a sore throat who contaminated blood cultures when performing blind subcultures after an initial 24-h incubation period (4). Pseudobacteremia with *S. aureus* has also been associated with an asymptomatic laboratory worker who had nasopharyngeal colonization (1) and with a physician who had an active skin infection and nasal colonization and was assumed to have contaminated the cultures upon inoculation (5). Cross-contamination with GAS (3) and *S. aureus* (2) in radiometric analyzers was traced to defective needle sterilization.

We did not use the venting needles supplied by Organon Teknika, the manufacturer of the BacT/Alert blood culture system. Removal of the lower part of this device exposes a short, unfiltered, beveled needle, which is inserted into the bottle. This procedure allows gas exchange via the needle. It is doubtful whether this device would have prevented the contamination in this case, in view of the large volumes of air aspirated and the likelihood that the index case probably shed vast numbers of bacteria from his lesions. Nevertheless, our procedure was changed to deploy needles designed for vacuum tube blood collection, since their structure is essentially the same as that of the Organon Teknika units. This incident underscores that awareness of potential pitfalls and strict adherence to procedures are crucial in avoiding false-positive results. The incident described here resulted from a frank procedural breakdown in the presence of a highly contaminated environment. The planned introduction of bottles not requiring venting will prevent such mishaps.

REFERENCES