

Staphylococcus aureus Hordeolum as a Cause of Bacteremia and Secondary Foci

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Staphylococcus aureus bacteremia has a reported mortality rate ranging from 11% to 21%.^{1,2} Of concern in the treatment of *S aureus* bacteremia are the determination of the source of the infection (primary foci) and identification of secondary spread (secondary foci) (Tables 1 and 2). The case described herein demonstrates the ability of *S aureus* bacteremia to arise from an unsuspected site and spread distantly.

CASE REPORT

Mrs M., 55 years old, arrived in the emergency department with a temperature of 38.0°C (100.3°F), nausea, diaphoresis, and a hordeolum. A diagnosis of gastroenteritis was made. Before discharge, blood was drawn for culture.

The next day, four out of four culture samples grew gram-positive cocci. The patient was asked to return. She had a temperature of 40.8°C (105.5°F), blood pressure of 180/90 mmHg, respirations of 28/min, conjunctivitis, and a hordeolum on the left upper lid. She demonstrated tenderness of her right costovertebral angle and in her right upper and lower abdominal quadrants. All other physical findings were normal. Her history included an appendectomy at an earlier age and alcohol consumption of 1 pint per week; a review of systems for infectious diseases was unremarkable.

Laboratory tests included a white cell count of $17.1 \times 10^9/L$ ($17.1 \times 10^3/\mu L$) with 91% granulocytes, ethanol level 1 mmol/L (< 5 mg/dL), amylase 1.08 $\mu\text{kat/L}$ (65 U/L), and urinalysis (pH 8.5, serum amyloid A protein 1 g/L, negative nitrate and leukocyte esterase, red cells 1 to 2 per high-power field [hpf], white cells 3 to 4/hpf, epithelial cells 1 to 2/hpf, and trace bacteria). Findings on

chest x-ray films were normal; abdominal films showed a mild ileus.

Initial impressions were that Mrs M. had pyelonephritis, hypertension, sepsis, and conjunctivitis. She was placed on intravenous nafcillin and gentamicin and sulamyd ophthalmologic drops.

A strain of *Staphylococcus aureus* was isolated that was β -lactamase positive and sensitive to nafcillin. Her sedimentation rate was 92 mm/h, and her urine cultures were negative. Her sputum grew normal flora. There were no murmurs or splinter hemorrhages; rectal and bimanual examinations were unremarkable. Based on these data, the differential diagnosis centered on biliary tract disease, abdominal abscess, and endocarditis.

The conjunctival culture grew *S aureus* with a sensitivity pattern essentially the same as that of the blood cultures. The third and fourth blood cultures were also positive. Her echocardiogram, antinuclear antibody, and fibrin split products were normal. An ultrasound of her abdomen and pelvis showed a single gallstone with normal gallbladder and common bile duct.

By day 4, Mrs M. reported less tenderness; however, she had a fever of 38.8°C (101.9°F) at maximum. On day 5, a gallium scan showed a vague increase in uptake in the region of the right kidney. Blood cultures drawn on the previous day were negative. The diagnosis of bacteremia disseminated from the hordeolum and seeding to the right renal parenchyma was believed to be confirmed.

The *Staphylococcus* showed in vitro sensitivity to ceftriaxone, which was less costly than other regimens because it could be administered once per day, perhaps on an outpatient basis. Hence, she was switched to ceftriaxone on day 8.

On day 9, Mrs M. was afebrile, but her white blood cell count rose to $19.8 \times 10^9/L$ ($19.8 \times 10^3/\mu L$) and her platelets to $849 \times 10^9/L$ ($849 \times 10^3/\text{mm}^3$). As a precaution, an abdominal and pelvic computed tomographic (CT) scan was done to further evaluate for an abscess; it was normal. As serum bactericidal levels of the ceftriaxone were found to be subtherapeutic despite correct dosing, her white cell count was elevated, and her tenderness persisted, Mrs M.

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TABLE 1. COMPOSITE TABLE OF PRIMARY FOCI (Percentage as Primary Foci by Author)

Source	Finkelstein et al ³	Mirimanoff and Glauser ⁴	Korzeniowski et al ⁵
Skin		32	43
Undetermined		22	33
Intravenous catheter	39		10
Intravascular		21	
Other	20		7
Bone or joint		14	7
Lungs	3	8	
Arteriovenous shunt	8		
Wound	6		
Burn	6		
Pemphigus	6		
Pacemaker	5		
Diabetic gangrene	3		
Uterus	3		
Urinary catheter		3	
Tenkoff catheter	2		

TABLE 2. COMPOSITE TABLE OF SECONDARY FOCI (Percentage as Secondary Foci by Author*)

Source	Finkelstein et al ³	Nolan and and Beaty ²	Libman and Arbeit ¹
Lung	21	66	10
Joint	33	34	10
Bone	37		30
Central nervous system	37	7	
Kidney	4	23	
Wound			20
Skin	17	11	
Perisplenic abscess			10
Lesser sac abscess			10
Spleen	8		
Eye	4	5	
Suppurative thrombo-phlebitis			10

*Finkelstein et al and Nolan and Beaty include patients with more than one secondary site per patient

was switched back to nafcillin and gentamicin. By day 14, her white cell count was normal.

As Mrs M. generally improved, she complained of hip and back pain; hence, x-ray films of those areas were taken. The pelvic CT was re-evaluated, and a possible lytic lesion of the fourth lumbar vertebra was identified. A further CT scan of that vertebra showed a small lytic lesion. Alkaline phosphatase, serum protein electrophoresis, and quantitative immunoglobulin evaluations were done to rule out multiple myeloma. To assess further for endocarditis and abscesses, an indium white cell scan was done and found to be normal. Teichoic acid and antibodies were normal. Based on the finding of osteomyelitis, 2 weeks of nafcillin and gentamicin followed by another 2 weeks of nafcillin were ordered.

On this regimen, Mrs M. recovered well, and she was discharged on day 41 on a 14-day course of oral dicloxacillin.

DISCUSSION

This case presents a unique instance of *Staphylococcus aureus* bacteremia in which a hordeolum can be identified as the primary focus of infection (as defined by Nolan and Beaty).² Superficial sites can often be the focus of infection and may be easily missed. This case, which spread to the renal parenchyma and a lumbar vertebra, illustrates the distance and unusual presentation that secondary foci can have.

While the possibility of endocarditis was considered early in the case, only one of the Nolan and Beaty criteria² for possible endocarditis was met—that of four sets of positive blood cultures. Wilson and Hamburger⁶ indicated

that sepsis or endocarditis was considered as the initial diagnosis in only 20% of *S aureus* bacteremia. Three of 65 cases that they reviewed occurred in patients who were admitted to the hospital with a diagnosis of pyelonephritis.

Because of the costs of nafcillin and gentamicin (approximately \$115 per day at this institution for both administration and the drugs), the patient was switched to ceftriaxone (at a cost of approximately \$42 per day) on the basis of in vitro sensitivities. The results, including serum bactericidal titers, were inadequate. Hence, she was switched to nafcillin and gentamicin, which are the standard therapy—they are synergistic.⁷ Another possibility is vancomycin.³ Seventy-seven percent of the strains of *Staphylococcus* isolated are now resistant to penicillin.³

Teichoic acid antibodies, which are formed to a portion of the *Staphylococcus* cell wall, are sensitive, but not specific, markers of infectious complications of bacteremia.¹ If negative, they are helpful by making distant spread less likely.^{8,9}

In summary, *Staphylococcus aureus* bacteremia can have inconspicuous or absent primary foci and widely dispersed spread; initially, it should be treated aggressively with nafcillin and gentamicin; endocarditis must be ruled out.

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