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Postpartum Group A Streptococcus Case Series: Reach Out to Infection Prevention!

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A series of postpartum *Streptococcus pyogenes* infections prompted an investigation to rule out potential transmission by a health care worker. None of the hospital staff screened were colonized. All isolates were determined to be unrelated by molecular methods, including whole-genome sequencing. Thus, nosocomial transmission was considered unlikely.

Keywords. hospital epidemiology; postpartum infection; streptococcus pyogenes.

Invasive infections caused by *Streptococcus pyogenes* (group A streptococcus [GAS]) cause significant global morbidity and mortality. For postpartum women, the risk of acquiring invasive GAS is 20-fold higher than in nonpregnant women, resulting in 220 cases per year in the United States as of 2002 [1, 2]. Although the infection occurs in otherwise healthy women, it carries significant risk of mortality, with a case fatality rate of 3.5% and a 6- to 20-fold increased incidence of neonatal death [1, 2].

GAS infections can occur in clusters and may be transmitted by an asymptomatic health care worker (HCW), potentially causing infections up to even more than a year apart [1, 3, 4]. Thus, any case of postpartum GAS warrants investigation to rule out possible transmission by an HCW to prevent potential additional cases. As part of routine surveillance for Caesarean section surgical site infections (SSIs), 5 cases of postpartum GAS were identified at a large academic medical center over 14 months, from February 2015 to March 2016. With the identification of the first case, an investigation transpired to ensure that cases were not connected through carriage by an HCW.

METHODS

Case Definition

The 2002 Centers for Disease Control and Prevention (CDC) guideline identifies the following as a case of an invasive health care–associated postpartum GAS infection: isolation, during the hospital stay or within the first 7 days after discharge, of GAS from a sterile site or a surgical wound [5].

Investigation Methodology

For each case, the electronic medical record was reviewed using a standardized data collection form to identify demographics, potential risk factors for infection, possible source, clinical course, and treatment. HCWs who had cared for the patients were also identified. Potential patient colonization was assessed by an Ob-Gyn physician who interviewed each patient to identify sick contacts and history of reported skin/soft tissue infections. Patients were screened at nonsterile sites (ie, oropharynx, vagina, and perirectal area) for GAS colonization. The HCWs associated with the first case were also screened for GAS at the same nonsterile sites, and wounds if present.

GAS strains from each patient were retained by the hospital microbiology lab and sent to the Ohio Department of Health for comparison by pulsed field gel electrophoresis (PFGE). Two isolates that were indistinguishable by PFGE were sent to the Department of Pathology and Genomic Medicine, Houston Methodist Hospital, for whole-genome sequencing (WGS), performed as previously described [6, 7].

RESULTS

Case 1

In February 2015, a 37-year-old female (F) was identified 10 days after a Caesarian delivery with an infected incision that grew GAS. Screening cultures from the oropharynx, vagina, and rectum were negative (Table 1), suggesting that she was not colonized with GAS. Blood and urine cultures were not done. An investigation was begun to ensure that no health care–associated transmission had occurred. Seventeen HCWs who cared for her were identified; none screened positive for GAS carriage at any site.

Case 2

A 26-year-old F was identified 3 months after case 1, when she presented with endometritis and GAS bacteremia 1 day after an uncomplicated vaginal delivery. A urine culture and GAS

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Table 1. Demographics, Risk Factors, Cultures From 5 Postpartum Females

	Case 1	Case 2	Case 3	Case 4	Case 5
Age, y	37	26	39	31	34
Ethnicity	White	Black	White	Black	White
Weight, kg	65.5	60.9	98.2	88.6	81.8
Smoking status	Former	Current	Former	Current	Former
GBS status	Not performed	Negative	Negative	Positive	Negative
Gestational age at delivery	28w 1d	36w 1d	39w 3d	38w 4d	40w 4d
Delivery method	C-section	Vaginal	C-section	C-section	Vaginal
Days from delivery to GAS culture	10	1	20	7	2
Days from discharge to GAS culture	6	0	17	4	1
Comorbid illnesses and possible risk factor for GAS	Chronic kidney disease	Sick contact with fever, sore throat	Congenital coagulopathy	Clitoral piercing removed 1 day before delivery	None
Endometritis	No	Yes	No	No	Yes
Primary site of infection	C-section incisional	Endometritis	No clinical infection; vaginal colonization only	Bacteremia	Endometritis
Blood culture	Not performed	Positive	Not performed	Positive	Positive
Urine culture	Not performed	Positive	Negative	Positive	Negative
Wound culture	Positive	No wound	No wound	No wound	No wound
Oropharyngeal culture	Negative	Positive	Not performed	Negative	Negative
Vaginal culture	Negative	Positive	Positive	Positive	Positive
Perirectal culture	Negative	Negative	Not performed	Negative	Negative

Abbreviations: C-section, Cesarean section; GAS, group A streptococcus; GBS, group B streptococcus.

screening cultures from the oropharynx and vagina were positive, indicating likely colonization before delivery. PFGE results (Figure 1) showed that case 1 and 2 were different, supporting the hypothesis that HCW transmission had not occurred. No additional staff were screened then.

Case 3

Two months after case 2, a 39-year-old F presented with vaginal bleeding on postoperative day 20 after a Caesarian section delivery. A vaginal culture was positive for GAS, and all other screening sites were culture-negative. She was judged to be colonized, rather than having a true infection.

Case 4

A 31-year-old F re-presented 1 day after case 3 with septic shock due to GAS bacteremia. She was on postoperative day 7 from a Caesarian section delivery. Cultures were positive for GAS from blood, urine, and vagina. Her condition quickly improved with antibiotics and supportive care. Further questioning revealed that she had a clitoral ring removed 1 day before delivery. Although she did not have overt signs of clitoral infection, because she was positive for vaginal colonization, this was considered the most likely source. Notably, her prenatal group B streptococcus (GBS) screen was positive, and she had

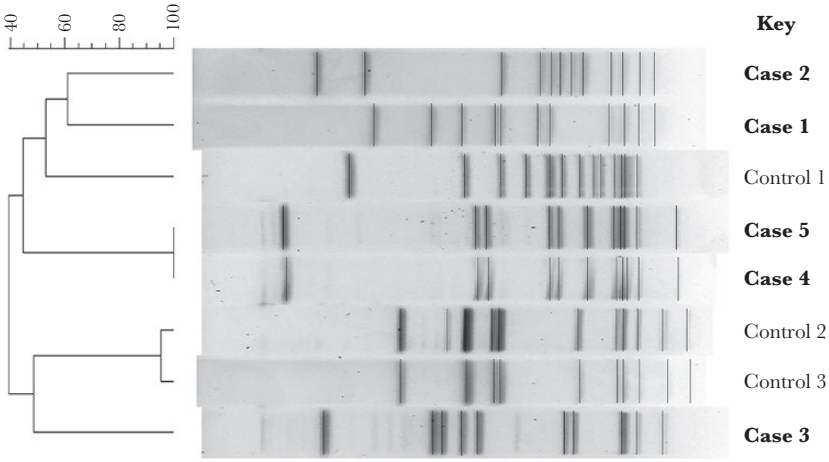

Figure 1. Pulsed field gel electrophoresis.

been treated with ampicillin 6 hours before delivery. She also received cefazolin perioperatively and for 24 hours after delivery. PFGE showed that cases 3 and 4 were distinct from each other and also from the prior 2 patients. There was no overlap in HCWs caring for these 4 patients, so health care–related transmission was thought unlikely.

Case 5

Eight months after case 4, in March 2016, a 34-year-old F presented with endometritis and GAS bacteremia 2 days after an uncomplicated vaginal delivery. The patient was culture-positive for vaginal carriage. The PFGE pattern of both her isolates was identical to the strain from case 4, prompting further investigation. A single HCW had cared for both patients, and this HCW screened negative for GAS carriage in the oropharynx, vagina, and rectum. Isolates from cases 4 and 5 were both type *emm3*. WGS showed that these 2 isolates differed by 16 single nucleotide polymorphisms. This level of genetic difference strongly argues against HCW-related transmission or a common source of transmission [8].

DISCUSSION

Cases 1, 2, 4, and 5 met the CDC case definition for invasive postpartum GAS infection. Case 3 presented beyond the 7-day postdischarge window required to be considered health care associated. In addition, this patient was judged to be colonized with GAS rather than truly infected. Index case 1 was not colonized with GAS, so her case was initially concerning for health care–associated transmission; however, an exhaustive review of HCWs who cared for her did not reveal any colonization. Cases 2, 4, and 5 also met CDC criteria for postpartum invasive GAS, but the isolates from these 3 patients were genetically distinct from each other, as assessed by a combination of PFGE and WGS analysis, and did not appear to have been transmitted by a shared HCW. Other than case 1, all had vaginal carriage of GAS, which likely predisposed them to an invasive GAS infection. No other shared risk factors were identified, and all 5 patients recovered quickly with appropriate treatment. Due to the potentially severe nature of invasive GAS infections, the identification of a single case, especially in an otherwise healthy postpartum patient, mandates a thorough epidemiologic investigation. In this case series, there was no evidence indicating that infections were cross-transmitted, hospital acquired, or associated with an HCW.

It is well established that prenatal screening for GBS has dramatically reduced the incidence of neonatal infections [9], but screening for GAS is not routinely performed. GAS vaginal colonization is a risk factor for developing an invasive infection, although compared with GBS, GAS colonization is far less frequent. A surveillance study performed in 2000 indicated that the rate of GAS colonization late in pregnancy was 0.03%, vs 20.1% for GBS [10]; however, in our small series, 4 of the 5 patients were colonized with GAS. There were 5661 deliveries at our institution during the study period, so based on only 4 positive patients, the rate was 0.071%. This is double the previously reported rate without screening any of the asymptomatic patients; thus we presume our local rate of GAS colonization is much higher. This is supported by surveillance data from the Ohio Department of Health indicating that the total rate of invasive GAS has increased 7-fold in the period from 1996 to 2008 [11], although unfortunately the percentage of postpartum infections was not specifically quantified. In the last 3 years in the county where our facility is located, invasive GAS case rates have steadily increased from 3.0 (2014) to 3.8 (2015) to 4.3 per 100 000 population in 2016 [12]. Furthermore, in 2015, there were 5 community outbreaks of GAS in the county, involving 133 total patients, compared with just 2 outbreaks involving 22 total patients during the preceding 3 years [11]. Thus, local rates are on the rise and coincided with our cases. With this increase, screening for GAS colonization may be useful, especially if peripartum antibiotics reduced colonization rates and risk for invasive infection. In our cases, only 1 patient (case 4) had GBS colonization before delivery. This patient was treated with peripartum ampicillin but remained colonized with GAS upon presentation, with an invasive infection 7 days later, suggesting that GAS colonization was not eradicated.

In conclusion, although the incidence of GAS vs GBS remains low, current data show that both community-acquired disease and invasive infections are increasing. Additional surveillance data are necessary to confirm rates of vaginal GAS carriage and to assess if targeted peripartum antibiotic treatment of carriers would alter the risk of postpartum invasive GAS. Given the potential for high morbidity and mortality with GAS infection, it is important for hospital epidemiology programs to remain vigilant. Importantly, no additional cases have been identified through calendar year 2017. Although no HCW transmission was identified in this investigation, Caesarian section SSI surveillance is ongoing.

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