



CASE REPORT

Septic Shock from Pyelonephritis in Pregnancy

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Abstract

Pyelonephritis is a relatively common infection in pregnancy. We report a case of a 20-year-old pregnant woman with limited prenatal care and history of untreated asymptomatic bacteriuria who presented to labor and delivery triage with signs and symptoms suggestive of sepsis. The initial management, although primarily driven by the patient's chief complaints, history, and vital signs, was confounded by a relatively unremarkable urinalysis and physical exam. The patient subsequently developed septic shock from pyelonephritis which was supported by urine culture and imaging, underscoring the pitfalls in late prenatal care and urinalysis for initial diagnosis.

Keywords

Bacteriuria, Pregnancy, Pyelonephritis, Septic shock, Urinary tract infection

Pyelonephritis is a relatively common infection in pregnancy, affecting up to 2% of pregnancies, due to a variety of pregnancy-related physiological and anatomical changes [1,2]. It can result in sepsis which is a clinical syndrome characterized by systemic inflammation due to infection which can also progress to septic shock [3].

We report a case of a 20-year-old pregnant woman with limited prenatal care and history of untreated asymptomatic bacteriuria who presented to labor and delivery triage with signs and symptoms suggestive of sepsis. The initial management, although primarily driven by the patient's chief complaints, history, and vital signs, was confounded by a relatively unremarkable urinalysis and physical exam. The patient subsequently

developed septic shock from pyelonephritis which was supported by urine culture and imaging. After some time in the ICU which was less than 72 hours, the patient eventually stabilized on intravenous antibiotics, stress-dose steroids, and aggressive fluid resuscitation.

Case Description

A 20-year-old pregnant, G2P1001, African-American woman at 24 weeks 2 days gestation with no prior prenatal care presented to labor and delivery triage by EMS with one-day history of generalized lowerback pain, increased urinary frequency, dizziness, chills, and malaise. Upon arrival, her overnight symptoms were still present, but she was otherwise alert and oriented, and denied any concerning symptom for active labor. Blood pressure was 104/54 mmHg, pulse was 127 bpm, temperature was 102.4 °F, and respiratory rate was 24. Multi-system physical exam was unrevealing for any abnormality, including negative for costovertebral angle or abdominal tenderness. A STAT urine dip was not consistent with a urinary tract infection that matched her severity (negative nitrites, with only trace leukocyte esterase and blood; bacteria and white blood cell were not measured). White blood cell was 23.9. Urine culture, blood cultures, and lactate levels were taken. The patient was started on empiric Ceftriaxone 1g intravenous daily and maintenance fluids following positive sensitivities, and was given a total of 2 L of bolus fluids.

Initial chart review showed no prior prenatal visits for this pregnancy. She had a documented urinary tract infection from a prior emergency department visit 3

months for nausea and vomiting. Urinalysis at that time showed positive nitrites, many bacteria, pyuria, and trace leukocyte esterase. Urine culture from that emergency department visit grew *E. coli*. She was discharged with a prescription of outpatient Cephalexin, but the antibiotics were never picked up.

On hospital day two, urine culture returned positive for *E. coli*, lactate returned physiologic, and the patient remained on the Ceftriaxone and maintenance fluids. Despite a transient improvement in her vital signs later in the day, she became acutely distressed, with worsening tachycardia up to 140 bpm, worsening fever up to 104.1 degrees Fahrenheit, increased respiratory rate near 40, and she remained persistently hypotensive in spite of aggressive fluid bolus administration. She began to exhibit labored breathing, despite a consistent pulse oximetry reading at 100%. Chest X-ray showed no acute processes and she was subsequently transferred to the medical intensive care unit for septic shock management.

Upon arrival at the medical intensive care unit, she was started on Piperacillin/Tazobactam and stress-dose steroids with discontinuation of Ceftriaxone. Computerized tomography renal showed severe right hydronephrosis with perinephric and peri-ureteric fat stranding with no obstructions, concerning for right pyelonephritis (Figure 1), and renal ultrasound findings were compatible with right pyelonephritis. She was stabilized without the need for vasopressors while in the Medical Intensive Care Unit and transferred back to labor and delivery on hospital day three where she would eventually be discharged. Both blood cultures returned negative at 48 hours. She was discharged with close outpatient follow-up and on outpatient Cephalexin for the remainder of her pregnancy.

Discussion

Urinary tract infection in pregnancy can lead to much worse outcomes than in the non-pregnant population. This is even true for asymptomatic bacteriuria, which is a urinary tract infection without notable symptoms [4]. Pregnant women undergo several physiologic and anatomical changes that explain this. First, there is dilation of the urinary tract along with slight hydronephrosis, caused partly by a reduction in smooth muscle tone that is thought to be due to elevated circulating progesterone. Moreover, the expanding uterus compresses the bladder, raising the intravesical pressure which leads to vesico-ureteral reflux and urine retention. All of these factors place the pregnant patient at increased risk for developing pyelonephritis. In fact, pregnant women have up to 40% increased risk of urinary tract infection progressing to pyelonephritis [5].

Assessing for pyelonephritis often begins with search for infection in the lower urinary tract [6]. As such the diagnostic algorithm for pyelonephritis usually starts with a urinalysis of a patient's urine. Despite its accepted role in diagnosing urinary tract infection and pyelonephritis, there are limitations with urinalysis in ruling out infections. This has been illustrated in a number of studies. One review from American Family Physician noted the sensitivity of leukocyte esterase to be 74 to 96% and nitrite to be 35 to 85% for diagnosing urinary tract infection [6]. More strikingly, in a 2012 study of 102 cases of acute pyelonephritis in pregnancy, only 29.4% were nitrite positive, and only 38.2% had microscopic hematuria. However, 81.4% of the 102 cases had the presence of white blood cell [7]. Another study in 2015 found the sensitivity of nitrite alone and leukocyte esterase alone to be 23.3% and 48.5%, respectively, when testing for urinary tract infection in a group of 635 urine culture-positive patients [8].



Figure 1: Computerized Tomography of renal calculus study showing right hydronephrosis with perinephric and peri-ureteric fat stranding, concerning for pyelonephritis (hospital day 2).

From these studies, it is not entirely surprising that the urinalysis results did not correlate with the patient's toxic appearance. Although the urinalysis did show trace leukocyte esterase and blood, these values did not reflect the severity of her clinical status. As recommended in established diagnostic algorithms [6,9], the patient had a urine culture grown, along with imaging findings done (computerized tomography scan, kidney ultrasound), which both confirmed the presence of pyelonephritis.

In retrospect, proper prenatal care likely could have played a role in preventing her pyelonephritis, as it is recommended that pregnant patients be screened for asymptomatic bacteriuria between week 12 and 16 [5]. The patient was yet to establish prenatal care, and 3 months prior to her development of sepsis, she presented to the emergency department with nausea and vomiting during which she was found to have asymptomatic bacteriuria. She was discharged with a prescription of Cephalexin, but for unknown reasons, the patient never was able to pick up the prescription. In addition to picking up the prescription, the patient's pyelonephritis could have been prevented had she established prenatal care earlier and been assessed for asymptomatic bacteriuria.

It is clear from this case report that urinalysis results may not always be consistent with the severity of the infection within the urinary tract. Urine culture remains the gold standard for diagnosis of pyelonephritis, although urinalysis may serve as a tool for initial diagnosis. Furthermore, this case highlights the importance of proper prenatal care, assessing for asymptomatic bacteriuria with urine culture, and making sure that it is treated like a similar reported case [10]. Lastly, this case serves as a broad reminder for all healthcare providers about the danger in discarding important diagnoses that have yet to be fully ruled out.

Sources of Support

None.

Author Contribution

All authors contributed equally to the conception, drafting, and final approval of the manuscript.

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