Poststreptococcal Glomerulonephritis: A Rare Complication in Pregnancy

John Shepherd, MD, and Carolyn Shepherd, MD
Denver and Lafayette, Colorado

Streptococcus pyogenes rarely causes glomerulonephritis in pregnant women. The family physician must consider this nonsuppurative cause, however, in the differential diagnosis of a pregnant patient with edema, abnormal urinalysis, and declining renal function, as this case study demonstrates.

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Family physicians diagnose and treat group A β-hemolytic streptococcal (GABHS) pharyngitis daily. In fact, studies have estimated that over 30 million throat cultures are performed yearly in provider offices.[1] Generally this organism causes self-limited disease even in pregnant women. Nonsuppurative sequelae such as rheumatic fever and poststreptococcal glomerulonephritis, however, can arise from streptococcal infections. Many pregnant women have other children in the home who return from school with streptococcal infections of the skin and pharynx and expose them to the disease. We report a case of acute poststreptococcal glomerulonephritis developing in the second trimester of pregnancy in an otherwise healthy woman. A search of the medical literature through 1988 revealed only 24 previously reported cases.[2–5]

Case Report

A 34-year-old woman, G2,P1, presented for her first prenatal visit on November 6, 1990. Her last normal menstrual period was August 21, 1990, and her estimated due date was May 26, 1991. Her first pregnancy had been uncomplicated, and she had given birth to a healthy full-term infant. The prenatal laboratory tests demonstrated an 0+ blood type, nonreactive rapid plasma reagin test, negative results on hepatitis B surface antigen, on tuberculin test (PPD), and on human immunodeficiency virus (HIV) tests as well as negative gonorrhea and *Chlamydia trachomatis* cultures. Her Papanicolaou smear and urine analysis and culture were within normal limits. At 15 weeks' gestation, her α-fetoprotein was checked and was normal.

On January 25, 1991, at 21½ weeks' gestation, she and her 7-year-old son came to the office complaining of 3 days of sore throat, fever, and general malaise. Her son's throat culture grew group A β-hemolytic streptococcus within 24 hours, and treatment was initiated. The mother's culture was also positive, and treatment with penicillin VK, 250 mg four times a day, was begun. Ten days later, she returned with a maculopapular rash, which she attributed to the over-the-counter cold medicine that she had taken.

On February 15, 2½ weeks after treatment was initiated and 3 weeks after the onset of symptoms, she came for her routine prenatal visit. At that time the patient had marked pedal edema and an active urine sediment. Table 1 is a summary of her clinical course and laboratory data throughout the remainder of her pregnancy and during the postpartum period.

The diagnosis of nephritis was made based on the presence of red and white cell casts, blood and protein in the urine, and on her previous illness with group A β-hemolytic streptococcal pharyngitis, which suggested poststreptococcal glomerulonephritis. The lack of hypertension and normal antistreptolysin-O titer and C3 and C4 levels confused the diagnosis, however, and expanded the differential diagnosis to include urinary tract infection, preeclampsia, lupus nephritis, Goodpasture's syndrome, and IgA nephropathy, as well as poststreptococcal glomerulonephritis. The consultant nephrologist recommended rechecking the antinuclear antibody (ANA) level at a later date to rule out a false-negative

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From the Department of Family Medicine (Dr John Shepherd), University of Colorado, Denver, and the Clinica Campesina Family Health Services (Dr Carolyn Shepherd), Lafayette, Colorado. Requests for reprints should be addressed to John Shepherd, MD, Department of Family Medicine, University of Colorado, 1180 Clermont, Denver, CO 80220.

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Table 1. Clinical and Laboratory Data of a Pregnant Woman with Poststreptococcal Glomerulonephritis

Variable	Date of Patient Visit										
	11/6	1/25	2/15	2/21	3/1	3/8	3/20	3/26	3/29	5/28	6/25
Clinical event		Sore Throat	Edema					Admitted to Hospital		After Birth of Child 4/22	
Weight (lb)	132	148	156	158	153	153	152	153			
Urine analysis											
Protein			2+	2+	2+	2+	2+	3+		Trace	Trace
Blood			2+	3+	3+	3+	3+	4+		1+	2+
WBC			TNTC	TNTC	TNTC	MOD	TNTC	TNTC		—	—
RBC			TNTC	TNTC	TNTC	TNTC	TNTC	TNTC		10	—
Casts			WBC	WBC	Rare	Rare	Rare	Rare		—	—
			RBC	RBC	WBC	WBC	WBC	WBC		—	—
Creatinine			.9	1.1	1.1	1.2	1.6	1.7	1.5	1.1	
Creatinine clearance			86			56	48		75		
Albumin			3.0		3.2	3.1	3.2	3.2			
Hemoglobin	13		11		12		11	10	9.7	10	10.8
C3			72		95		104				
C4			28		42		45				

WBC denotes white blood cells; TNTC, too numerous to count; MOD, moderate; RBC, red blood cells.

titer for systemic lupus erythematosus, examining the anti-DNAase B titer to confirm a recent streptococcal infection, and testing for the presence of antibody against the glomerular basement membrane to eliminate Goodpasture's syndrome as a cause. He noted that only a renal biopsy would eliminate IgA nephropathy from consideration.

Treatment for edema, hypertension, and worsening renal function included bed rest and careful observation. Pharmacologic treatment for hypertension or other complications was not required. The woman had mild hypertension, and a significant decrease in creatinine clearance, which resulted in her being hospitalized at 31 weeks' gestation to ensure complete bed rest. After fetal lung maturity was confirmed on April 22, labor was induced and she gave birth to a 2430-g (5 lb 6 oz) male infant with Apgar scores of 8 at 1 minute and 9 at 5 minutes. The child was not evaluated for group A β-hemolytic streptococci because he showed no evidence of sepsis.

The patient remained asymptomatic after the delivery, and her renal function returned to normal.

Discussion

Streptococcal pharyngitis in pregnancy rarely causes poststreptococcal complications, with the incidence of poststreptococcal glomerulonephritis estimated as 1:40,000.[2,3,6] Given the high prevalence of streptococcal disease, however, family physicians certainly will care for pregnant women at theoretical risk for this nonsuppurative sequela.

Over 60 M protein serotypes of group A β-hemolytic streptococcus exist within the species of *Streptococcus pyogenes*. Particular M types seem to cause infection either in the pharynx or on the skin, with certain M protein serotypes, particularly type 12, associated with poststreptococcal glomerulonephritis.[7] The M type that caused our patient's pharyngitis was not determined. The etiology of poststreptococcal glomerulonephritis remains speculative, with current theories focusing on the organism's mucoid colony form and toxin production, individual patient susceptibility, and possible shared epitopes with the kidney, leading to autoimmune injury.[8] The classic histology with glomerular deposition of IgG, C3, C4, and fibrin supports the latter.

Conventional understanding of the natural history of poststreptococcal glomerulonephritis suggests that it occurs 10 to 21 days after acute infection (21 days after pyoderma and 10 days after pharyngitis).[7] Usually, if a rash caused by streptococcal erythrogenic toxin appears, it begins 24 to 48 hours after the onset of the pharyngitis. Little evidence exists to demonstrate how health care providers might intervene and interrupt the progression of streptococcal infection to poststreptococcal glomerulonephritis other than a rabbit model, which indicates that treatment within 3 days of infection might prevent

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renal involvement.[8] Also, no one has published data on the efficacy of prophylaxis in preventing recurrent glomerulonephritis. Previous reports suggested that poststreptococcal glomerulonephritis presages a poor prognosis, but more recent evidence describes maternal recovery and neonatal health.[4,5,9]

Textbooks base the diagnosis of poststreptococcal glomerulonephritis on a positive throat culture, hematuria, an increased antistreptolysin-O (ASO) titer, and decreased C3 and C4 levels.[7] We attributed this patient's nephritis to GABHS infection because she had a documented positive throat culture (as did her son) that became negative after treatment with penicillin. She demonstrated a typical active urinary sediment, which returned to normal after delivery, and a positive anti-DNAase B agglutination titer of 1/120 (significantly elevated). A normal ASO level can occur in 15% to 20% of patients with streptococcal infections, particularly when the infection follows pyoderma or chorea.[7] The serotype of streptococci probably determines the amount of the antibody produced. When the ASO titer does not rise, the anti-DNAase B titer usually does. The combination of these two tests has a sensitivity of 99%.[10] Both of these tests generally become positive within 3 to 5 weeks of infection; a positive ASO can persist for weeks or even a year; and the anti-DNAase B titer generally returns to normal within 6 months, as does the urine analysis. This woman had no documented streptococcal infections in the preceding year. The C3 and C4 levels do not always fall in poststreptococcal glomerulonephritis.

The negative antinuclear antibody and antiglomerular basement membrane tests should have eliminated lupus nephritis and Goodpasture's syndrome, respectively. Two negative urine cultures excluded urinary tract infection, and the minimal hypertension, normal uric acid, and edema rapidly resolving with bed rest made preeclampsia unlikely. Only IgA nephropathy remained in the differential diagnosis, and previously normal urine analyses made this cause less probable. Because of the patient's rapid rate of recovery, biopsy and histological studies of the kidneys were not performed. Of the 24 previously reported cases of poststreptococcal glomerulonephritis, only 5 had tissue confirmation.[4,5] Diagnosis in the other cases relied on a positive throat culture or an increase in ASO titer or both.[4]

Because family physicians care for the entire family of obstetric patients, they are in a position to rapidly recognize and treat many infections in the pregnant woman. Fortunately, this woman gave birth to a healthy child and recovered completely after suffering a rare and unavoidable complication of a common disease.

References

1. Holmberg SD, Faich GA. Streptococcal pharyngitis and acute rheumatic fever in Rhode Island. JAMA 1983; 250:2307–12.
2. Nadler N, Salinas-Madrigal L, Charles A, Pollak VE. Acute glomerulonephritis during late pregnancy: report of a case. Obstet Gynecol 1969; 34:277.
3. Chesley LC. Hypertensive disorders of pregnancy. New York: Appleton-Century-Crofts, 1978:490–2.
4. Singson E, Fisher K, Lindheimer M. Acute poststreptococcal glomerulonephritis in pregnancy: case report with an 18-year follow-up. Am J Obstet Gynecol 1980; 137:857–8.
5. Fukuda O, Ito M, Nakayama M, Matsui K, Fujisaki S, Okamura H. Acute glomerulonephritis during the third trimester of pregnancy. Int J Gynecol Obstet 1988; 26:141–4.
6. Lindheimer MD, Katz AI. Kidney function and disease in pregnancy. Philadelphia: Lea & Febiger, 1977:152–4.
7. Dillion H. Streptococcal skin infections and glomerulonephritis. In: Hoeprich P. Infectious diseases. New York: Harper & Row, 1977:794–9.
8. Holm S. The pathogenesis of acute post-streptococcal glomerulonephritis in new lights. Acta Pathol Microbiol Immunol Scand 1988; 96:189–93.
9. Baldwin DS, Gluck MC, Schact RG, Gallo G. The long term course of poststreptococcal glomerulonephritis. Ann Intern Med 1974; 80:342.
10. Bisno A, Itzhak O. Serologic diagnosis of streptococcal infections. Am J Dis Child 1974; 127:676–81.