

Are Antibiotics Necessary for Pediatric Epididymitis?

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Objectives: To determine the percentage of cases of epididymitis in pediatric patients that is of bacterial cause and to identify factors that predict a positive urine culture.

Methods: We conducted a retrospective chart review of patients diagnosed with acute epididymitis or epididymo-orchitis in 1 pediatric emergency department for 11 years. Charts were reviewed for historical, physical, laboratory, and radiologic data. A positive urine culture was used to identify patients with a bacterial cause of epididymitis.

Results: A total of 160 patient records were initially identified as having a diagnosis of epididymitis; of these, 20 met exclusion criteria or did not have records available for review and 140 cases of epididymitis were reviewed. Patients' age ranged from 2 months to 17 years, with a median age of 11 years. Of these patients, 91% received empiric antibiotic therapy. Also, of these patients, 97 (69%) had a urine culture sent, of whom 4 (4.1%; 95% confidence interval, 1.1%–10.2%) were positive. Of the 4 positive urine cultures, 3 had organisms not sensitive to usual empiric therapy for urinary tract infections. The boys with positive urine cultures were not significantly different from the other patients in age, maximum temperature, or number of white blood cells on urinalysis.

Conclusions: Given the low incidence of urinary tract infections in boys with epididymitis, in prepubertal patients, antibiotic therapy can be reserved for young infants and those with pyuria or positive urine cultures. Because it is difficult to predict which patients will have a positive urine culture, urine cultures should be sent on all pediatric patients with epididymitis.

Key Words: epididymitis, acute scrotum, antibiotics

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The cause of epididymitis in pediatric patients is not well understood. In older men with prostatic hypertrophy and reflux of urine, enteric organisms are a common cause of epididymitis. Multiple studies have demonstrated that most cases of epididymitis in men younger than 35 years are due to sexually transmitted organisms.^{1–3} However, the cause in prepubertal boys is not well understood. Theories include an ascending infection from the bladder or urethra, chemical irritation from reflux of sterile urine, viral causes, and, occasionally, hematogenously spread bacteria.^{4–8}

Treatment of epididymitis in children has generally focused on antibiotic therapy. Most textbooks state that epididymitis is the result of an infection ascending from the bladder or urethra and should be treated with a course of antibiotics effective against usual urinary pathogens. However, there are few data to support a

bacterial cause of epididymitis in children, and these treatment recommendations are not evidence based.^{9–11}

Several studies have been published that demonstrate that, in patients with epididymitis, the results of urine cultures correlate well with those of cultures obtained from epididymal aspirates.^{12–14} In pediatric patients, positive urine cultures have been reported in between 7% and 83% of cases of epididymitis.^{7,8,15–20} Most studies report that less than a quarter of patients have positive urine cultures.

The objectives of this study were to review our center's experience with boys presenting to the pediatric emergency department with acute, nontraumatic epididymitis and to identify factors that predict a positive urine culture. Specifically, we reviewed the results of urinalyses, urine cultures, and sexually transmitted infection testing in these patients to determine the percentage of boys with epididymitis who had a bacterial infection.

METHODS

Study Design and Setting

This was a retrospective chart review of all cases of pediatric epididymitis seen in a single urban pediatric emergency department from 1996 to 2006. Children from birth up to their 18th birthday were included. The study protocol was approved by the institutional review board of Harbor – UCLA Medical Center.

Subjects

Potential cases were identified through a query of the discharge diagnoses of all pediatric patients in the hospital

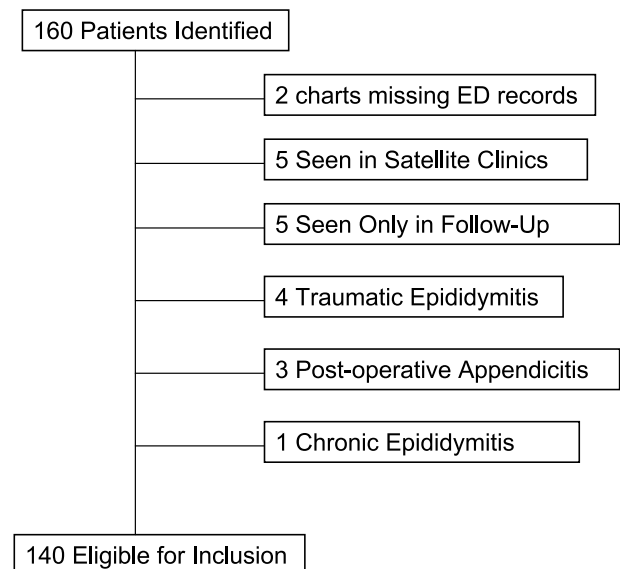


FIGURE 1. Flowchart of cohort identified as potential study subjects. A total of 201 patients were initially identified by medical records. After chart review, 61 cases were not eligible for inclusion, and the final study population consisted of 140 patients.

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TABLE 1. Historical, Physical Examination, and Laboratory Characteristics of Patients

	No. Positive/No. With Information Available in Chart (%)
History of fever	12/132 (10%)
Scrotal pain or tenderness	135/138 (98%)
Erythema	74/100 (74%)
Swelling	99/120 (83%)
History of vomiting	13/111 (12%)
Dysuria	18/118 (15%)
Positive urinalysis	6/123 (5%)
Positive urine culture	4/97 (4%)

information system from 1996 to 2006. A total of 160 patients were identified, and their medical records were reviewed. Cases were eligible if the patient was younger than 18 years and received a diagnosis of epididymitis or epididymo-orchitis in the pediatric emergency department, and the emergency department record was available for review. Exclusion criteria were epididymitis secondary to trauma, urologic surgery within the last month, and known lower genitourinary tract anomaly.

Data Collection

Data abstracted from the chart included historical information, physical examination findings, and results of any laboratory and radiologic examinations performed. We looked specifically at the urinalyses and cultures of the patients. On the basis of previous studies by other researchers,¹²⁻¹⁴ epididymitis was considered to be bacterial if urine cultures were positive. For purposes of this study, urinalysis was considered positive if 5 or more white blood cells per high-powered field were present on microscopy. If microscopy was not performed, urinalysis was considered positive if the dipstick showed any leukocyte esterase. Urine cultures with greater than 10,000 colony-forming units of a pure strain of bacteria were considered positive.

Data Analysis

Data were entered into a database (Excel; Microsoft Corp, Redmond, Wash) and translated into native SAS format using DBMS/Copy (Dataflux Corp, Cary, NC). Data were analyzed using SAS 9.1 (SAS Institute, Cary, NC). Medians and interquartile ranges (IQRs) were used to summarize numerical variables. The Wilcoxon rank sum test was used to compare numerical variables, and Fisher exact tests was used to compare categorical variables. *P* ≤ 0.05 was considered significant. No adjustments were made for multiple comparisons.

RESULTS

Of the 160 patients identified by the medical records department, 20 of the patients were not eligible for inclusion (Fig. 1). Five were excluded because, although they were in the computer system, their visits were at satellite clinics and were not in the hospital chart. Five were excluded because they were referred from outside clinics to urology clinic but were never seen in the emergency department. Four patients had traumatic epididymitis. Three patients had epididymitis after a perforated appendicitis and were diagnosed either in surgical follow-up clinic or while still hospitalized for appendicitis. One patient had

chronic epididymitis. Two of the charts were missing the emergency department visit record. One hundred and forty patients met inclusion criteria for this study.

Most presented with scrotal pain or tenderness (98%), scrotal erythema (74%), and scrotal swelling (83%). Few patients were febrile. Only 10% of patients reported a history of fever at home but even fewer (1%) had a temperature 38°C or higher recorded in the emergency department. In addition, 15% reported dysuria and 12% reported vomiting. Ages ranged from 2 months to 17 years, with a median age of 11 years (IQR, 8.5-13 years).

Of these patients, 121 (86%) had an ultrasound ordered as part of the diagnostic workup. No patient had an epididymal culture sent. Also, 124 patients (89%) had a urinalysis and/or culture sent, of whom 9 (7%) had a positive urinalysis and/or culture. Three patients had a positive urinalysis but did not have a culture sent. Of those 3 patients, 1 patient was positive for gonorrhea and chlamydia. Two patients had a positive urinalysis but a negative culture. Of the 140 patients, 97 (69%) had a urine culture sent. Of these, 4 (4.1%) were positive yielding, a 95% confidence interval of 1.1% to 10.2% (Table 1). None of these 4 patients were febrile at home or in the emergency department. The 4 boys with positive urine cultures did not differ significantly from the boys with negative urine cultures in age, maximum temperature in the emergency department, or in the number of white blood cells present in the urinalysis, although the power of these comparisons is small, given the low proportion with bacterial infection (Table 2). Additional information for all patients with either a positive urinalysis or culture is given in Table 3.

Of the 54 adolescent boys (≥12 years), 12 (37%) were tested for gonorrhea and chlamydia. Twenty tests for gonorrhea were performed; 1 specimen was not tested for chlamydia because an insufficient specimen was submitted to the laboratory. Only 1 patient tested positive for a sexually transmitted infection: a 16-year-old who was positive for both gonorrhea and chlamydia. Therefore, 5% of the patients tested for a sexually transmitted infection were positive. Of the 25 patients 15 to 17 years, only 15 (60%) were tested for gonorrhea and chlamydia.

Of all patients, 91% received antibiotics. Of the 25 patients 15 years and older, 24 (96%) received empiric antibiotics. Of these patients, 5 (20%) received empiric treatment of urinary tract infection and were not covered for sexually transmitted infections. Of the 86 boys younger than 12 years, discharge medications are known for 85 patients. Of these 85 patients, 76 (89%) were empirically treated with antibiotics, most commonly with cephalexin or cotrimazole. The 4 boys who ultimately had a positive urine culture were all treated with either cephalexin or cotrimazole. Of those 4 patients, 3 were initially treated with antibiotics that would not cover the organism isolated.

TABLE 2. Clinical Characteristics of Patients With Positive and Negative Urine Cultures

	Negative Urine Culture	Positive Urine Culture	<i>P</i>
Age, yr	11 (9-13)	6.5 (1.6-12.5)	0.27
No. white blood cells on urinalysis	0 (0-0.5)	1.5 (0-114)	0.14
Maximum recorded temperature, °C	37.1 (36.7-37.4)	37.1 (36.8-37.4)	0.91
Values are median (IQR).			

TABLE 3. Characteristics of Patients With Positive Urinalysis and/or Urine Cultures

Age	History of Fever	Highest Temperature Recorded, °C	Urinalysis	No. Leukocytes on Urinalysis	No. Red Blood Cells on Urinalysis
2 mo	No	37.7	Negative	3	0
3 yr	No	37.1	Negative	0	1
7 yr	No	36	Positive	Trace (no micro)	Negative (no micro)
10 yr	No	37.1	Negative	0	0
12 yr	No	36.8	Positive	6	1
14 yr	No	37.5	Positive	299	4
15 yr	No	36.5	Positive (3+ leukocytes, 2+ heme)	225	23
16 yr	Unknown	37.7	Positive	13	2
17 yr	Yes	36.6	Positive	5	3

Almost all (98%) patients were discharged home. Two patients were admitted to the pediatric ward. One patient was discharged home and admitted to the ward at a follow-up visit.

DISCUSSION

In contrast to common teaching, we found that a bacterial cause for epididymitis was uncommon in children. Of all boys, 91% were treated with antibiotics, but only 5 patients (4%) had a proven bacterial infection: 4 with urinary tract infections and 1 with a sexually transmitted infection. In addition, most of the bacterial cases of epididymitis identified were due to organisms not treated with commonly used empiric antibiotics.

Epididymal aspirate cultures were not routinely sent. However, previous data demonstrate that urine cultures and testing for sexually transmitted infections will isolate bacteria responsible for cases of uncomplicated epididymitis. Several studies on pediatric and adult patients have shown that no patient had a positive epididymal culture unless the urine or urethral culture was positive for the same organism.^{12,14} In contrast, there is a report of 4 men whose epididymal cultures revealed an organism not isolated in the urine.¹³ However, these 4 men either had been pre-treated with antibiotics and/or had an indwelling urinary catheter. On the basis of this literature, we believe that epididymal cultures are not required to determine whether epididymitis is due to a bacterial infection. Urine cultures and, in sexually active patients, gonorrhea and chlamydia testing are sufficient.

Previous studies have indirectly examined the causes of epididymitis. One study of 336 adult and pediatric patients compared antibiotics, oral streptokinase-streptodornase, and oxyphenbutazone (a nonsteroidal anti-inflammatory agent) for the treatment of epididymitis.²¹ Patients receiving oxyphenbutazone recovered the fastest, suggesting a nonbacterial cause of epididymitis. In 1 study of 44 boys younger than 15 years, patients with epididymitis were more likely to have elevated titers to *Mycoplasma pneumoniae*, adenoviruses, and enteroviruses than control subjects.⁷ In a prospective study of 48 prepubertal boys, those with a negative urinalysis were treated with supportive measures but were not given antibiotics.¹⁶ There were no complications during a 3-month follow-up period. The authors suggested that, in boys without urologic abnormalities, epididymitis in the absence of pyuria does not require antibiotics.

Data on epididymitis in pediatric patients are limited, and even less information is available on young infants. One retro-

spective study of 7 infants younger than 3 months showed a high rate of bacterial disease.²² Of the 7 patients with epididymitis or orchitis, 6 had urine or blood cultures sent and all 6 had positive blood or urine cultures. In our study, there was only 1 case of epididymitis in a patient younger than 3 months. That patient had a positive urine culture. Although very limited, the available data suggest that young infants with epididymitis should be treated with antibiotics.

Previous studies have shown that most men younger than 35 years with epididymitis have chlamydia or gonorrhea.¹⁻³ However, in our study, only 60% of boys 15 years and older were tested for sexually transmitted infections and only 1 boy tested positive for a sexually transmitted infection. Sexual history was not documented in the chart for most adolescents. At our hospital, the nucleic acid amplification test for detection of gonorrhea and chlamydia was not available until 2003, half-way into the study period. Before that time, testing required sending a urethral swab. This may explain the low rate of testing in teenage boys in this series. On the basis of previous literature, any sexually active boy or any adolescent with an unreliable sexual history presenting with epididymitis should be tested for gonorrhea and chlamydia.

In the current study, only 4% of patients with a urine culture sent had a positive result. It could be argued that the urine cultures of the 10-year-old boy with mixed flora and the 3-year-old boy with 27,000 *Enterococcus faecium* were contaminants, but given the clinical scenario, many clinicians would treat these patients as having urinary tract infections. Because it was not possible to predict which patients would have positive urine cultures, our data suggest that urine cultures should be sent on all patients with epididymitis even if the urinalysis is negative. We propose that, given the low rate of positive urine cultures seen in this and other studies, an option would be to send a urine culture but withhold antibiotics pending urine culture results. Boys with positive urinalyses should continue to be presumptively treated with antibiotics active against usual urinary pathogens. This would avoid unnecessary antibiotics in most patients with nonbacterial causes.

The published studies of pediatric epididymitis are all small. The largest study of pediatric epididymitis previously published included 110 patients.²³ That study did not include information on urinalyses or cultures. To our knowledge, our study is the largest series of pediatric epididymitis treated in the emergency department published to date. In addition, most series published include only patients who were hospitalized for management of an acute scrotum. It is likely that the patients

Gram Stain	Urine Culture	Gonorrhea/Chlamydia Testing	Empiric Antibiotics
Not done	50,000 <i>Escherichia coli</i>	Not done	Cephalexin
<50,000 gram-positive cocci	27,000 <i>Enterococcus faecium</i>	Not done	Cephalexin
Not done	Not done	Not done	Cotrimazole
Negative	36,000 <i>Enterococcus</i> -like, >100,000 gram-positive rods, diptheroids	Not done	Cotrimazole
Not done	Not done	Gonorrhea-negative (chlamydia not done—insufficient sample)	Ceftriaxone + doxycycline
<50,000 gram-positive cocci	Negative	Not done	Ceftriaxone + doxycycline
Not done	>100,000 <i>Enterococcus avium</i>	Not done	Cephalexin
Not done	Not done	Gonorrhea and chlamydia-positive	Ceftriaxone + doxycycline
Not done	Negative	Negative	Cefixime + doxycycline

admitted to the hospital with epididymitis are fundamentally different from the average patient presenting to the emergency department. The patients in our study were largely treated as outpatients and, therefore, more similarly mirror the average pediatric patient with epididymitis presenting to the emergency department.

LIMITATIONS

Pediatric epididymitis is infrequent enough that a prospective study design was not possible. However, the retrospective design of this study introduced several limitations. We were dependent on information recorded in the chart, and frequently, historical and physical examination data were missing. Workup was determined by each physician, so all patients did not have the same laboratory and radiologic studies performed. Specifically, only 69% of patients had a urine culture sent. Another limitation is that follow-up information was rarely available.

CONCLUSIONS

In this study, only 5 of 140 patients had a proven bacterial infection. Four percent of urine cultures sent were positive. Given this low rate of bacterial epididymitis, we recommend a selective approach to antibiotic therapy in pediatric epididymitis. We recommend treating all young infants, regardless of urinalysis results, and older boys who have a positive urinalysis or culture. Sexually active adolescents with epididymitis should be treated presumptively for sexually transmitted infections. In this retrospective study, we excluded boys with recent urologic surgery or known lower urinary tract anomalies and cannot make recommendations for treatment of these patients.

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