Prevalence of Urinary Tract Infection among Children with Febrile Convulsion

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Abstract

Background: Febrile convulsion (FC) and urinary tract infection (UTI) account for a large number of visits to pediatric emergency departments and both are common during early childhood. The aim of this study was to determine the prevalence of UTI among children presenting with FC.

Methods: In this prospective study, children with FC who presented to a pediatric emergency department were consecutively evaluated by an attending pediatrician. Demographic data, characteristics of convulsion, signs, and symptoms of UTI, laboratory findings, and final diagnoses were collected. Catheter specimens for urine analysis and culture were obtained from all of the patients.

Results: A total of 153 children (88 boys, 57.5%) with mean age ± SD of 21.64 ± 12.86 months were included. Urinary frequency and/or symptoms of UTI were present in 58 (38.1%) children. Urine specimen from midstream void is ≥ 10^4 CFU/ml with symptoms or ≥ 10^5 CFU/ml without symptoms were defined as UTI. UTI was identified in 24 (15.7%) patients of which 17 (11.1%) patients, 58.8% of whom did not have any signs or symptoms attributable to UTI.

Conclusion: The prevalence of UTI among children with FC is relatively high and most of the patients have no signs or symptoms other than fever. Routine performance of UC is recommended in this population.

Keywords: Urinary tract infection; Febrile convulsion; Urine culture

Introduction

Urinary tract infection (UTI) is one of the most common bacterial infections in childhood and accounts for up to 14% of the pediatric visits to the emergency departments (ED) [1]. Pediatric UTI is common in the first five years of life [2], the same age during which febrile convulsions (FC) occur. Primary evaluation of children presenting with FC aims at diagnosing the potential sources of infection, including UTIs [3,4]. Therefore, physicians usually face a situation in which they have to make the decision of performing a urine sampling. Knowing the nonspecific presentation of the UTI in early childhood, making such decisions is hard. Therefore, the prevalence of UTI may represent an estimate of the probability of this infection prior to diagnostic testing and in part facilitate the decision-making process for the physicians. Accordingly, this study was conducted to determine the prevalence of UTI among children with FC.

Materials and Methods

This prospective study was conducted during January to September 2014 in the ED of the Children’s Medical Center hospital (an affiliated hospital of Tehran University of Medical Science, Tehran, Iran). The study protocol was approved by Ethics Committee of the university and written informed consents were obtained from parents or caregivers of the children. Patients were eligible for enrollment if: 1) they were aged between 6 months to 5 years, 2) had a temperature of at least 38.3°C at presentation, and 3) presented to the ED with seizure or had a reliable history of seizure prior to admission. Patients with a history of unprovoked a febrile seizure, significant neurological abnormality or head trauma were excluded.

Patients were concisely evaluated by an attending pediatrician at the time of admission. Antiepileptic medications, antipyretics and antibiotics were administered as standard medical treatment when indicated. Although urethral catheterization may be associated with some complications, such as urethra rage or late urethral stricture the urine specimens were obtained by urethral catheterization to assure the certainty of infection. Urinalyses (UA), urine cultures (UC) and complete blood counts (CBC) were performed in all of the patients, regardless of the presence of signs or symptoms of a possible source of infection (e.g., upper respiratory infection). Other laboratory tests and paraclinical investigations were performed based on the decision of the ED pediatricians. A list of signs and symptoms of pediatric UTI, made through expert’s opinion and literature review, was used for the documentation of the signs and symptoms of UTI. If there were 2nd or 3rd episodes children should undergone more exams such as VCUG to find vesico-ureteral reflux, which is frequently associated with recurrent UTI.

Other data including demographic characteristic, past medical history, characteristics of seizure, laboratory findings and etiology of fever were collected using a data collection sheet.

EAU or AUA definition concerning criteria for UTI in children using Urine specimen from midstream void is ≥ 10^4 CFU/ml with symptoms or ≥ 10^5 CFU/ml without symptoms, for urine specimen from bladder catheterization, it is ≥ 1,000-50,000 CFU/ML. FC was defined according to the American Academy of Pedictricians’ clinical practice guideline as a seizure accompanied by fever in a child of 6 to 60 months age in absence of metabolic abnormality, central nervous system infection, or history of non-febrile seizure [5]. A positive UC was defined as the growth of at least 10^6 colony-forming units (CFU) per ml of a single pathogen from a catheter specimen. Other definitions are presented in table 1.

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Descriptive statistics of the patient characteristics, signs, symptoms and diagnostic evaluations were performed using SPSS version 15 (SPSS Inc., Chicago, IL, USA).

**Results**

After screening for eligibility criteria, 153 patients (88 male, 56%) entered the final sample. The mean age ± SD of the patients was 21.64 ± 12.86 months (Figure 1). Seven patients (4.6%) had a history of urogenital anomaly. History of UTI was present in 8 cases (5.2%), all of whom had undergone adequate antibiotic treatment at least 3 months prior to presentation. Out of 88 boys, 70 (79.5%) were circumcised.

Patients with first episode of FC (136 cases, 88.9%) consisted the majority of the study population. Whereas, 12 cases (7.8%) presented with second episode and 5 cases (3.2%) with third episode of FC. The mean ± SD of the seizure duration was 5.48 ± 3.17 minutes and 3 patients (2%) had prolonged seizures. Median of seizure frequency was 1 per 24 hours and 25 patients had experienced recurrent seizures. Of 33 patients with complex FC, 20 (60.6%) had one complex feature, 11 (33.3%) had two complex features and 2 (6.0%) had three complex features (Figure 2).

On medical history taking and physical examination, 137 patients (89.5%) had no sign or symptom attributable to UTI other than fever. Urinary frequency and abdominal pain were the only presenting symptoms which were present in 6 (3.9%) and 10 (6.5%) patients, respectively. Mean body temperature at presentation was 38.82 ± 0.61 °C.

153 urine samples were obtained from 153 patients, 50 patients (32.7%) had at least one abnormal parameter in urine analysis (i.e., pyuria or hematuria). The median urine RBC and WBC counts were 0 with IQRs of 0-2 and 0-5, respectively. Pyuria was present in 38 patients (24.8%) and hematuria. Of 153 cultured specimens, UC was positive in 17 (11.1%). *E.coli* was the single isolated pathogen and colony counts were more than $1 \times 10^{9}$ per HPF in all of the cultures. Characteristics of the patients diagnosed with UTI are presented in Table 2. Blood cultures were obtained in 101 cases (66%), with only one positive result for Brucellosis. The Mean ± SD of peripheral blood WBC was 12231 ± 4685 per µL. Lumbar puncture was performed in 68 cases (44.4%). The median CSF WBC count was zero (IQR=0–2) and all CSF cultures were negative.

In the studied population, upper respiratory infection, with 37 cases (24.2%) was identified as the most common cause of fever and UTI was the single isolated pathogen and colony counts were $1 \times 10^{9}$ per ml of a single pathogen from a catheter specimen.
Comparison of the findings of this study with previous studies

In conclusion, knowing the relatively high prevalence of UTI, it must be considered as a possible diagnosis for any child presenting with FC. We recommend the routine performance of UCs in this population. Future studies may focus on developing decision rules which will optimize the patient care by estimating the probability of UTI prior to further investigations.

Acknowledgement
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Table 4: Comparison of the findings of this study with previous studies regarding the rate of urine sampling and prevalence of UTI.

<table>
<thead>
<tr>
<th>Study</th>
<th>Total sample size</th>
<th>Rate of urine sampling (%)</th>
<th>Positive urine culture (n)</th>
<th>Prevalence of UTI (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Study population</td>
</tr>
<tr>
<td>Rutter and Smales [11]</td>
<td>328</td>
<td>NR*</td>
<td>4</td>
<td>1.2</td>
</tr>
<tr>
<td>McIntyre et al. [12]</td>
<td>307</td>
<td>88.6</td>
<td>7</td>
<td>2.3</td>
</tr>
<tr>
<td>Lee and Verrier Jones [13]</td>
<td>403</td>
<td>56</td>
<td>19</td>
<td>5</td>
</tr>
<tr>
<td>Teach and Geil [14]</td>
<td>243</td>
<td>53.5</td>
<td>1</td>
<td>0.4</td>
</tr>
<tr>
<td>Trainor et al. [7]</td>
<td>455</td>
<td>38</td>
<td>10</td>
<td>2.2</td>
</tr>
<tr>
<td>Donaldson et al. [15]</td>
<td>59</td>
<td>68</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Momen et al. [16]</td>
<td>137</td>
<td>NR</td>
<td>9</td>
<td>6.6</td>
</tr>
<tr>
<td>Bello et al [17]</td>
<td>145</td>
<td>100</td>
<td>15</td>
<td>10.3</td>
</tr>
<tr>
<td>This study</td>
<td>153</td>
<td>100</td>
<td>17</td>
<td>11.1%</td>
</tr>
</tbody>
</table>

*NR, Not reported; **Prevalence of UTI was 12% in uncontaminated urine samples (n=155).

References


