



## Research Article

# Urinary Tract Infections in Pediatric Surgery: A Prospective Study of 36 Cases

Ndèye Aby Ndoye<sup>1\*</sup>, Lissoune Cisse<sup>2</sup>, Papa Alassane Mbaye<sup>1</sup>, Modou Ngom<sup>2</sup>, Yacine Fall<sup>2</sup>, Fatou SY<sup>2</sup>, Doudou Gueye<sup>2</sup>, Ibrahima Bocar Welle<sup>2</sup>, Aloïse Sagna<sup>1</sup>, Oumar<sup>3</sup> Ndour, Gabriel Ngom<sup>3</sup>

<sup>1</sup>Department of Pediatric Surgery, Albert Royer Children's Hospital, Cheikh Anta Diop University, Dakar, Senegal

<sup>2</sup>Department of Pediatric Surgery, Albert Royer Children's Hospital Dakar, Senegal

<sup>3</sup>Department of Pediatric Surgery, Aristide LeDantec Hospital, Cheikh Anta Diop University, Dakar, Senegal

\*Corresponding author: Ndèye Aby Ndoye, Department of Pediatric Surgery, Albert Royer Children's Hospital, Avenue Cheikh Anta Diop University, Dakar, Senegal

**Citation:** Ndoye NA, Cisse L, baye PAM, Ngom M, Fall Y (2023) Urinary Tract Infections in Pediatric Surgery: A Prospective Study of 36 Cases. Arch Pediatr 8: 237. DOI: 10.29011/2575-825X.100237

**Received Date:** 12 January 2023; **Accepted Date:** 20 January 2023; **Published Date:** 24 January 2023.

## Abstract

**Introduction:** Urinary tract infection is one of the most common bacterial infections in pediatrics. The objective of our work is to determine the epidemiology and the profile of patients likely to develop a urinary infection in pediatric surgery. **Patients and method:** This is a prospective, descriptive study conducted in the pediatric surgery department of the Albert Royer Children's Hospital in Dakar over a period of 14 months, from April 1, 2020 to May 31, 2021. **Results:** We collected 36 patients, representing 3.08% of the patients hospitalized and followed during the study period. The average age was 3 years and infants represented 41.6%. The sex ratio was 3. Thirty-three patients had abnormalities of the urinary tract defect, including 21 posterior urethral valves (58.7%). Fourteen patients (38.9%) had a history of urinary catheterization. Probabilistic antibiotic therapy combining a 3rd generation cephalosporin and an aminoglycoside was used as first-line treatment in 22 cases (61%). Adaptation of antibiotic therapy was necessary in 4 patients with multi-resistant bacteria secreting extended-spectrum  $\beta$ -lactamase. Ten patients presented a recurrence requiring circumcision in 5 children with urinary tract abnormalities. **Conclusion:** Urinary tract infections are frequent in pediatric surgery. They mainly affect male infants with urinary tract abnormalities or who have had an urinary catheterization.

**Keywords:** Child; Surgery; Urinary catheterization; Urinary tract infection; Urinary tract abnormalities

## Introduction

Urinary tract infection (UTI) is one of the most common bacterial infections in pediatrics and is a major public health problem [1]. In surgical departments, it is often associated with a functional or anatomical abnormality of the urinary tract. It is a serious pathology because it occurs in a growing organ with a potential risk of progression to chronic renal failure and renal destruction [1]. The prevalence of UTI in children depends on multiple factors, including age and gender, but the incidence

of first episode is highest in the first year of life, and the risk of bacteremia is greatest [2].

UTIs are mainly caused by enterobacteria, with *Escherichia coli* in the lead [1,3].

The development of bacterial resistance, particularly from enterobacteria secreting extended-spectrum  $\beta$ -lactamase involved in UTIs, limits the choice of antibiotics and requires up-to-date knowledge of local bacteriological data in order to better adapt probabilistic antibiotic therapy [4].

The aim of our work is to determine the epidemiology of UTIs, as well as the risk factors for developing a UTI in pediatric

surgery.

**Patients and Method**

This was a prospective, single-center study conducted in the pediatric surgery department of the Albert Royer Children’s Hospital from April 1, 2020 to May 31, 2021. All children aged 0-15 years, hospitalized or followed up in the department during the study period for a bacterial urinary tract infection with positive UTI, were included. The parameters studied were frequency, age, sex, history, ECBU data, underlying uropathies, other etiological factors, treatment and evolution.

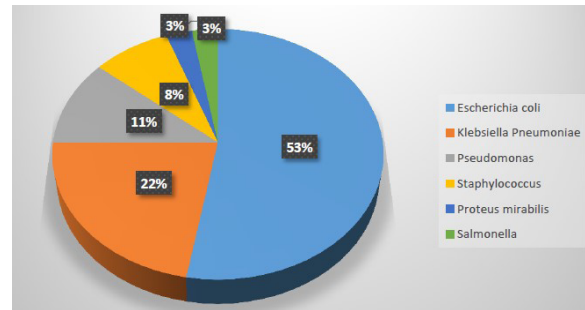
**Results**

We collected 36 children who had a urinary tract infection over 14 months, representing 2.76 UTIs/month and 3.08% of patients hospitalized during the study period. The average age of the patients in our series was 3 years with extremes of 2 months and 12 years. Infants represented 15 cases (41.6%). Our series was composed of 27 boys and 9 girls, with a sex ratio of 3.

At the time of diagnosis of UTI, 14 patients (39%) had an history of urinary tract malformation, 7 of whom had posterior urethral valves (Table 1). 20 patients (56%) had a previous history of UTI. Fourteen patients (38.9%) had had an indwelling urinary catheter. Six patients (16%) had a UTI after surgery. Twelve strains of Escherichia coli were found, representing 53% of patients (Figure 1).

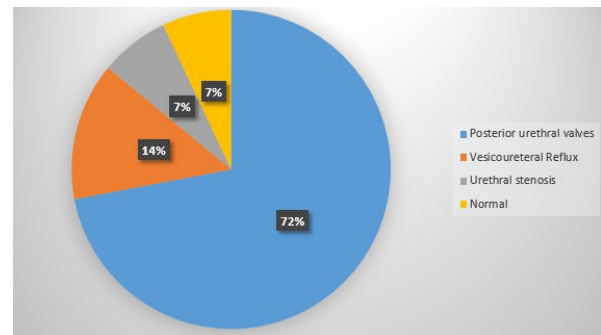
**Table 1:** Distribution of patients by history of urinary tract abnormalities.

Urinary tract abnormalities	Number	Percentage
Posterior urethral valves	8	57
Anorectal malformation with urinary fistula	1	7,1
Vesicoureteral junction obstruction	2	14
Congenital megabladder	1	7,1
Pyeloureteral junction syndrome	1	7,1
Hypospadias	1	7,1
Total	14	100



**Figure 1:** Distribution of patients according to the germs isolated.

The etiological research revealed 32 malformations of the urinary tract, representing 89% of patients (Figure 2). Three patients had tight phimosis and one patient had urinary lithiasis. The most commonly used antibiotics were aminoglycosides in 26 patients, third generation cephalosporins in 22 patients, and β-lactams in 7 patients (Table 2).

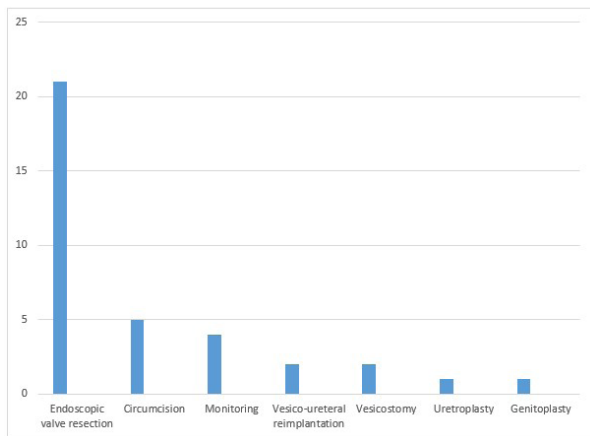


**Figure 2:** Distribution of patients according to urinary tract abnormalities.

**Table 2:** Distribution of patients according to the antibiotic treatment.

Antibiotic therapy	Number	Percentage
Cefotaxime + Gentamycin	13	36.1%
Ceftriaxone + Gentamycin	9	25%
Amoxicillin clavulanic acid	7	19.4%
Amikacin+Gentamycin	4	11.1%
Ciprofloxacin	1	2.7%
Imipenem	2	5.6%
TOTAL	36	100

Other treatments were endoscopic valve resection of the posterior urethra in 21 cases, circumcision in 5 cases (Figure 3). After 10 days of antibiotic treatment, 22 patients (61.1%) had a favourable outcome, 4 children (11.1%) had a resistant germ at the follow-up ECBU, and they progressed well after treatment with imipenem.



**Figure 3:** Distribution of patients according to other therapeutic means.

## Discussion

The incidence of urinary tract infection in children is difficult to establish because of the non-specificity of the symptoms, especially in newborns and infants, and the significant number of children treated for UTI without bacteriological evidence [5]. Nevertheless, the number of children treated for UTI in our study is similar to that found by other authors in our country, such as Coulibaly [7]. Urinary tract infections mainly affect infants as was the case in our study and reported in the literature. Indeed, few malformative uropathies are diagnosed antenatally in our context. And they are revealed in infants after a urinary infection.

Enterobacteria have dominated the bacteriological profile of urinary tract infections, with *Escherichia coli* coming out on top [6,7]. This is due to the ascending pathophysiology of UTI as well as the high colonisation of the perineum by enterobacteria of digestive origin. In addition, *Escherichia coli* has specific uropathogenic factors such as bacterial adhesins.

In our series, the posterior urethral valve (PUV) is the most common urinary tract defect associated with UTIs, in contrast to other series in the literature that note vesico-ureteral reflux (VUR) as the most common underlying urinary tract anomaly [8]. This may be explained by the frequency of VUP in our practice. Indeed, the availability of an endoscopic neonatal valve resector justifies the transfer of all young patients with this anomaly to our facility,

in addition to the fact that VUR is very rarely encountered in our practice and is probably under diagnosed. Fourteen patients (38.9%) had a history of indwelling urinary catheterization as part of the treatment of a urinary tract malformation or other surgery.

The treatment of UTI in children has long been a source of debate about the choice of antibiotic, the route of administration and the duration of treatment, which in most cases depends on the clinical presentation but also on local and individual preferences.

According to the recommendations, the choice of antibiotic should take into account the presumed bacterial epidemiology, the in vitro antibiotic susceptibility of the bacteria most often involved and the pharmacokinetic and pharmacodynamic properties of the molecules [9].

In acute pyelonephritis (AP), treatment should be started immediately and the initial choice of antibiotic should be guided by knowledge of the resistance profile of the urinary tract organisms most commonly encountered locally. Injectable cephalosporins and aminoglycosides, the molecules used in the first line of treatment, have the most favourable efficacy criteria as a probabilistic treatment for ANP, given the frequency of *E. Coli* and the lower resistance rate of these two molecules compared to others. Nevertheless, their use should not be trivialised so as not to increase the percentage of resistant strains [10].

The initial parenteral route is recommended by the French agency for the safety of health products, Afssaps, and was used in all our patients [11]. According to studies, urinary tract infection is 10 to 15 times more frequent in uncircumcised boys [12]. Circumcision is therefore a means of preventing urinary tract infection and should be considered in children under one year of age with urinary tract abnormalities in the same way as antibiotic prophylaxis. It was performed in 5 of our patients who had a recurrence of UTI in addition to treatment of the underlying malformation. The outcome was positive in 82.6% of the children. The rate of recurrence of UTI within 6 months of the first episode varies between 20 and 48% according to studies [13]. In our series, recurrence of UTI was noted in 7 children, representing 19.4%, although 20 had a history of UTI, which is in line with the literature [13,14].

## Conclusion

Urinary tract infections are frequent in pediatric surgery and mainly affect male infants with urinary tract abnormalities or children who have had an indwelling urinary catheter. In view of the emergence of multi-resistant enterobacteria, it is necessary to set up a programme to monitor bacterial ecology and antibiotic sensitivity in order to allow a controlled prescription of probabilistic antibiotic therapy.

## References

1. Ayelign B, Abebe B, Shibeshi A, Meshesha S, Shibabaw T, et al. (2018) Bacterial isolates and their antimicrobial susceptibility patterns among pediatric patients with urinary tract infections. Turk J Urol 44: 62-69.
2. Arshad M, Seed PC (2015) Urinary Tract Infections in the Infant. Clin Perinatol 42: 17-28.
3. Beyene G, Tsegaye W (2011) Bacterial uropathogens in urinary tract infection and antibiotic susceptibility pattern in jimma university specialized hospital, southwest ethiopia. Ethiop J Health Sci 21: 141-146.
4. Armand-Lefèvre L (2017) La résistance en ville, mythe ou réalité ? La menace des entérobactéries productrices de BLSE. Journal Européen des Urgences et de Réanimation 29: 235-240.
5. Masson E (2023) Épidémiologie de l'infection urinaire chez l'enfant à Marrakech [Internet]. EM-Consulte.
6. Masson E (2023) Synthèse de la prise en charge des infections urinaires de l'enfant [Internet]. EM-Consulte.
7. Les infections urinaires - Bernard Lobel , Claude-James Soussy - Librairie Eyrolles [Internet]
8. Masson E (2023) Les uropathies malformatives chez l'enfant : à propos de 71 cas [Internet].
9. Chong CY, Tan ASL, Ng W, Tan-Kendrick A, Balakrishnan A, et al. (2003) Treatment of urinary tract infection with gentamicin once or three times daily. Acta Paediatr 92: 291-296.
10. Masson E (2023) Infections urinaires de l'enfant [Internet]. EM-Consulte.
11. Shah G, Upadhyay J (2005) Controversies in the diagnosis and management of urinary tract infections in children. Paediatr Drugs 7: 339-346.
12. Schoen EJ, Colby CJ, Ray GT (2000) Newborn circumcision decreases incidence and costs of urinary tract infections during the first year of life. Pediatrics 105: 789-793.
13. Viday A, Heffner MD, Marc H, Gorelick MD (2008) Pediatric Urinary Tract Infection. Clin Ped Emerg Med 9: 233-237.
14. Larcombe J (2015) Urinary tract infection in children: recurrent infections. BMJ Clin Evid 12: 0306.