*Albanian Journal of Trauma and Emergency Surgery (2025) 9/1:1726 - 1729*
*DOI: https://doi.org/10.32391/ajtes.v9i1.447*

OPEN ACCESS JOURNALS

CASE REPORTS

# *Candiduria in Pediatric Patients: Two Case Reports and a Review of Management Strategies*

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*Received:* 9 December 2025 / *Accepted:* 03 January 2025 / *Published online:* 20 January 2025
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## *Abstract*

***Introduction:*** Urinary infections, while common in intensive care and surgical units, present a unique challenge when fungal pathogens are involved. These fungal urinary infections, known as fungiuria, require a more intricate and prolonged treatment plan involving antifungal medications. This complexity underscores the need for specialized knowledge and skills in managing such cases.

This study aims to present two cases of operated pediatric patients who developed urinary fungal infections following Catheterization and simultaneous treatment with two antibiotics.

***Results:*** Two pediatric patients, aged 12 and 16, underwent surgical procedures in our clinic. The first patient was treated for gangrenous appendicitis complicated by generalized peritonitis. The second patient was treated for a perforation of the small intestine caused by gangrene in a segment of the bowel, resulting from twisting around intestinal adhesions, also complicated by generalized peritonitis.

Both patients, aged 12 and 16, developed urinary symptoms four days after surgery. Microbiological analysis confirmed the presence of fungal infections caused by Candida albicans. However, with the administration of antifungal medications, we were able to successfully eradicate Candida albicans from their urinary tracts, as confirmed by follow-up microbiological cultures after several weeks of therapy. This successful outcome should instill a sense of accomplishment in the audience.

***Conclusion:*** Candidiasis, a significant complication in patients undergoing prolonged Catheterization and simultaneous antibiotic therapy, requires vigilant monitoring. The challenging treatment often necessitates long-term administration of antifungal medications for successful eradication. This underscores the importance of vigilance in monitoring fungal infections in catheterized patients and adopting preventive strategies to minimize their occurrence.

***Keywords:*** Candida, antibiotics, urinary catheter, candiduria

## *Introduction*

Candiduria is typically caused by the overgrowth of *Candida* species in the urinary tract. These pathogens are commonly found in the mouth, skin, and intestines. Children's most frequently associated species include *Candida albicans*, *Candida glabrata*, and *Candida tropicalis* [1]. In healthy individuals, the incidence of candiduria is less than 1%; however, this incidence increases significantly in immunocompromised individuals or those with diabetes and systemic diseases [2, 3].

In pediatric patients, several factors contribute to an increased risk of candiduria. Among the most common causes are:

- Urinary Tract Abnormalities, particularly vesicoureteral reflux.
- Prolonged Use of Broad-Spectrum Antibiotics, which disrupt the natural microbial balance.
- Long-term Catheterization of the urinary tract.
- Poorly Controlled Diabetes, where elevated glucose levels in the urine provide an environment conducive to fungal growth.

*Original article, no submission or publication in advance or in parallel*

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- Immunocompromised Conditions, such as leukemia, solid organ transplantation, or other forms of immunosuppression [1, 2, 4, 8].

These factors highlight the importance of vigilance in managing pediatric patients at risk for fungal urinary infections to minimize their incidence and associated complications.

## *Case Report 1*

An 8-year-old girl was admitted to the Department of Surgery due to a perforated appendix accompanied by generalized peritonitis. Following an appendectomy and peritoneal lavage, the patient was hospitalized. On the fifth day of hospitalization, she developed febrile episodes and suprapubic pain. The discharge from the abdominal drain was minimal and consisted of clear serous fluid, while the urine appeared cloudy and foul-smelling. Despite being catheterized, the patient reported a sensation of urgency to urinate.

After the surgical intervention, the patient's vital signs stabilized, and no significant deterioration was observed at the onset of urinary symptoms. According to the parents, the patient had experienced a urinary tract infection (UTI) two years prior.

Laboratory investigations revealed a white blood cell (WBC) count of 12.8/μL, with 48% neutrophils, a C-reactive protein (CRP) level of 4, a serum creatinine level of 0.16 mg/dL (normal range: 0.03–0.50 mg/dL), and a urea level of 32 mg/dL (normal range: 2.1–8.5 mmol/L). Urinalysis showed 3+ proteinuria, glucose, nitrites, and microhematuria. Abdominal ultrasonography identified minimal fluid in the Douglas cavity without any other abnormalities.

After replacing the urinary catheter and disinfecting it with an alcohol solution, approximately 15 mL of urine was collected for culture. Microbiological examination identified *Candida albicans* in the fungal culture, which was sensitive to fluconazole. Urine samples were inoculated onto blood and chromogenic media. After 16–24 hours of incubation, the colonies were sent for identification, and the genus and species were determined using the Vitek MS system.

The patient was started on fluconazole at a dose of 3 mg/kg/day. Postoperatively, she was also treated with ceftriaxone at a dose of 1 g twice daily, which was continued alongside fluconazole until her discharge from the hospital.

Urine cultures were repeated on the fifth and tenth days after initiating antifungal treatment, and both results remained positive for *C. albicans*. Consequently, fluconazole therapy was continued. The urine culture tested negative for *C. albicans* three weeks after starting treatment, but the patient continued fluconazole therapy for an additional two weeks.

Following the completion of therapy, urine cultures were repeated at intervals of two, five, and eight weeks, and all three results were negative for candiduria.

## *Case Report 2*

A 16-year-old boy was hospitalized with abdominal pain localized across all quadrants. Anamnesis revealed that the patient had undergone surgery six years earlier for a perforated appendix. Physical examination showed a distended and tense abdomen with pronounced tenderness in all quadrants, accompanied by positive peritoneal signs. The patient reported multiple episodes of vomiting and an absence of defecation for the previous three days. Additionally, mucous membranes were dry, and skin turgor was slightly decreased.

Abdominal ultrasonography revealed distended, fluid-filled small bowel loops, while plain abdominal radiography showed multiple air-fluid levels. Laboratory analyses were within normal ranges, except for slightly elevated urea and creatinine levels. The white blood cell (WBC) count was 18.8/μL, and the C-reactive protein (CRP) level was elevated at 84 mg/dL. Electrolyte values were normal: sodium 139 mmol/L, potassium 4.4 mmol/L, calcium 9.4–10.7 mg/dL, chloride 102 mmol/L, and bicarbonate 22 mmol/L.

A nasogastric tube was inserted, draining approximately 300 mL of gastric juice with bile content. A urinary catheter was also placed, yielding only 150 mL of concentrated urine. The patient's treatment included Ringer's solution and gastric antisecretory medication (famotidine).

Despite intensive treatment, the patient's condition worsened, with persistent abdominal distension. A computed tomography (CT) scan of the abdomen revealed an abrupt transition from dilated to collapsed bowel segments, distorting the loops. Additionally, a significant amount of free fluid was observed in the abdominal cavity.

Given the lack of improvement, surgical intervention was performed. Intraoperative findings included an ischemic segment of the small intestine with multiple perforations and extensive adhesions between the small bowel loops and the abdominal wall. A 15 cm ischemic segment of the small intestine was resected, and adhesiolysis was performed. The abdominal cavity was irrigated with a large volume of physiological saline, and a Douglas drain was placed after the procedure.

Postoperatively, the patient was treated with two antibiotics: ceftriaxone and metronidazole. On the fourth day of hospitalization, the patient began to experience suprapubic discomfort and urethral burning, with cloudy urine observed in the urinary collection bag. The patient developed a fever and moderate leukocytosis (WBC count of 12.5/μL), and urinalysis showed proteinuria, glucose, nitrites, and microhematuria.

The urinary catheter was replaced, and a urine sample was collected for culture. Microbiological analysis identified *Candida albicans*. Antifungal treatment was initiated, and a follow-up urine culture conducted 10 days later was negative. The patient continued antifungal therapy for an additional two weeks. Subsequent urine cultures at intervals of three, eight, and twelve weeks were also negative, confirming the resolution of candiduria.

## Discussion

Urinary infections remain one of the most common issues among children in surgical wards, with an estimated incidence of approximately 8% [5]. The high incidence is primarily attributed to the need for prolonged Catheterization following surgical interventions. The main clinical concerns associated with these infections include suprapubic discomfort and elevated body temperature. Studies indicate that the incidence of urinary infections varies depending on factors such as gender, age, and race, with the most frequent causative agent being *Escherichia coli* [1, 2, 5, 6].

The *Escherichia coli* group, which typically colonizes the large intestine, is the predominant cause of urinary infections. However, other bacterial species may occasionally be responsible, and in rare cases, fungal pathogens, particularly *Candida* species, can lead to urinary infections [3, 4, 7].

Children with severe illnesses, those admitted to intensive care units, or those with underlying conditions such as diabetes mellitus, indwelling catheters, or recent antibiotic use are at increased risk for fungal infections, including candidemia [6, 7, 8]. Other contributing factors include abnormalities of the urogenital tract (e.g., vesicoureteral reflux), prematurity, prolonged hospitalization, malignant diseases (especially hematological malignancies), and neutropenia [1, 2, 5, 11, 12].

In hospitalized patients and postoperative cases, antibiotic use, mainly when two or more antibiotics are administered simultaneously, is a significant factor in promoting the development of candida infections [10, 15].

Among fungal pathogens, *Candida* species are the most prevalent, accounting for approximately 90% of cases. Though less common, other causative agents include *Aspergillus*, *Blastomyces*, and *Cryptococcus* [4, 7, 9].

Numerous studies have reported an increasing incidence of candidiasis, with some references indicating rates as high as 40% in hospitalized patients [5, 7, 13, 14]. Patients with fungal infections, especially those presenting with systemic symptoms such as fever and dysuria, should be treated with antifungal medications, with fluconazole being the preferred choice [16].

Fluconazole treatment should be prolonged, continuing for at least 21 days after the last negative culture for candiduria or 40–45 days from the initiation of therapy. The recommended dosage is 3 to 6 mg/kg, administered intravenously once daily, followed by oral administration at the exact dosage after discharge.

Amphotericin B is an alternative treatment for systemic and severe fungal infections, including candiduria in specific cases. This antifungal agent is particularly effective in severe or refractory cases and remains an important option in clinical practice.

## Conclusion

Urinary infections are among the most common infections in patients admitted to intensive care units and surgical wards. While most of these infections are caused by bacteria, particularly *Escherichia coli*, fungal infections, most commonly due to *Candida albicans*, are also significant contributors.

Several factors influence the development of candiduria, including the concurrent use of multiple antibiotics, prolonged Catheterization, serious chronic illnesses, and abnormalities of the urogenital tract.

The treatment of candiduria requires antifungal medications, with fluconazole demonstrating high efficacy. However, antifungal therapy must be extended for several weeks following the first negative urine culture for *Candida* to ensure complete eradication and prevent recurrence.

***COI Statement:*** This paper has yet to be submitted in parallel, presented fully or partially at a meeting, podium, or congress, published, or submitted for consideration beforehand.

No relevant or minor financial relationships exist between authors, their relatives, or the next of kin with external companies.

***Disclosure:*** The authors declared no conflict of interest. No funding was received for this article.

## References

1. Kliegman RM, Stanton BF, St Geme III JW, Schor NF. Nelson textbook of pediatrics, 20th ed. Vol 1. Philadelphia: Elsevier, 2016 DOI: 10.1007/s00247-017-3907-9
2. Shaikh, N., Morone, N. E., Bost, J. E., & Farrell, M. H. (2008). Prevalence of urinary tract infection in childhood: a meta-analysis. The Pediatric infectious disease journal, 27(4), 302–308. https://doi.org/10.1097/INF.0b013e31815e4122
3. Sobel, J. D., Fisher, J. F., Kauffman, C. A., & Newman, C. A. (2011). Candida urinary tract infections--epidemiology. Clinical infectious diseases: an official publication of the Infectious Diseases Society of America, 52 Suppl 6, S433–S436. https://doi.org/10.1093/cid/cir109
4. Kauffman, C. A., Vazquez, J. A., Sobel, J. D., Gallis, H. A., McKinsey, D. S., Karchmer, A. W., Sugar, A. M., Sharkey, P. K., Wise, G. J., Mangi, R., Mosher, A., Lee, J. Y., & Dismukes, W. E. (2000). Prospective multicenter surveillance study of funguria in hospitalized patients. The National Institute for Allergy and Infectious Diseases (NIAID) Mycoses Study Group. Clinical infectious diseases: an official publication of the Infectious Diseases Society of America, 30(1), 14–18. https://doi.org/10.1086/313583
5. Shaikh, N., Morone, N. E., Bost, J. E., & Farrell, M. H. (2008). Prevalence of urinary tract infection in childhood: a meta-analysis. The Pediatric infectious disease journal, 27(4), 302–308. https://doi.org/10.1097/INF.0b013e31815e4122

6. Alanazi, M. Q., Alqahtani, F. Y., & Aleanizy, F. S. (2018). An evaluation of E. coli in urinary tract infection in emergency department at KAMC in Riyadh, Saudi Arabia: retrospective study. Annals of clinical microbiology and antimicrobials, 17(1), 3. https://doi.org/10.1186/s12941-018-0255-z
7. Reiss E, Shadomy HJ, Lyon GM. Fundamental medical mycology. New Jersey: Wiley-Blackwell, 2012, pp. 656. https://doi. org/10.1002/9781118101773
8. Foxman B. (2003). Epidemiology of urinary tract infections: incidence, morbidity, and economic costs. Disease-a-month: DM, 49(2), 53–70. https://doi.org/10.1067/mda.2003.7
9. Seyedmousavi A, İlkit M, Durdu M, Ergin Ç, Polat SH, Melchers WJG, et al. Candida and candidosis: Updates on epidemiology, diagnosis, treatment, antifungal drug resistance and host genetic susceptibility. Türk Mikrobiyol Cem Derg 2015;45(1):1-11 DOI: 10.5578/ced.20239701
10. Zaoutis, T. E., Greves, H. M., Lautenbach, E., Bilker, W. B., & Coffin, S. E. (2004). Risk factors for disseminated candidiasis in children with candidemia. The Pediatric infectious disease journal, 23(7), 635–641. https://doi.org/10.1097/01.inf.0000128781.77600.6f
11. Bower, J. M., Eto, D. S., & Mulvey, M. A. (2005). Covert operations of uropathogenic Escherichia coli within the urinary tract. Traffic (Copenhagen, Denmark), 6(1), 18–31. https://doi.org/10.1111/j.1600-0854.2004.00251.x
12. Shortliffe LM. Urinary tract infection in infants and children. In: Walsh P, Retik AB, Vaughn ED, et al., editors. Campbell's urology. 8th edition. Philadelphia7 WB Saunders; 2002. p. 1846–84.
13. Conde-Rosa, A., Amador, R., Pérez-Torres, D., Colón, E., Sánchez-Rivera, C., Nieves-Plaza, M., González-Ramos, M., & Bertrán-Pasarell, J. (2010). Candidemia distribution, associated risk factors, and attributed mortality at a university-based medical center. Puerto Rico health sciences journal, 29(1), 26–29. PMCID: PMC2866152
14. Steinbach, W. J., Roilides, E., Berman, D., Hoffman, J. A., Groll, A. H., Bin-Hussain, I., Palazzi, D. L., Castagnola, E., Halasa, N., Velegraki, A., Dvorak, C. C., Charkabarti, A., Sung, L., Danziger-Isakov, L., Lachenauer, C., Arrieta, A., Knapp, K., Abzug, M. J., Ziebold, C., Lehrnbecher, T., … International Pediatric Fungal Network (2012). Results from a prospective, international, epidemiologic study of invasive candidiasis in children and neonates. The Pediatric infectious disease journal, 31(12), 1252–1257. https://doi.org/10.1097/INF.0b013e3182737427
15. Weinberger, M., Sweet, S., Leibovici, L., Pitlik, S. D., & Samra, Z. (2003). Correlation between candiduria and departmental antibiotic use. The Journal of hospital infection, 53(3), 183–186. https://doi.org/10.1053/jhin.2002.1354
16. Sobel, J. D., Kauffman, C. A., McKinsey, D., Zervos, M., Vazquez, J. A., Karchmer, A. W., Lee, J., Thomas, C., Panzer, H., & Dismukes, W. E. (2000). Candiduria: a randomized, double-blind study of treatment with fluconazole and placebo. The National Institute of Allergy and Infectious Diseases (NIAID) Mycoses Study Group. Clinical infectious diseases: an official publication of the Infectious Diseases Society of America, 30(1), 19–24. https://doi.org/10.1086/313580