

Prevalence of Urinary Tract Infections (UTIs) in Children with Inguinal Hernia Repairs

Arkan Kareem Abd¹; Ali Ghazi Abbood¹; Saud Hussein Mousa Al-jumaily²

¹Specialist Surgeon, Fellow Iraqi Council for Medical Specialization General Surgery (F.I.C.M. S), Ministry of Health and Environment / Baghdad Health Directorate- Al Karkh / Al Yarmouk Teaching Hospital; ²Specialist Surgeon M.B.CH. B F.I.C.M.S(uro.) /Al-Salam Teaching Hospital / Ministry of Health and environment / Directorate of Health Nenva/ Iraq

Abstract

This case control study was carried out in Baghdad city from 1st of April 2018 to 1 March 2019 included 40 studied cases (children with inguinal hernia) and 40 healthy children to evaluate the prevalence of UTIs in children with inguinal hernia repairs. It was known that the children are infected or not with urinary tract infection through clinical examination of the signs that indicate urinary tract infection, as well as a laboratory examination of the urine to detect the presence of bacteria that cause urinary tract infection in the laboratory. All children under 15 years of age were included in the study who attended pediatric surgery clinics. Ages over the age of 15 years old, children with complex inguinal hernia such as blocked, irreducible, strangulated hernia and children with recurrent hernia were excluded. All children included in our study included in the study were examined through routine and microscopic examination of urine, urine culture and sensitivity. Children with urinary tract infections were treated according to sensitivity culture reports. This case control study included children with inguinal hernia (90% males and 10% females), their age range was <1 year to 15 year (mean: 9.52±1.3 year), the study also included 40 healthy children (as control group) with the same characteristics of patient. The study revealed that urinary tract infection was observed in 25% of (10 of 40) of children with inguinal hernia compared with 5% of (2 of 40) of the control group ($P < 0.001$). This study showed that most of children with inguinal hernia were suffered from abdominal pain, urge to urinate, polyuria, cloudy urine, fever and pyelonephritis. The study found that, 50% of children with inguinal hernia who suffered from UTI were due *E. coli*, *S. aureus* with rate 40% and *Klebsiella* spp with rate 10%. The study showed that 80% of *E. coli* isolates were sensitive to ampicillin, 60% to amikacin and 40% to Amoxiclavate, while 100% of *S. aureus* were sensitive to Ceftriaxone and 75% to Cefotaxime. It was concluded that, there significant positive correlation between UTIs and inguinal hernia repairs in children.

Keywords: Children; inguinal hernia; UTI; Prevalence

Introduction

Herniorrhaphy operations have become the most important and successful options for treating inguinal

hernia in children, as the percentages in these operations reached twenty million successful operations per year⁽¹⁾. The availability of databases for cases who suffer from hernia repair in general, especially in children, may be almost rare. Studies indicate that approximately 26% of men and a small minority of women experience inguinal hernia repair operations worldwide once in their lifetime⁽²⁾. Some disorders and bacterial infection are associated with the operations of repairing inguinal hernia in children, and among those problems and diseases is urinary tract infection, where urinary tract

Correspondent author:

Dr. Arkan Kareem Abd

Specialist Surgeon, Fellow Iraqi Council for Medical Specialization General Surgery (F.I.C.M. S), Ministry of Health and Environment / Baghdad Health Directorate- Al Karkh / Al Yarmouk Teaching Hospital;

infection is one of the most important causes suffered by children under the age of 12 years and the distance between the operations of repairing inguinal hernia and the urinary tract is close⁽³⁻⁵⁾. Like the bladder and the ureter between, it is expected that they will have urinary tract infections, especially those children who suffer from high temperatures, colic and decreased urination. The infection caused by multidrug resistance (MDR) organisms is more likely to prolong the hospital stay, increase the risk of death, and require treatment with more expensive antibiotics⁽⁶⁻⁸⁾. The aim of this study was to evaluate the prevalence of UTIs in children with inguinal hernia repairs .

Materials and Methods

This case control study was carried out in Baghdad city from 1st of April 2018 to 1 March 2019 included 40 studied cases (children with inguinal hernia) and 40 healthy children. it was known that the children are infected or not with urinary tract infection through clinical examination of the signs that indicate urinary tract infection, as well as a laboratory examination of

the urine to detect the presence of bacteria that cause urinary tract infection in the laboratory. All children under 15 years of age were included in the study who attended pediatric surgery clinics. Ages over the age of 15 years old, children with complex inguinal hernia such as blocked, irreducible, strangulated hernia and children with recurrent hernia were excluded. All children included in our study included in the study were examined through routine and microscopic examination of urine, urine culture and sensitivity. children with urinary tract infections were treated according to sensitivity culture reports.

Results

This case control study included children with inguinal hernia (90% males and 10% females), their age range was <1 year to 15 year (mean: 9.52±1.3 year), the study also included 40 healthy children (as control group) with the same characteristics of patient. Further features of patients and control were mentioned in Table 1

Table 1:General characteristics of the studied children

Parameters		Children with inguinal hernia		Healthy control children		P. value
		No.	%	No.	%	
Age groups (years)	< 1 year	3	7.5	4	10	NS*
	1-4	10	25	11	27.5	NS
	5-8	15	37.5	14	35	NS
	9-15	12	30	11	27.5	NS
	Total	40	100	400	100	NS
	(Mean±SD)	9.52±1.3		8.53±2.2		NS
Gender	Males	36	90	35	87.5	NS
	Females	4	10	5	12.5	
Residence	Rural	20	40	22	55	NS
	Urban	20	50	18	45	

* P. value >0.05 = non-significant (NS)

The study revealed that urinary tract infection was observed in 25% of (10 of 40) of children with inguinal hernia compared with 5% of (2 of 40) of the control group ($P < 0.001$), Table 2.

Table 2: Distribution of UTI among children with inguinal hernia compared healthy group.

Rate	Children with inguinal hernia	Healthy control children
No.	10	2
Percentage	25%	5%

$P < 0.001$

This study showed that most of children with inguinal hernia were suffered from abdominal pain, urge to urinate, polyurea, cloudy urine, fever and pyelonephritis, Table 3.

Table 3: Associated clinical features of UTI in children with inguinal hernia

Associated clinical features	children with inguinal (No.=40)
Abdominal pain	25%
urge to urinate	27%
Polyurea	40%
Cloudy urine	18%
Fever	19%
Pyelonephritis	29%

The study found that, 20 of 40% of children with inguinal hernia who suffered from UTI were due E. coli with rate 50%, S. aureus with rate 40% and Klebsiella spp with rate 10%, Table 4.

Table 4: Distribution of bacterial isolates from children with inguinal hernia

Bacterial isolates	Children with inguinal hernia	
	No.	%
S. aureus	4	40
E. coli	5	50
Klebsiella spp	4	10
Total	10	100

$P < 0.01$

Table 5 shows that 80% of *E. coli* isolates were sensitive to ampicillin, 60% to amikacin and 40% to Amoxiclave, while 100% of *S. aureus* were sensitive to Ceftriaxone and cand 75% to Cefotaxime.

Table 5: Rate of antibiotics sensitivity toward isolated *E. coli* and *S. aureus*

Antibiotics	% of <i>E. coli</i> (No.=5)	% of <i>S. aureus</i> (No.=5)
Ampicillin	20	25
Ceftriaxone	80	100
Amikacin	60	25
Amoxiclave	40	25
Cefotaxime	20	75

Discussion

Numerous studies have shown that the results that we have reached in our study are limited by the fact that the most vulnerable children to me hernia are males, especially those over the age of five years^(5,7). This is due to the fact that males are more susceptible to movement and activity than females and that ages more than five years are among the factors⁽⁸⁾.

The task and influencing the movement of the child, where he has knowledge and love in movement. Going outside the house, which leads to exposure to a hernia in the lower abdomen⁽⁹⁾. In view of the prevalence of UTIs in children with inguinal hernia repairs. Different studies also showed that there is a strong relationship between urinary tract infection and people at risk of inguinal hernia⁽¹¹⁻¹³⁾. Several studied also found similar finding as *S. aureus* and *E. coli* were the predominate bacterial isolates of UTI in children^(14,15). Other studies indicated that most of *E. faecalis* were resistant to Amikacin^(16,17). as another study found that most of *E. faecalis* isolates were resistant to vancomycin and Ceftriaxone with rate reach to 80%⁽¹⁸⁾. The

reasons for the high resistance of these bacteria to many antibiotics are due to the fact that they are present and in abundance the medical body as well as the community hospital environment⁽¹⁹⁾. And that the excessive and wrong use of antibiotics in the community has a negative impact on these bacteria and made them resistant to antibiotics, which are used frequently and in excess in all pathological conditions such as urinary tract infection, diarrhea and coughing. To the other by many means, which makes it more harmful than other types that are resistant to antibiotics^(20,21). On the related level, there are many studies that prove that most people, especially children who suffer from urinary tract infection, actually suffer from a high temperature, the desire to urinate, in which women who suffer from diabetes do not suffer from frequent urination and fatigue^(22,23).

Conclusions: It was concluded that, there significant positive correlation between UTIs and inguinal hernia repairs in children.

Ethical Clearance: None

Source of Funding: None

Conflict of Interest: None

References

1. Subramanian A, Clapp ML, Hicks SC, Awad SS, Liang MK. Laparoscopic ventral hernia repair: primary versus secondary hernias. *Journal of Surgical Research*. 2013 May 1;181(1):e1-5.
2. Sulkowski JP, Cooper JN, Duggan EM, Balci O, Anandalwar SP, Blakely ML, Heiss K, Rangel S, Minneci PC, Deans KJ. Does timing of neonatal inguinal hernia repair affect outcomes?. *Journal of pediatric surgery*. 2015 Jan 1;50(1):171-6.
3. Sigalos JT, Pastuszak AW. Chronic orchialgia: epidemiology, diagnosis and evaluation. *Translational andrology and urology*. 2017 May;6(Suppl 1):S37.
4. Westwood M. The diagnosis of urinary tract infection (UTI) in children under five years: Rapid tests and urine sampling techniques. *Am J Pedi and Heal care*. 2019;1(1):01-9.
5. Aldoescu S, Patrascu T, Brezean I. Predictors for length of hospital stay after inguinal hernia surgery. *J Med Life*. 2015;8:350-355.
6. Jakhmola CK, Kumar A. Laparoscopic inguinal hernia repair in the armed forces: a 5-year single centre study. *Med J Armed Forces India*. 2015;71:317-323. doi:10.1016/j.mjafi.2015.05.005 .
7. Primatesta P, Goldacre MJ. Inguinal hernia repair: incidence of elective and emergency surgery, readmission and mortality. *Int J Epidemiol*. 1996;25:835-839.
8. Pogorelić Z, Rikalo M, Jukić M, et al. Modified Marcy repair for indirect inguinal hernia in children: a 24-year single center experience of 6826 pediatric patients. *Surg Today*. 2017;47:108-113.
9. Chang SJ, Chen JY, Hsu CK, Chuang FC, Yang SS. The incidence of inguinal hernia and associated risk factors of incarceration in pediatric inguinal hernia: a nation-wide longitudinal population-based study. *Hernia*. 2016;20:559-563. doi:10.1007/s10029-015-1450-x [
10. Liem M, van der Graaf Y, Zwart R, Geurts I, van Vroonhaven T. Risk factors for inguinal hernia in women: a case-controlled study. The Coala Trial Group. *Am J Epidemiol*. 1997;146:721-726.
11. Salma U, Ahmed I, Ishtiaq S. A comparison of post operative pain and hospital stay between Lichtenstein's repair and laparoscopic transabdominal preperitoneal (TAPP) repair of inguinal hernia: a randomized controlled trial. *Pak J Med Sci*. 2015;31:1062-1066. doi:10.12669/pjms.315.4811 .
12. National Health Insurance Administration, Ministry of Health and Welfare. Universal Health Coverage in Taiwan. https://www.nhi.gov.tw/Resource/webdata/21717_1_UniversalHealthCoverage-2.pdf. Accessed November 21, 2018.
13. National Health Insurance Administration, Ministry of Health and Welfare. *2017-2018 National Health Insurance in Taiwan Annual Report (Bilingual)*. Taipei: National Health Insurance, Ministry of Health and Welfare; 2018.
14. Boocock GR, Todd PJ. Inguinal hernias are common in preterm infants. *Arch Dis Child*. 1985;60:669-670.
15. Peevy KJ, Speed FA, Hoff CJ. Epidemiology of inguinal hernia in preterm neonates. *Pediatrics*. 1986;77:246-247.
16. Engle WA, Tomashek KM, Wallman C; Committee on Fetus and Newborn, American Academy of Pediatrics. "Late-preterm" infants: a population at risk. *Pediatrics*. 2007;120:1390-1401.
17. Mardan SA, Alazzawy MA. Relation of UTI with Type 2 Diabetes and Pregnancy in Women Attended Obstetrics, Gynecology and Pediatric Hospital in Kirkuk City. Prof.(Dr) RK Sharma. 2020 Oct;20(4):41642.
18. Mahyar A, Ayazi P, Azimi E, Dalirani R, Barikani A, Esmaeily S. The relation between urinary tract infection and febrile seizure. *Iranian journal of child neurology*. 2018;12(4):120.
19. Amin EK, Kotb AE. Epidemiology Of Urinary Tract Infections In The Children In Zagazig

- University Children's Hospital. Zagazig University Medical Journal. 2019 Nov 1;25(6):909-18.
20. Balasubramanian S, Kuppaswamy D, Padmanabhan S, Chandramohan V, Amperayani S. Extended-spectrum beta-lactamase-producing community-acquired urinary tract infections in children: Chart review of risk factors. *Journal of global infectious diseases*. 2018 Oct;10(4):222.
 21. Yim HE, Han KD, Kim B, Yoo KH. Impact of early-life weight status on urinary tract infection in children: a nationwide population-based study in South Korea. *Epidemiology and Health*. 2020 Dec 29:e2021005.
 22. Peerayeh SN, Navidinia M, Fallah F, Bakhshi B, Jamali J. Pathogenicity determinants and epidemiology of uropathogenic *E. coli* (UPEC) strains isolated from children with urinary tract infection (UTI) to define distinct pathotypes.
 23. Bandari B, Sindgikar SP, Kumar SS, Vijaya MS, Shankar R. Renal scarring following urinary tract infections in children. *Sudanese journal of paediatrics*. 2019;19(1):25.