DOI: https://doi.org/10.53350/pjmhs22161192

ORIGINAL ARTICLE

Comparison of Sonographic Findings and Routine Urine Examination in patient with Acute Pyelonephritis

MUHAMMAD UZAIR[1,2], RAHAM BACHA[1,2], ZAIN UL HASAN[1,2], SYED MUHAMMAD YOUSAF FAROOQ[1], MEHREENFATIMA[1], SYEDA KHADIJA TUL SUGHRA[1], SHAFQAT REHMAN[3], SHAHZAD AHMED DAULA[3]

[1]*University Institute of Radiological Sciences and Medical Imaging TechnologyFaculty of Allied Health Sciences the University of Lahore, Lahore Pakistan*

[2]*Gilani Ultrasound Center, Main Ferozepur Road, Lahore, Pakistan*

[3]*Sanabil Health Services Hospital, Khayaban-e-Quaid, Mansoorah Bazar, Multan Road, Lahore.*

Correspondence to Muhammad Uzair. E-mail: muzair477@gmail.com, Contact No: +92 343 4385296

ABSTRACT

Background: Pyelonephritis is a renal inflammatory condition diagnosed with patient'shistory, physical examination and imaging studies. Although laboratory finding, clinical sign and symptoms are considered for the diagnosis and treatment.

Aim: To compare the sonographic findings of pyelonephritis with urine completeexamination

Methodology: A Cross sectional analytical study was conduct at Gilani Ultrasound Center, Ferozepur Road, Lahore and routine urine examination was performed in the Sanabil Health Services Hospital, Khayaban-e-Quaid, Lahore. Entirely comprised patients were queried concerning variables such as gender, age, clinical history, grey scale ultrasound findings, Doppler ultrasound findings and lab findings. Patients were enquired to lie down as well asdepiction Abdomen.

Results: Out of 138 patients, 77 were males and 61 were females, maximum age of patientswas 77 years and minimum was 18 years, 75 (54.3%) patients with clinical history ofpyelonephritis, 67 patients were with lab findings that support pyelonephritis and 71 patientshad no lab findings. Out of 138 patients, 67(48.6%) patients had right kidney acutepyelonephritis and 65(47.1%) had left kidney acute pyelonephritis.

Conclusion: The study concluded that there was an important association among the Urinecomplete examination as well as sonographic findings in the evaluation of acute pyelonephritis. However, the clinical and ultrasound findings in acute Pyelonephritis do not play a significantrole but these findings can be helpful in chronic cases of Pyelonephritis.

Key words: Acute pyelonephritis, Ultrasonography, Urine complete analysis, Routine urineexamination.

INTRODUCTION

Urinary Tract Infections (UTIs) are amongst utmost common infections affecting the humans[1]. Urinary tract infection ascends from bladder to ureter and ultimately to kidneys, damaging the collecting systems[2]. Once contagion transfers toward Upper Urinary Tract, is planted there hematogenous[3], mutually Renal Pelvis as well as Parenchyma become inflamed; therefore, situation is categorized as Pyelonephritis[4]. Pyelonephritis mentions to infection including Renal Parenchyma as well as Renal Pelvis. Uncertainty treatment is postponed, patient is immune compromised. Micro abscesses which form in the course of Acute Phase of Pyelonephritis can merge, developing a Renal Abscess[5].

Pyelonephritis has an annual incidence of 15 to 17 cases per 10000 women[6]. UTI prevalence is prejudiced through sex, age, urine collection method, diagnostic criteria, population sample, testing methodologies as well as culture. Sex and age are most significant factors[7,8]. [7] [8] In newborns, UTI prevalence in Preterm Infants (2.9%) go beyond that of term Infants (0.7%). Urinary tract infection is more common in pre-school age of child (01% -03%) than in schoolage of child (0.7 % to 2.3 %)[9].

The incidence of pyelonephritis during pregnancy reaches 2%. About 40% to 50% of females knowledge as a minimum one urinary tract infection in the course of life time as well as an assessed 01 out of 03 females experience urinary tract infection by the age 24 years, cases by 15% to 25% of these females developing recurring infection. Community acquired contagions by *Escherichia coli* as well as further Entero-bacteriaceae happen in 75% patients [10]. On ultrasound Positive findings include diversity of alterations in Renal Parenchyma like mild filling in the renal sinuses, enlargement of renal, renal sinus fat loss because of edema, echogenicity changes due to edema or hemorrhage, loss of corticomedullary differentiation dilated renal pyramids and echogenic renal sinus[11,12]. Power Doppler shows areas of hypo perfusion and Parenchymal Defects of Pyelonephritis which is usually perceived such as pivotal or Segmental, Patchy, Hypo-echoic wounds spreading from Medulla toward Renal Capsule[13]. Pyelonephritis can be diagnosed with patient's history, physical examination and imaging studies. Although laboratory finding and clinical sign and symptoms are considered for the diagnosis and treatment.

The current study intends to develop a procedure that will place ultrasound imaging prior to laboratory examination and will place the fact, which will portray imaging studies as final confirmation for acute pyelonephritis[14].

METHODOLOGY

A Cross sectional analytical study was conduct at Gilani Ultrasound Center, Ferozepur Road, Lahore and routine urine examination was performed in the Sanabil Health Services hospital, Khayaban-e-Quaid, Lahore. After permission from Ethical Review Board, entirely comprised patients were queried concerning variables such as gender, age, clinical history, grey scale ultrasound findings, Doppler ultrasound findings and lab findings. Patients were enquired to lie down as well as depiction Abdomen. Renal Ultrasound was done upon these patients, Grey Scale as well as Doppler. Each variable declared overhead for all patients were note down & maintained in their individual case record form (CRF). Data was collected according to duration. Data was analyzed by SPSS version 2.4 for evaluation of the data as well as compilation of results.

RESULTS

Out of 138 patients, 77 were males and 61 were females, maximum age of patients was 77 years and minimum was 18 years, 75(54.3%) patients with clinical history ofpyelonephritis, 67 patients were with lab findings that support pyelonephritis and 71 patients had no lab findings. Out of 138 patients, 67(48.6%) patients had right kidney acutepyelonephritis and 65(47.1%) had left kidney acute pyelonephritis.

Table 1 shows that there were 138 patients, out of which 63(45.7%) patients had no clinical history of pyelonephritis but 57(55.3%) were suffering from pyelonephritis based on ultrasonography findings. 75(54.3%) patients were suffering from pyelonephritis based on clinical findings butout of those, 29(82.9%) patients were not pyelonephritic on ultrasound. A total of 103 patients, out of 138, were suffering from pyelonephritis based on

Received on 19-07-2021
Accepted on 27-12-2021

ultrasonography and 35 patients werenormal.

Crosstab

Clinical history		**Pyelonephritis**		**Total**
		No	**Yes**	
No	Count	6	57	63
	% within pyelonephritis	17.1%	55.3%	45.7%
Yes	Count	29	46	75
	% within pyelonephritis	82.9%	44.7%	54.3%
Total	Count	35	103	138
	% within pyelonephritis	100.0%	100.0%	100.0%

Table 2 shows that there were 74(53.6%) patients, out of 138 patients, who came out to pyelonephritic based on laboratory findings while 64(46.4%) patients were normal. However, 103 patients, out of 138 patients, were suffering from pyelonephritis based on ultrasonography, while 35 came out to be normal. 43(41.7%) patients were pyelonephritic on ultrasound, which seemed normal on lab findings and 14(40%) patients were normal on ultrasound, which were pyelonephritic based on lab findings.

Table 2:

Chi-Square Tests					
	Value	**Df**	**Asymptotic Significance (2-sided)**	**Exact Sig. (2-sided)**	**Exact Sig. (1-sided)**
Pearson Chi-Square	15.362[a]	1	.000		
Continuity Correction[b]	13.861	1	.000		
Likelihood Ratio	16.582	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	138				

Crosstab

Lab findings		**Pyelonephritis**		Total
		No	**Yes**	
No	Count	21	43	64
	% within pyelonephritis	60.0%	41.7%	46.4%
Yes	Count	14	60	74
	% within pyelonephritis	40.0%	58.3%	53.6%
Total	Count	35	103	138
	% within pyelonephritis	100.0%	100.0%	100.0%

DISCUSSION

Our study was designed to comparison of sonographic findings and routine urine examination in-patient with acute pyelonephritis, Based on diagnostic performance and comparison of sonographic findings and routine urine test and detection of ultrasonography that a reliable method for assessing patients with acute pyelonephritis.

In current study, attempt was made to comparison of sonographic findings and routine urine examination in patient with acute pyelonephritis. Entirely comprised patients were queried concerning variables such as gender, age, clinical history, grey scale ultrasound findings, Doppler ultrasound findings and lab findings. Patients were enquired to lie down as well as depiction Abdomen. Renal Ultrasound was done upon these patients, Grey Scale as well as Doppler. Patients were come for Abdominal Ultrasound in group 1. Whichever uncommon discoveries of kidneys will be noted and then their urine samples will be sent in the lab for routine urine examinations.

Data of 138 patients, 77 were males and 61 were females, maximum age of patients was 77 years and minimum was 18 years, 75 (54.3%) patients with clinical history of pyelonephritis, 67 patients were with lab findings that support pyelonephritis and 71 patients had no lab findings. Out of 138 patients, 67(48.6%) patients had right kidney acute pyelonephritis and 65 (47.1%) had left kidney acute pyelonephritis.

Another study by Cheng et al in which they studied about that culture of urine was done in 157 patients. Out of 157 patients, 92 patients had positive urine culture and 65 had no apparent organism which might be isolated from urine culture. Among these 92 patients, *Escherichia coli* was utmost common pathogen. In result of my study shows out of 138 patients 67 patientswere with lab findings that supports pyelonephritis and in 71 patients there were no lab findings[19,20].

In a study conduct by Ramakrishna K et in 2005 in which they study that young as well as middle aged females hand out an Emergency Department by pyuria, fever as well as other upper UTI features, 98% had acute Pyelonephritis. 16% were given alternative diagnosis in the absences of fever. Though, upto 1/3 mature patients with Acute Pyelonephritis have no fever. In some complicated cases, Gram stain analysis of urine can aid in the choice of initial antibiotic therapy. Another option is the use of the antibody-coated bacteria assay, which may be helpful in localizing subclinical upper UTIs. In result of my study the clinical history of patients. Out of total number of 138 patients, 75 patients were with clinical history of pyelonephritis and in 63 patients there was no clinical history. In similar study that in 90% patients with acute pyelonephritis, urine cultures are positive. Culture samples must be attained earlier start of Antibiotic Therapy. Cultures of blood have been suggested for Hospitalized patients, upto 20 percent patients have positive cultures. In comparison with other 2 studies though, accomplishment of Blood Cultures didn't consequence in alterations in organization plans in patients with Acute Pyelonephritis. [21] According the result of my study there were outof total number of 138 patients 67 patients were with lab findings that supports pyelonephritisand in 71 patients were no lab findings.

A study was conducted by sheu Jn et al in 2007 upon Acute Pyelonephritis that is common transferable sickness in children as well as may consequence in enduring Renal Damage. Out of 75 children with age 1 to 121 months by diagnosis of first time febrile UTI were studied after the Acute Pyelonephritis for detecting renal scaring and 20 with other febrile disease served as non-febrile controls. Results showed that young kids remain on danger of expansion of Renal Scarring subsequent Acute Pyelonephritis. [22] In another study Renal Sonography notices aberration in merely 40 percent Pediatric Pyelonephritis [23]. In result of our study maximum age of patients were 77 years and minimum 18 years.

A study was conduct by Birgir Jakobsson et.al in which Seventy six children, 18 boys and 58 girls, aged 0-15. Changes on the DMSA scan were found in 65 (86%) children during acute pyelonephritis, in 45 (59%) children at two months, and in 28(37%) children at two years after infection. Vesicoureteral reflux (VUR) was found in 19 (25%) children at two months. Renal scarring was significantly correlated with the presence of gross VUR and recurrent pyelonephritis, but 62% of the scarred kidneys were drained by non-refluxing ureters. In result of my study shows the cross tabulation between gender and right kidney acute pyelonephritis

Thirty one females had not right kidney acute pyelonephritis and 30 had right kidney acute pyelonephritis. In males there were 40 males had not right kidney acute pyelonephritis and 37had right kidney acute pyelonephritis shows the cross tabulation between gender and left kidney acute pyelonephritis. 29 females had not left kidney acute pyelonephritis and 32 had left kidney acute pyelonephritis. In males there were 44 males had not left kidney acute pyelonephritis and 33 had left kidney acute pyelonephritis[24].

Imaging is required if complication is suspected in acute pyelonephritis to assess the nature and extent of the lesions, and to detect underlying causes. The current imaging modality of choice in clinical practice is computed tomography. Because of associated radiation and potential nephrotoxicity, CEUS is an alternative that has been proven to be equally accurate in the detection of acute pyelonephritis renal lesions. The aims of this study of 48 patients are to describe in detail the CEUS findings in acute pyelonephritis, and to determine if abscess and focal pyelonephritis may be distinguished. Very characteristic morphologic and temporal patterns of enhancement are described. These allow differentiation of focal pyelonephritis from renal abscess, and detection of tiny suppurative foci within focal pyelonephritis. The detection of abscesses is important because follow-up in 25 patients revealed a longer clinical course[25].

Typical pyelonephritis CEUS features permit distinction from other renal lesions. As a whole, CEUS is an excellent tool in the work-up of complicated acute pyelonephritis, so it may be considered as the imaging technique of choice in the evaluation and follow-up of these patients who frequently are very young, so as to minimize radiation exposure

CONCLUSION

The study concluded that there was an important association among the Urine complete examination as well as sonographic findings in the evaluation of acute pyelonephritis. However, the clinical and ultrasound findings in acute Pyelonephritis do not play a significantrole but these findings can be helpful in chronic cases of Pyelonephritis.

Limitations: Clinical findings were not comprises the complete history of acute pyelonephritis.

Recommendation: There should be a detail history of clinical sign and symptoms which co relate with ultrasound and urine complete examination. Urine complete examination is nonspecific test it should be replace with urine cultural examination.It is recommended that a study should be carried out with the comparison of ultrasound findings with CT scan taking as a gold standard with a large sample size.

Conflict of interest: Nothing to declare

REFERENCES

1. Nikolaidis P, Dogra VS, Goldfarb S, Gore JL, Harvin HJ, Heilbrun ME, Heller MT, Khatri G, Purysko AS, Savage SJ, Smith AD. ACR appropriateness criteria® acute pyelonephritis. Journal of the American College of Radiology. 2018 Nov 1;15(11):S232-9.
2. Kitano Y, Wakatake H, Saito H, Tsutsumi K, Yoshida H, Yoshida M, Takita M, Yoshida T, Masui Y, Taira Y, Fujitani S. Clinical outcomes of urinary tract infection caused by extended spectrum beta- lactamase producing Enterobacteriaceae: a retrospective observational study comparing patients with and without systemic inflammatory response syndrome. Acute Medicine & Surgery. 2020 Jan;7(1):e472.
3. Schmaldienst S, Dittrich E, Horl WH. Urinary tract infections after renal transplantation. Curr Opin Urol 2002; 12: 125–130
4. Säemann M, Hörl WH. Urinary tract infection in renal transplant recipients. Eur J ClinInvest 2008; 38: 58–65
5. Abbott KC, Swanson SJ, Richter ER et al. Late urinary tract infection after renal transplantation in the United States. Am J Kidney Dis 2004; 44: 353–362
6. Schrier RW. Infections of the upper urinary tract. In: Diseases of the kidney and urinary tract. Philadelphia, Pa: Lippincott, Williams & Wilkins, 2001; 847–869.
7. Foxman B. Epidemiology of urinary tract infections: incidence, morbidity, and economic costs. Am J Med 2002; 113(suppl 1A):5S–13S.
8. Craig WD, Wagner BJ, Travis MD. Pyelonephritis: radiologicpathologic review. Radiographics 2008;28:255-77; quiz 327-8.
9. https://urology-partners.com/2017/06/22/urinary-tract-infections
10. Czaja CA, Scholes D, Hooton TM, Stamm WE. Population-based epidemiologic analysis of acute pyelonephritis. Clinical infectious diseases. 2007 Aug 1;45(3):273- 80.
11. Raszka WV, Khan O. Pyelonephritis. Pediatrics in review. 2005 Oct 1;26(10):358.
12. Foxman B, Barlow R, D'Arcy H, et al. Urinary tract infection: self-reported incidence and associated costs. Ann Epidemiol. 2000;10(8):509–515.
13. Engel JD, Schaeffer AJ. Evaluation of and antimicrobial therapy for recurrent urinary tract infections in women. Urol Clin North Am. 1998;25(4):685–701. x.
14. Stapleton A. Prevention of recurrent urinary-tract infections in women. Lancet. 1999;353(9146):7–8.
15. Beyene G, Tsegaye W. Bacterial uropathogens in urinary tract infection and antibiotic susceptibility pattern in Jimma University specialized hospital, southwest Ethiopia. Ethiop J Health Sci. 2011;21(2):141–146.
16. Stunell H, Buckley O, Feeney J, Geoghegan T, Browne RFJ, Torreggiani WC. Imaging of acute pyelonephritis in the adult. Eur Radiol 2007; 17(7):1820–1828.
17. Hoepelman AI, Meiland R, Geerlings SE. Pathogenesis and management of bacterial urinary tract infections in adult patients with diabetes mellitus. Int J Antimicrob Agents2003;22 Suppl 2:35-43.
18. June CH, Browning MD, Smith LP, et al. Ultrasonography and computed tomographyin severe urinary tract infection. Arch Intern Med 1985;145:841-5.
19. 5. Sfakianaki E, Sfakianakis GN, Georgiou M, Hsiao B. Renal scintigraphy in the acutecare setting. Semin Nucl Med 2013;43: 114-28
20. Nikolaidis P, Dogra VS, Goldfarb S, Gore JL, Harvin HJ, Heilbrun ME, Heller MT, Khatri G, Purysko AS, Savage SJ, Smith AD. ACR appropriateness criteria® acute pyelonephritis. Journal of the American College of Radiology. 2018 Nov 1;15(11):S232-9
21. Sharma P, Thapa L. Acute pyelonephritis in pregnancy: a retrospective study. Australian and New Zealand Journal of Obstetrics and Gynaecology. 2007 Aug;47(4):313-5.
22. Ramakrishnan K, Scheid DC. Diagnosis and management of acute pyelonephritis in adults. American family physician. 2005 Mar 1;71(5):933-42
23. SHEU JN, CHEN MC, CHENG SL, LEE IC, CHEN SM, Tsay GJ. Urine interleukin- 1β in children with acute pyelonephritis and renal scarring. Nephrology. 2007 Oct;12(5):487-93.
24. Mohkam M, Karimi A, Habibian S, Sharifian M. Urinary N-acetyl-beta-D-glucosaminidase as a diagnostic marker of acute pyelonephritis in children. Iran J Kidney Dis.2008;2:24-8.
25. Narchi H, Donovan R. Renal power Doppler ultrasound does not predict renal scarring after urinary tract infection. Scott Med J. 2008;53:7-10.