

Research Article

From Acute Appendicitis to Obstructive Uropathy: Evaluating Urological Overlap in General Surgery

Abdul Razaq¹, Junaid Hassan², Ahmad Raza Nasar³, Muhammad Tahir⁴, Aliya Hashmi⁵, Bilal Akhtar⁶

¹Assistant Professor, Department of Urology, M. Islam Medical & Dental College, Gujranwala, Pakistan

²Assistant Professor, Department of General Surgery, M. Islam Medical & Dental College, Gujranwala, Pakistan

³Associate Professor, Department of General Surgery, Islam Medical College, Sialkot, Pakistan

⁴Assistant Professor, Department of Surgery Unit-1, Civil Hospital/Bolan Medical College Quetta, Pakistan

⁵Assistant Professor, Department of General Surgery, Bolan Medical College, Quetta, Pakistan

⁶Senior Registrar, Department of Urology, M. Islam Medical & Dental College, Gujranwala, Pakistan

Corresponding Author: Dr. Abdul Razaq, Assistant Professor, Department of Urology, M. Islam Medical & Dental College, Gujranwala, Pakistan

E-mail: arazaq51@hotmail.com

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ABSTRACT

Background: Acute appendicitis with hydronephrosis is a rare but recognized clinical occurrence in which inflammation or abscess formation due to appendicitis obstruction or compression of the urinary tract.

Objective: To evaluate the incidence of hydronephrosis among patients with acute appendicitis.

Methodology: This cross-sectional analytical study was carried out at Department of Urology, M. Islam Medical & Dental College, Gujranwala from 1st October 2024 to 31st August 2025 and 90 cases undergoing surgery for acute appendicitis within the age group of 10-30 years were enrolled. Pregnant women, children under 10 years of age, patients with history of hydronephrosis, renal issues were excluded. The clinical symptoms combined with imaging details (ultrasonography/computed tomography) were thoroughly assessed. Presence of hydronephrosis due to various reasons was exclusively observed. Associated clinical and laboratory features (renal colic, impaired renal function, leukocytosis, hematuria) were documented.

Result: The mean age was 17.5±4 years having acute appendicitis. Within the various imaging modalities observed, around 44.4% cases were diagnosed through ultrasound followed 10% through computed tomography scan in total enrolled cases. There were 49(54.4%) cases where imaging available, only 5 (9.1%) cases had hydronephrosis (renal obstruction). No case with severe hydronephrosis was reported. Rovsing's sign, obturator sign and psoas sign were negative while Rebound tenderness was observed as positive in all the cases.

Conclusion: The presence of 3.3% cases with right secondary hydronephrosis, while 2.2% had mild right hydronephrosis. However, all the hydronephrosis cases observed were identified from the cases with imaging performed.

Keywords: Acute appendicitis, Obstructive uropathy, Incidence, Hydronephrosis

INTRODUCTION

Acute appendicitis is considered as one of the most common clinical indications requiring immediate surgical interventions. Research reports 6-8% of lifetime incidence within men or women of various ages.¹ The clinical reason of appendicitis lies in appendiceal lumen obstruction by a fecal stone, parasite, hyperplasia of the lower epidermal lymphatic tissue, or any tumor triggering pathological alterations.²⁻³ Common clinical symptoms include pain in the upper mid abdominal regions or periumbilical area, migrating into lower right quadrant. This is commonly accompanied by low

appetite, nausea and vomiting. However, there are 50% of cases which are reported without any classical symptoms rendering as an atypical clinical presentation.⁴

Urinary tract involvement in patients with acute appendicitis exemplifies this phenomenon, manifesting as microscopic hematuria and pain in the right lower abdomen or flank. These symptoms may arise from unilateral ureteral obstruction caused by peri-appendiceal inflammation or the presence of an abscess.⁴⁻⁶ In cases of ruptured appendicitis the events of hydronephrosis and hydroureter without any impaired renal function concomitants are well

associated.⁶ This fact is attributed to the alterations in the ureteral peristalsis. There are other rare urological events related to acute appendicitis including urinary retention or bilateral ureteral obstruction.⁷⁻⁹ However, there were only few cases reports submitted for reporting hydronephrosis as a secondary complication in cases of acute appendicitis.¹⁰ The purpose of the study was to identify hydronephrosis in cases admitted with acute appendicitis. The reason for this prospective study was to describe and gain knowledge on the clinical course as well as outcome of hydronephrosis secondary to acute appendicitis.

MATERIALS AND METHODS

The present study was prospectively designed as cross-sectional analytical including all those cases which were enrolled at Department of Urology, M. Islam Medical & Dental College, Gujranwala from 1st October 2024 to 31st August 2025. As renal obstruction is a rare event, therefore each case admitted with acute appendicitis was clinically assessed for any related complications. A total of 90 cases were enrolled after obtaining their written informed consent. The sample size was generated after considering the prevalence of renal obstructions within acute appendicitis cases as 2.3-3.5% wherein 5% margin of error, 80% power of test and 95% confidence of interval was applied and calculated using WHO sample size calculator. All patients undergoing surgery for acute appendicitis within the age group of 10-30 years were included. Pregnant women, children under 10 years of age, patients with history of hydronephrosis, renal issues were excluded. The clinical symptoms combined with imaging details (ultrasonography/computed tomography) were thoroughly assessed. Presence of hydronephrosis due to various reasons was exclusively observed. Hydronephrosis was termed as distension of the renal calyces as well as pelvis with urine due to obstruction of the outflow of urine distal to the renal pelvis. Hydronephrosis was graded as mild, moderate, or severe wherein mild hydronephrosis is presented with dilation of pelvis and calyces system of the kidney. Analogously, hydroureter was considered dilation of ureter. Associated clinical and laboratory features (renal colic, impaired renal function, leukocytosis, and hematuria) were documented. A well-structured questionnaire was designed for documenting patient's demographic and clinical data. Data was analyzed using SPSS-26.0 wherein t test was done for continuous variables and Chi

square was performed for proportions of discrete variable as well as for comparative tests. All statistical tests were two-tailed and a *P* value of 0.05 was considered statistically significant.

RESULTS

The mean was 17.5±4 year having acute appendicitis while 5 cases having acute appendicitis with renal obstruction within a mean age of 14.5±1.5 years. Within the total cases there were 53.3% males than 46.7% female cases of acute appendicitis. The male dominance (3.3%) was even observed in the 5/90 cases of acute appendicitis with renal obstruction (*p*<0.05). Each case was clinically assessed for appendicitis related complications and presence of any secondary morbidities, only 5 were observed to be suffering from hydronephrosis (renal obstruction) (Tables 1-2).

Sonographic jets were observed in all ultrasound cases. It is significant (*p*<0.05) to highlight that within the various imaging modalities observed, around 44.4% cases were diagnosed through ultrasound followed 10% through CT scan in total enrolled cases. There were 9 (10%) cases imaged through CT scan, only three cases were those observed with renal obstruction while 40 (44.4%) cases where ultrasound imaging was performed, only two cases had acute appendicitis with renal obstruction. Alarming 45.6% of cases of acute appendicitis were not reported through any imaging mode. Open surgery was performed in 74 cases, considering acute appendicitis as an emergency requiring immediate actions while rest 16 patients were treated through laparoscopic procedure. Around 87.8% of the reported cases had true appendicitis. Erythrocyturia was positive in 48.9% of the cases (Tables 3-4).

Within the total 49 (54.4%) cases where imaging was available, only 5 (9.1%) cases had hydronephrosis (renal obstruction) within them 3 had mild while 2 had moderate right hydronephrosis. No case with severe hydronephrosis was reported (Fig. 1).

The abdominal examination of cases with hydronephrosis presented tenderness at lower abdomen marked at right iliac fossa. Rovsing's sign, obturator sign and psoas sign were negative while rebound tenderness was observed as positive in all of the cases. Similarly in all the 05 cases the Alvarado score was 5 points (1 for rebound tenderness, 1 for right iliac fossa tenderness, 2 for elevated leukocyte count and 1 for leukocyte left shift) [Table 5].

Table 1: Demographic features of total enrolled patients with acute appendicitis (with or without renal obstruction) (n=90)

Variable	Mean±SD/No.(%)	P value
Age (years) according to gender		
Male (range 10-27)	14±5	<0.05
Female (15-30)	21±3	
Gender		
Male	48 (53.3%)	<0.05
Female	42 (46.7%)	

Table 2: Demographic features of total enrolled patients with acute appendicitis (with renal obstruction) [n=5]

Variable	Mean±SD/No.(%)	P value
Age (years) according to gender		
Male (range 10-12)	12±1	<0.05
Female (16-22)	17±2	
Gender		
Male	3 (3.33%)	<0.05
Female	2 (2.22%)	

Table 3: Clinical features of acute appendicitis with or without renal obstruction (n=90)

Characteristics	No.	%
Imaging modality		
None	41	45.6
Ultrasound	40	44.4
Computed tomography	9	10.0
Surgery		
Laparoscopic	16	17.8
Open	74	82.2
Surgery outcome		
True appendicitis	79	87.8
Normal appendix	11	12.2
Erythrocyturia		
Positive	44	48.9
Negative	46	51.1

Table 4: Clinical features of patients with acute appendicitis with renal obstruction (n=5/90)

Characteristics	No.	%
Imaging modality		
None	--	--
Ultrasound	2	2.22
Computed tomography	3	3.33
Surgery		
Laparoscopic	1	1.11
Open	4	4.44
Surgery outcome		
True appendicitis	5	5.55
Normal appendix	----	----
Erythrocyturia		
Positive	----	----
Negative	5	5.55

Table 5: Mean biochemistry levels of acute appendicitis cases with renal obstruction (n=5)

Parameters	Levels
Hemoglobin (g/dL)	15.8±1
Hematocrit (%)	46.2
Mean corpuscular volume (fL)	82.6±0.2
White blood cells ($\times 10^9/L$)	14.2
Neutrophils ($\times 10^3$ cells/ μL)	88.2
Lymphocytes ($\times 10^3$ cells/ μL)	5.1
Platelets ($\times 10^3/\mu L$)	266
Blood urea nitrogen (mmol/L)	9.2±0.7
Creatinine (mg/dL)	1±0.2
Sodium (mEq/L)	136±0.5
Potassium (mEq/L)	3.4±0.3
Chloride (mEq/L)	97±1
Bicarbonate (mg/dL)	28.9±0.2
Urine cultures	Growth found in 2cases

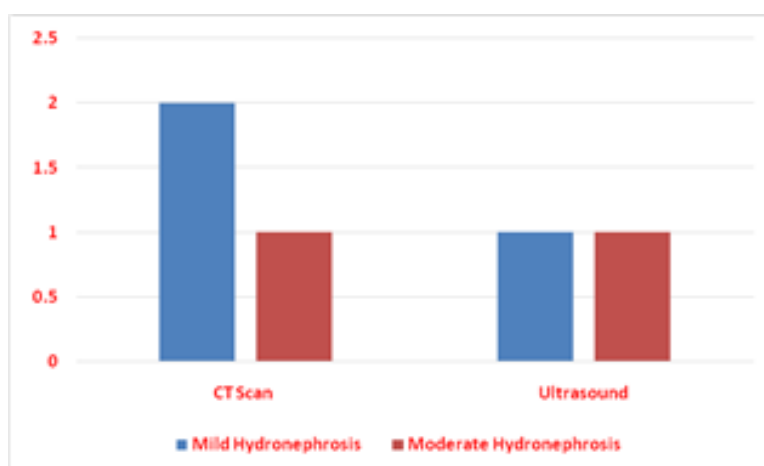


Figure 1: Frequency of hydronephrosis in cases with imaging performed

DISCUSSION

The anatomical position of the appendix can vary markedly, and in some cases, urological symptoms may predominate.¹¹ These manifestations may include renal or ureteric colic, cost vertebral angle tenderness, urinary frequency, dysuria, anuria, and urinary retention. Lower urinary tract features of acute appendicitis can be misleading, mimicking conditions such as cystitis, bladder neoplasms, or prostatitis. In males, the condition may present with scrotal pain, whereas in females it has been associated with cervical motion tenderness and adnexal pain or masses, potentially suggesting ovarian torsion.¹² There have been cases where abnormal urinalysis may be observed with a prevalence of 48 percent.¹³ This can further be linked with the presentation of hematuria, albuminuria or pyuria due to ruptured appendicitis. In the present study no rupture case of appendicitis was observed, therefore the complicated urine related presentations were not observed. Similar

reports have been generated from a study on acute appendicitis and cases of hydronephrosis.¹⁰ It is important to note that inflamed appendicitis or ruptured appendicitis is positioned adjacent to the urinary tract.¹⁴ In the current study bacterial cultures were reported in 2 out of 5 cases of acute appendicitis cases with hydronephrosis. The bacterial growth can be observed in urinary and appendiceal cultures as the bacteria can disseminate from appendix to the posterior- peritoneal cavity and followed into the urinary tract.¹⁵ It is pertinent to mention that in cases where the cluster of urological findings masks clinical presentations and ultrasound scans presents hydronephrosis with no clear evidence of acute appendicitis, then this further leads in complication in diagnosis and case criticalities.¹⁶ In the current study there were 45.6% cases where no ultrasound was performed, however none of the acute appendicitis had hydronephrosis.

In the current study all cases who underwent an ultrasound imaging scan demonstrated sonographic "jets," ruling out any intraluminal obstruction. Majority of the hydronephrosis reported were from mild category and also presents the similar findings wherein only a few case reports has been documented to report occurrence of secondary hydronephrosis.¹⁷ The exact pathogenesis of secondary hydronephrosis in acute appendicitis is idiopathic. Most appropriate explanation can be the involvement of the inflammatory process through the posterior-perietal peritoneum which further results into segmental ureteral ileus, observed with peritonitis.^{18,19}

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CONCLUSION

The presence of 3.3% cases with right secondary hydronephrosis, while 2.2% had mild right hydronephrosis were recorded. However, all the hydronephrosis cases observed were identified from the cases with imaging performed. Despite the rare finding in of renal obstruction in acute appendicitis cases there is still a need for physicians to be aware of this phenomenon and the risks involved in delayed diagnosis of acute appendicitis.

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