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ORIGINAL ARTICLE

Efficacy and Role of CT Urography in Investigating Hematuria Among Local Population of Pakistan

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ABSTRACT

Introduction: Hematuria is a common urologic finding in young adults, reported in 0.3–38.7% of adults in population-based studies.

Objectives: The main objective of the study is to find the role of CT urography in investigating hematuria among local population of Pakistan.

Material and methods: This descriptive cross-sectional study was conducted in Ganga Ram Hospital, Lahore during June 2020 to July 2021. Fifty patients with hematuria from the hospital OPD provided the data for this study.

Results: Most common age group for hematuria was 31-45 years which constituted 41% of the study group and least common age group was 61-75 years constitutes 16%. Thirty-eight women and twelve men took part. Urinary obstruction was caused most frequently by renal, ureteric or both stone disease, which was found in 75.0% of group A patients and 65.0% of those in group B, as shown in table 01.

Conclusion: It is concluded that CT urography is useful in detecting urolithiasis, nephrographic phase mostly useful for upper urinary tract pathologies and pyelographic phases are useful for detecting lower urinary tract pathologies.

Keywords: Patients, Hematuria, Urolithiasis, Urography

INTRODUCTION

Hematuria is a common urologic finding in young adults, reported in 0.3–38.7% of adults in population-based studies. Gross hematuria has a relatively high predictive value for malignancy and therefore warrants a thorough urologic evaluation. Asymptomatic microscopic hematuria rarely signals a life-threatening condition and is most often a benign incidental finding. The appropriate strategy for imaging young adults with microscopic hematuria has therefore been controversial [1].

Current guidelines from the American Urologic Association and American College of Radiology recommend upper urinary tract imaging of adults with excretory urography or CT urography [2]. However, many studies have found few clinically significant upper urinary tract findings in patients aged 40 years and younger, leading some to question the need to image all young adults with microscopic hematuria. The increasing use of CT urography as the initial imaging test raises additional concerns about radiation exposure to this radiosensitive population [3].

Hematuria, symptomatic and incidental, that involves more than three red blood cells per high-power field on two of three properly collected urinalysis specimens warrants some type of imaging to evaluate the upper tracts. Traditionally, excretory urography or the intravenous pyelogram has been the mainstay of the hematuria work-up, but computed tomography urography has more recently been recognized to have significant advantages [4]. Multidetector computed tomography urography, a cross-sectional technique, is less susceptible to overlying bowel gas and more sensitive for detection of small tumors and calculi. Moreover, intravenous-pyelogram–like images can be obtained by using reconstruction techniques [5]. In specific cases, ultrasound examination and magnetic resonance imaging can also be useful, and are particularly helpful in children and pregnant women. Neither modality has the sensitivity of computed tomography for calculi, but small tumors may be visible on magnetic resonance imaging. This article reviews the appropriateness criteria for the various radiologic imaging tests used in the evaluation of hematuria, as proposed by the American College of Radiology [6].

Hematuria is one of the most common presentations of patients with urinary tract diseases; therefore, it is a common reason for urinary tract imaging. The most appropriate imaging for adult patients presenting with hematuria as a symptom is reviewed in this article, based on the Appropriateness Criteria from the American College of Radiology [7]. The American Urologic Association (AUA) has previously published guidelines regarding the use of imaging in asymptomatic hematuria. The AUA guidelines recommended upper tract imaging for low- and high-risk patients with microscopic hematuria, defined as three or more red blood cells per high-power field from two of three properly collected urinalysis specimens. Patients whose urinary tracts have no detectable pathology normally release small amounts of blood into urine, so that one or two red cells per high-power field may normally be visible upon microscopic examination of the spun sediment [8]. This fact, together with the low prevalence of clinically detectable disease in patients with asymptomatic microscopic hematuria, has led investigators to suggest that such minimal microhematuria in an asymptomatic young adult needs no evaluation [9].

Objectives: The main objective of the study is to find the role of CT urography in investigating hematuria among local population of Pakistan.

MATERIAL AND METHODS

This descriptive cross-sectional study was conducted in Ganga Ram Hospital, Lahore during June 2020 to July 2021. Fifty patients with hematuria from the hospital OPD provided the data for this study.

Inclusion criteria

- All the patients diagnosed with hematuria were included in the study

Exclusion criteria

- Patients who do not want to participate in the study
- Excluded from the study were patients with cardiovascular and renal disease, as well as those who were unwilling to participate.

Data collection: This study included all patients with hematuria between the ages of 20 and 60. After obtaining a thorough clinical history, the patients were subjected to a CECT examination. Six hours prior to the study, the patient is instructed to fast. Non-contrast phase: First, the non-contrast stage, and then the corticomedullary phase, which was acquired following a delay of 25-80 seconds after administration of non-ionic low osmolar contrast medium to distinguish normal variants of renal parenchymal from renal masses and better depiction tumour

hypervascularity, respectively. CT scans were taken from the diaphragm to the bladder using a Multi detector row CT scanner. Histopathological findings will be used to determine the next step in the diagnosis process. Nephrographic coronal and pyelographic coronal images show illdefined heterogenously hyper enhancing mass lesion noted in lower pole of left kidney, the lesion shows contrast washout in excretory pyelographic phase- suggestive of renal cell carcinoma.

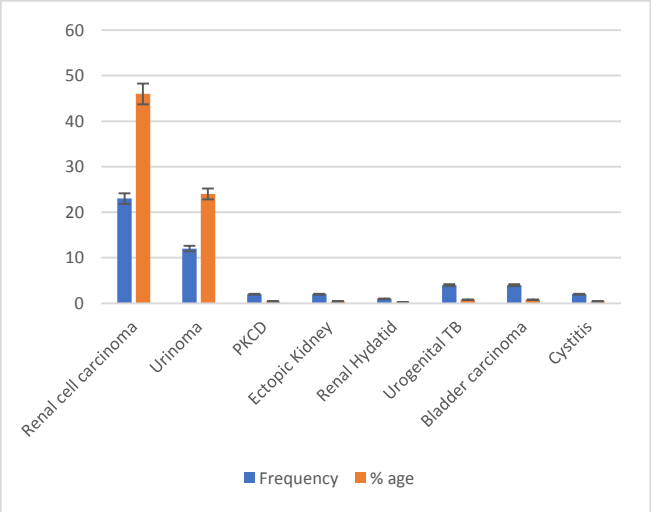
Statistical analysis: The data was collected and analyzed using SPSS 20.0. All the values will be expressed as mean and standard deviation.

RESULTS

Most common age group for hematuria was 31-45 years which constituted 41% of the study group and least common age group was 61-75 years constitutes 16%. Thirty-eight women and twelve men took part. Urinary obstruction was caused most frequently by renal, ureteric or both stone disease, which was found in 75.0% of group A patients and 65.0% of those in group B, as shown in table 01. Other common causes included carcinomas, pyonephrosis and obstruction of the posterior urethral jugular vein (PUJ).

Table 1: Causes of Obstructive Uropathy in selected patients

Causes	*No. of patients*	*%age*
Stone disease	75	75.0
• Renal	40	40.0
• Ureteric	25	25.0
• Renal + Ureteric	10	10.0
Carcinomas	20	20.0
• Urinary Bladder	03	3.0
• Prostate	02	2.0
• Cervix	05	5.010.0
• Others	10	
Pyonephrosis	03	3.0
PUJ Obstruction	02	2.0



Cervical cancer was the most common malignancy associated with ureteral obstructions requiring urinary diversion among the benign etiologies.

Table 2: Primary cause of ureteral obstruction.

Causes	Frequency	% age
Renal cell carcinoma	23	46
Urinoma	12	24
PKCD	2	0.4
Ectopic Kidney	2	0.4
Renal Hydatid	1	0.2
Urogenital TB	4	0.8
Bladder carcinoma	4	0.8
Cystitis	2	0.4

DISCUSSION

Hematuria is one of the most common manifestations of urinary tract diseases. It can originate from any site along the urinary tract and has spectrum of causes including calculi, neoplasm, infection, trauma, medications, coagulopathy and renal parenchymal diseases. Assessment of urological malignancies are probably the most important reason for evaluating these patients to get an early and accurate diagnosis [10]. Therefore, examinations with a high sensitivity for the detection of neoplasms are essential. The ability to detect other possible causes of hematuria is also important [11].

The urinary system has recently been evaluated with MRI. An inherent drawback to this modality's utility in diagnosing urinary pathologies, however, is that MRI cannot detect calcination. Its use is also constrained by the high price and difficulty in obtaining it [12]. For the time being, the use of MR urography is restricted to pregnant women, children, those with renal insufficiency, and eight patients who are allergic to contrast agents. To better understand urinary tract disorders associated with hemorrhagic cystitis, many authors have proposed using CT urography to assess both the renal parenchyma and urothelium [13].

Every patient who undergoes a CT urogram receives water, which is primarily used to hydrate and expand the kidneys and urinary tract. It is next necessary to perform noncontrast helical CT scan of kidney to detect renal calculi [14]. To check for tumours and filling defects, a high-resolution nephrographic phase is performed, followed by an injection of iodinated contrast media [15]. The latter can be used to reconstruct the urinary system and the bladder for diagnostic purposes. When combined with delayed images similar to those from an intravenous-pyelogram, this type of CT urography has been shown to be just as sensitive as the more traditional intravenous pyelogram in diagnosing the underlying cause of hematuria [16].

CONCLUSION

It is concluded that CT urography is useful in detecting urolithiasis, nephrographic phase mostly useful for upper urinary tract pathologies and pyelographic phases are useful for detecting lower urinary tract pathologies. Multiple-detector CT urography can accurately detect the full range of urinary tract pathologies that cause haematuria.

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