DOI:https://doi.org/10.54393/pbmj.v5i1.228

PAKISTAN BIOMEDICAL JOURNAL

https://www.pakistanbmj.com/journal/index.php/pbmj/index

Volume 5, Issue 1 (January 2022)

Original Article

Role of CT Urography in Investigating Hematuria

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ARTICLE INFO

Key Words:
Hematuria, CT, Patients, Carcinoma

How to Cite:
Ghous, M. H. ., Afzal, S. ., Malik, S. M. ., & Arooj, M. . (2022). Role of CT Urography in Investigating Hematuria: Role of CT Urography in investigating Hematuria. Pakistan BioMedical Journal, 5(1), 69–72. https://doi.org/10.54393/pbmj.v5i1.228

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ABSTRACT

Hematuria can signify serious disease such as bladder cancer, upper urinary tract urothelial cell cancer (UUT-UCC), renal cell cancer or urinary tract stones. **Objective:** To analyse the main role of CT urography in case of haematuria in terms of diagnosis and treatment. **Methods:** This cross-sectional study was conducted in Department of Urology University College of Medicine, The University of Lahore, during January 2020 to June 2021. The data was collected from 50 patients of haematuria from the OPD of the hospital. The patients underwent CECT examination after obtaining detailed clinical history. **Results**: There were 38 females and 12 males. The most common cause of obstructive uropathy was stone disease i.e. renal, ureteric or both and 75.0% patients in group A and 65.0% in group B, presented with it followed by other causes i.e. carcinomas, pyonephrosis and posterior urethral jugular vein (PUJ) obstruction. **Conclusion:** It is concluded that multidetector CT urography detects the entire spectrum of urinary tract pathologies causing haematuria with high accuracy.

INTRODUCTION

In some cases, hematuria can indicate the presence of bladder cancer, UUT-UCC, renal cell carcinoma, or urinary tract stones. The presence of blood in the urine, whether microscopic or macroscopic, is referred to as haematuria. More precisely, it is defined as the presence of five or more red blood cells that were collected at least one week apart from one another. The presence of blood in the urine is usually the first sign of haematuria in the clinical setting. Symptomatic or asymptomatic, short-term or long-term, isolated or in conjunction with other urinary abnormalities, it can occur as a single finding or as part of a larger pattern [1]. As one of the most common urinary tract pathologies, haematuria warrants both the patient's and treating physician's attention. One of the most common symptoms of a variety of urinary tract disorders, including calculi, neoplasms, infections, trauma, medication-induced thrombocytopenia, developmental anomalies, and diseases of the renal parenchyma, is haematuria [2]. Intravenous urography (IVU) was the first method of genitourinary imaging until the beginning of the 21st century. However, MDCT urography is now the preferred imaging technique [3]. Haematuria investigation depends on practise however, this has changed recently. Plain film imaging may be useful in certain situations, such as in the case of acute renal colic that results in haematuria. In order to rule out malignancy, the most sensitive imaging modalities are ultrasound and CT [4]. Detection of haematuria relies heavily on the use of ultrasound. Its sensitivity varies based on the operator's experience and the patient's body habitus. Urinary tract calculi can be detected using this method. Further research shows that ultrasound is more sensitive than IVU for the detection of urological malignancy [5]. When it comes to diagnosing haematuria, contrast-enhanced CT has been found to be most effective. Compared to ultrasound's sensitivity of about 85% in diagnosing renal masses, its sensitivity ranges from >98% to >85% for this test. By contrast, 15 CT-U has an 85 percent higher sensitivity in diagnosing upper tract urothelial malignancy than IVU [6].

METHODS

During the months of January 2020 to June 2021, the Department of Urology, University College of Medicine, The

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University of Lahore, conducted a cross-sectional study. Fifty patients with haematuria from the hospital's OPD were included. This study included all patients with haematuria between the ages of 30 and 60 years. Excluded from the study were patients with cardiovascular and renal disease, as well as those who were unwilling to participate. 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 hypervascularіy, respectively. CT scans were taken from the diaphragm to the bladder using a Multi detector row CT scanner. Histopathological findings were used to determine the next step in the diagnosis process. SPSS version 20 was used to collect and analyse the data. The mean and standard deviation were used for all of the data.

RESULTS

A total of 50 patients participated in the study. 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 1. Other common causes included carcinomas, pyonephrosis and obstruction of the posterior urethral jugular vein(PUJ)(Table 2).

Causes	%age
Stone disease	75.0
Renal	40.0
Ureteric	25.0
Renal + Uriteric	10.0
Carcinomas	20.0
Urinary Bladder	3.0
Prostate	2.0
Cervix	5.010.0
Others	
Pyonephrosis	3.0
PUJ Obstructon	2.0

Table 1: Causes of Obstructive Uropathy in selected patients

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

Causes	Ureteral stent	Percutaneous nephrostomy
Benign cause	40	16
Malignancy	26	28
Cervical cancer	19	9
Prostate cancer	4	5
colon Cancer	1	7
Bladder Cancer	2	1
Stomach cancer	0	1
Ovarian cancerate	0	1
lung cancer	0	1
Endomentrail cancer	0	1
Lymphoma	0	1
Breast Cancer	0	1

Table 2: Primary cause of ureteral obstruction

A total of 24 of the 27 neoplastic foci on MDCT urography were found by the two retrospective reviewers, including all 18 prospectively discovered urothelial tumours as well as six additional lesions. A total of six patients were diagnosed with these abnormalities. Two malignancies that were missed in the prospective review were found retroactively in four patients. Three small masses in the intrarenal collecting system constituted the six foci that were not seen in advance but were later discovered(Figure 1).

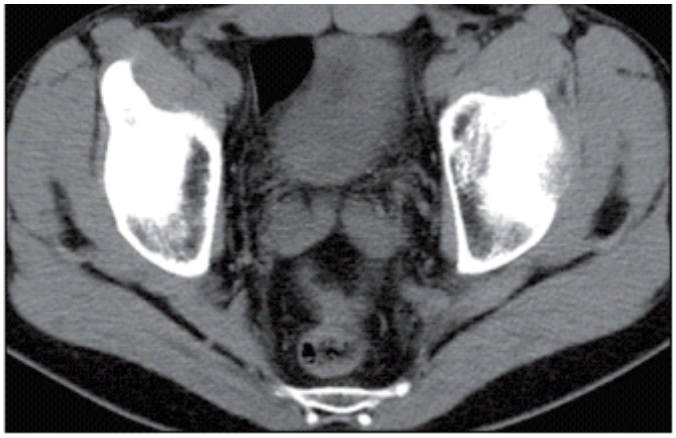

Figure 1: CT of a patients shows a soft tissue defect

DISCUSSION:

Contrast-opacified thin section images of the collecting systems, ureters, and bladder can be added to conventional abdominal CT scans to enhance the examination of the entire urinary tract, which is known as CT urography [8]. When intravenous contrast, previously administered for the CT, has rendered the urinary tract opaque, film (or direct digital) images can be exposed to obtain the intravenous-pyelogram-like portions of the examination. These images can also be created by reformatting delayed CT scans in the axial or transverse planes [9]. A pyelogram portion of this exam may be comparable to a standard intravenous pyelogram, making CT more sensitive and specific (statistically and pathologically) than ultrasound or nephrotomography with regard to focal renal parenchymal abnormalities [10-12].

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

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calcination. Its use is also constrained by the high price and difficulty in obtaining it [13]. 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 [14].

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 non-contrast helical CT scan of kidney to detect renal calculi [15]. To check for tumours and filling defects, a high-resolution nephrographic phase (slices of 1 to 2 mm thick) is performed, followed by an injection of iodinated contrast media [16,17]. 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 [18-20].

This study didn't take into account other risk factors for cancer, such as age. A patient's history of bladder cancer or gross rather than microscopic haemorrhage was cited in some examination reports, but risk factors were not specified in the vast majority of patient histories or medical charts. In fact, Patients with gross hematuria were more likely than those with microscopic hematuria to be diagnosed with malignancy.

CONCLUSIONS

It is concluded that Multiple-detector CT urography can accurately detect the full range of urinary tract pathologies that cause haematuria. Urinary tract pathologies can be accurately diagnosed using CT Urography.

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