

Different Diagnostic Findings in patients with Gross Hematuria on Computed Tomography Urography

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ABSTRACT

Background: In urine, the presence of abnormal quantity of RBCs is Hematuria. Computed Tomography Urography ability for assessing urothelium and renal parenchyma within particular examination also provides insight into morphological and functional urinary system which may help the physician in better treatment and management of their patients.

Aim: To evaluate different diagnostic findings into patients presenting with gross Hematuria on CTU.

Methodology: A descriptive study was conducted at Shalimar Hospital Lahore. Data of 113 participants were designated done suitable sample method. For analysis of data 24 SPSS version was used.

Results: Out of total number of 113 patients, comprising Out of total number of 113 patients, 33 (29.2%) were females and 80 (70.8%) were males. Out of 113 patients, 42 (37.2%) patients had gross haematuria, 40 (35.4%) had macroscopic haematuria and 31 (27.4%) had no haematuria. 25 (22.1%) patients had nephrolithiasis and 88 (77.9%) had not nephrolithiasis. 20 (17.7%) patients had PUJ calculus and 93 (82.3%) had PUJ calculus. 14 (12.4%) patients had urinary tract masses and 99 (87.6%) patients had not urinary tract masses. Out of 113 patients, 58 (51.3%) patients had no calculus and 10 (8.8%) had calculus at distal pole, 30 (26.5%) had calculus at mid pole and 15 (13.3%) had calculus at proximal pole. Mid ureter is the most frequent site for urolithiasis. 27 (23.9%) patients had prostatic abnormalities and 86 (76.1%) patients had not prostatic abnormalities.

Conclusion: This study concluded that the utility of CTU is now widely recognized as well as has grown to be the imaging of choice to evaluate of asymptomatic Hematuria. In our study gross Hematuria are most common in males. The most common site for cause of Hematuria was ureteric calculi and least common site was nephrolithiasis.

Keywords: Hematuria, Intravenous Urography, Urolithiasis, pelvic ureteric junction.

INTRODUCTION

The Hematuria may be whichever disgustingly evident (Macro-Hematuria) or else merely obvious underneath Microscope (Micro-Hematuria). The term Hematuria is a Greek word Hema means blood as well as Ouron means urine for referring the presence of blood in urine. While blood may be seen through naked eye is macro-hematuria and it requires investigation. In condition of micro-hematuria, blood only seen under microscope. Hematuria can be examined when concentration as low as 1ml blood per liter urine^{2,3,4}. Macro-scopic Hematuria is for the most ordinary sign of tumor of upper urinary tract.⁶ Hematuria be able to indicate grave ailment like upper urinary tract urothelial cell carcinoma (UUT-UCC), urinary tract stones and cancer of bladder⁵.

CTU is the new analytical imaging examination provides inclusive assessment of lower and upper urinary tract. It is defensible the same as first line examination of Macroscopic Hematuria.⁶ CTU is rising as one stop analytic method which offers meticulous assessment of stones in urinary tract, urothelial neoplasm as well as masses of kidney in single assessment. CTU is stated as multi-detector computed Tomography Examination of kidney, bladder as well as ureters among as a minimum single series of imaging attained throughout Excretory Phase subsequent to I.V. Contrast Administration.⁷ Reason to use the CTU to investigate the Hematuria eventually based upon lofty analytic accurateness for series of Excretory Phase for Urothelial Imaging, particularly for Upper Urinary Tract Urothelial Cell Carcinoma.⁹

Aim is finding different underlying finding within patients presenting with gross Hematuria. We observe those patients on CTU to evaluate whole urinary tract for any anomaly.

MATERIAL AND METHODS

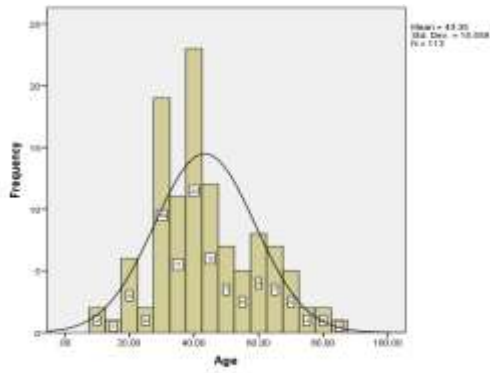
A descriptive study was conducted after approval of Ethical Review Board at university of Lahore faculty of Allied Health sciences, Lahore. On the basis of diagnosis inclusion criteria were included adult patients of both genders for CTU. And patients who are willing to participate. In exclusion Criteria excluded the Patient present with any known renal pathologies. Data were collected with help of convenient sampling technique according to the age, gender and renal calculi, hematuria, site of renal calculi and renal masses. Total sample size was 113. After collection data were managed in Microsoft excel sheet and were analysed SPSS version 21 was used for data analysis.

RESULTS

Out of total number of 113 patients, 33(29.2%) were females and 80(70.8%) were males. Out of 113 patients, 42(37.2%) patients had gross haematuria, 40(35.4%) had macroscopic haematuria and 31 (27.4%) had no haematuria. 25(22.1%) patients had nephrolithiasis and 88(77.9%) had not nephrolithiasis. 20(17.7%) patients had PUJ calculus and 93(82.3%) had PUJ calculus. 14(12.4%) patients had urinary tract masses and 99(87.6%) patients had not urinary tract masses. Out of 113 patients, 58 (51.3%) patients had no calculus and 10(8.8%) had calculus at distal pole, 30 (26.5%) had calculus at mid pole and 15(13.3%) had calculus at proximal pole. Mid ureter is the most frequent site for urolithiasis. 27(23.9%) patients had prostatic abnormalities and 86(76.1%) patients had not prostatic abnormalities.

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Cross tabulation between gender and gross haematuria

		GROSS HAEMATURIA			Total
		Gross	Macroscopic	NO	
Female	Count	11	11	11	33
	% within Gender	33.3%	33.3%	33.3%	100.0%
Male	Count	31	29	20	80
	% within Gender	38.8%	36.3%	25.0%	100.0%
Total	Count	42	40	31	113
	% within Gender	37.2%	35.4%	27.4%	100.0%

Cross tabulation shows that out of total number of 113 patients, 11 females had gross haematuria and 11 had microscopic and 11 had no haematuria, 31 male had gross haematuria, 29 had macroscopic and 20 had no haematuria.

Cross tabulation between gender and urinary tract masses

		Urinary Tract Masses		Total
		NO	YES	
Female	Count	30	3	33
	% within Gender	90.9%	9.1%	100.0%
Male	Count	69	11	80
	% within Gender	86.3%	13.8%	100.0%
Total	Count	99	14	113
	% within Gender	87.6%	12.4%	100.0%

Cross tabulation shows that out of total number of 113 patients 30 female had no urinary tract mass and 3 had masses, 69 males had no urinary tract masses and 11 had masses.

GROSS HAEMATURIA * Site of Urinary Tract Calculi-Level of Ureter Crosstabulation

GROSS HAEMATURIA		Site of Urinary Tract Calculi-Level of Ureter				Total
		Distal	MID	NO	Proximal	
GROSS	Count	3	13	20	6	42
	% within GROSS HAEMATURIA	7.1%	31.0%	47.6%	14.3%	100.0%
MICRO-SCOPIC	Count	4	9	23	4	40
	% within GROSS HAEMATURIA	10.0%	22.5%	57.5%	10.0%	100.0%
NO	Count	3	8	15	5	31
	% within GROSS HAEMATURIA	9.7%	25.8%	48.4%	16.1%	100.0%
Total	Count	10	30	58	15	113
	% within GROSS HAEMATURIA	8.8%	26.5%	51.3%	13.3%	100.0%

Cross tabulation shows that mid site is more frequent for ureteric calculi causing gross haematuria

GROSS HAEMATURIA * URINARY TRACT MASSES Crosstabulation

GROSS HAEMATURIA		Urinary Tract Masses		Total
		No	Yes	
Gross	Count	36	6	42
	% within gross haematuria	85.7%	14.3%	100.0%
Microscopic	Count	35	5	40
	% within gross haematuria	87.5%	12.5%	100.0%
No	Count	28	3	31
	% within gross haematuria	90.3%	9.7%	100.0%
Total	Count	99	14	113
	% within gross haematuria	87.6%	12.4%	100.0%

Cross tabulation shows that 6 patients had urinary tract masses causing gross haematuria, 5 patients causing microscopic haematuria, and 3 had masses but no haematuria.

GROSS HAEMATURIA * Site of Urinary Tract Calculi-PUJ Crosstabulation

GROSS HAEMATURIA		Site of Urinary Tract Calculi-PUJ		Total
		NO	YES	
GROSS	Count	34	8	42
	% within GROSS HAEMATURIA	81.0%	19.0%	100.0%
MICRO-SCOPIC	Count	30	10	40
	% within GROSS HAEMATURIA	75.0%	25.0%	100.0%
NO	Count	29	2	31
	% within GROSS HAEMATURIA	93.5%	6.5%	100.0%
Total	Count	93	20	113
	% within GROSS HAEMATURIA	82.3%	17.7%	100.0%

Cross tabulation shows that 8 patients had PUJ calculi causing gross haematuria, 10 had microscopic haematuria and 2 had PUJ calculi but no history of haematuria.

Fig 1: Obstructing calculus in left mid ureter resulting in upstream mild hydronephroureter



Fig 2: Right dysfunctional atrophic kidney with renal and ureteric calculi.



DISCUSSION

In this study, evaluate different diagnostic finding in patients presented among gross Hematuria on CTU. On the basis of diagnostic performance to evaluate the underlying risk of clinically significant pathologies including age, gender, urolithiasis, urinary tract masses, prostatic abnormalities and finding of hematuria is important and the main strength of computed tomography urography is to image whole Upper Urinary Tract among elevated extent of Spatial declaration consent to detect the irregularity within Hematuria patients.

In Hematuria setting, Computed Tomography Urography is lately expected like assessment for evaluation of intact Urinary System as well as analyze likely Hematuria causes, counting Urolithiasis, additional Benign Etiologies, Renal Parenchymal lesion as well as Urothelial Neoplasm, therefore eliminate require intended for other Imaging¹⁰. In term of stage of cancer, Computed Tomography Urography may identify straight Peri-renal, Peri-ureteral as well as Extra-vesical Tumor increase as well as secluded meta-stases. Computed Tomography Urography too let extra full assessment of Renal Parenchyma as well as Peri-renal tissues moreover consent

improved assessment of blocked collect system than Excretory Urography.¹¹ Advantage of Computed Tomography Urography is finished likely through Multi-detector Helical Computed Tomography among Volumetric Acquisition that gives quick Acquisition of high resolution pictures furthermore let multi-planar re-construction¹².

In current study, the attempt was made to determine the role CT-Urography in Hematuria. Data were collected according to including age, gender, urolithiasis, urinary tract masses, prostatic abnormalities and finding of Hematuria. Data of Table shows that out of total number of 113 patients, comprising 33(29%) were females and 80(70%) were males collected from Sharif City Hospital Lahore and Shalimar Hospital Lahore.

Albani *et al.* found out the worth of Computed Tomography Urography like an option to IVU used for first assessment for Hematuria patients. Examination of 2 separate matchless patients group (n = 259) revealed that Computed Tomography Urography was considerably additional susceptible than IVU to detect Upper Tract Disease (94.1% vs. 50%)¹³.

Wang *et al.*, 2010 performed the study on adult patients of Hematuria who underwent the Computed Tomography Urography over period of 2.5 years. Computed Tomography Urography accuracy was 0.996, 0.958 and 1.000. In our study Out of total number of 195 patients comprising 58 had Hematuria and 137 had not haematuria¹⁴.

Amin Z *et al.*, exposed extremely elevated Computed Tomography Urography specificity and sensitivity in comparison of this present study. According to their results, NPV of Computed Tomography Urography was 91.6%, PPV was 96.8%, specificity was 95.6% as well as sensitivity was 93.6% with 94.6% accuracy. Accuracy of Computed Tomography KUB according to results to diagnose the urolithiasis was 96.39%.¹⁵ Like in another study, Computed Tomography Urography identify 23 patients of urolithiasis become cause for Hematuria including VUJ, PUJ, renal, and ureteric calculi moreover that constitutes to about 40% in total therefore become chief reason of Hematuria. Similar study, CTU role for initial evaluation of Hematuria by Albani JM *et al.*, 2007 described the sources of Hematuria in the 107 patients as well as they found that urolithiasis (26%) was common cause of Hematuria. In present study, the main common location of urolithiasis was ureteric (35%) followed by VUJ. Mahmud MA *et al* in 2015, studied the main cause of Hematuria was urolithiasis in about 24% patients. While in present study, out of total number of 113 patients comprising 25 patients had nephrolithiasis and 88 had not nephrolithiasis, 20 patients had PUJ calculus and 93 had PUJ calculus.¹⁶ On the other hand, In our results there were 2 females had calculi at distal ureter, 9 female had mid ureteric calculi, 6 had proximal ureteric calculi and 16 had no calculi, 8 males had distal ureteric calculi, 21 had mid ureteric calculi, 9 had proximal ureteric calculi and 42 had no calculi¹⁷.

Sierakowski, *et al.* 2010 conduct a study about the common cause of Hematuria such as ureteral, bladder and renal calculi. 12% people develop stones of kidney at some point during life time. Unenhanced helical computed tomography is the best evaluating modality for calculi. It is also helpful to detect the non-obstructing calculi in patients with urinary symptoms¹⁸. Though conservative radiography can assist identify Urinary Calculi, not like perceptive while Unenhanced-CT. Unenhanced part of our Computed Tomography assessment gives best assessment of every Urinary Calculi and assessment to obstruct associated with calculi¹⁹.

Computed Tomography Imaging is more sensitive test to evaluate cancer of bladder range from 79% - 89.7%, among 91% - 94.7% specificity. Furthermore, Computed Tomography is more perceptive than IVU or Ultrasonography to identify the lesions of upper tract²⁰.

Mainly Computed Tomography Urography is able to recognize Hematuria cause in 33% to 43% cases²¹. The overall specificity is 89% to 97% and sensitivity is 92% to 100% to identify the cause of Hematuria. Recent minute metanalysis demonstrated a joint 99% specificity and 96% sensitivity. Computed Tomography Urography too executes fine in Lower Urinary Tract²². According to result of our study out of 113 patients, 42(37.2%) pateints had gross haemutria, 40(35.4%) had macroscopic haemtuiria and 31(27.4%) had no haemturia, 27 (23.9%) patients had prostatic abnormalities and 86(76.1%) patients had not prostatic abnormalities.

CONCLUSION

This study concluded that the utility of CTU is now widely recognized as well as has grown to be the Imaging of choice to evaluate of asymptomatic Hematuria. In our study gross Hematuria are most common in males. The most common site for cause of Hematuria was ureteric calculi and least common site was nephrolithiasis.

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