Summary

Hematuria is defined as the presence of blood in urine. It has a wide range of causes, including calculi, neoplasms, infections, trauma, drug toxicity, coagulopathy, and varices. Assessment of urologic malignancy is the most important cause for evaluation of patients with hematuria.

Evaluation of patients with hematuria frequently requires several imaging modalities including intravenous urography (IVU), ultrasonography(US), computed tomography (CT), magnetic resonance imaging (MRI), retrograde ureterography and pyelography, cystoscopy and ureteroscopy.

Multi-slice CT urography performed with a combination of unenhanced, nephrographic-phase, and excretory-phase imaging can demonstrate a wide spectrum of disease in these patients with a single study. Unenhanced imaging provides optimal detection of calculi which is a common cause of hematuria. In addition, the combination of unenhanced and nephrographic-phase imaging provides outstanding evaluation of renal masses. Findings at excretory phase imaging mimic IVU findings and allow excellent evaluation of the collecting systems and ureters. Bladder disease, a common cause of hematuria, is often well seen on unenhanced or excretory-phase images, although cystoscopy may still be necessary.

Multi-slice CT urography (MSCTU) offers several advantages for imaging of the urinary system: single breath-hold coverage of the entire urinary tract with absence of respiratory mis-registration, rapid imaging

with optimum contrast medium opacification and reduced partial- volume effect as appropriate slices can be selected from the volumetric data. In addition, acquisition of multiple thin overlapping slices provides excellent two-dimensional (2D) and three-dimensional (3D) reformations, and facilitates virtual cystoscopy. These advantages have established MSCTU as a compelling alternative to excretory urography (EU) and ultrasonography (US) in the evaluation of the patient with hematuria.

The purpose of this study is to discuses the benefits of multi-detector row CT urography (MDCTU), in the evaluation of patients with non traumatic hematuria.

Sixty five consecutive patients with non traumatic hematuria (gross & microscopic) were recruited from Nephrology and Urology out patients' clinics of Mansoura Urology and Nephrology Center were examined using MDCT, between may 2007 and march 2010.In fifty five patients abnormality detected on MDCT and these patients were included in our study, the other ten patients no abnormality was detected on MDCT examination and referred to further medical examination and excluded from our study.

According to the patients presentation & suspected lesion to be found (depending on previous radiological examination), protocol of study is tailored.

a- In cases where urinary stones are suspected, just thin slice non-enhanced cuts without intravenous or oral contrast are obtained.

b- In suspected renal vascular, renal Parenchymal & urothelial lesions, single bolus four phases technique was used including:

- Arterial (corticomedullary) phase: with automatic detection of contrast media (range from 30-35 sec).
- Nephrographic phase: 60-90 seconds after the end of the arterial phase.
- Delayed(excretory or pyelographic) phase: 3-5 minutes after the end of the nephrographic phase.

Shortly after starting our study, the quad phase technique was modified to be triphasic instead, aiming to reduce the radiation dose delivered to the patient so for vascular pathology unenhanced phase was done followed by early arterial and excretory phase, for urothelial pathology unenhanced phase was done followed by Nephrographic and excretory phase

Fifty five patients with abnormalities detected on MDCT examination include thirty male and twenty female with age ranged from two to seventy five years .abnormalities were classified into three groups

- **Group A**: Showed parenchymal pathology including 12 cases that can classified by MDCT into subgroups; inflammatory and Neoplastic pathology.
- **Group B**: Showed urothelial tract pathology including 39 cases that can classified by MDCT into subgroups; inflammatory, Neoplastic, urolithiasis and PUJO.
- **Group C:** Showed vascular pathology including 4 cases.

MDCT played an important role in diagnosis and management of Parenchymal renal pathology and allowed detection of 12 cases of

Parenchymal renal masses (5malignant and 7 benign) with sensitivity and accuracy 100%

MDCT was helpful in diagnosis and management of vascular pathology and allowed detection of 4 cases of vascular pathology (one case of arteritis ,one case of RAS and two case of nutcracker syndrome) with sensitivity an accuracy 100%

Urolithiasis had been identified by MDCT examination in 100% of cases. MDCT could detect all stones regardless to its size or location and accurate differentiate between small distal Ureteric stones and pelvic phlebolie.

The sensitivity of our CT protocol for detection of urothelial tumor was 100% and accuracy was 83.3%. Lesions were characterized by location (intrarenal collecting system, ureter or urinary bladder) and by appearance (masse or wall thickening).

Our CT protocol allowed detection of PUJO cases and allow detection if there was crossing vasculature at point of transition that allow better surgical management

In conclusion, MSCTU is a versatile imaging test, which can clearly demonstrate urinary tract anomalies, inflammatory, Neoplastic Parenchymal pathology, and vascular pathology as well as urothelial tract pathology including urolithiasis and Neoplastic lesions. Consequently, it is being increasingly recommended as a first line of investigation in the patients with hematuria.