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Original Article

Role of CT-KUB for Detection of Obstructive and Non-Obstructive Hydronephrosis on The Basis of Frequency of Calculi

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ABSTRACT

The kidneys and ureters are the most prevalent sites for stones. The swelling of the kidneys due to renal stones, most often ureteric stones, is known as hydronephrosis. For detecting the position of stones, CT-KUB has a high sensitivity. **Objective:** To determine the frequency of obstructive and non-obstructive hydronephrosis due to calculi in CT-KUB. **Methods:** A cross-sectional study was conducted from January, 2022 to May, 2022 at Tertiary Hospital in Lahore, Pakistan. A sample size of 166 patients was obtained using a non-probability convenient sampling technique based on the previously published articles. All patients with renal calculi were included. 64 Slices Aquilian CT Machine was used. SPSS ver. 22 was used for data entry and analysis. **Results:** 166 Patients were in the age ranges of (15-25), (26-35), (36-45), (46-55), (56-65), and (66-75) were 27(16.3%), 39(16.3%), 32(19.3%), 37(22.3%), 22(13.3%), 9(5.4%) respectively. There were 126(75.9%) males and 40 (24.1%) females. Flank pain was present in 154(94%) and hematuria in 68(41%) patients. Stones were noted in kidneys 102(46.6%), proximal ureter 35(16%), mid ureter 21(9.6%), distal ureter 51(23.3%), urinary bladder 10(4.6%). 96 patients were diagnosed with obstructing hydronephrosis (57.8%). **Conclusion:** Urinary tract stones are most commonly seen in the kidneys and ureters. Obstructive and non-obstructive hydronephrosis is mostly caused by kidney stones. Obstructive hydronephrosis accounted for 57.8% of the total, whereas non-obstructive hydronephrosis accounted for 42.2%. CT-KUB plays a vital role in the diagnosis of hydronephrosis.

INTRODUCTION

Hydronephrosis is a swelling of the kidney caused by the accumulation of urine in the renal pelvis and calyces [1]. The presence of stones in the urinary tract system is the most common cause of hydronephrosis, although it can also be caused by obstructions in the urinary tract system caused by Renal Calculi, or inflammation [2,3]. Urolithiasis is a condition in which calculus or stones build in various sections of the urinary tract system (kidney, ureter, and bladder) [4,5]. Urolithiasis is the most prevalent cause of renal colic pain and hematuria, or blood in the urine, in patients [6]. Renal tract stones might be detected by chance or develop suddenly, accompanied by symptoms such as flank discomfort or renal colic [7,8]. Urinary tract blockage causes renal colic. The most common clinical concern is underlying renal, and ureteric stones [9]. Stones in the urinary system are frequent, with a lifetime incidence of up to 12% and recurrent rates of up to 50% [10]. Early diagnosis of Urolithiasis for which non-contrast CT is considered the gold standard, is also useful in the treatment of this disease [11,12]. CT KUB is the preferred examination for evaluation of Urolithiasis because of its availability, ease of performance, and high sensitivity [13]. Because it is a more sensitive and non-invasive approach than IVU and most of the stones noted were radio-opaque

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on CT for which plain radiography is not enough to diagnose the stones [14-17]. The size and burden of stones, and also the degree of urinary blockage, may all be detected immediately [16,18]. Two important parameters in detecting the passage of the stones are the size of the stone and its position in the ureters [19,21]. It provides for the accurate detection and quantification of calculus size, as well as the assessment of any related urinary tract blockage [22]. Because it is associated with the spontaneous passage of ureteric stones, accurate assessment of the stone size and position is important for therapeutic therapy [23-25].

METHODS

The duration from January, 2022 to May, 2022 was considered and patients with renal colic having flank pain and hematuria have been referred to the Department of Radiology for CT-KUB at Tertiary Hospital in Lahore Pakistan. This was a cross-sectional study and the sample size of 166 patients was obtained using a non-probability convenient sampling technique based on the previously published articles. 126 were males and 40 were females. Both Male and Female patients were between the age ranges of 15 to 60 years. All patients with renal calculi who have been referred to the Department of Radiology for CT-KUB were included. While patients other than renal calculi have urinary Tract Infection (UTI), renal failure, and renal tumors were excluded. 64 Slices Aquillion CT Machine was used. Axial slices of 5 mm were obtained through the KUB area without the use of contrast media. SPSS version 22.0 was used for data entry and analysis.

RESULTS

A sample size of 166patients was taken in the study. Table 1 shows the age of the patients categorized into different groups. 166 patients were in the age ranges of (15-25), (26-35), (36-45), (46-55), (56-65), and (66-75) were 27(16.3%), 39(16.3%), 32(19.3%), 37(22.3%), 22(13.3%), 9(5.4%) respectively.

Age	Frequency	Percent
15-25	27	16.3
26-35	39	23.5
36-45	32	19.3
46-55	37	22.3
56-65	22	13.3
66-75	9	5.4
Total	166	100.0

Table 1: Age of the Patients

Table 2 shows the gender of the patient. There were 126(75.9%) males and 40(24.1%) females among 166 patients.

Gender	Frequency	Percent
Female	40	24.1
Male	126	75.9
Total	166	100.0

Table 2: Gender of the Patients

Table 3 shows symptoms of the patients most commonly flank pain and hematuria. Flank pain is present in 154(94%) patients, while hematuria in 68(41%) patients are noted.

Symptoms		Frequency	Percent
Flank Pain	Yes	156	94.0
	No	10	6.0
	Total	166	100.0
Hematuria	Yes	68	41.0
	No	98	59.0
	Total	166	100.0

Table 3: Symptom among patients

Table 4 shows the location of the stones. Frequencies of the location of stones are kidney stones 102(46.6%), Proximal ureter 35(16%), Mid ureter 21(9.6%), distal ureter 51(23.3%), and Urinary Bladder 10(4.6%).

Location of stone in CT KUB	Frequency	Percent
Kidney	102	46.6
Proximal ureter	35	16.0
Mid ureter	21	9.6
Distal ureter	51	23.3
Urinary bladder	10	4.6
Total	219	100.0

Table 4: Location of the stone in CT KUB

Table 5 shows the categorization of hydronephrosis in kidney stones. 96 patients were diagnosed with Obstructing hydronephrosis 57.8% and 70 patients with Non-Obstructing hydronephrosis 42.2%

Categorization of hydronephrosis kidney stones	Frequency	Percent
Obstructive hydronephrosis	96	57.8
Non-obstructive hydronephrosis	70	42.2
Total	166	100.0

Table 6: Categorization of hydronephrosis kidney stones

DISCUSSION

In the current study, non-contrast CT KUB (Kidney, Ureter, and Bladder) on 166 patients was performed. Patients came with complaints of flank pain and hematuria. Flank pain was present in 154(94%) patients. Hematuria was in 68(41%) patients. A study by Moawia Gamerddin et.al shows that males are more prone to have kidney stones than females. Another study by Hizbullah Janet also shows male ratio is more than the female ratio [19]. Parisa Fani in 2018 concluded that male patient with stones is more prevalent than females. The current study also shows males are more than females. In the current study, stones are observed more common in males 126(75.9%), and less common in females 40 (24.1%) [18]. All of above mentioned previously published studies and the present study concluded that

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urinary tract stones are most common in males. The age ranges of (15-25), (26-35), (36-45), (46-55), (56-65), and (66-75). The minimum age was 15years and the maximum age was 75 years. All patients with urinary tract stones who came with the complaint of flank pain and hematuria were included. While patients other than renal calculi had Urinary Tract Infection, Renal failure, and Renal Tumors were excluded. Calculi can be present in the pelvicalyceal system or other locations (Proximal ureter, Mid ureter, Distal ureter) in ureters that were the majority cause of obstructing hydronephrosis. In literature, Parisa Fani et.al described that majority of the calculi were ureteric. However, the present study also indicates a higher percentage of presence of the ureteric calculi at different locations. In the current study Obstructive hydronephrosis is more prevalent than non-Obstructive hydronephrosis.

CONCLUSION

Urolithiasis is the most common condition in both men and women. Patients with stones in their urinary system have flank pains and hematuria. Urinary tract stones are most commonly seen in the kidneys and ureters. The presence of stones in the urinary tract system (Urolithiasis) is the most prevalent cause of hydronephrosis. Obstructive and non-obstructive hydronephrosis are caused by kidney stones. For patients with stones in the kidney, various regions of the ureters, and the urinary bladder, non-contrast CT KUB conducted outstanding imaging investigations. The role of CT-KUB in the diagnosis of urinary system calculi was also investigated in this study.

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