

VALIDITY OF MICROSCOPIC HAEMATURIA AS A PREDICTOR OF URINARY CALCULI

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ABSTRACT

- Objective** To determine the validity of microscopic haematuria as a predictor of urinary calculi in patients with acute renal colic presenting with acute flank pain.
- Study design** Cross sectional study
- Place & Duration of study** Hamdard University Hospital and other private hospitals where authors work, from July 2007 to June 2008.
- Patients and Methods** All adult patients who presented with complaints of acute renal colic (acute flank pain) and had urinalysis done within 72 hours of onset of pain were included in this study. Patients below the age of 12 years, those having gross haematuria and if their urinalysis was not done within 72 hours of onset of pain, were excluded. Presence of calculi was determined either by intravenous urography (IVU) or history of passing calculi per urethra. Sensitivity, specificity, positive and negative predictive values of microscopic haematuria for urinary calculi were calculated.
- Results** Fifty seven patients fulfilled the inclusion criteria. There were 38(66.67%) males and 19 (33.33%) females with mean age 40.66 years (range 15-65 years). Of the urinalyses, 22 were true-positive, 9 true-negative, 7 false-positive, and 19 false-negative, yielding a sensitivity, specificity, positive predictive value, and negative predictive value of 53.66%, 56.25%, 75.86% and 32.14% respectively.
- Conclusion** Microscopic haematuria is not a sensitive or specific indicator of presence of urinary calculi in patients with acute renal colic and may not be used as a guide for further work up.
- Key words** Hematuria, Renal colic, Urinary calculi, Urinalysis

INTRODUCTION:

Renal colic caused by calculi is a common urological

condition, occurring in approximately 2% of the western population.¹ Combination of renal colic with haematuria is the hallmark of stone disease,² so diagnostic algorithm includes detection of haematuria by urinalysis or urinary dipstick test.^{3,4} In the appropriate clinical setting the presence of haematuria has been used to make a presumptive diagnosis of urolithiasis and may preclude performance of additional confirmatory tests.³ Some authors have suggested that in the absence of haematuria further investigation for urolithiasis may not be warranted

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and other diagnoses should be pursued to explain the acute flank pain.⁵ This fact has been challenged by others reporting a negative urinalysis for microscopic hematuria in about 9-18% of such patients.⁴ The purpose of this study was to determine the validity of haematuria as a predictor of urinary calculi in patients presenting with acute renal colic (acute flank pain).

PATIENTS AND METHODS:

This cross sectional study was performed between July 2007 to June 2008 at Hamdard University Hospital and other private hospitals (Kutiyana Memon Hospital, Jamal Noor Hospital) where authors work. Patients who presented with complaints of acute renal colic and if their urine DR was done with in 72 hours of onset of pain were included in the study.

Acute renal colic was defined as an acute pain felt in the loin and radiating to the ipsilateral iliac fossa and genitalia,⁶ and microscopic haematuria as presence of 3 or more red blood cells per high power field on urine microscopy as per American Urological Association best practice guidelines.⁷ These patients initially presented to Emergency rooms or managed by their family physician and then referred to consultant’s clinics. A self administered questionnaire was used to record clinical details and data entered on Microsoft Excel.

Patients below the age of 12 year, those with gross haematuria and if their urine DR was not done with in 72 hours of onset of pain, were excluded from the study. Stone confirmation tools were IVU or/and history of spontaneous passage of calculus per urethra.

RESULTS:

A total of 57 patients fulfilled the inclusion criteria. There were 38 (66.67%) males and 19 (33.33%) females with mean age 40.66 years ranging from 15 to 65 years. Thirty eight patients initially presented

to emergency room where as 19 were managed by their family physicians. Microscopic haematuria was present in 29(50.88%) patients. Out of these 22 had stone (true positive), whereas 7 had no stone (false positive). Twenty eight (49.12 %) patients did not have microscopic haematuria and out of these 19 had stone (false negative) where as no stone was present in 9 cases (true negative). Sensitivity and specificity of microscopic haematuria were 53.66% and 56.25% respectively. The positive predictive value and negative predictive value for haematuria as a marker for stone disease was 75.86% and 32.14% respectively.

DISCUSSION:

Urinary calculi represent the third most common affliction of the urinary system with their history dating back to 4800 BC. The life time risk for developing urolithiasis in industrialized countries is 1 to 5% and reno-ureteral calculosis is more common in age group 20 to 50 years with male to female ratio of 3:1.⁸ On the contrary, primitive vesical calculus is fairly wide spread in Asia due to malnutrition in the early years of life.⁹ The mean age of presentation in our study (40.66 years) was comparable with international data but here the male to female ratio was 2:1.

Haematuria either gross or microscopic is a common accompaniment of stone in urinary tract but it is not always the case and up to 15% of patients with a stone may not have haematuria at all.^{8,10} Therefore the initial work up of patients presenting with acute renal colic remains controversial. Traditionally urinalysis and x-ray KUB have been done as initial Emergency Room investigations.¹¹ Urinalysis is simple and inexpensive to perform and the presence of microscopic haematuria on urinalysis has been thought as a sensitive marker for detection of stone.^{1,12} In favour of this few studies state that if haematuria is absent on urinalysis then possibility of urolithiasis is unlikely.⁵ Uptil now the most important step in the

Table I: Haematuria as an indicator of urolithiasis in different studies

S No	Authors	Sensitivity (%)	Specificity (%)	Positive predictive value (%)	Negative predictive value (%)
1	Present study	53.66	56.25	75.86	32.14
2	Xafis K et al ¹²	67	58	86	31
3	Luchs JS et al ¹⁴	84	48	72	65
4	Teh HS et al ¹¹	90.0	33.8	-	-
5	Boyd R et al ¹	100	32	64	100

diagnostic algorithm of renal colic has been considered the detection of haematuria on which further diagnostic work up depends. Although over 80% of the patients with acute flank pain are tested positive for haematuria but its need in diagnosis is debatable.¹³ The presence or absence of blood on urinalysis cannot be used reliably to determine which of the patients actually have stones.^{2,3,11,14} The negative haematuria may result because of poor reliability of microscopy due to technique, red cell haemolysis and not all patients with stones bleed.² Even strongly positive, haematuria has insufficient positive predictive value for diagnosing urolithiasis and may be misleading as other serious conditions resulting in acute flank pain may yield a positive test.³ In our study 50.88% patients with acute renal colic had haematuria.

In Pakistan there is enough literature available on various aspects of urolithiasis but articles on this correlation (calculous and haematuria) were not found. A possible reason of low frequency of detection of blood on urinalysis in our study is the interval of 72 hours during which urine DR was decided to be done and perhaps in patients in whom urine DR was done late in this decided period the episode of haematuria might have settled. The role of urinalysis for detecting haematuria to predict the presence of stone has been challenged by many authors and wide variability in its results in different studies is evident as shown in table I.

In comparison to formal urinalysis, urine dipstick test has been suggested to be more sensitive for the detection of haematuria in emergency room setting but it is still underutilized in our set up.^{2,4,5} The plain x-rays taken in emergency room without bowel preparations may be unyielding especially when small stone is the cause,¹ and commonly followed algorithm after detection of haematuria is intravenous urography in our set up.

Historically intravenous urography has been considered the corner stone of emergency evaluation of urolithiasis with its ability to demonstrate the anatomy of the entire urinary tract and gross assessment of the renal function. However, it is time consuming, expensive and exposes the patient to IV contrast and radiation.^{2,15} Since described by Perlman et al in 1996, un-enhanced helical computerized tomography has emerged as superior tool than excretory urography as ultrasound, in diagnosing urolithiasis and can evaluate many other

causes of flank pain.^{7,16,17,18} Due to limited availability and financial constraints we have not used it as a routine. Urinary tract ultrasonography is still recommended as the initial imaging modality for suspected renal colic in pregnant women, children and in follow up after treatment but recent studies suggest use of unenhanced helical CT as safe even during pregnancy.¹⁵ In our opinion if the patient presents with acute flank pain typical of urolithiasis, we can make definitive diagnosis by CT urography or intravenous urography, depending on the availability and/or affordability rather than depending on routine urinalysis and its results.

CONCLUSIONS:

Microscopic haematuria is not a sensitive or specific indicator of presence of urinary calculi in patients with acute renal colic and may not be used as a guide for further work up.

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