# Information

## The Absence of Hematuria in Patients With Symptomatic Urinary Tract Stones

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OUR PERSONAL experience with a patient who had symptomatic urolithiasis but a normal urinalysis prompted a search of the literature to determine how frequently urinary tract stones occur without hematuria. We found that gross hematuria is reported to occur in 33% of patients with urolithiasis.[1] The occurrence of microhematuria in such cases is believed to be 90% to 95%, but this information is based on anecdotal experience.[2] The uncertainty of these data is reflected by the vague statement in most textbooks that hematuria is "almost invariably present" or "the rule" in patients with urinary tract stones. To better define the incidence of hematuria in patients with symptomatic urolithiasis, we did a retrospective review of inpatient and outpatient populations.

### Patients and Methods

*Inpatient Evaluation*

Hospital records were used to identify all patients at Good Samaritan Hospital and Medical Center of Portland, Oregon, from August 1978 to March 1983 with a discharge diagnosis of renal or ureteral calculus. In all, 80 patients were identified and their records were reviewed. Patients were included in the study only if all of the following criteria were met: the hospital admission was required because of abdominal, back or groin pain; this was the patient's first known episode of urolithiasis; urolithiasis was documented by intravenous pyelography or by collection of a stone (or both), and a "clean catch" (noninstrumented) urine specimen was submitted to the Good Samaritan Hospital laboratory on admission. Patients were excluded from the study if any one of the following criteria were met: the initial urine specimen was not obtained in a clean-catch manner; the patient was a woman who had menses or dysfunctional uterine bleeding at presentation; the patient had "vigorously" exercised within one day of urine collection ("vigorous" was defined as any activity significantly greater than that of daily living[3]), or there was any recorded history of renal or genitourinary disease including benign prostatic hypertrophy, urinary tract infection within three months of the initial evaluation, abdominal or back trauma within three months of presentation, glomerulonephritis, malignant hypertension, polycystic disease, tumor, papillary necrosis, vascular abnormalities, sickle cell anemia or bleeding disorders. Of the 80 patients, 24 (30%) fulfilled all inclusion and exclusion criteria. All of the urine specimens had been delivered to the laboratory at Good Samaritan Hospital. Each urine specimen was evaluated chemically with Chemstrip 6 (Bio-Dynamics) and "no blood present" was considered normal. Then 12 ml of urine was centrifuged at 2,000 rpm for five minutes and microscopic examination was done by certified medical technologists on the 0.5-ml sediment; 15 to 20 high-power fields (×400) were reviewed on each specimen. Normal values were defined by the laboratory as zero to two erythrocytes and zero to five leukocytes per high-power field.

*Outpatient Evaluation*

We reviewed all outpatient records between January 1967 and January 1983 with a diagnosis of renal or ureteral calculus contained in the 5% randomly selected medical record sample of the Portland, Oregon, Kaiser Permanente Health Care Center. We identified the records of 175 such outpatients and evaluated 171 (98%). Of these, 52 patients (30%) met all inclusion and exclusion criteria. These criteria were identical to those described for inpatient evaluation except that outpatient urine specimens were examined by the Kaiser Permanente laboratory. Chemical testing was done with Multistix (Ames Division of Miles Laboratories, Inc) from 1967 to 1980 and with Chemstrip 9 (Bio-Dynamics) from 1980 to 1983. The absence of blood was considered normal. The microscopic urine examination was done on the sediment of 8 to 12 ml after five minutes of centrifugation at 3,500 rpm and normal values were identical to those of the Good Samaritan Hospital laboratory.

In both phases of investigation, the following data were recorded for each patient: age, sex, date of presentation, analysis of the initial clean-catch urine specimen for gross and chemical blood and number of erythrocytes and leukocytes per high-power field. The following data were recorded if available: previous urinalysis results, urine culture, location of calculus (renal pelvis, ureter or bladder), size of calculus and composition of calculus (analyzed by the Louis Herring Company of Orlando, Florida).

### Results

The frequency of hematuria in patients with symptomatic renal or ureteral calculi is shown in Table 1. Of the inpatient population, 7 of 24 (29%) had zero to two erythrocytes per high-power field, as did 7 of 52 (13%) of the outpatient population. Six of 24 (25%) of the hospital-evaluated group and 19 of 52 (37%) of the non-hospital-evaluated patients had no chemical hematuria. Of the seven inpatients with normal microscopic urine examination, six were negative and one was trace positive for blood. Similarly, six of the seven outpatients with zero to two erythrocytes seen had no chemical

(Dunn PM, Keller RT, Jones SR: The absence of hematuria in patients with symptomatic urinary tract stones [Information]. West J Med 1985 May; 142:717-719)

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TABLE 1.—*The Urinalysis in Patients With Urolithiasis*

| | Hematuria | | | | | | | | | Pyuria | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Microscopic (RBC/HPF) | | | | | Gross | | Chemical | | (WBC/HPF) | |
| | 0-2 | 3-5 | 6-10 | 10-30 | >30 | + | − | + | − | 0-5 | >5 |
| Inpatient (24) | | | | | | | | | | | |
| Number | 7 | 1 | 0 | 6 | 10 | 3 | 21 | 18 | 6 | 18 | 6 |
| Percent* | 29 | 4 | 0 | 25 | 42 | 13 | 88 | 75 | 25 | 75 | 25 |
| Outpatient (52) | | | | | | | | | | | |
| Number | 7 | 3 | 7 | 7 | 28 | 5 | 47 | 33 | 19 | 45 | 7 |
| Percent* | 13 | 6 | 13 | 13 | 54 | 10 | 90 | 63 | 37 | 87 | 13 |

RBC/HPF=erythrocytes per high-power field, WBC/HPF=leukocytes per high-power field, +=positive, −=negative

*Due to rounding out of the percentages, not all groups will add up to 100% (range, 99%-101%).

hematuria. Gross hematuria was not present in 21 of 24 (88%) of the inpatients and 47 of 52 (90%) of the outpatients evaluated. Significant pyuria was present in 6 of 24 (25%) of the inpatients and in only 7 of 52 (13%) of the non-hospital-evaluated group.

The major reasons for study exclusion were a previous history of renal calculi or no documentation of urolithiasis. Urinary tract infection was rarely associated with stones in these patients. The mean age, sex, mode of diagnosis, stone location, size and composition of both the inpatient and outpatient populations are shown in Table 2.

## Discussion

Symptomatic urolithiasis is a common clinical problem not frequently confused with other abdominal conditions because of the unique quality and distribution of the pain. Many times, however, classic symptoms are not present, and the clinician must rely on laboratory information. The urinalysis is a simple, time-honored test used in the diagnosis of urolithiasis. The presence of blood in the urine of a patient with abdominal pain has strongly suggested this diagnosis and, conversely, the presence of a symptomatic stone has meant that hematuria was "invariably" present.

Our investigation has better defined the sensitivity of the urine examination in patients with symptomatic renal or ureteral stones. Only 71% of inpatients and 86% of outpatients had hematuria on initial presentation. These values are less than previously reported. Gross hematuria was present in 13% of hospital-evaluated patients and in 10% of non-hospital-evaluated patients, percentages that are much less than previously stated.[1] Clinicians should appreciate that hematuria is not invariably present in a patient with symptomatic urolithiasis. A missed or delayed diagnosis will be avoided by continued consideration of renal or ureteral stones even if the urine specimen contains no blood.

We found appreciable differences in the incidence of hematuria in the inpatient and outpatient populations. The inpatient group was more likely to have difficult diagnostic and therapeutic problems. The absence of hematuria added to the diagnostic confusion and probably increased the likelihood of hospital admission.

The outpatient population provided information about a less select and more relevant patient group. Less than 25% of these patients were eventually admitted to hospital for acute pain and many of these were admitted because the absence of hematuria obscured the actual diagnosis.

No correlation can be made between stone size or composition and the absence of hematuria as the number of patients without hematuria is too small for evaluation. There was no relationship found between calculus location and gross hematuria, contrary to the belief that stones in the renal pelvis are more likely to cause visible blood in the urine.[4] Significant pyuria with urolithiasis is infrequent in both the inpatient (25%) and outpatient (13%) populations, despite this being a "common" finding in anecdotal reports.[4]

The reason for the absence of hematuria in patients with urinary stones is not known. It has been reported that some of these patients do not have hematuria because the calculus has created complete obstruction.[5] In our study, however, there appeared to be no correlation between complete ureteral obstruction and the absence of hematuria. We repeatedly noted that hematuria was closely correlated with a patient's maximal pain. Increased pain possibly correlates with increased uromucosal excoriation or distention by the stone, which causes increased bleeding. Similarly, patients with diminished pain have a reduction or absence of blood in the urine, probably due to decreased urothelial damage. For example, a 26-year-old woman was admitted to hospital for abdominal pain and had no hematuria. Two hours later, she had severe pain and a second urine specimen showed 3+ blood and 320 erythrocytes per high-power field. A third specimen submitted hours later during another episode of severe pain was unchanged and she subsequently passed a small calculus with resolution of her pain and hematuria. This correlation be-

TABLE 2.—*Age, Sex, Mode of Diagnosis and Calculus Specifications*

| | Inpatient N=24 | Outpatient N=52 |
|---|---|---|
| Mean age (yr) | 42 | 43 |
| Sex (♂:♀) | 1:1 | 2.7:1 |
| Diagnosed by (%) | | |
| Intravenous pyelography | 96 | 90 |
| Calculus collection | 54 | 46 |
| Both | 50 | 36 |
| Calculus | | |
| Location (%) | | |
| Renal pelvis | 8 | 11 |
| Ureter | 75 | 85 |
| Both | 17 | 4 |
| Size (mean diameter, mm) | 1 to 9 | 1 to 7 |
| Composition (% calcium oxalate) | 100 | 95 |

tween pain and hematuria was noted in five other patients. To increase the likelihood of "catching" the hematuria, it may be reasonable to obtain the urine specimen during the period of maximal pain, collect serial urine specimens or do a timed urine collection. Prospective evaluation of this problem is needed.

The incidence of hematuria in patients with a symptomatic renal or ureteral calculus is not as high as previously believed; therefore, the absence of hematuria should not prematurely delete urolithiasis from the differential diagnosis of back, abdominal or groin pain. Physician examination of serial urine specimens collected during maximal pain may increase the detection of hematuria and aid in the diagnosis of urolithiasis.


**REFERENCES**

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# Medical Practice Question

EDITOR'S NOTE: *From time to time medical practice questions from organizations with a legitimate interest in the information are referred to the Scientific Board by the Quality Care Review Commission of the California Medical Association. The opinions offered are based on training, experience and literature reviewed by specialists. These opinions are, however, informational only and should not be interpreted as directives, instructions or policy statements.*

## Biochemical Biopsy

**QUESTION:**

*Is biochemical biopsy considered accepted medical practice?*

**OPINION:**

In the absence of a specific clinical context and guidance by informed clinical judgment, it is the opinion of the Scientific Advisory Panel on Pathology that the value of such an extensive battery of laboratory tests as offered by biochemical biopsy is unknown. Biochemical biopsy involves a complex series of blood tests, the results of which are then analyzed by computer in an attempt to establish a diagnosis. Patients recommended for this procedure include those with vague patterns of symptomatology and no evident primary disease pattern, those not responding to therapies because of some secondary subclinical condition and those who cannot communicate their symptoms or complaints.

Computer analysis of laboratory data is accepted practice. It can shorten diagnostic time and can greatly assist clinicians both in diagnosis and treatment. The method proposed by the biochemical biopsy, however, suffers from blind overkill. Though most of the tests cited are valid and may give additional direction when used with discretion and ordered on the basis of clinical findings, other tests listed would be done at unnecessary expense. Occasionally, unsuspected pathologic conditions may be suggested by "blind" laboratory studies, but just as frequently misdirection may be the result. The accuracy and reliability of this method remain to be documented and its expense proved cost-effective.