

Contribution of Imaging in the Diagnosis of Urinary Tract Lithiasis at the Fertilia Medical Clinic in Bamako

Mamadou N'Diaye^{1*}, Mamadou Dembélé^{1,3}, Alassane Kouma¹, Zoumana Cheick Berete², Souleymane Sanogo¹, Ousmane Traoré¹, Issa Cissé¹, Aboubacar Sidiki N'Diaye¹, Ilias Guindo¹, Ouncoumba Diarra¹, Adama Diaman Keita¹ and Siaka Sidibe¹

¹Faculty of Medicine and Odonto-Stomatology of Bamako (FMOS), Bamako, Mali

²Department of Education and Research in Public Health (DERSP), Bamako, Mali

³Fertilia Medical Clinic

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*Corresponding author: Mamadou N'Diaye

Faculty of Medicine and Odonto-Stomatology of Bamako (FMOS), Bamako, Mali

Abstract

Original Research Article

Aims: Urolithiasis is a common pathology which affects, depending on the country, from 4 to 20% of the population. Several epidemiological studies have shown over the last 30 years that the frequency of lithiasis continues to increase in industrialized countries. The objective of our study was to evaluate the contribution of imaging methods in the management of lithiasis of the urinary tree at the Fertilia medical clinic in Bamako. **Subjects And Methods:** This was a 24-month cross-sectional and prospective study, between January 2020 and January 2022, which involved 160 patients who came for imaging examinations looking for urinary tract lithiasis. Data were entered and analyzed using SPSS. **Results:** A total of 2,875 radiological examinations were carried out during our study period and we retained 160 cases of urinary tract lithiasis, i.e. a frequency of 05.56%. The most represented age group was 21-30 years old with 24.37%. The male sex represented 65%, pupils and students were the most numerous with 24.34%. 90.62% of our patients were referred to us by other doctors. The most common urological antecedent was urinary bilharziasis. The most cited reason for consultation was acute renal colic. The radiological examination that was performed the most was the combination of plain abdominal radiography and ultrasound. The ASP was normal in 28.75% of cases. The renal site was the most common location of lithiasis (63%) and mainly on the left (46.25%). The calyx location of lithiasis was the most common with 58.75%. The number of lithiasis was two or more in 54.38%. The most cited ureteral location was the terminal ureter (60%). The complication on the upper urinary tract was hydronephrosis (60%). Creatinine was normal in 76.87% of cases. **Conclusion:** Urolithiasis remains a fairly common condition in Gao. It is especially seen among the working population. It is common at all ages and more frequently in males. Urolithiasis is responsible for temporary professional incapacity and therefore constitutes a public health problem.

Keywords: Ultrasound, ASP, Lithiasis, Bilharziasis, hydronephrosis.

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INTRODUCTION

Urolithiasis is a common pathology which affects, depending on the country, from 4 to 20% of the population [1]. Several epidemiological studies have shown over the last 30 years that the frequency of lithiasis continues to increase in industrialized countries [2].

The frequency of stone disease seems to increase in hot regions due to changes in nutritional habits, sanitary conditions, environmental factors or lack of fluid intake favoring excessive concentration of urine.

A highly recurrent pathology, urolithiasis is responsible for several hospitalizations in health services and can be responsible for numerous renal functional consequences. Medical imaging is essential in the functional and pathological diagnosis of urinary tract lithiasis. The role of medical imaging is to confirm the diagnosis, to enumerate, locate, specify the denials of the stone(s), to eliminate possible complications and finally to assess the functionality of the upper urinary tract.

Few studies have been carried out in health centers in our country where the climate seems conducive to the establishment of lithiasis. This is why our work aims to evaluate the interest of imaging

techniques (ultrasound and conventional radiology) in the diagnosis and management of lithiasis of the urinary tract at the Fertilia medical clinic in Bamako.

MATERIALS AND METHOD

This was a 24-month cross-sectional and prospective study, between January 2020 and January 2022, which involved 160 patients who came for imaging examinations looking for urinary tract lithiasis. Data were entered and analyzed using SPSS. The ultrasounds were done using a general electric Voluson E8 device and the x-rays were done using an Italia X-ray device.

DATA PROCESSING AND ANALYSIS

The data collected on the technical sheets were entered and analyzed using SPSS software. Spearman and Pearson correlation tests were used to determine the level of significance during comparisons at the 5% level.

RESULTS

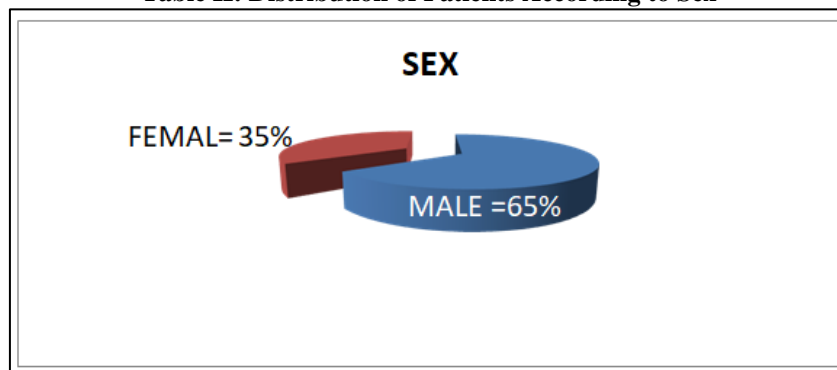
A total of 2,875 radiological examinations were carried out during our study period and we retained 160 cases of urinary tract lithiasis, i.e. a frequency of 05.56%. The most represented age group was 21-30 years old with 24.37%. The male sex represented 65%, pupils and students were the most numerous with 24.34%. 90.62% of our patients were referred to us by other doctors. The most common urological antecedent was urinary bilharziasis. The most cited reason for consultation was acute renal colic. The radiological examination that was performed the most was the combination of plain abdominal radiography and ultrasound. The ASP was normal in 28.75% of cases. The renal site was the most common location of lithiasis (63%) and mainly on the left (46.25%). The calyx location of lithiasis was the most common with 58.75%. The number of lithiasis was two or more in 54.38%. The most cited ureteral location was the terminal ureter (60%). The complication on the upper urinary tract was hydronephrosis (60%). Creatinine was normal in 76.87% of cases.

Table I: Distribution of Patients According to their Age

AGE	NUMBER	PERCENTAGE
1-10 YEARS	36	22,50%
11-20 YEARS	19	11,87%
21-30 YEARS	39	24,37%
31-40 YEARS	28	17,50%
41-50 YEARS	17	10, 63%
51-60 YEARS	11	6,87%
61-70 YEARS	8	5%
71-80 YEARS	1	0,63%
81 YEARS AND PLUS	1	0,63%

The age group of 21-30 was the most affected with 39 patients or 24.37%.

Table II: Distribution of Patients According to Sex



The male gender represented 65% or 104 patients.

Table III: Distribution of Patients According to Urological History

UROLOGICAL HISTORIES	NUMBER	PERCENTAGE
URINARY LITHIASIS	13	8,12%
URINARY INFECTION	55	34,38%
BILHARZIASIS	59	36,88%
NO HISTORY	33	20,62%
TOTAL	160	100%

Bilharzia was found in 59 patients or 36.88%.

Table IV: Distribution of Patients Suffering from Lithiasis (Clinical Information or Reason for Consultation)

REASON FOR CONSULTATION	NUMBER	PERCENTAGES
ACUTE NEPHRETIC COLIC	38	23,75%
RIGHT FLANK PAIN	16	10%
LEFT FLANK PAIN	19	11,87
LOWER BACK PAIN	12	7,50%
HEMATURIA	20	12,50%
POLLAKIURIA	6	3,75%
ACUTE URINE RETENTION	15	9,37%
DYSURIA	31	19,38%
LUCKY FIND	3	1,88%
TOTAL	160	100%

Renal colic was the most frequent reason for consultation with 23.75%.

Table V: Distribution of Patients Suffering from Lithiasis According to the Imaging Examination Used

TECHNICAL	NUMBER	PERCENTAGE
ULTRASOUND+ABDO X-RAY	67	41,87%
ULTRASOUND	93	58,13%
TOTAL	160	100%

All of our patients have had an ultrasound.

Table VI: Distribution of Patients Suffering from Lithiasis According to the Site of the Lithiasis

SEAT	NUMBER	PERCENTAGE
KIDNEY	101	63%
URETER	8	5%
BLADDER	51	32%
TOTAL	160	100%

Renal lithiasis was the most common with 101 cases or 63%.

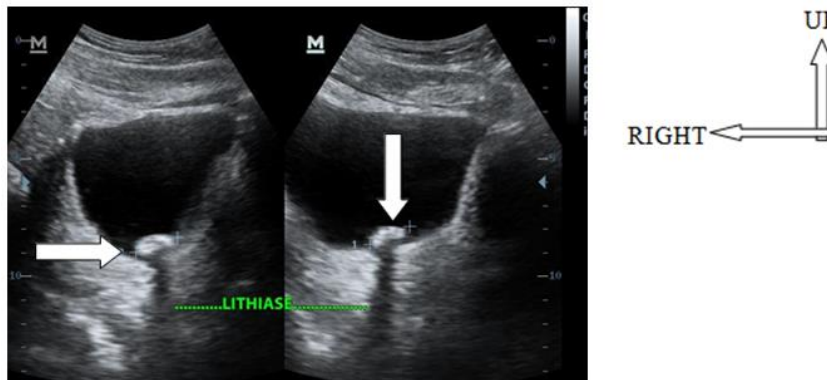


Fig 1: Pelvic ultrasound in cross section in a 42-year-old man revealing a hyperechoic image in the bladder with a posterior shadow cone: bladder lithiasis



Fig 2: Ultrasound of the right kidney in sagittal section highlighting a hyperechoic image measuring 13 mm in diameter (solid arrow) presenting a posterior shadow cone



Fig 3: Pelvic ultrasound in cross section in a 47-year-old woman revealing a 46mm hyperechoic image of the bladder with a posterior shadow cone (solid arrows): bladder lithiasis



Fig 4: Abdomen X-ray lying on the front showing a dense opacity projecting into the median pelvic excavation (arrow): bladder lithiasis in a child

DISCUSSION

A- GENERAL DATA:

1- FREQUENCY:

During the study period, 160 cases of urolithiasis were collected out of a total of 2,875 patients seen in the department, i.e. a frequency of 05.56%.

This result is lower than that of IBRAHIM COULIBALY [3] who found a frequency of 15.65% among operative procedures in the urology department of Point-G Hospital.

2- SEX:

Our study showed a large predominance of the male sex, i.e. 65% (104 cases) against 35% (56 cases) of the female sex (with a sex ratio of 1.85).

Our results agree with those of IDRISSE TRAORE [4] who found 74.1% male versus 25.9% female (with a sex ratio of 2.85); SANGARE Y [5] reported 73.8% male versus 26.2% female; and DIARAH KANTE [6] who brings 64% males against 36% females. These higher frequencies in men than in women can be explained by environmental factors; due to the fact that in our country, most of the tasks and activities of daily life are carried out by men. This exposes them to extreme climatic conditions favoring dehydration; associated with recurrent urinary infections.

3- AGE:

With a total of 39 cases or 24.37% of urolithiasis, the age group of 21-30 years is the most affected.

Our results agree with those of IDRISSE TRAORE [4] which reports 25.9%, YACOUBA TRAORE [7] with 26% and YACOUBA DOUGNON [8] with 26.66%.

It appears from these results that the age group frequently affected by stone damage to the urinary tract is the 3rd decade, i.e. 21-30 years.

This may lead us to believe that a good number of lithiasis form during periods of genital and social activity and draws attention to urogenital infections.

4- PROFESSION:

In our study pupils and students predominated with 25%.

Civil servants occupied third place after housewives. These results are consistent with those of YACOUBA N.TRAORE [7]. At COULIBALY.M [9], civil servants were the most affected (28.30%), pupils and students were in second place with a frequency of (20%). On the other hand, SANGARE.Y [5] out of 42 case found a predominance of breeders, i.e. 38.1%. This diversity of frequencies shows us that stone pathology is not necessarily linked to the profession, provided that it does not have a concomitant lithogenesis factor.

5- ORIGIN:

The highest concentration in our series was observed in the city of Bamako with 108 cases or 67.50%.

This can be explained on the one hand by the density of the population and on the other hand, by the frequent consumption of foods rich in oxalic acid (tea, tomatoes, tree leaves) and/or the fairly high frequency of bilharzia; or the strong heat linked to the climate.

6- REFERENCE MODE:

The majority of patients were referred by health structures, i.e. 90.62%, the others came on their own (9.38%).

B- CLINICAL CHARACTERISTICS:

1- REASONS FOR CONSULTATION:

In our study urolithiasis was revealed in the majority of cases by pain (right flank or left flank) 47 cases or 29.37% compared to 69.12% in IDRISSE TRAORE [4]; 75% at SOULEYMAE S.TRAORE [10]; and 83% among YACOUBA N.TRAORE [7].

Renal colic present in 38 patients or 23.75% compared to 45.45% in the study by DIARAH KANTE [6].

Dysuria was found in 31 patients or 19.38% compared to 11.36% for DIARAH KANTE [6]; 25% for SOULEYMANE S.TRAORE [10]; and 10.20% for YACOUBA DOUGNON [8].

Hematuria was found in 20 patients, i.e. 12.50% in our series compared to 11.36% for DIARAH KANTE [6], 16.7% for SOULEYMAE S. TRAORE [10], and 4.8% for YACOUBA DOUGNON [8].

Acute urine retention was observed in 15 patients, i.e. 9.37% compared to 3.70% for IDRISSE TRAORE [4]; and 2.04% for YACOUBA DOUGNON [8].

Pollakiuria present in 6 patients, i.e. 3.75% compared to 13.63% for DIARAH KANTE [6]; 8.3% for SOULEYMAE.S.TRAORE [10]; and 8.16% for YACOUBA DOUGNON [8].

All our results are quite classic but demonstrate that the clinical symptomatology of urolithiasis in our context has a particularity, because it emerges from our study that it is rather pain, renal colic and dysuria which are the most frequently encountered symptoms. Whereas in the literature it is renal colic and hematuria which predominate.

We explain this phenomenon by the high frequency of the association of infection and pathologies of the lower urinary tract with urolithiasis in our context.

2- MEDICAL HISTORY:

The most frequent morbid association was peptic ulcer syndrome, i.e. 14.37%; against 4.9% IDRISSE TRAORE [4]; on the other hand, SANGARE Y [5] focused on hypertension.

3- UROLOGICAL HISTORY:

Urinary schistosomiasis was found in 59 patients, i.e. 36.88% compared to 25% for YACOUBA N.TRAORE [5], 56% for IBRAHIM COULIBALY [3]; 6.20% for IDRISSE TRAORE [4].

These high frequencies demonstrate the endemic nature of bilharzia. The upper urinary tract is exposed to chronic lesions of bilharzia, one of the consequences of which is stenosis of the lower ureters. On the other hand, the lower urinary tract is exposed to acute lesions from bilharzia.

55 of our patients had a history of urinary infections, i.e. 34.38% compared to 9.9% for Idrissa TRAORE [6]; 21% for YACOUBA N.TRAORE [5]; and 12% for IBRAHIM COULIBALY [3].

Thirteen of our patients had a history of urolithiasis, i.e. 8.12%

Thirty-three patients, or 20.62%, had no urological history compared to 31.5% for DEMBELE Z. [11] and 27% for OUMAR K [12].

C- PARA CLINICAL DATA:**1- IMAGERY:**

All our patients had an ultrasound; 41.87% of an ultrasound combined with ASP.

**a- LOCALIZATION OF LITHIASIS
DISTRIBUTION OF PATIENTS ACCORDING TO
THE SITE OF THE LITHIASIS ON
ULTRASOUND**

Renal location represented 63% or 101 cases compared to 32% bladder location and 5% ureteral location.

This predominance of renal location was noted by IBRAHIM COULIALY [11] with 48.23%. It can be explained by the fact that the majority of stones are small and small stones rarely last in the bladder.

In our series, ultrasound detected 94 cases of calyceal stones, i.e. 58.75% compared to 1.90%, i.e. 4 pyelic calculi and 3 pyelocalical stones, i.e. 1.43%.

IN 2003 PERU A [13] found 51.6% of calyceal lithiasis, 1.9% of pyelic lithiasis and 6.3% of coralliform lithiasis.

In France, VAN-KOTE G. [14] found 50% calyceal localization and 9% coralliform lithiasis.

**DISTRIBUTION OF PATIENTS ACCORDING TO
THE AFFECTED SIDE:**

The left side was the most affected with 46.25% compared to 39.37% for right involvement and 10.63% for bilateral involvement.

On the other hand, DIARAH KANTE [6] provided 50% for the right side, 40.9% for the left side and 9.10% bilaterally.

PERU A [13] found a near equality between the two sides with 37% for the right, 35.6% for the left and 27.4% of bilateral seats.

We were unable to find factors that could explain the predominance of the affected side in our study. The association of right kidney and bladder damage, left kidney and bladder damage was found in our series, this may be due to the migration of stones along the urinary tree.

**DISTRIBUTION OF LITHIASIS ACCORDING TO
THE SEAT IN THE ASP:**

Bladder localization represented 36.87% or 59 cases compared to 30.63% renal and 3.75% ureteral localization.

At the ASP, involvement of the terminal ureter was predominant with a frequency of 60% compared to 20% of lumbar lithiasis; 10% iliac lithiasis and 10% pelvic lithiasis. These results are superimposable with

that of IBRAHIM COULIBALY [11] who provides 29.42% ureteral location.

On the other hand, PEROU A [13] reported 60% pelvic localization.

**b- THE SIZE OF THE STONES ON
ULTRASOUND:**

In our study the size of the lithiasis was between 5 and 45mm on ultrasound with an average of 8mm.

In his PEROU A series [13] reported an average size of 10.86 mm and extremes of 3 and 42 mm.

In Morocco KASMAOU E. H *et al.*, cited by PEROU A [13] found an average size of 8mm and extremes of 4 and 16 mm. VAN-KOTE G *et al.*, [14] found in 1999 a stone size of between 5 and 10mm in 71.24% of cases.

**c- DIAGNOSTIC VALUES OF THE
EXAMINATIONS CARRIED OUT:**

The ultrasound carried out in 160 patients revealed the presence of urinary calculi in 153 patients, i.e. 95.62% compared to 82.7% in IDRISSE TRAORE [4]; 55.1% for ADERRAHAMANE M. C [15] and 35.8% for DOUKANSI A [16].

The ASP carried out in 67 patients revealed urinary calculi in 58 patients, i.e. 27.48% compared to 97% for YACOUBA N.TRAORE [7].

Ultrasound had a sensitivity of 72.51% and a specificity of 43.75% in our study, which agrees with the results of C. ROY and X. BUY [17], who reported a sensitivity of 98 % and a specificity of 76 to 100%.

The sensitivity of ASP was 27.48% and the specificity 56.25%. C. ROY and X. BUY [17] found that the sensitivity of ASP varied between 44.5 and 95% and its specificity from 65% to 90%.

d- COMPLICATIONS ON ULTRASOUND:

Of the 160 patients, 134 had a complication, or 83.74%; it was hydronephrosis with a frequency of 60%; uretero-hydronephrosis of 6.87% and renal suffering 16.87%. YACOUBA DOUGNON [8] in 2011 found 46.67% hydronephrosis and 26.67% uretero-hydronephrosis.

DIARAH KANTE [6] observed hydronephrosis of 38.64% and uretero-hydronephrosis of 6.67%.

2- BIOLOGY:

Serum creatinine was normal in 123 patients or 76.87% and elevated in 37 patients or 23.13%; this is due to the fact that the lithiasis was bilateral in the majority of cases.

CONCLUSION

Urolithiasis remains a fairly common condition in our country. It is especially seen among the working population. It is common at all ages and more frequently in males. Urolithiasis is responsible for temporary professional incapacity and therefore constitutes a public health problem.

During our study, pain was the most frequent clinical symptomatology, ahead of voiding disorders and hematuria; the association of these different symptoms was not uncommon. The chance discovery was not exceptional. Renal lithiasis was the most common.

Hydronephrosis and uretero-hydronephrosis were the complications encountered. Bilharziasis and urinary infection were the main associated lesions. We recommend the decision tree represented by the diagnostic strategy for the radiological exploration of lithiasis.

Conflict of Interest Statement: The authors have declared that they have no conflict of interest.

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