

Renal Failure of Lithiasis Origin: Frequency and Management in the Nephrology and Haemodialysis Department of the Point G University Hospital in Mali

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Abstract

Background: The term urinary lithiasis (UL) from the Greek “lithos” refers to the disease characterised by the result of abnormal precipitation of normal constituents of the urine within the urinary tract. The aim of this work was to determine the frequency of obstructive renal failure (ORF) of lithiasis origin and to describe the therapeutic indications. **Methods:** This was a retrospective prospective study in patients hospitalised in the nephrology department of Point G University Hospital for ORF of lithiasis origin over a 26-month period from 1 January 2018 to 1 February 2020 inclusive. **Results:** Among 1898 hospitalized patients, 32 met the inclusion criteria, *i.e.* a frequency of 1.7%. The male sex was 68.75% with a sex ratio of 2.2. The mean age was 48.38 ± 13.423 years with extremes of 20 and 65 years. Dysuria and urinary bilharzia were the main uro-nephrological antecedents, accounting for 25% of the cases each. Pain syndrome was the main functional sign, accounting for 100%. Ultrasound of the urinary tract (n = 28) showed stones in 92.85%. These stones were bilateral in 22.22% of cases. The dilatation was pyelocalic in 14 cases (51.8%). The uroscanner showed a pyelic location of the stones in both kidneys; 42.1% on the right and 33.3% on the left. Hydronephrosis was

the most common dilatation: 37.8% on the right and 29.7% on the left. Renal lithiasis was complicated by acute kidney injury (ARI) in 17 cases (53.1%) versus 15 cases (46.9%) of chronic kidney disease (CKD). Urethral catheter was the means of drainage in 24 (75%) followed by nephrostomy in 8 cases (25%). Nephrolithotomy accounted for 9.4% of cases. The case fatality rate was 28.12% (9 cases). Deaths occurred in the context of uraemic coma 6 cases and cardiorespiratory arrest 3 cases. **Conclusions:** The management of urinary lithiasis complicated by renal failure calls for the correction of hydrolytic disorders, drainage of the excretory tract and treatment of the stone, of which percutaneous nephrolithotomy seems to be the modality of choice.

Keywords

Renal Failure, Urinary Lithiasis, Nephrology, University Teaching Hospital of Point-G

1. Introduction

The term urinary lithiasis (UL) from the Greek “lithos” refers to the disease characterised by the result of abnormal precipitation of normal constituents of urine within the urinary tract [1]. It is a major public health problem that nephrologists and urologists are regularly confronted with because of the recurrent nature of the disease [2]. It is currently the most common urinary tract disease; almost 10% of men and 5% of women have suffered or will suffer from renal colic at least once in their lifetime [2] [3].

In the vast majority of cases, it is a painful and essentially benign condition, however some forms of UL can lead to impaired renal function which may require replacement therapy [4].

Imaging is used to confirm the positive diagnosis of UL, to assess its impact on the excretory tract and the renal parenchyma, and to contribute to the etiological investigation [5]. The search for lithogenic factors involves anamnestic investigation, analysis of the stone and/or urinary crystals, and blood and urine biology. This is essential if effective preventive measures against recurrence are to be proposed [6]. Surgical treatment has made considerable progress with percutaneous surgery, extracorporeal lithotripsy and endoscopic surgery. Although usually reversible, some lithiasis tends to recur, increasing the risk of renal failure [5] [6]. UL affects 10% - 12% of the French population and is responsible for 2% - 3% of the causes of end-stage renal disease (ESRD) [7]. In sub-Saharan Africa, ESRD of lithiasis origin is an important factor in hospital morbidity and mortality due to the severity of the underlying pathologies and the high incidence of complications [8] [9]. In Ivory Coast at Treichville University Hospital, from June 2010 to June 2014, upper urinary tract obstructions were responsible for fatal renal failure in 29.23% of cases [8]. The prevalence of obstructive renal failure (ORF) was 10.32% in Cotonou in 2017 and its causes were dominated by

pelvic tumours and LU [9]. In Morocco, Zahra F [3] found 21% of renal failure cases of lithiasis origin.

In Mali, Diarra M [10] in his study in the urology department of the University Teaching Hospital of Kati found a frequency of ORF of 16.06%.

To our knowledge, there has been no study in Mali on ORF of lithiasis origin, hence the interest of this work which aimed to determine the frequency of ORF of lithiasis origin and to describe the therapeutic indications.

2. Methodology

2.1. Type and Period of Study

This was a retrospective prospective study, spanning a period of 26 months from January 1, 2018 to February 1, 2020 concerning patients hospitalised in the Nephrology Department of the University Teaching Hospital of Point-G.

2.2. Study Population

All patients hospitalised in the nephrology department for lithiasis-induced renal failure (RI) during the study period constituted our study population.

These patients were subdivided into four groups according to the presence of renal failure, the latter being defined by a plasma creatinine greater than 132.75 $\mu\text{mol/l}$ [11]:

- Group 1: patients with urinary calculi complicated by chronic kidney disease (CKD) without urinary tract infection (UTI).
- Group 2: patients with urinary calculi complicated by acute kidney injury (AKI) without UTI.
- Group 3: patients with urinary calculi complicated by CKD with UTI.
- Group 4: patients with urinary calculi complicated by AKI with UTI.

2.3. Inclusion Criteria

Any patient with AKI or CKD hospitalised in the department whose cause was radiologically confirmed lithiasis.

2.4. Non-Inclusion Criteria

- Presence of chronic/acute kidney disease or chronic/acute renal failure (CKD/AKI) of non-lithiasis origin.
- Non-usable records.

2.5. Data Collection and Analysis

Data were collected from the patient's file and hospitalization register including surname, first name, age, date of entry, origin, complementary examinations, daily treatment, and evolution (see **Annexes**). The standards used for the biological examinations were those of the different analysis laboratories in Bamako.

Each patient in the series was given an individual survey form (after obtaining the consent of the patient or a close relative) which enabled us to collect data

classified into qualitative and quantitative variables.

The data was entered using Microsoft Word 2010. Data analysis was done using SPSS 22.0 for Windows. The statistical tests used for the comparison of these categorical variables were Pearson's Chi2 test and Fischer's test of accuracy. The expected level of significance was $p < 0.05$.

2.6. Operational Definitions

Elderly: The world health organization (WHO) has defined an elderly person as anyone over the age of 65 years [12].

Acute renal failure: ARF is defined as a sudden and significant drop in glomerular filtration rate (GFR) that is usually reversible after treatment (Table 1).

Chronic kidney disease: defined as a glomerular filtration rate (GFR) < 60 ml/min/1.73m² for more than 3 months (Table 2).

3. Results

During the study period, 1898 patients were hospitalized in the nephrology department of Point G University Hospital, and 32 patients met the inclusion criteria, *i.e.* a prevalence of 1.7%.

Table 1. Universal definition of acute renal failure according to KDIGO (Kidney Disease/Improving Global Outcome 2012).

ARI stage	Créatinine	Diuresis
1	Increase > 26 μ mol/L (3 mg/L) in 48 h or $>50\%$ in 7 days	<0.5 ml/kg/h for 6 to 12 hours
2	Creatinine $\times 2 < 0.5$ ml/kg/h ≥ 12 h Creatinine $\times 3$	Creatinine $\times 2 < 0.5$ ml/kg/h ≥ 12 h
3	or Creatinine > 354 μ mol/L (40 mg/L) if no previous value or need for dialysis	<0.3 ml/kg/h ≥ 24 h or anuria ≥ 12 h

Table 2. Modification diet in renal disease (MDRD) stage of chronic kidney disease.

Stages	Description	GFR (ml/min/1.73m ²)
1	CKD* with normal renal function	≥ 90
2	CKD* with mild renal failure	60 - 89
3A	Moderate renal failure	45 - 59
3B	Moderate renal failure	30 - 44
4	severe renal failure	15 - 29
5	End-stage renal failure	<15

*With markers of renal impairment: clinical proteinuria, haematuria, leucocyturia, or morphological or histological abnormalities or markers of tubular dysfunction, persisting for more than 3 months.

The male sex was 68.75% (22 cases), *i.e.* a sex ratio of 2.2. The age group 40 - 59 was the most represented, *i.e.* 43.75 (14 cases) with an average age of 48.38 ± 13.423 years and extremes of 20 and 65 years (**Table 3**).

Hypercreatinemia was the main reason for consultation, 62.5% or 20 cases (**Table 4**).

According to MDRD, end-stage renal disease accounted for 28.1% of patients (28.1 cases). Hypertension was the main associated condition, 43.75% (14 cases). Dysuria and urinary bilharzia were the main uro-nephrological antecedents, each accounting for 25% (8 cases).

Physical asthenia and algic syndrome were the main clinical signs, accounting for 75% (24 cases) and 100% respectively (**Table 5**).

Symptoms related to uraemia were anorexia (71.9%), vomiting (68.8%), nausea (62.5%), and insomnia (21.9%).

The physical examination showed oedema of the lower limbs in 75% of the patients (24 cases) (**Table 5**).

Arterial hypertension (AH) was observed in 40.6% (13 cases) with a mean blood pressure of 143.19/89.66 mmHg, extremes of 240 and 70 mmHg for systole and 150 and 40 mmHg for diastole. WHO grade 3 hypertension accounted for 53.8% of the 13 hypertensive patients.

On renal ultrasound (n = 28), urinary stones were found in 92.85% (26 cases). They were bilateral in 22.22% of cases. The dilatation was pyelocalic in 51.8% (14 cases).

The uroscanner performed in 20 patients showed a pyelic location of the stones in both kidneys; 42.1% (8 cases) on the right and 33.3% (6 cases) on the left.

Table 3. Distribution of patients by age group.

Age range	Frequency	Percent (%)
20 - 39	10	31.25
40 - 59	14	43.75
≥ 60	8	25
Total	32	100.0

Table 4. Breakdown by reason for consultation.

Reasons for consulting	Frequency	Percent (%)
Increase in creatinine	20	62.5
Renal distress on ultrasound	5	15.6
Renal colic	3	9.4
Oedematous syndrome	2	6.25
Polycystic kidney disease	1	3.125
Headache	1	3.125
Total	32	100,0

Table 5. Distribution according to clinical signs.

clinical signs	Frequency	Percent (%)	
<i>General signs</i>	Physical asthenia	24	75.0
	Fever	20	62.5
	Weight loss	18	56.3
	Conjunctival heat	17	53.1
	High blood pressure	13	40.6
	Extrarenal dehydration	9	28.1
<i>Functional signs</i>	Pain syndrome*	32	100
	Anorexia	23	71.9
	Vomiting	22	68.8
	Nausea	20	62.5
	Dizziness	14	43.8
	Headache	13	40.6
	Dysuria	12	37.5
	Dyspnea	12	37.5
	Hematuria	11	34.4
	Burning of the bladder	10	31.3
	Insomnia	7	21.9
	Tinnitus	7	21.9
	Abdominal distension	6	18.8
	Visual blur	5	15.6
	Pollakiuria	4	12.5
Diarrhoea	3	12.5	
Anuria	2	6.3	
<i>Physical signs</i>	Edema	24	75.0
	Tachycardia	11	34.4
	Lumbar contact	6	18.8
	Abdominal distension	4	12.5
	Abdominal pelvic mass	4	12.5

*Pain syndrome: renal colic, low back pain, hypogastric pain.

Hydronephrosis was the most common dilatation: 37.8% (14 cases) on the right and 29.7% (11 cases) on the left (**Table 6**).

End-stage renal failure was observed in 09 cases (28.1%) and the mean creatinemia was 598.15 $\mu\text{mol/l}$, with extremes from 160 $\mu\text{mol/l}$ to 2309 $\mu\text{mol/l}$.

Anemia was found in 89.3% of patients (25 cases) with a mean hemoglobin level of 9.3 g/dl and extremes ranging from 4 g/dl to 16.10 g/dl. It was normocytic normochromic in 44% of cases and aregenerative in 88.9% of cases.

Table 6. Impact of calculus on the cortical index of the kidney on computed tomography.

Impact on the cortical index	Kidney	
	Rith (n = 19)	Left (n = 18)
Hydronephrosis	14 (37.8%)	11 (29.7%)
Ureteral dilatation	3 (8.1%)	3 (8.2%)
Uretero hydronephrosis	2 (5.4%)	4 (10.8%)
Total	19 (51.35%)	18 (48.64%)

Hypocalcaemia and hyperphosphataemia were present in 34.4% and 37.5% of cases respectively. Hypovitaminosis D (n = 13) represented 61.5% or 5 cases. Parathyroid hormone (PTH, n = 13) was increased in 69.23% of patients (9 cases). The mean PTH was 297.54 pg/ml with extremes of 14.69 and 1895.70 pg/ml.

Proteinuria (n = 22) was minimal in 77.3% of cases (17 cases). Leukocyturia (n = 24) was found in 15 cases and associated with haematuria in 7 cases (33.3%).

Uraculture (n = 24) was positive in 58.3% (14 cases) with *Escherichia coli* as the most frequent germ (50%). Thus group 1 of the patients represented 60% (9 cases), group 2 52.9% (9 cases), group 3 40.6% (6 cases), group 4 47.1% (8 cases) (Table 7).

Renal lithiasis was complicated by AKI in 17 cases (53.1%) and CKD in 15 cases (46.9%).

Urethral catheterisation was the means of drainage in 24 cases (75%) followed by 8 cases of nephrostomy (25%). Nephrolithotomy accounted for 9.4% of cases. The three cases of nephrolithotomy were performed only in CKD patients.

Medical treatment consisted of analgesics and antispasmodics in 100% of cases. Antibiotic therapy was used in 96.9% of patients (31 cases).

Renal replacement therapy by haemodialysis was initiated in 12 patients (37.5%). The indications for dialysis were uraemic syndrome (05 cases), hyperkalaemia (2 cases), acute lung oedema (03 cases) and pre-operatively (2 cases).

The outcome was favourable in 14 cases (Table 8). The case fatality rate was 28.12 (09 cases). The causes of death were uraemic coma (06 cases) and cardiorespiratory arrest (03 cases).

4. Comments and Discussion

4.1. Frequency

At the end of our study, 32 patients out of 1898 hospitalizations were treated for lithiasis-induced OFR, *i.e.* a prevalence of 1.7%.

There are very few published studies on the development of renal failure in patients with UL. However, the occurrence of renal failure in patients with UL remains a fairly common complication [4] [13] [14]. Some authors have found similar results such as Gupta *et al.* [15] 1.7%; Kukreja *et al.* [16] 1.8%.

Table 7. Distribution of the type of renal failure according to the urinary infection.

Type of renal failure	urinary infection		Total
	Yes	No	
Lithiasis complicated by AKI	8 (47.1%)	9 (52.9%)	17 (53.1%)
Lithiasis complicated by CKD	6 (40%)	9 (60%)	15 (46.9%)
Total	14 (43.8%)	18 (56.2%)	32 (100%)

Chi-square = 0.161; ddl = 1; p = 0.688.

Table 8. Distribution according to the evolution of the patients

Évolution	Frequency	Percent (%)
favourable	14	43.8
Deaths	9	28.1
lost sight of	3	9.4
Discharged against medical advice	6	18.7
Total	32	100.0

4.2. Socio-Demographic Data

The mean age of our patients was 48.38 ± 13.423 . The age of discovery of lithiasis in our series varied from 20 to 59 years. Studies by Daudon M [17], on the evolution of urinary lithiasis according to age, have shown the appearance of the first stone with a significant spread of the frequency peak between 30 and 55 years of age in both sexes. These results show that the age group frequently affected by urinary lithiasis is between the 3rd and 6th decade. This leads to the conclusion that many urinary tract infections occur during periods of genital and social activity, which draws attention to urogenital infections.

The male gender was predominantly with a sex ratio of 2.2 in favour of men.

The male predominance can be explained by the multiplicity of organic factors that can favour lithogenesis (prostate hypertrophy, urethral strictures) [18].

4.3. Clinical Characteristics

All the patients in our study were referred by the health structures for nephrological consultation, the main reason being an increase in creatinemia, which accounted for 62.5% of the patients (20 patients).

High blood pressure was the most frequent morbid association (40.6%). Our rate is much higher than that of Zahra F [3] (8.5%). This high frequency could be explained by a late nephrological consultation on the one hand and on the other hand through ageing leading to an increase in arterial stiffness by replacement of collagen by elastic fibres [19].

On the uro-nephrological level, urinary bilharziasis was found in 8 patients, *i.e.* 25% of cases, compared with 46.5% for Ongoiba I [19]; 48.6% for Dembélé Z [20]; and 41.6% for Keita. O [21].

These high frequencies testify to the endemic nature of urinary bilharziasis and demonstrate its role in lithogenesis through inflammation and fibrosis of the urinary tract, which leads to urinary stasis that favours the formation of urinary stones. Its low frequency in this study could be explained by the intensification of mass campaigns for the management of neglected tropical diseases in recent decades [22].

With regard to clinical symptoms, pain was the first revealing sign (90.62%) and anuria (6.2%). The series by Zahra F [3] also found pain to be the first revealing manifestation with a frequency of 95.4%; on the other hand, Agrawal *et al.* [23] found that the two main reasons for consultations leading to the diagnosis of renal failure of lithiasis origin were anuria and incidental discovery as part of a standard workup when the patients were totally asymptomatic.

However, most of our patients came to the clinic in the end stage with a manifest uraemic syndrome (physical asthenia, anorexia, vomiting, nausea, and insomnia).

On physical assessment, lumbar contact was found in 18.8% of our patients. This frequency is similar to that of Zahra F [3] who reported 15.3% of cases.

4.4. Paraclinical Data

4.4.1. Medical Imaging Data

Ultrasound of the urinary tract and computed tomography (CT) were the medical imaging examinations performed with 87.5% and 62.5% respectively [24].

Ultrasound in 28 patients showed UL in 100% of cases and pyelocal dilatation in 92.85% of cases.

In the study by Zahra F [3], ultrasound found lithiasis in 73.9% and pyelocal dilatation in 69.2%.

CT, having benefited from helical acquisition, seems to be the imaging examination with the best sensitivity and specificity [24].

Uroscans were performed in 62.5% of our patients (20 cases). A single left kidney was found. Hydronephrosis was found in 37.8% on the right and 29.7% on the left; the latter was the most frequent dilatation.

4.4.2. Biological Data

The mean creatinine level was 598.15 $\mu\text{mol/l}$ with extremes of 160 $\mu\text{mol/l}$ and 2309 $\mu\text{mol/l}$. A lower mean was observed in the series of Allodé AS *et al.* in benign [25] 152.5 $\mu\text{mol/l}$ with extremes of 128.5 $\mu\text{mol/l}$ and 2159.6 $\mu\text{mol/l}$. This high rate was probably related to a delay in diagnosis.

In our series, anaemia was present in 89.3% of cases. It was severe in 7.2% of cases. The mean haemoglobin level was 9 g/dl with extremes ranging from 4 to 16.10 g/dl. Age and advanced stage of chronic kidney disease may explain this high frequency of anaemia [26]. Zahra F [3] reported a lower frequency of anaemia in her study, 69.1%.

On uroculture, *Escherichia coli* was the most frequent germ (50%). In the series by Dembélé M [27], the dominant germ was *Enterococcus* sp. with 13%.

In Mali, Dembélé Z [20] found a urinary tract infection in 35.2% and 42.9% of cases respectively. This shows that UTI is frequently associated with urinary tract infections. The UTI may be secondary to the stone or to a foreign body (JJ catheter, nephrostomy). Endo urological manoeuvres for calculi significantly increase the risk of UTI, mainly *Escherichia coli* and *Proteus mirabilis*. While the germs of stones secondary to infection are in more than 55% of cases *Proteus* or *Pseudomonas* [28].

4.5. Management of UL Complicated by Renal Failure

Correction of metabolic disorders constituted treatment of hyperkalaemia in 2 patients by emergency management with haemodialysis. Of the 24 patients (75%) with fluid overload, the three patients with acute lung edema received emergency haemodialysis.

With regard to surgical treatment. Urine drainage is essential. When the obstruction is acute, it must be carried out urgently because there is a risk of infection of the overlying urine, causing acute obstructive pyelonephritis [28].

In our series, urinary drainage was performed in all our cases, *i.e.* 100%:

The placement of a simple urethral catheter was effective in 24 cases (75%) versus 8 cases of nephrotomy (25%). Our result is different from those of Abaydi A *et al.* [29] in whom the double urethral catheter was used as internal urinary drainage in 82.7% of cases.

In the literature, nephrostomy seems to be the modality of choice for drainage of the excretory tract in lithiasis patients with renal failure, it allows to improve renal function and the results of treatment of UL thus decreasing the recourse to dialysis and renal transplantation [30].

In this study, only three patients were able to undergo nephrolithotomy, *i.e.* 9.4% of cases. In the postoperative evolution, an improvement in renal function was noted in all three patients. These three patients had benefited from a nephrostomy long before and all had chronic kidney disease. Hyams *et al.* have shown that nephrolithotomy is effective and does not lead to deterioration of renal function [31].

4.6. Evolution

In our series, the evolution was favorable in 43.75% of cases versus 81.5% for Zahra F [3]. Most of our patients had a low socio-economic level, which had an unfavorable impact on the early diagnosis and rapid management of the disease.

Patients with CKD of lithiasis origin had a favorable evolution compared to those with AKI, respectively 28.125% (9 cases) versus 15.62% (5 cases).

There was no significant relationship ($P = 0.392$) between outcome and type of renal failure.

The case fatality rate was 28.125% of cases, which is significantly lower than that of Lengani A *et al.* [32] in Burkina Faso where it was 44.2%. The two causes of death were, in order of frequency, uraemic coma (66.7%) and cardiorespira-

tory arrest (33.3%).

5. Limitations of the Study

In the course of our work we encountered limitations including:

- The very low socio-economic level of the patients.
- The files could not be used due to incomplete assessment.
- Lack of analysis of the lithiasis.

6. Conclusions

The management of urinary lithiasis complicated by renal failure calls for the correction of hydrolytic disorders, drainage of the excretory tract and treatment of the stone, of which percutaneous nephrolithotomy seems to be the modality of choice.

It is a relatively easily curable condition, especially with the advent of endourology, although some conditions require open surgery. The lack of financial means for patients is a barrier to better management.

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Authors' Contributions

Seydou Sy, Magara Samaké, Aboubacar Sidiki Fofana, Oligue Prudence Oman, Saharé Fongoro, Mamadou Lamine Diakité participated starting from proposal development, data collection, data entry and analysis, result write-up and interpretation, and manuscript preparation. All authors read and approved the final manuscript.

Availability of Data and Materials

The databases used for this study are available from the corresponding author on reasonable request.

Declarations

Ethics Approval and Consent to Participate

Free and informed consent was obtained before proceeding with the survey. Respect for anonymity was taken into consideration during data collection. The exploitation of the files was done after agreement of the head of the nephrology and haemodialysis department of the University Teaching Hospital of Point-G.

Consent for Publication

The authors state that the study is original, has not been published in any other journal and consents to its publication by this journal.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Abbreviations

UL: urinary lithiasis,
 ORF: obstructive renal failure,
 AKI: acute kidney injury,
 CKD: chronic kidney disease,
 ESRD: end-stage renal disease,
 UTI: urinary tract infection,
 MDRD: modification diet in renal disease,
 WHO: world health organization,
 CT: computed tomography.

Annexes

Survey form

IDENTITY

Age..... Sexe.....
 Origin..... Date of entry:
 Entry number..... Exit date:
 Order number:

REASONS FOR HOSPITALISATION

Increased creatinemia Anuria Oedema syndrome Pyuria
 Ultrasound renal distress Proteinuria Haematuria Others....

HISTORY

Renal colic Low back pain Macroscopic hematuria Dysuria
 Burning of the bladder Pollakiuria Spontaneous stone removal
 Intervention for urinary lithiasis Recurrent urinary tract infection
 Urinary bilharzia Hyperparathyroidism Use of lithogenic drugs
 Malformative uropathy Neurological bladder Diabetes
 Hypertension Pathological creatinemia Oedematous syndrome
 Family history of lithiasis Leukaemia Gastro-duodenal ulcer
 Tuberculosis Vesico-vaginal fistula Others to be specified.....

FUNCTIONAL SIGNS:

Renal colic Low back pain Iliac fossa pain Hypogastric pain
 Haematuria Dysuria Spontaneous stone removal
 Fever Pyuria Pollakiuria Acute retention of urine
 Urinary urgency Anuria Oliguria Incontinence
 Urinary tract infection Acute renal failure Chronic renal failure
 Nausea + vomiting Diarrhoea abdominal distension
 Anorexia + weight loss Physical asthenia Muscle cramps
 Headaches Tinnitus Visual blur Dizziness
 Dyspnea Haemoptysis Haematemesis Chest pain
 Melena Cough Incidental findings

PHYSICAL SIGNS

Blood pressure..... Temperature..... heart rate..... respiratory rate.....

Height: Weight: BMI:
 Altered general condition
 Conjunctival pallor Edema Dry mouth Uremic glaucens
 Icterus Dehydration folds stomatitis parotitis
 Cardiovascular examination: Normal Abnormal
 Lung examination: Normal Abnormal
 Other examinations:.....
 Abdominal scarring abdominal distension Bladder globe
 palpable pelvic mass Palpable abdominal mass
 prostatic hypertrophy cervical cancer flank tenderness
 lumbar contact large kidneys ascites splenomegaly
 hepatomegaly adenopathy muscle amyotrophy bone pain
 arthralgia polyneuritis state of consciousness

PARACLINICAL EXAMINATIONS

1) RADIOLOGICAL:

Urinary tract ultrasound information:
 Intravenous Urography informations:
 urological scanner informations:
 cardiac ultrasound informations:
 electrocardiogram informations:

2) BLOOD:

*creatinemia:/...../
 GFR according to MDRD/...../1 = Mild CKD (≥ 90); 2 = Mild CKD (60 - 89); 3 = Moderate CKD (30 - 59); 4 = Severe CKD (15 - 29); 5 = Terminal CKD ('15)

GFR according to COCKROFT-GAULT:/...../ GFR CKDEPI /...../
 *uric acid/...../normal (1) decreased (2) increased (3) value:
 *urea/...../normal (1) decreased (2) increased (3) value: *blood glucose/...../1 = normal (2.5 - 2.6) 2 = decreased (<2.1) increased (>2.6) value:

*blood phosphorus/...../1 = normal (0.8 - 1.45) 2 = decreased (<0.8) increased (>1.45) value:

*Vit D rate /...../normal (1) decreased (2) increased (3) value:
 *PTH /...../normal (1) decreased (2) increased (3) value:
 *natremia/...../1 = normal (135 - 145) 2 = decreased (<135) increased (>145) value:.....

*kalaemia/...../normal (1) decreased (2) increased (3) value:

- Blood count:

Anaemia yes no if yes
 Hemoglobin level in g/dl /...../; /...../1 = normocytic; 2 = microcytic; 3 = macrocytic /...../1 = normochromic; 2 = hypochromic /...../ 1 = regenerative; 2 = aregenerative
 white blood cells/...../1 = normale (4000 - 10,000) 2 = diminué (<4000) value:

Platelet /...../1 = normale (150,000 - 400,000) increased (>400,000) value:.....

ferritinemia /...../ saturation coefficient /.....%/ serial iron/...../

Interpretation.....

fat balance/...../ 1 = normal; 2 = disturbed albuminemia/...../normal
(1) decreased (2) increased (3) value: *blood glucose/...../normal (1)
decreased (2) increased (3) value: *blood glucose/...../normal (1) de-
creased (2) increased (3) value: glycated haemoglobin /...../normal
(1) decreased (2) increased (3) value:

- *urinary*:

Urine sediment: haematuria ($\geq 10,000/\text{ml}$) yes/no, leucocyturia ($\geq 10,000/\text{ml}$)
yes/no

pyuria yes/no culture/...../ 1 = positive; 2 = negative

if positive the germ:.....

24 H proteinuria/...../ 1 = nothing; 2 = minimal (<1 g); 3 = moderate (1 - 3
g); 4 = massive (>3 g) value:

Natriuresis /...../normal (1) decreased (2) increased (3) value:

kaliuresis: /...../normal (1) decreased (2) increased (3) value:

Natriuresis/Kaliuresis ratio:

Other balances.....

crystals:

DIAGNOSIS:

*AKI on urinary lithiasis/...../ *CKD on urinary lithiasis/...../

*URINARY INFECTION on urinary lithiasis/...../

MANAGEMENT:

1) Surgical:

simple urinary catheterisation nephrostomy pre-cutaneous nephroli-
thotomy

If yes number of sessions.....

- Extracorporeal lithotripsy yes/no Number of sessions.....

- ureteroscopy yes/no

- pyelolithotomy total nephrectomy Partial nephrectomie

- Open surgery:

*approach: *nephrolithotomy - ureterolithotomy

- Treatment of a malformation or associated pathology

-Laparoscopy

*gesture performed

- Nephrectomy bladder size nephrolithotomy bladder size - pyeloli-
thotomy bladder size - ureterolithotomy bladder size bladder size

2) Medical:

analgesic alone

antibiotic

urine acidification

replacement therapy

If yes: pre-operative haemodialysis post-operative haemodialysis

peritoneal dialysis

EVOLUTION:

1) Immediate postoperative:

clinical signs: Improvement of symptoms Persistence of symptoms

renal function:

improvement worsening stabilisation

Complication

2) In the long term

clinical signs:

improvement of symptoms

renal function:

improvement

worsening

stabilization