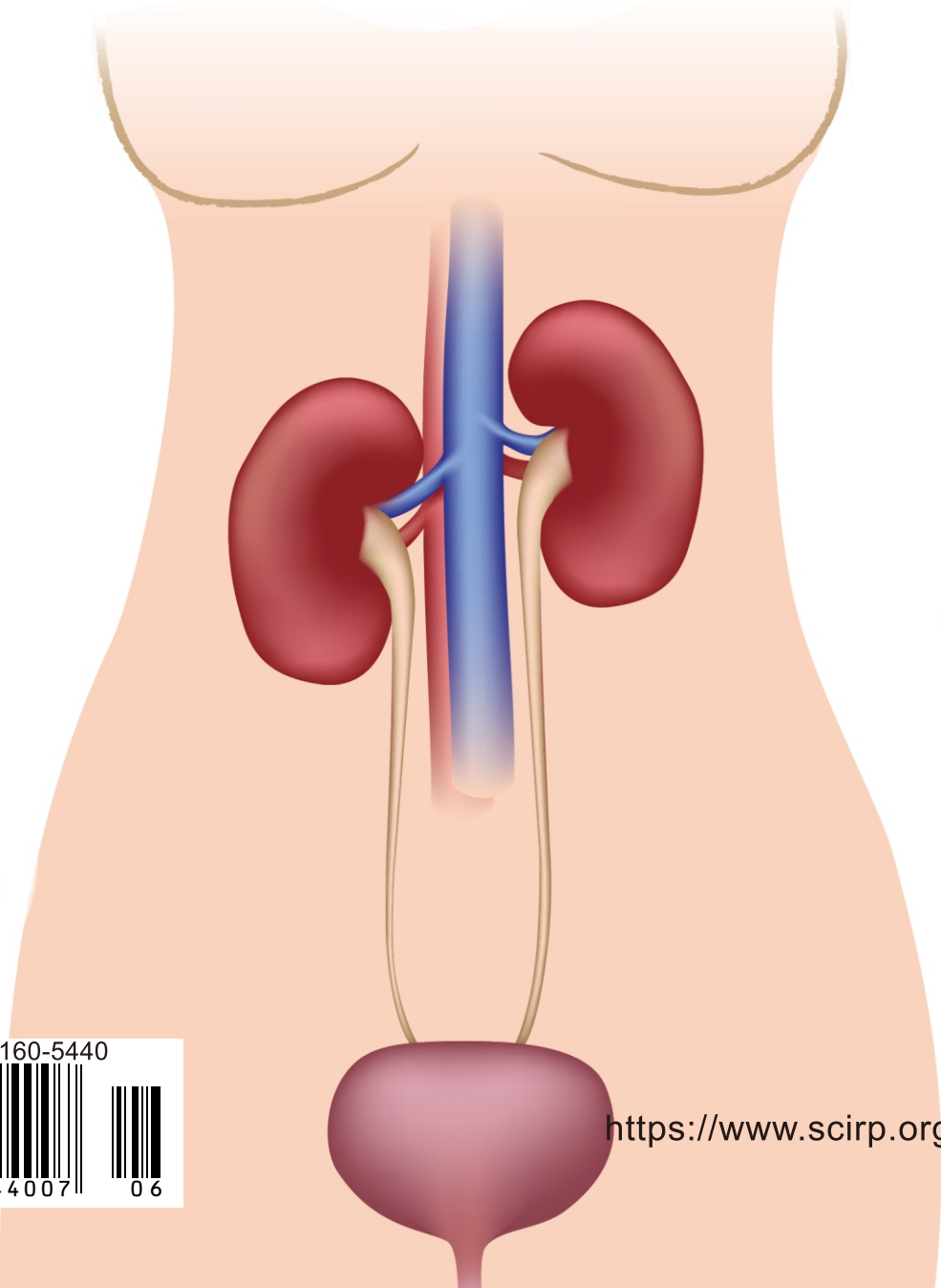


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Research Progress on Compliance of Pelvic Floor Muscle Training in Patients with Urinary Incontinence

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Abstract

This study describes the status quo and related factors of compliance with pelvic floor muscle training at home and abroad, and introduces in detail the current scale of compliance with pelvic floor muscle training at home and abroad, so as to provide a reliable and scientific method for clinical medical staff to objectively evaluate pelvic floor muscle training of patients with urinary incontinence, and also provide a basis for how to improve compliance with pelvic floor muscle training.

Keywords

Urinary Incontinence, Pelvic Floor Muscle Training (PFMT), Adherence, Review

1. Introduction

The International Continence Society (ICS) defines urinary incontinence (UI) as: It is a phenomenon that can be objectively verified and any involuntary leakage of urine [1] [2] [3], which brings inconvenience to social activities and troubles in personal hygiene [4]. Urinary incontinence can be divided into stress incontinence, urge incontinence and mixed incontinence [5] [6]. Stress urinary incontinence is commonly seen in women with postpartum abdominal pressure increase, surgical destruction of urethral and bladder normal anatomical support, urethral and bladder dysfunction, etc. [7] [8] [9]. Urgent urinary incontinence is mainly caused by acute cystitis, acute urethritis, urinary calculus, bladder hyperactivity and other factors [10]. Mixed urinary incontinence means that symptoms of stress and urge urinary incontinence exist at the same time or cannot be simply attributed to these two types of urinary incontinence, such as uncon-

cious urinary incontinence, persistent urinary incontinence, nocturnal enuresis, dripping after urination, filling urinary incontinence, and extraurethral urinary incontinence [5]. Urinary incontinence is not an incurable disease, and treatment can be divided into surgical treatment and non-surgical treatment. Surgical treatment includes anterior vaginal wall repair, pubic anterior vaginal wall suspension, bladder neck suspension and so on. The surgical complications include bladder and urethra injury, bleeding, infection and so on. The operation cost is high and the trauma is big. Non-surgical treatment, including strengthening pelvic floor muscle exercises and drug therapy, is an effective, affordable and safe treatment method [5] [11]. In the non-surgical treatment, pelvic floor muscle training is currently an effective rehabilitation training method for the treatment of urinary incontinence, simple, easy to perform, effective, suitable for patients to conduct autonomous training. Pelvic floor muscle training (PFMT) refers to the patient's conscious exercise on the pelvic floor muscle group (mainly the pubococcyx muscle group) [11] [12] [13]. Its effectiveness is dependent on patient compliance [14] [15]. Compliance refers to the degree to which a patient's behavior is consistent with the clinical medical advice after seeking medical treatment [16], which has been identified as an important predictor of overall effectiveness [17]. WHO points out that accurate measurement of compliance is a necessary condition for effective treatment [18]. The Pelvic Floor Gynecology Group of the Chinese Society of Obstetrics and Gynecology also pointed out that the role of pelvic floor muscle training in the prevention and treatment of urinary incontinence has been widely recognized, but because of monotonous movements and no fixed exercise mode, patients can not adhere to it well, poor training compliance and lack of training capacity, leading to poor effect [19]. Pelvic floor muscle training is an effective method to treat urinary incontinence, and its compliance is closely related to its efficacy. Therefore, it is necessary to understand the compliance status and influencing factors of pelvic floor muscle training in patients with urinary incontinence, so as to provide theoretical support and practical reference for improving patients' urinary control ability.

2. The Concept of Compliance

Compliance was first proposed and studied by foreign scholars. English words are "adherence", "compliance", "obedience", "concordance", "commitment", etc. [20]. In 1976, Scakett *et al.* defined compliance as "patients' behaviors consistent with doctors' opinions in terms of medication, diet and lifestyle changes" [21]. In 1979, Haynes defined compliance as "the degree to which patients comply with medical advice or treatment" [22]. In 1996, Urquhart [23] defined compliance as "the patient's actual behavior is consistent with the doctor's prescription, that is, the patient's compliance with the doctor's advice". In 2003, according to Haynes and Rand, the World Health Organization defined compliance as "the extent to which a person's behavior of taking drugs, diet, or lifestyle changes conforms to the recommendations made by medical and health personnel" [24]. Accurate measurement of compliance is essential for effective treatment [25]. "Compliance"

is a medical term. In the early stage, Professor Ruan Fangfu in China translated and used this term. He proposed that medical compliance refers to the extent to which patients' behaviors are consistent with doctors' medical advice in the treatment and prevention of diseases [20]. From the modern concept of health, compliance behavior can be divided into two categories: one is patient's compliance with treatment measures; Second, in order to prevent the occurrence of diseases, health education and behavioral guidance are provided to patients, and patients' compliance with preventive measures to avoid risk factors [21].

3. Compliance Status of Pelvic Floor Muscle Training

Heidi [26] investigated the willingness of 169 parturient women to participate in the program of pelvic floor muscle training to prevent urinary incontinence, and the results showed that only 31% of parturient women agreed to participate and 15% of parturient women did not want to participate. Beyar *et al.* [27] studied the pelvic floor muscle training of 208 women with urinary incontinence for up to 5 years, and conducted a survey in the form of questionnaire. The results showed that only 132 people completed the questionnaire, among which 55 (41.6%) reported compliance, 75 (56.8%) stopped training, and 2 (1.5%) underwent surgery. Takaoka [28] recruited 116 women for a pelvic floor muscle training program in a maternity clinic in Japan, and 89 women completed the program. Under the guidance and training of the researchers, only 36 (31%) women were highly adherent to the pelvic floor muscle training. Bayat *et al.* [29] studied the cognition of 200 pregnant women in the third trimester of pregnancy on pelvic floor muscle training by using semi-structured interview. 175 (87.5%) believed that urinary incontinence during pregnancy was normal, 54 (27%) were familiar with pelvic floor muscle training methods, and 25 (32.05%) had consulted obstetricians for urinary incontinence problems. Twenty-one (10.5%) performed pelvic floor exercises prior to pregnancy, 14 (66.6%) continued their exercises during pregnancy, and seven (33.4%) discontinued their exercises. Several studies have shown that pelvic floor muscle training is effective in the treatment of patients with urinary incontinence, but you need to keep training for long enough to get the desired results. The survey found that the number of patients who often complied with the requirements of health care providers for standardized training was small, and the number of patients who persisted in training was small.

4. Domestic and Foreign Studies on the Compliance of Pelvic Floor Muscle Training

4.1. Research in China

Domestic studies have reported that 88% of patients with urinary incontinence have poor compliance with rehabilitation training [30], and the starting time, process and specific program of training have not been unified, and the research on improving the compliance of rehabilitation training for patients with urinary incontinence is not in-depth enough [31] [32] [33]. Cai Shu [32] evaluated com-

pliance according to pelvic floor muscle training diaries recorded by female stress urinary incontinence patients. Patients whose average daily pelvic floor muscle training time was ≥ 30 min were considered to have good compliance with pelvic floor muscle training < 30 minutes, as poor compliance. Yang Zhilan [30] conducted a compliance survey on elderly rural female patients with urinary incontinence by using a self-designed questionnaire, referring to the design of five questions to evaluate the compliance of pelvic floor muscle training for elderly women with urinary incontinence. “No” to all five questions means good compliance, otherwise it means poor compliance. Fan Guorong [33] used the self-designed functional training compliance evaluation table to evaluate patients with postpartum urinary incontinence, which was divided into three categories: complete compliance, partial compliance and non-compliance. Complete compliance: patients take the initiative to train on time and in quantity and complete the prescribed movements; Partial compliance: patients need nurses or family members to supervise and check to complete the prescribed actions; Non-compliance: The patient does not follow the training plan or reduces or increases the amount of training on his own.

4.2. Research in Other Countries

According to foreign literature [34] [35] [36], the compliance of rehabilitation training is very important, but the compliance of training is low. Except for limited studies on women with urinary incontinence, there is little literature on most study populations, and few strategy studies and experiments comparing compliance strategies. Fitz *et al.* [37] used the results of training diaries to monitor the compliance of pelvic floor muscle training. 72 incontinence women were randomly divided into the control group and the observation group. Taking 30 days a month as an example, there are 3 groups of training every day, excluding the outpatient period, 8 groups of training every month, a total of 82 groups of training. If the training can be achieved, it indicates good compliance. Sacomori *et al.* [38] found that 86 women with stress, emergency, or mixed urinary incontinence received 3 separate rehabilitation sessions and 2 months of home pelvic floor muscle training on days 0, 15, and 30, respectively. The experimental group also received interventions to improve self-efficacy, including structured discussions of achievements and goals, nine-minute video evaluations and reminders. Compliance was assessed with structured questionnaires at 15, 30, and 90 days after the intervention. Figueiredo *et al.* [39] recruited 90 women for a clinical trial of pelvic floor muscle training. Under the guidance of rehabilitation therapists, these women received instructions on the anatomical site and function of pelvic floor muscles, as well as how to correctly contract, relax and train pelvic floor muscles. 12 sessions of pelvic floor muscle training were performed, each session lasted 30 minutes, and training records were made. The number of days of training was recorded, and training compliance was monitored according to the records.

5. Intervention Study on Improving the Compliance of Rehabilitation Training for Patients with Urinary Incontinence

5.1. Intervention Study on Improving Compliance of Rehabilitation Training for Domestic Patients with Urinary Incontinence

Yang Zhilan [30] [31] *et al.* improved patients' sense of self-efficacy, strengthened patients' cognition of urinary incontinence, increased patients' confidence in pelvic floor muscle training, and then improved patients' compliance with pelvic floor muscle training by setting goals, adjusting patients' emotions, sharing successful experience, follow-up supervision, and recording urine diary, etc. Wang Ailan [40] *et al.* made use of the "Staida" group function in the "Staida" APP to let puerpera punch in after each training and exchange training experience with each other. Nurses answered questions in the training process online, pushed relevant knowledge according to the training progress, checked and reminded those who did not punch in daily, so as to enhance patients' training compliance. Wang Li *et al.* [41] adopted individualized cross-theoretical model visit nursing form to promote behavioral change of incontinence puerperas, assess whether puerperas are willing to adopt new behaviors, and provide individualized guidance, which significantly improved the compliance of pelvic floor muscle training for puerperas.

5.2. Intervention Study on Improving Compliance of Rehabilitation Training for Foreign Patients with Urinary Incontinence

Asklund [42] used mobile phone APP to remind female patients with urinary incontinence to complete pelvic floor muscle training, and the close contact with mobile phone could reduce the embarrassment of female patients. App features such as reminders and visual charts are more conducive to supporting and motivating women with urinary incontinence to complete pelvic floor muscle training. Sacomori [43] used a conference format, organized by rehabilitation therapists, in which incontinence patients participated in meetings on the knowledge of pelvic floor muscle training, as well as educational methods through the distribution of home pelvic floor muscle training manuals, and the whole process was unsupervised. A subsequent assessment found improved training compliance. In the study of Hoff [44], patients with urinary incontinence were instructed by rehabilitation therapists to conduct pelvic floor muscle training for a period of 6 months, including personal strength training and daily family training, and the training compliance was significant.

6. Factors Influencing the Compliance of Pelvic Floor Muscle Training

Scholars [45]-[52] believe that the degree of attention to disease, education, age, severity of urinary incontinence, memory, cognitive deficiency, behavioral support and lack of professional supervision all affect the compliance of patients

with pelvic floor muscle training. The effect of urinary incontinence pelvic floor muscle training compliance, Yang Ziyang [45] and other studies believe that women with stress urinary incontinence after treatment, part of the light leakage of urine incontinence patients quickly relieve symptoms, thought it was a cure, to give up further treatment and pelvic floor muscle training, muscle after a period of time to drop, leakage symptoms will relapse; And with the increase of age, leakage symptoms will become more serious. Liu Yanhui [46] *et al.* found that the level of education directly affected the effect of health education and compliance behavior of patients, and patients' lack of knowledge and understanding affected the compliance of patients with bladder function rehabilitation training.

The influence of age factors on the compliance of pelvic floor muscle training for urinary incontinence, Tibaek *et al.* [47] investigated the pelvic floor muscle function level of 757 women with pelvic floor dysfunction and found that 70% of the patients could not normally perform voluntary pelvic floor muscle contraction. At the same time, the patient's memory and comprehension decreased, and he could not cooperate well with the instructor to complete the exercise as planned.

The influence of disease severity on the compliance of pelvic floor muscle training for urinary incontinence, Alewijnse *et al.* [48] showed that the frequency of urinary incontinence attacks during and after treatment was related to the compliance of pelvic floor muscle training during follow-up, and the more severe the patient's condition, the higher the compliance of pelvic floor muscle training.

Borello France *et al.* [49] investigated 146 incontinence patients who only received behavioral intervention and analyzed the influencing factors of exercise compliance during the supervised treatment period, 3 months and 12 months later, and found that many female incontinence patients reduced the frequency of pelvic floor muscle training over time. The influence of insufficient cognition on the compliance of pelvic floor muscle training, Pelaez *et al.* [50] believed that because incontinence patients did not know enough about pelvic floor muscle training and did not know enough about the importance of pelvic floor muscle training, most patients could not correctly grasp the pelvic floor muscle training methods, so that the training compliance was low. Behavior support in the effect of pelvic floor muscle training compliance, ying white [51] and so on through the theory of behavior change intervention in 100 patients with urinary incontinence, according to the behavior of the patients with urinary incontinence change requirements, provide targeted in the process of behavior change the behavior of the support, help patients to change or establish healthy behavior, found that in the control group patients with pelvic floor muscle training compliance is low. Lack of professional supervision and the effect of pelvic floor muscle training compliance, Lanhong Xia [52] Gongqie Chu studied 65 examples patients, such as hospital found that most patients with pelvic floor muscle training on their own that occupy the home, because of the lack of the supervi-

sion and guidance of nursing and rehabilitation therapists, unable to perform according to the scheduled training requirements, compliance is not high, can't reach the expected effect.

7. Evaluation Tool for Compliance of Urinary Incontinence Rehabilitation Training

In 2004, Chen [53] developed a self-efficacy scale for pelvic floor muscle training, which quantified the frequency, time and self-score of pelvic floor muscle training. The scale has 17 items and consists of two dimensions: confidence in pelvic floor muscle exercise and its efficacy, and confidence in overcoming obstacles to pelvic floor muscle exercise. Each item was scored on a 5-point scale, with a total score of 85 points. The higher the score, the higher the patient's self-efficacy level is and the greater the self-confidence is. A score between 34 and 68 is considered as poor self-efficacy; a score between 68 and 68 is considered as average self-efficacy; and a score between 68 and 68 is considered as good self-efficacy. Cronbach showed that α was 0.95, which showed good internal consistency and high correlation validity of criteria. Studies have pointed out that the self-efficacy mediation will directly or indirectly affect the training compliance, but this scale did not quantify the training compliance of patients. In 2013, Sacomori [54] developed a self-efficacy table for pelvic floor muscle training, which used graded scoring to evaluate the self-efficacy of pelvic floor muscle training and the compliance of women's pelvic floor muscle training. It is composed of 17 items, each item is 10 grades, each item score is 0 - 100 points, all items are positive points, the total score is 0 - 1700 points, the higher the total score, the better the self-efficacy of pelvic floor muscle training. Cronbach showed that α was 0.923. Although the scale also has 17 items, there are 4 items that mention continuous practice and focus more on the study and measurement of compliance, which is different from the contents of the scale developed by Chen. In 2016, Porta [55] modified Morisky's medication compliance questionnaire by replacing the word "taking medication" in each of the four questions of Morisky's questionnaire with "performing pelvic floor muscle training" in the original questionnaire to measure the adherence to pelvic floor muscle training in 70 patients with urinary incontinence. The question is: 1) Have you ever forgotten to do your pelvic floor muscle exercises? 2) Do you do pelvic floor exercises on schedule? 3) Do you stop doing pelvic floor exercises when you feel better? 4) Do you stop doing pelvic floor muscle exercises when you feel worse? Since this questionnaire has not been tested for reliability and validity after improvement, and the items are too few, patient compliance cannot be accurately measured.

Compliance of urinary incontinence rehabilitation training: 1) Pelvis floor muscle exercise (PFMT), which believes that the pubococcygeus muscle can be effectively treated by active self-contraction and anal relaxation through the synergism of intestinal tract, urinary tract and reproductive tract; 2) The traditional anal movement, contraction of the anus this health care method in our country

has a long history of more than two thousand years. It is mainly used for the daily maintenance of room health care and life prolongation, and then used in the treatment of diseases such as spermatorrhea and enuresis. Its specific exercise method is: in shrink, relax anus while, cooperate deep inhale, slow exhale, maintain calm, concentrate idea at umbilical and umbilical lower part; 3) Whole Postural Rebuilding Movement (GPR). The theoretical basis of GPR is the muscle chain theory, which believes that human muscles can form muscle chains through muscle overlap and mutual connection between aponeurosis. The distribution of tension in the muscle chain enables the muscle to resist gravity, maintain posture stability, and keep the body upright; 4) Yoga, as a time-honored ancient Indian physical strengthening technique, attaches great importance to the unity of body and mind. It is a sport with obvious physical and psychological interaction. Yoga adjusts the nervous and endocrine systems through asanas, breathing exercises and consciousness meditation, so as to maintain balance inside and outside the body; 5) Interrupt urination training. Interrupt urination method is a method to relieve urinary incontinence by instructing patients to consciously contract pelvic floor muscles during urination to interrupt urination. Through the urination interruption method training, patients with urinary incontinence can enhance the self-control of urination, in laughter, cough and other abdominal pressure suddenly increased before the conscious contraction of pelvic floor muscles, to reduce incontinence. Successful interruption of urination in patients can, on the one hand, help patients correctly contract the pelvic floor muscles; on the other hand, it can improve the muscle strength of urethral sphincter in the continuous control and interruption of urination training, and gradually make patients close to normal urination.

8. Summary

To sum up, the incidence of urinary incontinence is high at home and abroad, which seriously affects the quality of life of patients. Pelvic floor muscle training is an important measure for the treatment of urinary incontinence, and compliance is an important factor for the treatment effect. However, studies have found that patients with urinary incontinence have poor compliance with pelvic floor muscle training. The compliance of pelvic floor muscle training is affected by many factors, including the degree of attention to disease, education, age, severity of urinary incontinence, memory, cognitive deficiency, behavioral support, lack of professional supervision, etc. Correct pelvic floor muscle training method can effectively promote the recovery of pelvic floor function. There are many ways to improve the compliance of pelvic floor muscle training for patients with urinary incontinence at home and abroad, such as improving patients' sense of self-efficacy, adopting the way of meeting, professional guidance, cross-theoretical model individualized visit nursing form, modern information tools, etc., but there is no unified method or model. Now about incontinence patients of pelvic floor muscle training compliance evaluation tool is the use of self-made questionnaires or scales, self-efficacy evaluation, improvement of oth-

er compliance questionnaires to evaluate compliance, and failing to report its self-evaluation of the reliability and validity, has not yet found the scientific, objective and has good reliability and validity of evaluation tools. In order to obtain a good training effect, effectively improve the urine control ability of patients with urinary incontinence, and improve the quality of life of patients, how to accurately measure compliance and how to improve the compliance of patients with urinary incontinence rehabilitation training is worth exploring and studying.

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Conflicts of Interest

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

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Eating Habits among Lithiasic Patients in Kinshasa, the Democratic Republic of Congo

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Abstract

Introduction: Worldwide, the incidence of kidney stones has been progressively increasing. Various factors can influence the risk of stone formation, including lifestyle and eating habits. The dietary investigation is a standard of care in patients with urolithiasis. The objectives of this study were to determine the dietary habits of lithiasis patients in the city of Kinshasa and to investigate the association between dietary habits and the composition of the stones. **Material and Methods:** From January 2017 to September 2019, 85 patients attending 8 hospitals participated in the nutrition survey. Various foods commonly consumed in the Democratic Republic of Congo were categorized based on their composition: foods rich in animal proteins, foods rich in calcium, foods high in sugar, foods high in oxalate, and various vegetables and fruits. We also investigated daily water intake. The composition of the collected stones was analyzed by infrared spectrophotometry. **Results:** The mean (SD) age of patients was 47.1 (14.0) years, 63.5% of patients were males, 75.3% of the patients had stones located in the upper urinary tract, and 7.1% were undernourished. Most of patients consumed vegetables (77.6%), animal proteins (62.4%), and foods rich in oxalate (58.8%). The daily water intake was less than 1500 mL in more than half of the patients (68.2%). Major anhydrous uric acid stones were associated with a high body mass index ($p = 0.025$). Male patients with a high oxalate diet had more calcium oxalate stones (64.3%) compared to other types of stones ($p = 0.041$). **Conclusion:** High consumptions of vegetables and low water intake were linked to the formation of cal-

cium oxalate monohydrate stones. More data are needed to confirm these findings.

Keywords

Urolithiasis, Dietary Abnormality, Insufficient Diuresis, Chemical Composition

1. Introduction

Urolithiasis is a common health problem with a multifactorial etiology arising from the interaction of various factors including metabolic, genetic, and environmental [1]. Calcium oxalate accounts for the majority of kidney stones [2]. Over the last decades, urolithiasis incidence has been increasing worldwide at an alarming rate [3]. Several factors such as age, gender, race, nutrition, daily water intake, climate, geography, physical activity and Body Mass Index (BMI) play a key role in urolithiasis pathogenesis [4]. Early studies showed that nutrition contributes substantively to kidney stone formation [5] [6]. Prior evidence reported that high dietary calorie, animal protein and oxalate intake and low daily water intake, calcium and potassium consumption correlated with higher incidence of calcium oxalate stone formation, thus representing important risk factors in kidney stone formation [7] [8]. Therefore, dietary investigation represents an important step in the etiological investigation of urolithiasis [9]. Despite a wealth of studies investigating the association between kidney stone formation and nutrition habits, data on the nutritional status and dietary habits of patients afflicted with kidney stones in the Democratic Republic of Congo (DRC) are lacking. To fill this gap, the present study was designed to determine the dietary habits of patients who followed for urolithiasis in the city of Kinshasa and to evaluate the association between dietary habits and the composition of the stones.

2. Material and Methods

2.1. Study Design and Setting

This was a dietary survey conducted from January 2017 to September 2019 among lithiasic patients attending 8 hospitals in the city of Kinshasa. In this case study, the sample size was not predetermined in its initial phase and the study focused on lithiasic patients for the most part easily accessible in hospitals that agreed to collaborate in this study. Thus, 85 patients had taken part in the study. Only the patients followed in these hospitals for urolithiasis who agreed to freely answer the questionnaire for this survey had taken part in this study.

2.2. Dietary Survey

The final report of the study on the identification and evaluation of the nutritional quality of food supplements in use in the DRC carried out by the non-governmental

organization GAAD with funding and technical support from UNICEF [10] was used as a reference for the validation of this survey. Different foods commonly consumed in the DRC were categorized according to their composition: foods rich in animal proteins (beef, pork, goat meat, smoked meat, offal, chicken thighs, turkey rump, chicken, and others), foods high in salt (salted fish, cold meats, cans and others), foods rich in calcium (cow's milk, cheese, yogurt and others), foods high in sugar (sugary drinks, juices and other soda), foods rich in oxalate (peanuts, peanut feet, sorrel, spinach, eggs, chocolate and others) and various vegetables and fruits.

We then established a scale from 1 to 4 according to the frequency of consumption of these foods: occasional consumption of a food was rated 1, consumption once a week was rated 2, while consumption 2 to 3 times a week was rated 3, and a daily consumption was rated 4. Ratings 3 and 4 were categorized as heavy consumers of a given food.

We also evaluated daily water intake. This frequency was qualified as "a lot" when the patient took water several times during the day (quantity estimated at more than 1500 mL/d), "Not much" when the patient took water twice during the day (quantity estimated at 1000 to 1500 mL/day), finally "hardly" when there was only one dose during the day (quantity estimated at less than 1000 mL per day).

2.3. Infrared Analysis of Stones and Study Parameters

The different layers of stones were analyzed by Fourier transform infrared spectrophotometry (Vector 22 FT-IR spectrophotometer, Bruker Optics, Champ-sur-Marne, France) in absorbance mode by accumulation of 32 spectra between 4000 and 400 cm^{-1} , with a resolution of 4 cm^{-1} . Stones were classified according to their main component (chemical or crystalline body representing the large proportion in a stone).

Patient demographic and clinical data were obtained from medical records and during the medical appointment, including age, sex, place of residence, weight and height to calculate the body mass index (BMI), occupation, site of stones, existence of a urinary tract infection, comorbidities, and serum creatinine. Age was divided into 4 categories: <20 years, 20 - 39 years, 40 - 59 years, and ≥ 60 years. The profession was categorized in 3 groups: civil servant, liberal, and student/pupil and unemployed.

2.4. Statistical Analysis

Continuous variables were expressed as means and medians. Categorical variables were summarized into proportions. Differences in categorical variables between groups were assessed using Chi square test or the chi-square likelihood-ratio as appropriate. Differences in means were assessed by the student's t test. p values less or equal to 0.05 were interpreted as statistically significant. Statistical analysis was performed using SPSS Statistics software version 22 (IBM, Armonk, USA). This study was approved by the ethics committee of the School

of Public Health at the University of Kinshasa (approval number: ESP/CE/29/2020).

3. Results

A total of 85 lithiasis patients attending various hospitals in Kinshasa participated in this survey. Demographics are summarized in **Table 1**. The mean (SD) age of patients was 47.1 (14.0) years. Most participants were males (63.5%, n = 54). Sixty-four patients (75.3%) had stones located in the upper urinary tract. Females had more upper tract stones compared to males (90.3% vs. 66.7%, p = 0.012). The vast majority of patients (85%) were residents of Kinshasa.

While 6 (7.1%) patients were undernourished, 46 (54.1%) were overweight or obese. Just over a quarter of patients (25.9%) had a urinary tract infection and *Escherichia coli* was the most frequently isolated bacteria. Twenty patients (23.5%) had hypertension and 9 (10.6%) had impaired renal function (**Table 2**).

Table 1. Sociodemographic parameters by the site of stones.

Variables	All n = 85 (%)	Site of stones		P*
		Upper tract n = 64 (%)	Lower tract n = 21 (%)	
Age (years)				0.330
≤19	2 (2.4)	1 (1.6)	1 (4.8)	
20 - 39	24 (28.2)	17 (26.6)	7 (33.3)	
40 - 59	42 (49.4)	35 (54.7)	7 (33.3)	
≥60	17 (20.0)	11 (17.2)	6 (28.6)	
Sex				0.012
Females	31 (36.5)	28 (43.8)	3 (14.3)	
Males	54 (63.5)	36 (56.2)	18 (85.7)	
Residence				0.473
Kinshasa	71 (83.5)	54 (84.4)	17 (81.0)	
Outside Kinshasa	14 (16.5)	10 (15.6)	4 (19.0)	
Province of origin				0.030
Western	36 (42.4)	32 (50.0)	4 (19.0)	
North	15 (17.6)	9 (14.1)	6 (28.6)	
Center-South	29 (34.1)	21 (32.8)	8 (38.1)	
Eastern	5 (5.9)	2 (3.1)	3 (14.3)	
Profession				0.968
Unemployed	33 (38.8)	24 (37.5)	9 (42.9)	
Official	32 (37.6)	25 (39.1)	7 (33.3)	
Libéral	12 (14.1)	9 (14.1)	3 (14.3)	
Student	8 (9.4)	6 (9.4)	2 (9.5)	

*Pearson chi-square.

Table 2. Clinical parameters according to the site of the stones.

Variables	All n = 85 (%)	Site of stones		p*
		Upper tract n = 64 (%)	Lower tract n = 21 (%)	
BMI				0.682
Normal	33 (38.8)	23 (35.9)	10 (47.6)	
Overweight	29 (34.1)	23 (35.9)	6 (28.6)	
Obesity	17 (20.0)	14 (21.9)	3 (14.3)	
Under nutrition	6 (7.1)	4 (6.2)	2 (9.5)	
Urinary tract infection				0.624
Yes	22 (25.9)	16 (25.0)	6 (28.6)	
<i>E. coli</i>	10 (11.8)	8 (12.5)	2 (9.5)	
<i>Staphylococcus</i>	5 (5.9)	4 (6.2)	1 (4.8)	
<i>Citrobacter</i>	3 (3.5)	1 (1.6)	2 (9.5)	
<i>Enterococcus</i>	2 (2.4)	1 (1.6)	1 (4.8)	
<i>Klebsiella</i>	1 (1.2)	1 (1.6)	0 (0.0)	
<i>Acinetobacter</i>	1 (1.2)	1 (1.6)	0 (0.0)	
No	63 (74.1)	48 (75.0)	15 (71.4)	
Comorbidities				0.425
No	22 (25.9)	17 (26.6)	5 (23.8)	
Arterial hypertension	14 (16.5)	11 (17.2)	3 (14.3)	
Hypertension + diabetes	5 (5.9)	4 (6.2)	1 (4.8)	
Diabetes	3 (3.5)	2 (3.1)	1 (4.8)	
Yes	63 (74.1)	47 (73.4)	16 (76.2)	
Renal function				0.293
Normal	76 (89.4)	56 (87.5)	20 (95.2)	
Impaired	9 (10.6)	8 (12.5)	1 (4.8)	

*Pearson chi-square.

Most patients (77.6%, n = 66) consumed vegetables and fruits. Other dietary habits found in these patients were excessive consumption of animal proteins (62.4%, n = 53), heavy consumption of sugary drinks (58.8%), consumption of foods rich in oxalate (58.8%), high consumption of foods rich in calcium (40%), and a salty foods (34.1%). Most patients (68.2%) drank less than 1500 mL of water in 24 hours.

Females consumed more salty foods than males (48.4% women vs. 25.9% men, p = 0.032). Apart from the high-salt diet, we did not note any statistically significant differences between the eating habits and sex of the patients. Young adults consumed more sugary drinks than other age groups (83% young adults vs. 59% adults and 23.5% people over 60, p = 0.002) (**Table 3**).

Table 3. Eating habits by sex and age.

Variables	All n = 85 (%)	Sexe		P	Age groups (years)				P*
		Woman n = 31 (%)	Man n = 54 (%)		≤19 n = 2 (%)	20 - 39 n = 24 (%)	40 - 59 n = 42 (%)	≥60 n = 17 (%)	
Heavy cons of protein				0.439					0.166
Yes	53 (62.3)	19 (61.3)	34 (63.0)		1 (50.0)	18 (75.0)	27 (64.3)	7 (41.2)	
No	32 (37.7)	12 (38.7)	20 (37.0)		1 (50.0)	6 (25.0)	15 (35.7)	10 (58.8)	
Heavy cons. of salt				0.032					0.554
Yes	29 (34.1)	15 (48.4)	14 (25.9)		1 (50.0)	7 (29.2)	17 (40.5)	4 (23.5)	
No	56 (65.9)	16 (51.6)	40 (74.1)		1 (50.0)	17 (60.8)	25 (59.5)	13 (66.5)	
Heavy cons. Calcium				0.520					0.072
Yes	34 (40.0)	12 (38.7)	22 (40.7)		2 (100.0)	9 (37.5)	13 (30.9)	10 (58.8)	
No	51 (60.0)	19 (61.3)	32 (59.3)		0 (0.0)	15 (62.5)	29 (69.1)	7 (31.2)	
heavy cons. of Sugar				0.367					0.002
Yes	50 (58.8)	17 (54.8)	33 (61.1)		1 (50.0)	20 (83.3)	25 (59.5)	4 (23.5)	
No	35 (41.2)	14 (45.2)	21 (38.9)		1 (50.0)	4 (16.7)	17 (40.5)	13 (76.5)	
Heavy cons. Oxalate				0.453					0.223
Yes	50 (58.8)	19 (61.3)	31 (57.4)		2 (100.0)	11 (45.8)	28 (66.7)	9 (52.9)	
No	35 (41.2)	12 (38.7)	23 (42.6)		0 (0,0)	13 (54.2)	14 (33.3)	8 (47.1)	
Heavy cons. of vegetables				0.197					0.271
Yes	66 (77.6)	22 (71,0)	44 (81.5)		2 (100.0)	20 (83.3)	29 (69.0)	15 (88.2)	
No	19 (22.4)	9 (29.0)	10 (18.5)		0 (0.0)	4 (16.7)	13 (31.0)	2 (11.8)	
Water				0.307					0.809
A lot	27 (31.8)	7 (22.6)	20 (37.0)		1 (50.0)	7 (29.2)	13 (30.9)	6 (35.3)	
No a lot	32 (37.6)	12 (38.7)	20 (37.0)		1 (50.0)	8 (33.3)	15 (35.7)	8 (47.1)	
Almost not	26 (30.6)	12 (38.7)	14 (25.9)		0 (0.0)	9 (37.5)	14 (33.4)	3 (17.6)	

*Pearson chi-square, the p correspond to the distribution of eating habits according to sex and age groups of patients.

Patients residing in the provinces of the DRC had a saltier diet (64.3% outside Kinshasa vs. 28.2 Kinshasa, $p = 0.012$) than those residing in the city of Kinshasa. People from the western and northern provinces consumed more sugary drinks than those from other DRC provinces (66.7% West and 80% North vs. 41.4% Center-South and 40% East, $p = 0.041$) (**Table 4**).

Only the stones of 61 out of the 85 patients who took part in this dietary survey were extracted during our study period and analyzed at the TENON hospital (APHP, Paris, France).

The whewellite majority in the stones of 45 patients (or 73.8%) was the largest majority body. The other major bodies identified were carbapatite (in 6.5% of cases), weddellite (6.5%), struvite (4.9%), ammonium urate (4.9%) and l anhydrous uric acid (4.9%).

Table 4. Eating habits according to place of residence and province of origin.

Variables	All n = 85 (%)	Home		P	Provinces of origin				P
		Kinshasa n = 71 (%)	Hors Kinshasa n = 14 (%)		Western n = 36 (%)	North n = 15 (%)	Center-south n = 29 (%)	Eastern n = 5 (%)	
Heavy cons. of protéin				0.561					0.316
Yes	53 (62.4)	44 (62.0)	9 (64.3)		21 (58.3)	12 (80.0)	16 (55.2)	4 (80.0)	
No	32 (37.6)	27 (38.0)	5 (35.7)		15 (41.7)	3 (20.0)	13 (44.8)	1 (20.0)	
Heavy Consumer of salt				0.012					0.591
Yes	29 (34.1)	20 (28.2)	9 (64.3)		15 (41.7)	5 (33.3)	8 (27.6)	1 (20.0)	
No	56 (65.9)	51 (71.8)	5 (35.7)		21 (58.3)	10 (66.7)	21 (72.4)	4 (80.0)	
Heavy consumer calcium				0.259					0.502
Yes	34 (40.0)	30 (42.3)	4 (28.6)		15 (41.7)	8 (53.3)	10 (34.5)	1 (20.0)	
No	51 (60.0)	41 (57.7)	10 (71.4)		21 (58.3)	7 (46.7)	19 (65.5)	4 (80.0)	
Heavy consumer of sugar				0.557					0.041*
Yes	50 (58.8)	42 (59.2)	8 (57.1)		24 (66.7)	12 (80.0)	12 (41.4)	2 (40.0)	
No	35 (41.2)	29 (40.8)	6 (42.9)		12 (33.3)	3 (20.0)	17 (58.6)	3 (60.0)	
Heavy consumer of oxalate				0.442					0.574
Yes	50 (58.8)	41 (57.7)	9 (64.3)		24 (66.7)	8 (53.3)	16 (55.2)	2 (40.0)	
No	35 (41.2)	30 (42.3)	5 (35.7)		12 (33.3)	7 (46.7)	13 (44.8)	3 (60.0)	
Heavy cons of vegetables				0.053					0.449
Yes	66 (77.6)	58 (81.7)	8 (57.1)		26 (72.2)	11 (73.3)	24 (82.8)	5 (100.0)	
No	19 (22.4)	13 (18.3)	6 (42.9)		10 (27.8)	4 (26.7)	5 (17.2)	0 (0.0)	
Hydrant				0.898					0.629
A lot	27 (31.8)	23 (32.4)	4 (28.6)		13 (36.1)	5 (33.3)	8 (27.6)	1 (20.0)	
No a lot	32 (37.6)	27 (38.0)	5 (35.7)		15 (41.7)	3 (20.0)	12 (41.4)	2 (40.0)	
Almost not	26 (30.6)	21 (29.6)	5 (35.7)		8 (22.2)	7 (46.7)	9 (31.0)	2 (40.0)	

*Likelihood chi-square, p correspond to the distribution of eating habits according to the residence and province of origin of the patients.

Anhydrous uric acid stones were completely associated with a high BMI (overweight) and 50% of carapatite stones were associated with under nutrition ($p = 0.025$). No statistically significant difference was noted between the distribution of urinary tract infection and majority stone bodies.

Males with a diet rich in oxalate had more calcium oxalate stones (64.3%) compared to other major bodies (carapatite, struvite and ammonium urate) ($p = 0.041$) (Table 5).

4. Discussion

Eating Habits and Chemical Composition of Stones

In this study, vegetable consumption was the most predominant diet. The other dietary habits found in these lithiasis patients included high consumptions of

Table 5. Majority bodies based on BMI, urinary tract infection and oxalate consumption in men.

Variables	All n = 61 (%)	Corps majoritaires regroupés				P*
		Oxalate de calcium n = 49 (%)	CA n = 4 (%)	PAM n = 3 (%)	AU0 n = 2 (%)	
BMI						0.025
Normal	22 (36.1)	19 (38.8)	0 (0.0)	2 (66.7)	0 (0.0)	1 (33.3)
Overweight	22 (36.1)	17 (34.7)	0 (0.0)	1 (33.3)	2 (100.0)	2 (66.7)
Obesity	13 (21.3)	11 (22.4)	2 (50.0)	0 (0.0)	0 (0.0)	0 (0.0)
Under nutrition	4 (6.6)	2 (4.1)	2 (50.0)	0 (0.0)	0 (0.0)	0 (0.0)
Urinary tract infection						0.928
Yes	16 (26.2)	13 (26.5)	1 (25.0)	1 (33.3)	0 (0.0)	1 (33.3)
No	45 (73.8)	36 (73.5)	3 (75.0)	2 (66.7)	2 (100.0)	2 (66.7)
	n = 36 (%)	n = 28 (%)	n = 1 (%)	n = 2 (%)	n = 2 (%)	n = 3 (%)
Heavy cons. oxalate						0.041
Yes	20 (55.6)	18 (64.3)	0 (0.0)	0 (0.0)	2 (100.0)	0 (0.0)
No	16 (44.4)	10 (35.7)	1 (100.0)	2 (100.0)	0 (0.0)	3 (100.0)

*Pearson chi-square. CA: carbapatite, PAM: struvite, AU0: anhydrous uric acid and UrAm: ammonium urate.

animal proteins, consumptions of foods rich in oxalate, refined sugars, calcium, and consumptions of foods high in salt. Also, men with a diet high in oxalate had more calcium oxalate stones compared to other main stones.

Most of patients in this study (77.6%) had a diet rich in vegetables and fruits. Several studies have demonstrated the protective role of a diet rich in vegetables and fruits [11] [12]. Likewise, a Dietary Approaches to Stop Hypertension (DASH) diet, rich in fruits, vegetables, whole grains, and low-fat dairy products, has been shown to significantly reduce the risk of kidney stone formation [13]. However, it is worth mentioning that the protective effect of a diet rich in vegetables and fruits is only observed in people who rarely consume them [12]. Indeed, Meschi *et al.* [12] found that urinary citrate excretion was significantly reduced and calcium excretion was significantly increased after a two-week diet of vegetables in a normal population [12]. Furthermore, Daudon *et al.* [14] revealed that a vegetable diet is often rich in oxalic acid and poor in calcium, which would promote hyperoxaluria and the formation of calcium oxalate stones observed in developing countries. In this study, whewellite (73.8%) was the most frequent component and less than half of patients (40%) consumed foods rich in calcium. Thus, the need to examine the oxalate content in various green leaves and vegetables regularly consumed in the DRC.

In this study, 58.8% of patients had a diet rich in oxalate and a statistically significant association was found between a diet rich in oxalate and calcium oxalate stones in men. Higher consumptions of oxalate increase the risk of stone forma-

tion [15]. Oxalate, a terminal acid in metabolism whose primary route of excretion is the kidney, binds to calcium to form calcium oxalate which is an important lithogenic complex [9] [16]. Three potential sources of oxalate intake are known: foods rich in oxalate (represents 10% to 20% urinary oxalate) [9] [16], hyperoxaluria may be secondary to intestinal malabsorption [16] [17] [18] [19] and hepatic oxalate synthesis which depends on lean body mass (represents 80% to 90% of oxalate). However, a diet very low in oxalate can reduce urinary oxalate excretion by half [9] and only 100 - 1000 mg of free oxalate which is absorbed per day [9] [14].

Besides higher consumptions of vegetables, we also found that 62.4% of patients had a diet rich in animal proteins and 58.8% consumed refined sugars contained in juices and other soft drinks. Ferraro *et al.* [20] found that higher consumption of sugary drinks was one of the modifiable risk factors associated with urinary stones. There is also evidence that sugary and carbonated drinks increase the risk of urinary stone formation [21]. Zhuo *et al.* [11] reported that animal protein intake was significantly associated with the occurrence of urolithiasis. Short-term restriction of animal protein significantly reduces the excretion of calcium, phosphate, hydroxyproline, uric acid and oxalate and increases the excretion of citrate in the urine, reducing the risk of stone formation [22]. Therefore, patients with recurrent calcium oxalate urate stones should decrease consumptions of animal proteins and avoid foods high in purines.

It is known that calciuria is an important determinant of calcium lithogenicity because hypercalciuria is found in 30% to 60% of lithiasis patients. Calciuria is influenced by nutritional factors such as excessive salt, calcium, and proteins intake [9] [14] [16] [23] [24]. In this study higher intake of salt, calcium and proteins were found in 34.1%, 40%, and 62.4% of cases, respectively.

Milk, dairy products, and drinking water are the main sources of dietary calcium [9] [16]. Digestive absorption of calcium represents 20% of the amount ingested, or 5 mmol/d (200 mg), and the kidney is the only way out of calcium. Any excess sodium intake in food leads to increased urinary calcium excretion. It is also known that the consumption of animal proteins is associated with the increased incidence of calcium urolithiasis. The multifactorial effects of excess animal proteins include: lowering of urinary pH, increased excretion of calcium, uric acid, oxalate and a decrease in citrate excretion. [14] [25] [26] [27] [28]. Thus, sodium intake must be maintained around 6 and 7 g/d; whereas protein intakes should be normalized to 1 g/kg/day in adults [29] [30].

This dietary survey revealed that 68.2% of patients drank less than 1500 mL of water per 24 hours. High fluid intake has been shown to increase urine volume, reduce the concentration of calcium oxalate in urine, and reduce the risk of stone formation by 50% and the recurrence rate from 60% to 80% [31] [32]. Indeed, Zhuo *et al.* [11] demonstrated that fluid intake was significantly associated with the occurrence of urolithiasis. We believe that lower water intake in our study is due, at least partially, by limited access to clean drinking water. Water intake should be harmoniously distributed throughout the day and adjusted ac-

ording to the fluid losses. This could help prevent urolithiasis and reduce the frequency of recurrence [16] [31]. Remember that there are three categories of water; prepackaged natural mineral waters, prepackaged spring waters and water for public distribution (tap water), rainwater and well water; the latter being generally very low in calcium. Mineral and spring waters are the only ones that can take advantage of properties favorable to health, benefiting from an original nature and purity, coming from underground water free from any pollution, stable in their composition [9].

Finally, the small sample size of this hospital series is a limiting factor that must be taken into account in interpreting these results. But, beyond this possible limit, this study made it possible for the first time to describe the eating habits of lithic patients in the DRC.

5. Conclusion

In this study, high consumptions of vegetables and low water intake were linked to the formation of calcium oxalate monohydrate stones. More data are needed to confirm these findings.

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Conflicts of Interest

No conflict of interest has been declared by the authors.

Authors' Contributions

PD, DM designed, collected, interpreted, wrote and corrected the manuscript. EM, AN analyzed the data, read and corrected the article. JRM, ML and ES read and edited the article, MD and PD carried out the morpho-constitutional analysis of stones, and revised the manuscript, APM, SL, MD and JPH supervised, interpreted and edited the article. All authors have read and approved the final version of the article.

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DATA COLLECTION SHEET: DIETARY SURVEY OF LITHIASIC PATIENTS IN KINSHASA.

NAME:

Gender: M F Date of birth: Nationality:

Address: Weight: Size:

Province of origin: Profession:

LOCATION OF THE CALCULATION (at the time of its urological treatment):

Kidney/calyx:

upper middle lower bassinet bladder

Ureter:

high medium low coralliform: complete incomplete

Pyelocalical junction Pyelo-ureter Ureterovesical Other:

Obstructive lithiasis: Yes No

Kidney destroyed: Yes No

Side: left right Number of calculations:

ELIMINATION METHOD:

Spontaneous endoscopic surgical PCNL

Lithotripsy-endocorporeal extracorporeal rigid ureteroscopy
flexible other:

Disposal date: / /

DISCOVERY CIRCUMSTANCE(S):

C.N. Hematuria Urinary tract infection A.S.P.

Lower back pain other:

Is this a 1st stone of a recurrence on the same side
on the opposite side

Other in situ stones: Yes No If Yes: location:

Malformation Yes No If Yes: type

Urinary tract infection: Yes No

Recurrent: Yes No Germ (s):

PRESUMED ETIOLOGY OF STONE:

PERSONAL HISTORY:

Diabetes hypertension other: Yes No

If yes, which ones:

REGULAR TREATMENTS: Yes No

By Diamox* – Cycloteriam* – Prestole* – Calcium + Vitamin D – Beta-blockers
– Lipid lowering agents – Rocéphine* – Praxilene* – Others (specify):

DIET

Food preference: 1. Occasionally 2. Once a week 3. 2 - 3 times a week 4. Every day

Animal protein (beef, pork, thigh and others): 1 2 3 4

Salt (salted fish, cold meats, soda and others): 1 2 3 4

Calcium (milk, cheese, yogurt and others): 1 2 3 4

Sugar (sweet drink, juice and other soda):	1	2	3	4
Oxalate (chocolate, peanut, sorrel, and others):	1	2	3	4
Vegetables and fruits:	1	2	3	4

Frequency of water intake per day: A lot: several times/day. Not a lot: once or twice a day. Almost not: less than once a day

A lot
Not a lot
Almost not

Value balance

Urea:

Creatinine:

Blood sugar:

Taumatic Emergencies of the External Genital Organs

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Abstract

Background: The traumas of scrotum are often traumas caused by accidents on the public highway or in sport. However, fractures of the penis are secondary to a direct trauma to the penis with rupture of the albuginea causing hematoma, pain and deviation of the penis. Animal bites are rare. **Purpose:** To describe the management of traumatic emergencies of the external genital organs at the CHU Bouaké. **Patients and Methods:** Retrospective and descriptive study on the patients treated at Bouaké University Hospital for traumatic emergencies of the external genital organs during the period from January 01, 2012 to December 31, 2018. The parameters studied were epidemiological, clinical and therapeutic. **Results:** The study period registered 26 patients. The mean age was 34.5 years, Closed trauma to the scrotum was a frequent reason with 30.8%, the trauma sat on the scrotum in 53.8%, the penis in 42.3%, the vulva in 3.8% of cases. The circumstances of discovery of trauma to the penis were dominated by coitus missteps (45.5%), on the stock exchange and vulva by accidents on the public highway (60.8%). Scrotal swelling was the frequent clinical sign (26.9%). Treatment was dominated by surgery in 92.30%. Seven patients (29.16%) underwent exploratory scrototomy associated with hematoma evacuation, five patients (20.83%), a simple trimming, five patients (20.83%), an evacuation of the hematoma associated with a cavernous suture, one patient (4.16%), a trimming associated with a suture of the vulva, one patient (4.16%), a trimming associated with a right orchietomy. The hospital stay was less than 5 days. The course was simple in 92.30%

of the cases; two patients (7.7%) had complications such as testicular necrosis and atrophy which have been treated by orchidectomy. **Conclusion:** Traumatic emergencies of the external genitalia are rare but serious. Treatment is dominated by surgery.

Keywords

Orchidectomy, Scrototomy, Testicle, Trauma, Vulva

1. Introduction

Traumatic emergencies of the external genitalia are relatively uncommon and affect young people [1]. These traumas represent less than 1% in Africa [1], 8% - 10% in Europe [2], 2% - 10% Asia [3], 1% America [4] and 1.9% in the Middle East [5]. The etiologies are multiple and the lesions may involve the penis and/or the scrotal contents (testicle, epididymides, cord) in men and the vulva in women. The diagnosis of these injuries is most often clinical in the case of open trauma or fracture of the penis, and may involve ultrasound in the case of a large post-traumatic bursa [2]. They may lead to urinary complications and sequela (erectile dysfunction, curvature of the penis during erection, urethral stricture, testicular atrophy) and serious psychological harm [2]. The management of external genitalia trauma is done in an emergency setting and may include trimming in case of a wound or surgical exploration of the traumatized bursa and finally cavernous suture for penile fractures [3]. This management strategy therefore requires a rigorous clinical evaluation with a precise and complete lesion assessment. Treatment must be early to minimize complications and sequela. The aim of our study was to describe the epidemiological, clinical and therapeutic aspects of traumatic emergencies of the external genitalia in the urology department of the University Hospital of Bouaké.

2. Patients and Methods

This is a retrospective and descriptive study which took place in the urology department of the university hospital of Bouaké. The study took place from January 1, 2012 to December 31, 2018, during which we collected all cases of traumatic External Genitalia Organs (EGO) emergencies that were treated in the department. The study period registered 26 patients. The study included male and female patients of all ages who were treated medically or surgically for EGO trauma emergencies. There were no exclusion criteria. The parameters studied included: socio-demographic data: (age, profession, sex), clinical: (circumstances of occurrence, aetiology, consultation time, site of injury, associated injuries), paraclinical (imaging), therapeutic (surgical procedure, evolution, postoperative complications, hospitalization time). The data were collected from the patients' files, a survey form and the register of surgical reports of patients operated on for traumatic emergencies at the EGO. All data were entered into the WORLD

software and processed with Epi info 2.10.

3. Results

3.1. Epidemiology

The average age of the patients is 34.5 years with extremes of 16 years to 52 years. **Table 1** shows the epidemiological characteristics of the patients studied; the patients were predominantly male (96.23%) and almost half were over 30 years old. Most were Farmers with 38.46%. The majority was married (69.23%) and the illiterate ones were (46.23%).

Table 1. Epidemiological characteristics of patients.

Settings	Effective (n = 26)	Percentage (%)
AGE GROUPS (YEAR)		
16 - 28	3	11.53
29 - 35	17	65.38
36 - 45	3	11.53
45 and over	2	7.69
SEX		
Male	25	96.15
Female	1	3.84
PROFESSION		
administrator	1	3.84
merchant	2	7.69
Student	2	7.69
Teacher	4	15.38
mechanic	2	7.69
Plumber	1	3.84
Farmer	10	38.46
unemployed	2	7.69
Breeder	2	7.69
CIVIL STATUS		
Married	18	69.23
Single	5	19.23
Widower	3	11.53
LEVEL OF EDUCATION		
Primary School	5	19.23
Secondary School	4	15.38
Higher Education	5	19.23
Illiterate	12	46.15

3.2. Clinic

3.2.1. Reason for Consultation

Closed scrotal trauma was the most frequent reason for consultation with 30.8%. **Table 2** shows that closed trauma to the penis is the second reason for consultation with 26.9%. However, open traumatism of the scrotum and penis comes third (23.1%) and fourth (11.5%) respectively. Very few patients consult a doctor for scrotal sore (3.8%) or vulvar folds (3.8%).

3.2.2. Occurred Circumstances

1) Penis

The circumstances in which penile injuries occurred were dominated by coital slips with 45.5% (n = 5; **Table 3**).

2) Bursa

The circumstances of occurrence of trauma to the bursa are dominated by road traffic accidents with 60% (n = 6; **Table 4**).

Table 2. Dispatching of patients according to reason for consultation.

Reason for consultation	Number	Percentage
Open penile trauma	3	11.5
Closed penile trauma	7	26.9
Closed scrotal trauma	8	30.8
Open scrotal trauma	6	23.1
Vulvar wound	1	3.8
Scrotal wound	1	3.8
Total	26	100%

Table 3. Dispatching of patients according to the circumstances of occurrence.

Circumstances of occurrence	Number	Percentage
Road traffic accidents	3	27.3
Coitus slip	5	45.5
Dog bite	1	9.1
Firearm	2	18.2
Total	11	100%

Table 4. Dispatching of patients according to the circumstances of occurrence of trauma to the bursa.

Circumstances of occurrence	Number	Percentage
Road traffic accidents	9	60.0
Falls with impaction	3	20.0
Entrapment	1	6.7
Firearm	2	13.3
Total	15	100%

3) Vulva

Only one case of trauma to the vulva due to a road accident was noted (n = 1; 3.84%).

3.2.3. Delay of Consultation

The majority of patients consulted within 24 hours of the trauma (n = 23; 88.5%).

3.2.4. Site of Trauma

Trauma was predominantly to the scrotum with 53.8% in men (n = 14).

3.2.5. Clinical Signs

Scrotal swelling predominated with 26.9% (n = 6; **Table 5**).

3.3. Paraclinic

- Six (6) patients had an ultrasound scan (23.07%).
- Seventeen (17) patients had an X-ray of the pelvis (65.38%).

3.4. Treatment

3.4.1. Type of Treatment

The majority of patients received surgical treatment with 92.30% (n = 24).

3.4.2. Type of Anaesthesia

Loco-regional anaesthesia was the main route of anaesthesia with 91.66 (n = 22).

3.4.3. Per-Operative Lesions

Intraoperatively, non-expansive scrotal haematoma accounted for 29.16%, fracture of the corpora cavernosa accounted for 20.83% and superficial wounds of the penis and scrotum accounted for 20.83% (**Table 6**).

3.4.4. Surgical Procedures

Exploratory scrototomy associated with evacuation of scrotal hematoma were the most common surgical procedures performed on patients with 29.16%. **Table 7** shows that simple trimming and evacuation of the hematoma followed

Table 5. Dispatching of patients according to clinical signs.

Clinical signs	Number	Percentage
Scrotal pain	1	3.8
Small and/or large lip wound	1	3.8
Penile pain	3	11.5
Swelling of the penis	6	23.1
Sore glans	3	11.5
Scrotal swelling	7	26.9
Testicular avulsion	1	3.8
Testicular fracture	4	15.4
Total	26	100%

Table 6. Dispatching of patients according to intraoperative findings.

Intraoperative lesions	Number	Percentage
Testicular albuginea wound	4	16.16
Testicular avulsion	1	4.16
Fracture of the corpora cavernosa	5	20.83
Superficial wound of scrotum and penis	5	20.83
Dislocating wound of the vulva	1	4.16
Testicular fracture	1	4.16
Non-expansive haematoma of scrotum	7	29.16
Total	24	100%

Table 7. Dispatching of patients according to surgical procedure.

Surgical procedure	Number	Percentage
Trimming + suture of the albuginea	4	16.16
Trimming + haemostasis	1	4.16
Evacuation of the haematoma + cavernous suture	5	20.83
Simple trimming	5	20.83
Suture trimming of the small and large lip of the vulva	1	4.16
Trimming + right orchidectomy	1	4.16
Exploratory scrototomy + evacuation of scrotal haematoma	7	29.16
Total	24	100%

by suturing of the cavernous bodies each represented 20.83%. 16.16% of the patients benefited from a trimming of the albuginea wound associated with a suture. A patient underwent a trimming associated with a right orchidectomy (4.16%). The only woman benefited from a trimming associated with a suture of the vulva (4.16%).

3.4.5. Post-Operative Treatment of Associated Lesions

Post-operatively, all patients who had undergone suture of the corpora cavernosa received oral medication based on diazepam at a dose of 10 mg per day for a fortnight, and non-steroidal anti-inflammatory drugs for a week. They also received probabilistic antibiotic therapy with cephalosporin until the eighth day.

The dog-bitten patient had received rabies prevention, tetanus sero-vaccination and broad-spectrum antibiotic therapy.

Two patients had associated injuries.

There was a traumatic rupture of the urethra and a fracture of the pelvis (7.69%) (n = 2). The treatment consisted of an end-to-end suture of the urethra on a catheter and an orthopaedic treatment for the pelvic fracture.

3.4.6. Duration of Hospitalization

More than half of the patients had a hospital stay between [0 and 5 days] after

treatment, 65.4% (n = 17).

IV-7-Follow-up of the treatment.

One trophic complication (testicular atrophy) and one infectious complication (testicular necrosis) were observed post-operatively. Orchidectomy was performed to treat the testicular necrosis as well as the testicular atrophy in both patients.

4. Discussion

In our study, the minimal age of the patients was 34.5 years with extremes of 16 and 52 years. The young age has been reported by several authors in the literature. Bah in Senegal reported in his study an average age of 37 years [6]. Ouattara in Benin noted an average age of 32.3 years [7]. Djè in Côte d'Ivoire found an average age of 27.8 years [8]. The averages confirm on the one hand that this type of lesion concerns the most active population and on the other hand that young people constitute the most important part of the populations of developing countries. Trauma to the external genitalia is a male prerogative and almost all authors agree on this characteristic [8] [9]. 96.2% of our study involved men. This predominance of males was noted by Dekou, in his study of 27 cases of trauma to the genital-urinary system, who reported 26 male patients out of a series of 27 patients [1]. This strong male predominance in our series could be explained by the greater exposure of men to public road accidents. We noted one case of trauma to the vulva. This is a rare case and this rarity has been noted in the literature [8]. In our series, closed scrotal trauma was the most frequent reason for admission with 30.8%. This observation was made by Coulibaly in Mali [9], and Kambou in Burkina-Faso [10]. Open trauma was infrequent as reported in the literature [10], most often secondary to a firearm. The circumstances of occurrence of trauma to the bursa and vulva were dominated by road accidents with 63.6%. Our results are in line with those of Kambou in Burkina Faso [10] and Djè in Côte d'Ivoire [8], who found 45% and 75.6% respectively. These different results show that public road accidents are the greatest source of trauma. The main circumstance for the occurrence of penile trauma was coitus error, *i.e.* 36.4%. This result is similar to the literature [11] [12] [13]. The clinical symptomatology of trauma to the genital-urinary system is well known [6] [7]. It consists of:

- A haematocele which is clinically expressed as an enlarged, normally colored;
- A scrotal haematoma which is characterized by an enlarged, ecchymotic, dark red bursa on pale skin. Sometimes it is a localized deformity.

In our series, the clinical symptomatology was dominated by scrotal swelling in 26.9% followed by penile swelling in 23.1%.

Our results corroborate those of Coulibaly in Mali [9] and Andry in Switzerland [14]. The increase in the volume of the scrotum could be explained by the violence of the trauma on the scrotum on the one hand, and by the presence of a scrotal haematocele or haematoma on the other. As for the swelling of the penis, it can be explained by the presence of a haematoma opposite the fracture site of

the corpora cavernosa. From a paraclinical point of view, ultrasound of the bursa is necessary because the physical examination makes it difficult to diagnose lesions of the epididymis, the testicles or the cord, and above all because it is very sensitive due to the pain. Combined with Doppler, it can show areas of localized ischaemia in the case of compressive haematocele, intra-testicular haematoma or rupture of the albuginea [6]. However, its specificity is not perfect, sometimes leading to surgical exploration to make a complete assessment of the lesion [15]. In our work, the diagnosis was mainly made on the basis of clinical findings followed by an emergency operation. Ultrasound was not systematic. Six patients (23.07%) underwent scrotal ultrasound. Our attitude is in line with that of several authors, notably Djè [8] and Coulibaly [9], who recommend emergency surgical exploration except in cases of moderate trauma. This management would reduce the risks of complications and sequela. The therapeutic attitude to bursal trauma is variable and depends above all on the presence or absence of a haematocele on clinical examination [10]. Thus, in the absence of a haematocele and in the presence of an intact testicle on ultrasound, the medical treatment consists of analgesics, non-steroidal anti-inflammatory drugs in the absence of contraindication of gastro duodenal ulcers, antibiotic coverage, anti-tetanus sero-vaccination associated with suspension of bursaries [10], as was the case for two (2) of our patients, *i.e.* 7.7%. In our series, we used local-regional anaesthesia in 91.66% of cases. We chose spinal anaesthesia because of its advantages, which allow surgery to be performed with ease and comfort [16]. Surgical management consisted of an exploratory scrototomy followed by emergency evacuation of a scrotal haematoma in 29.16% of cases. This attitude, motivated by the acute traumatic bursa, has been noted by other authors [17] [18]. Our approach corroborates the rule according to which in the case of an acute large bursa, surgical exploration should not be delayed. In our series, all patients admitted for fracture of the corpora cavernosa were approached by circumferential sub coronal incision, because it allows an exhaustive diagnosis of the lesions. Evacuation of the haematoma followed by haemostasis and repair of the albuginea was done with 3/0 Vicryl using separate stitches followed by closure of the skin with separate stitches; a dry dressing was done in 45.5% of cases, *i.e.* 5 cases. Post-operatively, all patients received oral medication based on diazepam at a dose of 10 mg per day for a fortnight, and non-steroidal anti-inflammatory drugs for a week. Probabilistic antibiotic therapy was prescribed in our series based on cephalosporin until the eighth day after surgery as some authors [17] [18]. All patients admitted for open trauma received trimming. One patient had orchietomy on the right side and trimming. Our treatment was due to the fact that the patient presented with open gunshot trauma to the scrotum with disruption of the right testicle. We performed trimming plus haemostasis in one patient due to traumatic avulsion of the testis. Dekou reported four (4) cases of orchietomy in his study of trauma to the genitourinary system [1]. This finding reflects the violence of the trauma. Our series reports a case of open trauma to the vulva fol-

lowing a road traffic accident. It was a perineal impaction against the ground. Our management consisted of trimming and suturing of the labia minor and major with 3/0 Vicryl. This reconstructive surgery was performed in collaboration with gynaecologists. Trauma to the external genitalia involving the vulva is extremely rare [19]. The only case reported in seven years of practice confirms this rarity. Animal bites are rare as evidenced by our study but potentially serious [20]. Wolf *et al.* report four cases of dog bites [19]. Cummings and Boullier reported eight (8) cases treated for scrotal dog bites [20]. However, in the largest series in the literature, Gomes *et al.* report ten (10) new cases: eight (8) cases were attacked by dogs, one by a horse and one by a donkey [21]. The morbidity is directly related to the severity of the bite and the delay in consultation. These animal bites carry a triple infectious risk: bacterial, tetanic and rabies [15]. Broad spectrum antibiotic therapy should be administered. In our series, one case of dog bite was observed. The bite involved the body of the penis. Wound trimming combined with anti-rabies prevention and anti-tetanus sero-vaccination were carried out according to the vaccine recommendations [21]. The most common bacteria isolated in animal bites are streptococci and staphylococci, *Escherichia coli*, associated with anaerobic germs. In our case, no germ was identified, hence the choice of broad-spectrum antibiotic therapy. In our series, two patients had associated lesions. It was a traumatic rupture of the urethra and a fracture of the obturator frame, *i.e.* 7.69%. The bone lesion was managed by orthopaedic surgeons. The urethral injury was not treated as an emergency. It was done as a delayed emergency as recommended by Leguillou in Bordeaux and Gueye in Dakar between the 8th and 10th day [22] [23] and Diallo in Conakry [24]. Our patient was operated on as a delayed emergency after organization of the lesions and at a distance from the inflammatory and infectious processes. This approach of management at a distance from the trauma was that adopted by Dje and Fall [8] [25]. In our series, more than 60% of patients had a hospital stay of less than five days after treatment. Our duration is in line with that of Coulibaly in Mali [9]. However, some authors such as Kambou *et al.* in Burkina Faso [10] reported a longer hospital stay of 40.4 days after treatment. The postoperative period was marked by necrosis of the contralateral testicle in a patient who had undergone a right orchiectomy following a gunshot trauma with testicular damage. We performed a second orchiectomy; this unfortunate situation could be explained by microscopic lesions of the cord elements of the left testicle which would have led to secondary ischaemia and then to necrosis of the testicle. This highlights the importance of informing any patient with open bursal trauma of the risks of possible castration and its consequences. According to Bah *et al.* [15], the possibility of sperm conservation should be considered with the patient. In our case, this option had been proposed to him but he did not consider it appropriate, as he had already fathered 8 children. The possibility of sperm conservation for assisted reproduction was of lesser importance. We observed testicular atrophy which was managed by preventive left orchiectomy. This post bursal trauma

complication has been observed in approximately 50% of patients in the series by Cross *et al.* [26]. The mechanisms of occurrence of testicular atrophy are not well known: post-traumatic lesions of the micro-vascularization of the testis; ischaemia by compression due to oedema and haematoma and autoimmune mechanisms are mentioned in the literature [27]. However, this study has limitations which must be taken into account when interpreting the results. As this is the retrospective nature with significant loss of information, its relatively small size does not give it sufficient statistical power.

5. Conclusion

Traumatic emergencies of the external genital organs are uncommon, but it is potentially serious because it can lead to urinary or sexual complications with major consequences for fertility. These injuries are rare in women and very frequent in men. The diagnosis is most often based on clinical examination. However, clinical examination is often difficult because of pain and/or swelling, hence the importance of ultrasound. Trauma to the bursa is most often encountered in road accidents. As for penile trauma, it is secondary to a false step in the coitus and emergency treatment is surgical in most cases. In women, surgical management must be carried out in a multidisciplinary context involving urologists, gynaecologists and psychologists of both sexes. Animal bites of external genital organs are rare but serious and carry a significant infectious risk. Morbidity is related to the severity of the bite and the delay in consultation. Surgical treatment must always be combined with medical treatment and vaccination. Complications and sequela of EGO trauma are formidable. These complications must be explained to the patient before treatment in order to reduce the medico-legal problems associated with trauma.

Ethical Clearance

The patients were informed and agreed to participate in the study, and their anonymity was preserved.

Conflicts of Interest

The authors declare that they have no ties of interest.

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Prostatic Burkitt Lymphoma, a Rare Secondary Location

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Abstract

Introduction: Non-Hodgkin's malignant lymphoma is found primarily in African children. Prostate localization is a rare entity. We report the case of a secondary prostatic localization of Burkitt lymphoma in a 14-year-old child.

Observation: the 14-year-old child NNJ was followed at the Libreville Cancer Institute (ICL) for Burkitt maxillo-facial stage II bilateral Murphy lymphoma. The clinical examination noted an alteration of the general state, total hematuria, a voluminous prostatic mass filling the rectal ampoule. The paraclinical assessment noted renal insufficiency, a prostatic mass on ultrasound. Anatomic-pathological examination of the prostatic biopsy diagnosed Burkitt type non-Hodgkin's malignant lymphoma. He died a week later. **Conclusion:** Primary or secondary prostatic lymphoma is rare. Obstructive renal insufficiency is an additional complication that darkens its prognosis by delaying etiological treatment based on polychemotherapy.

Keywords

Burkitt Lymphoma, Prostate, Renal Insufficiency, Libreville

1. Introduction

Described in 1958 by Denis Parsons Burkitt, non-Hodgkin's malignant lymphoma is found mainly in African children with a peak in frequency between 6 and 7 years [1]. It can be divided into three subtypes: endemic, sporadic and associated with immunodeficiency [2]. The endemic type is almost always associated with the Epstein-Barr virus (EBV) and occurs frequently in African children. In western countries, the sporadic form is more common. The type associated with immunodeficiency is observed in patients infected with HIV [2].

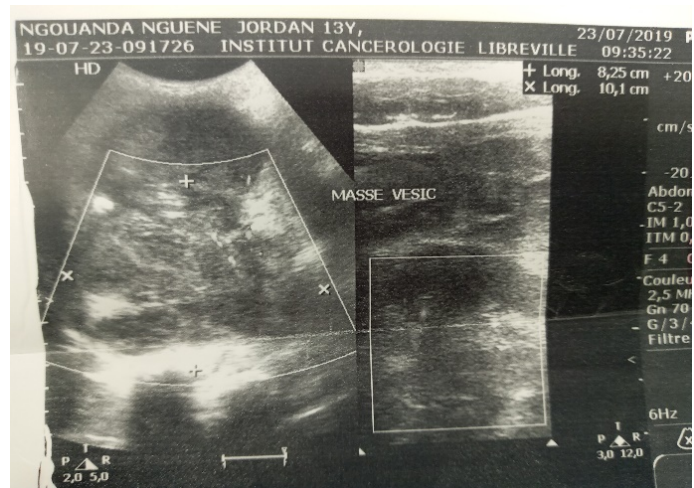
Prostatic involvement is a rare entity and represents less than 0.1% of genitourinary involvement, most often associated with extraprostatic involvement [3] [4]. The specific treatment is based on polychemotherapy with anthracycline (Except in case of renal insufficiency) and radiotherapy, the place of surgery is reserved to support the diagnosis and in case of testicular involvement [5]. Burkitt's cure rates are higher than 95% in children and 80% in adults [3]. A review of the literature reports the poor prognosis of prostatic lymphoma, diagnosis often being late [6]. We report the case of a secondary prostatic localization of Burkitt lymphoma in a 14-year-old child.

2. Observation

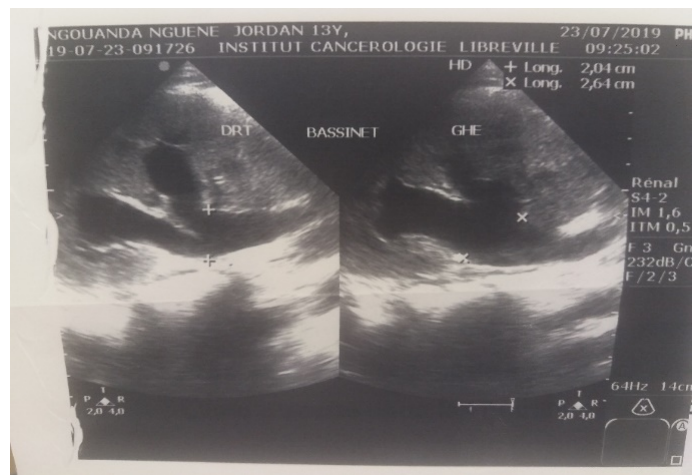
The 14-year-old NNJ child was referred from the Libreville Cancer Institute for total hematuria associated with dysuria, nocturnal pollakiuria and hypogastric pain. He was being followed to ICL for Burkitt maxillo-facial stage II bilateral Murphy lymphoma. We have not found a history of infectious mononucleosis and identification of the Epstein-Barr virus. He had 6 courses of chemotherapy containing cyclophosphamide, vincristine, doxorubicin and prednisone. Melting of the maxillofacial masses had made it possible to declare him in complete remission 6 months before, despite the absence of a PET scan. The clinical examination noted an alteration of the general state, a voluminous, hard, irregular and painful prostatic mass. The paraclinical assessment summarized in **Table 1** noted renal insufficiency with severe hyponatremia, a large prostatic mass of $101 \times 83 \text{ mm}^2$ with bilateral uretero-hydronephrosis on ultrasound (**Figure 1(a)** and **Figure 1(b)**). The PSA rate was normal. Anatomico-pathological examination of the prostatic biopsy diagnosed Burkitt type non-Hodgkin's malignant lymphoma. Histological images (**Figure 2** and **Figure 3**) with haematoxylin eosin examination showed a tumor proliferation of basophilic malignant cells within fibrous tissue with a so-called "starry sky" appearance.

Table 1. Laboratory parameters of a patient admitted for secondary prostatic lymphoma.

Additional Examination	Result
Creatinine	1528.2 $\mu\text{mol/L}$
Creatinine clearance	5.4 mL/min
Urea	46.6 mmol/L
Blood sugar	5.8 mmol/L
Natremia	117mEq/L
Kalaemia	4.8 mEq/L
Chloremia	92 mEq/L
hemoglobin	13.1 g/dL
CRP	70 mg/L
PSA	0.8 ng/mL



(a)



(b)

Figure 1. (a) and (b) Vesico-prostatic tumor mass of $101 \times 83 \text{ mm}^2$ with bilateral uretero-hydronephrosis.

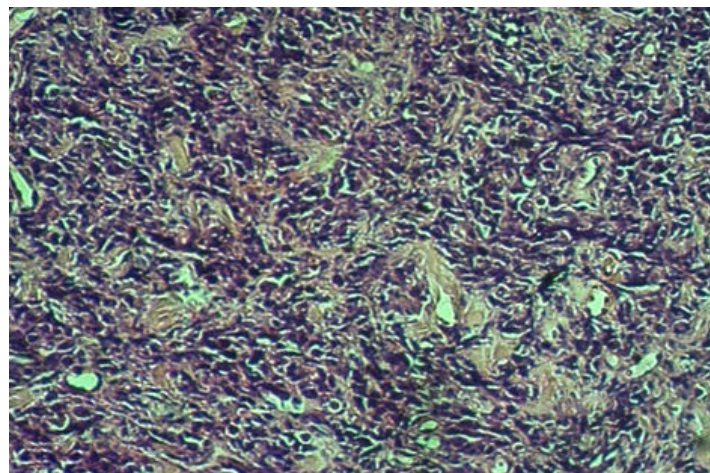


Figure 2. Histological image with eosin hematoxylin at low magnification $10\times$ which shows tumor proliferation within a collagen fibrous tissue giving a “starry sky” appearance.

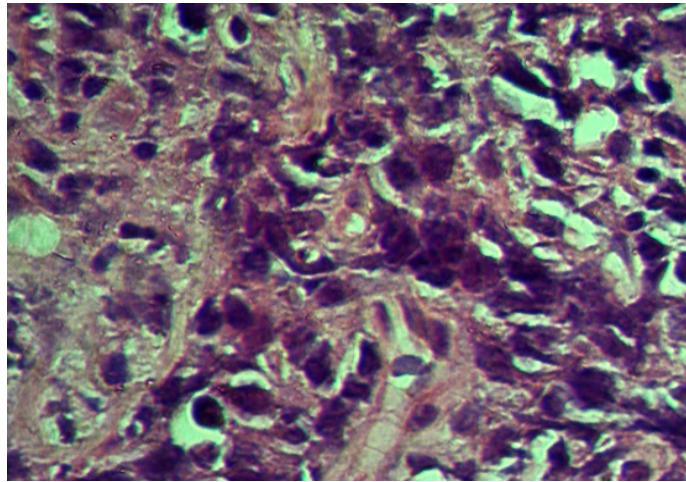


Figure 3. Histological image with eosin hematoxylin at high magnification 40× showing a proliferation of malignant, basophilic lymphoid cells with tingible bodies macrophages giving a “starry sky” appearance.

The patient had been probed with bladder irrigation. He was on antibiotics (ceftriaxone), haemostatic (tranexamic acid), analgesic (paracetamol) and prednisone. He had also 3 hemodialysis sessions. He died one week later in intensive care with a non-febrile seizure while waiting for his kidney function to improve before starting new chemotherapy sessions.

3. Discussion and Comments

WHO characterizes Burkitt lymphoma in 3 types: endemic, sporadic and associated with immunodeficiency [7]. Renal involvement is the most common of all the urogenital tract and represents the second extra-lymph node location of lymphomas after the lung followed by testicular involvement in the elderly [7]. Vesical and prostatic locations are very rare and their incidence is poorly known [7]. Indeed, non-Hodgkin’s lymphomas, which include Burkitt’s lymphoma, affect the prostate in only 0.1% of cases [4]. They most often present as painless lymphadenopathy elsewhere in the body and can cause abdominal or chest pain and systemic symptoms such as fever, weight loss and night sweats [4]. This symptomatology was present in our patient, including abdominal pain, profuse sweating and a deterioration in general condition.

Our 14-year-old case had obstructive urination disorders and primary maxillary localization of Burkitt’s lymphoma. It looks like the one described by Sinclair *et al.* [8] who had concurrent maxillary and prostatic involvement. However, this localization remains rare because, according to these radiologists, although abdominal and pelvic lesions are common, prostatic Burkitt’s lymphoma, especially in children, would not have been previously described in the imaging literature [8].

In a multi-institutional study of 62 malignant lymphoma cases involving the prostate, Bostwick *et al.* [9] reported a single case of Burkitt lymphoma described in the only child in the series. He is a 5-year-old boy with secondary prostate

disease who died a week after diagnosis. In this report of 62 cases of malignant lymphoma affecting the prostate, mainly in adults, they found that secondary prostate involvement was more frequent than primary involvement (65% versus 35%) and that lymphoma-specific survival was 64% at 1 year and 50% at 2 years. The case we are reporting is the first observed in our service since it's opened for thirty years. This confirms the rarity of this location.

Only ultrasound had allowed us to explore the prostate. Specific imaging of the prostate is rarely justified in children but is included in the assessment of symptoms related to the lower genitourinary tract, including urinary retention, hematuria, dysuria and incontinence, or during investigations for suspected congenital abnormalities [8]. If benign vesicoprostatic causes are excluded or if treatment fails, broader diagnostic tests such as cystoscopy and imaging techniques such as computed tomography or MRI are required. A subsequent prostate biopsy must be performed urgently to clarify the diagnosis [4]. Cystoscopy and prostate biopsy did allow us to make the diagnosis of Burkitt's lymphoma in our case. According to Humphrey *et al.* [10], in younger patients, malignant rhabdomyosarcomas are the most common prostate malignancy and there are only a few reports of childhood prostate Burkitt lymphoma. Renal failure delayed the treatment of our patient who died a week after making the diagnosis of secondary prostatic localization of Burkitt's lymphoma. According to Ferry [2], in recent years, Efforts that focused on improving therapy led to the development of combined short-term chemotherapy proven to be extremely effective for a high proportion of patients with Burkitt's lymphoma. The specific treatment is based on polychemotherapy with anthracycline (Except in case of renal insufficiency) to radiotherapy, the place of surgery is reserved to support the diagnosis and in case of testicular involvement [7]. The prognosis is poor and related to age, histology and tumour grade. The specific survival of these lymphomas is 75% at one year, 50% at 2 years, 33% at 5 years and 16% at 15 years. The median survival is identical between primary and secondary lymphomas (28 months). This poor prognosis is reported by Ghoundale *et al.* [6] who noted that despite a considerable regression in tumour volume from the third week onwards, the patient died the day after his 5th cycle of chemotherapy. Renal insufficiency was therefore a limiting factor in the initiation of the ideal treatment in our patient. This renal insufficiency associated with the therapeutic delay induced by this complication certainly worsened the vital prognosis in our case.

4. Conclusion

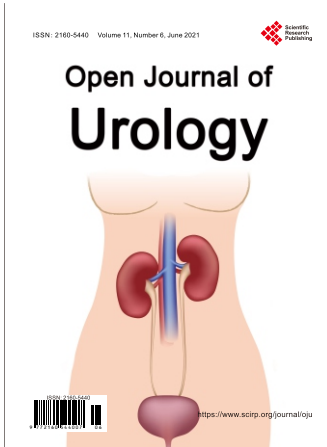
Primary or secondary prostatic localization of Burkitt's lymphoma is rare. Obstructive renal insufficiency is an additional complication that darkens its prognosis by delaying etiological treatment based on polychemotherapy.

Conflicts of Interest

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

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