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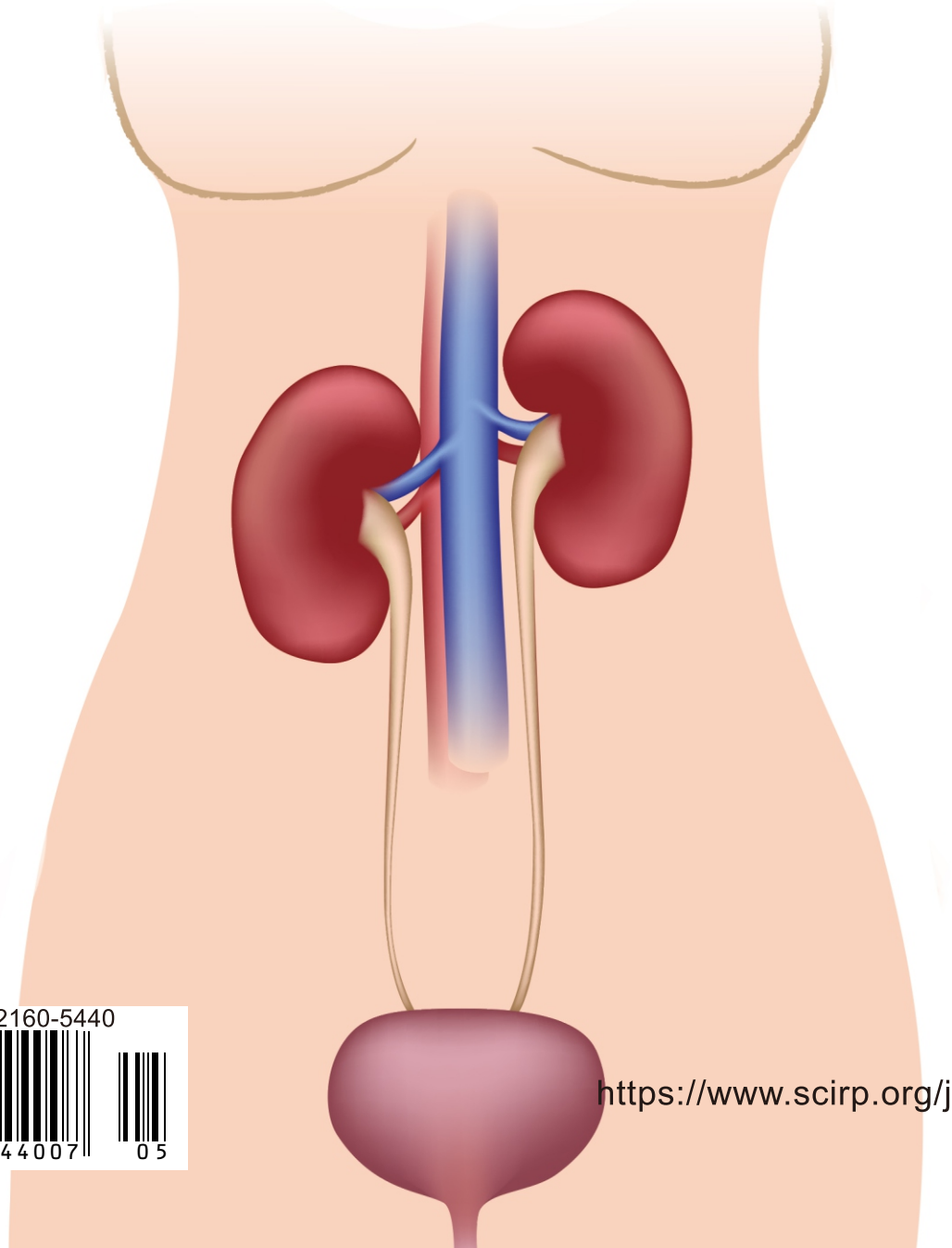

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Acute Priapism: A Revealing Inaugural Mode of Chronic Myeloid Leukemia. A Case Report and Review of the Literature

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Abstract

Priapism is a painful and prolonged erection occurring without any sexual stimulation and not resulting in ejaculation. It most often occurs in patients with sickle cell disease. We report here the case of acute recurrent priapism revealing inaugural mode of CML in a 22-year-old patient with no particular pathological history. The study of the onco-hematological karyotype revealed a karyotype with 46 chromosomes with a clonal chromosomal anomaly: The t (9; 22) "Philadelphia chromosome". The evolution was favorable under imatinib.

Keywords

Priapism, Chronic Myeloid Leukaemia, Philadelphia Chromosome

1. Introduction

Priapism is a prolonged, often painful, pathological erection occurring without sexual arousal and not leading to ejaculation. It is a urological emergency because the functional prognosis of the penis may be at stake. It is a condition that is encountered in our African context often in sickle cell patients. When this etiology is not found, other causes, particularly hematological ones, are sought. Simple symptomatic management of so-called "idiopathic" priapism, without thorough etiological research, will lead to recurrence with possible severe functional sequelae. Less than a hundred cases of priapism occurring in leukemic

*Main author.

subjects or revealing leukemia have been described in the literature [1]-[8]. In this case, we report an acute recurrent priapism in a 22-year-old man with no previous history of leukemia, which ultimately revealed chronic myeloid leukemia. The evolution after the realization of a cavernous-spongy shunt, and the beginning of the treatment of the chronic myeloid leukaemia was favourable.

2. Observation

This was a 22-year-old patient admitted for a painful, involuntary and prolonged erection that had been evolving for 13 hours. This episode had been preceded by a first one 48 hours before, with a favorable evolution after cavernous evacuation puncture and injection of alpha-stimulant drugs.

The history did not reveal any personal or family medical or surgical history, no notion of medication taken before the onset of the symptomatology, nor of perineal trauma.

The clinical examination revealed an apyretic patient, in good general condition, with an erect penis, with hard cavernous bodies, contrasting with a supple glans. Local infiltration was noted with an ecchymotic aspect of the penis extending to its root and to the bursa related to the previous iterative punctures. The rectal examination was normal.

The haemogram showed white blood cells at 403,500, haemoglobin (Hb) at 6 g/dl and platelets at 460,000/mm^3; uraemia at 0.19 g/l, creatinemia at 15 g/dl, C-reactive protein at 88 mg/l. A blood smear showed anisopoikilocytosis of red blood cells with rare erythroblasts; white blood cells: myelmia; platelets: thrombocytosis

The myelogram showed a significant hyperplasia of the granular lineage at 96% without signs of dysplasia with myeloblasts at 10%, eosinophils at 4% and basophils at 6% (**Figure 1**).

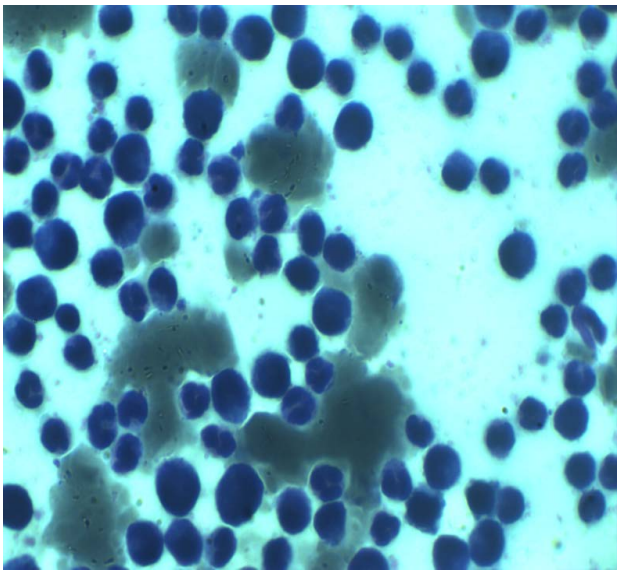

Figure 1. Myélogramme.

The karyotype study confirmed the diagnosis of CML, showing a 46-chromosome karyotype with a clonal chromosomal abnormality: the t (9; 22) "Philadelphia chromosome".

The patient benefited from a cavernous-spongiosa shunt because of the persistence of priapism despite several evacuation punctures. Hyperhydration with physiological serum at a rate of 5 liters per day was also instituted. In view of the repeated punctures, which caused infiltration and an ecchymotic aspect of the penis, exposing the patient to gangrene, antibiotic therapy with ceftriaxone 2 grams per day was instituted.

In relation to chronic myeloid leukemia, the patient was put on a Tyrosine kynase inhibitor (ImatinibR: 400 mg/d), associated with Allopurinol 300 mg/d.

The evolution was marked by a regression of the pain after 24 hours, a detumescence of the penis, a resorption of the ecchymosis of the external genitalia. At the end of the episode, there was a loss of erectile function.

On the haematological level, the control blood count done 1 month after the treatment showed a normalization of the rate of the different blood lines. Cytogenetic tests for the Philadelphia chromosome were negative. On the molecular level, PCR tests for BCR-ABL abnormalities were also negative.

3. Discussion

Priapism is a urological emergency; and the publications reported in the literature on this subject concern, for the most part, cases secondary to sickle cell disease (the main etiology in Africa), or to the use of psychotropic drugs (the main etiology in Europe) [9] [10]. Kamal *et al.* [10] in a series of 28 patients noted 1 case of priapism revealing CML while Fall *et al.* [11] in Senegal found 2 cases out of 63 patients collected over a 10-year period. This could be explained by the rarity of these two conditions, and the even lower probability of presenting with this complication during leukemia. Indeed, the most frequent circumstances for the diagnosis of CML are an anemic syndrome, an alteration of the general state of health, a prolonged fever, and clinically hepatomegaly and splenomegaly [12]. Furthermore, a proportion of priapism seen in emergency departments and labelled as "idiopathic", representing 30% of the causes of priapism [8], could be related to an undiagnosed disease, after a rapid interrogation to rule out sickle cell disease, drug intake or the use of intra-cavernous injections, and in the absence of a minimal biological work-up including a blood count. It should be noted in our case that the patient went home following remission of priapism after cavernous puncture during the first episode. He was admitted and further investigated on the occasion of the recurrence 48 hours later. Nevertheless, a few publications have been reported in the literature on priapism of leukemic origin (**Table 1**).

The time of consultation is the essential element determining the therapeutic choice and the functional prognosis of the penis. In the Senegalese series [11], 50% of patients were seen between the 24th hour and the 5th day, justifying radical surgical treatment (creation of a cavernous-spongy fistula) after failure of

Table 1. Literature review of cases of priapism in chronic myeloid leukemia.

Authors	Number	Time to consultation	Treatment	Erectile dysfunction
Shaeer *et al.*	1	4 days	Failed puncture, imatinib.	Yes
Yoshida *et al.*	1	2 days	Failed puncture, shunt caverno-spongieux, imatinib	No
Tazi I	1	22 hours	Puncture, imatinib	No
Chang M.W *et al.*	1	19 hours	Puncture, interferon alfa, allopurinol	No
Ergenc H *et al.*	1	18 hours	Imatinib, leukapheresis	No
Rojas B *et al.*	1	36 hours	Leukapheresis, Cavernous-spongy shunt	Yes
Nerli R.B *et al.*	1	24 hours	hydratation	No
Fall *et al.*	2	24 hours	Cavernous-spongy shunt	No
Sarr A	1	6 hours	Puncture	No
Dhar J	1	4 hours	Puncture	No

cavernous puncture. Portillo [13] in Spain found a consultation time varying between the 4th and 72nd hour. In our case, the patient had consulted 13 hours after the onset of symptoms. The patient benefited from cavernous puncture. Tazi *et al.* [1] in Morocco and Chang *et al.* [5] in China observed detumescence after evacuation puncture in patients admitted for priapism due to haemopathy and who consulted within 24 hours. Rojas, Nerli, Yoshida [2] [3] [4] used cavernous-spongiosa shunt in patients with priapism due to haematological disease and who consulted beyond 24 hours.

The initial management of priapism in CML, as in other etiologies, involves aspiration of the corpora cavernosa and injection of a vasoconstrictor, with the aim of obtaining detumescence. In daily practice, it is common to receive patients after the 6th hour, making it difficult to obtain detumescence due to the onset of ischemia and fibrosis of the cavernous tissue [3] [4]. In our case, detumescence was obtained after puncture. This management included a second, etiological aspect related to chronic myeloid leukemia and included hyperhydration, allopurinol, imatinib and prevention of possible infection by antibiotic therapy. Stabilization of the basic pathology will prevent a recurrence of priapism. The evolution was marked by a loss of erectile function. Of the reported cases of priapism in leukemia (**Table 1**), only Shaeer and Rojas [4] [6] also described erectile dysfunction after treatment.

4. Conclusion

Priapism can be the telltale sign of CML, although it is rare. We must suspect it in a subject without any particular medical or surgical history and presenting an abnormality of the blood lines on the haemogram.

Conflicts of Interest

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

References

[1] Tazi, I. (2009) Priapism as the First Manifestation of Chronic Myeloid Leukemia. *Annals of Saudi Medicine*, **29**, 412. https://doi.org/10.4103/0256-4947.55176

[2] Yoshida, K., Kinoshita, H., Taniguti, H., Chizaki, R., Nishida, T., Kawakita, S., *et al.* (2007) Priapism Complicated by Chronic Myelogenous Leukemia (CML): A Case Report. *Hinyokika Kiyo*, **53**, 323-325.

[3] Nerli, R.B., Magdum, P.V., Hiremath, S.C., Patil, A.Y., Pai, S.V., Handigund, R.S., *et al.* (2015) Priapism—A Rare Presentation in Chronic Myeloid Leukemia: Case Report. *Urology Case Reports*, **30**, 8-10. https://doi.org/10.1016/j.eucr.2015.08.005

[4] Rojas, B., Cabrera, M.E., Kliwadenko, W. and Avilés, J.J. (1998) Priapism in a Patient with Chronic Myeloid Leukemia. *Revista Médica de Chile*, **126**, 978-880.

[5] Chang, M.W., Tang, C.C. and Chang, S.S. (2003) Priapism—A Rare Presentation in Chronic Myeloid Leukemia: Case Report and Review of the Literature. *Chang Gung Medical Journal*, **26**, 288-292.

[6] Shaeer, O.K.Z.M., Shaeer, K.Z.M., Abdel-Rahman, I.F.S., El-Haddad, M.S. and Selim, O.M. (2015) Priapism as a Result of Chronic Myeloid Leukemia: Case Report, Pathology, and Review of the Literature. *Journal of Sexual Medicine*, **12**, 827-834. https://doi.org/10.1111/jsm.12812

[7] Kueviakoe, M.D.I., Padaro, E., Layibo, Y., Anoukoum, T., Magnang, H., Mawussi, K., Vovor, A. and Segbena, A.Y. (2017) Le priapisme aigu: Mode inaugural de decouverte d'une Leucemie Myeloïde Chronique (LMC) avec mutation T351I. *Journal de la Recherche Scientifique de l'Université de Lomé*, **19**.

[8] Cuitláhuac Becerra-Pedrazaa, L., Jiménez-Martínezb, L.E., Pe˜na-Morfinc, I., Nava-Esquiveld, R. and Villegas-Martínezba, J.A. (2018) Priapism as the Initial Sign in Hematologic Disease: Case Report and Literature Review. *International Journal of Surgery Case Reports*, **43**, 13-17. https://doi.org/10.1016/j.ijscr.2017.12.038

[9] Kassogue, Coulibaly, M., Ouattara, Z., Diarra, A., Tembely, A., El Fassi, M.J., Farih, M.H. and Ouattara, K. (2014) Aspects cliniques et therapeutiques du priapisme au CHU Gabriel Toure: Etude de 36 cas. *Pan African Medical Journal*, **17**, 286. https://doi.org/10.11604/pamj.2014.17.286.4109

[10] Kamel, K., Mohamed, M., Abderrazek, B., Mohamed, C., Amine, D., Riadh, B.S. and Mohamed, C. (2016) Prises-en charge du priapisme à bas débit vue tardivement: À propos de 28 cas. *African Journal of Urology*, **22**, 297-304. https://doi.org/10.1016/j.afju.2015.10.005

[11] Fall, P.A., Diao, B., Ndoye, A.K., Ndiaye Diop, E., Sylla, C. and Gueye, S.M. (2005) Le priapisme: Particularités cliniques et étiologies. *African Journal of Urology*, **11**, 186-190.

[12] Fazer, R., Irvine, A.E. and McMullin, M.F. (2007) Chronic Myeloid Leukaemia in the 21st Century. *Ulster Medical Journal*, **76**, 8-17.

[13] Portillo Martin, J.A., Correas Gómez, M.A., Gutiérrez Baños, J.L., *et al.* (2001) Incidence of Priapism at the Marquez de Valdecilla University Hospital in Santander. *Archivos Espanoles de Urologia*, **54**, 241.

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Management of Urological Emergencies at the Nianankoro Fomba Hospital in Segou: A Case Report of 72 Patients

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Abstract

PURPOSE: Our aim was to present the diagnostic and therapeutic aspects of urological emergencies in a regional hospital. MATERIAL AND METHODS: We conducted a prospective study over a period of 6 months (April 2021 to September 2021) collecting all the emergencies received by the on-call urology team at the Nianankoro Fomba Hospital in Segou. This team was led by a DES in urology under the supervision of a urological surgeon. We were interested in age, sex of patients, diagnosis, number of patients hospitalised and type of surgery performed in emergency. RESULTS: We registered 72 patients. The mean age of our patients was 58.8 years with extremes of 6 and 90 years. Acute bladder retention was represented in 61% and total haematuria in 24%. Renal colic was reported in 8%. Acute prostatitis was reported in 4% of cases, and acute pyelonephritis in 1%. Urogenital trauma accounted for 6%. CONCLUSION: Although underestimated, in our context, the management of urological emergencies remains a regular activity of the urology department in view of the number of patients managed. Bladder drainage remains the most frequent procedure.

Keywords

Urological Emergency, Nianankoro Fomba Hospital, Diagnosis Treatment

1. Introduction

Urological emergencies are an important but often underestimated part of the activity of a urology department. In Africa, in general and in Mali in particular,

although emergencies are a usual reason for hospitalisation in public hospitals [1], data on the epidemiology of urological emergencies are rare.

The aim of our study was to present the diagnostic and therapeutic aspects of urological emergencies in a regional hospital.

2. Materials and Methods

We carried out a prospective study over a period of 6 months (April 2021 to September 2021) collating all the emergencies received by the on-call team in the urology department of the Nianankoro Fomba Hospital in Segou. The on-call team consisted of one or two nurses, a doctor specialising in urology and a urologist. The doctor on duty was responsible for monitoring patients hospitalised in the entire urology department, particularly those recently operated on.

For urological emergencies we were interested in the age and sex of the patients, the diagnosis, the number of patients hospitalised and the type of surgery performed in emergency. Patients seen by doctors in the consultation room or during on-call duty for urogenital pathologies that do not fall within the scope of an emergency were excluded from this study.

3. Results

We registered 72 patients. The mean age of our patients was 58.8 years (6 - 90 years) (**Figure 1**). The most frequent urological emergency symptoms were acute retention of urine (61%) and total haematuria in 24% of cases (**Table 1**). Nephritic colic in 8% of cases.

The main aetiologies of urine retention cases were prostatic tumours (47%) and urethral stricture (6%) (**Table 2**).

The main etiologies of haematuria were bladder tumour in 15% of cases and kidney trauma in 4% of cases.

All aetiologies of the nephritic colic cases were lithiasis.

Infectious urological emergencies were dominated by acute prostatitis (4% of cases) and acute pyelonephritis (1%).

Urogenital trauma accounted for 6% and priapism for 1%. Of the urogenital injuries, the most common were kidney injury (4%) and urethral injury (1%) (**Table 3**).

Lithitic nephritic colic accounted for 8% of urological emergencies during the study period.

The number of emergency hospitalisations was 26 cases (36%).

Eight emergency surgical procedures were performed. The main procedures performed were suprapubic cystocatheterisation (38%) and nephrostomy (25%) (**Table 4**).

Trans vesical prostatic adenomectomy was the most common final procedure (**Table 5**).

4. Discussions

Acute retention of urine is the most frequent urological emergency in our study (61%) against (73.9%), (64%) for A. Bobo *et al.,* Kodjo T [2] [3].

Age

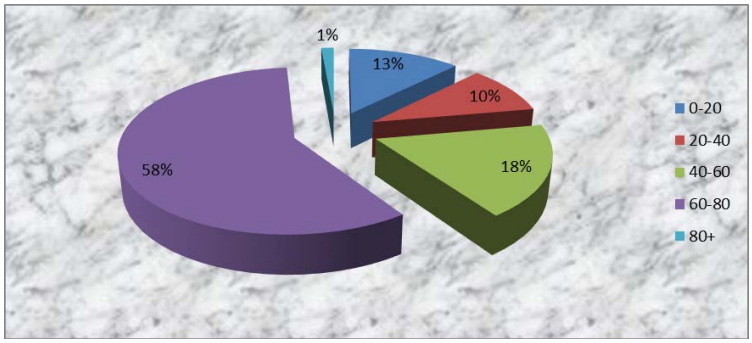

Figure 1. Distribution of patients according to age.

Types of emergencies

Table 1. Repair of patients according to type of emergency.

Types of emergencies	Frequency	Percentage
CN right	6	8%
Verge fracture	1	1%
Hematuria	17	24%
Priaprism	1	1%
Acute prostatitis	3	4%
RAUV	44	61%
Total	72	100%

Etiological diagnosis of emergencies

Table 2. Distribution of patients according to etiological diagnosis.

Selected diagnosis	Frequency	Percentage
Urinary bilharzia	1	1%
Fracture of the penis	1	1%
Prostate tumours	34	47%
Urinary lithiasis	6	8%
Paraphimosis	1	1%
NAP left	1	1%
High-speed priapism	1	1%
Acute prostatitis	3	4%
shrinkage of the u	4	6%
Bladder neck sclerosis	1	1%
Stenosis of the right lower urethra	2	3%
Stenosis of the meat urethra	1	1%
Trauma to the kidney	3	4%
Trauma to the urethra	1	1%
Bladder tumour	11	15%
Right renal tumour	1	1%
Total	72	100%

The type of monitoring

Table 3. Distribution of patients according to type of follow-up.

Follow-up	Frequency	Percentage
Discharge	3	4%
Hospitalization	26	36%
outpatient follow-up	43	60%
Total	72	100%

Emergency procedures

Table 4. Distribution of patients according to the procedure performed in emergency.

CARE	Frequency	Percentage
NSAIDS	5	7%
AINS/ANTALGIC/ATB	6	8%
Antibilharzian	1	1%
Suprapubic catheter	3	4%
Bladder irrigation	12	17%
Nephrostomy	2	3%
Cavernous puncture	1	1%
transurethral survey	42	58%
Total	72	100%

The final treatment

Table 5. Distribution of patients according to final treatment.

Type of treatment	Frequency	Percentage
ATVP	23	32%
Cervicotomy	1	1%
Dilation in the benches	4	6%
Right nephrectomy	1	1%
Pulpectomy	3	4%
Biltral URI	3	4%
Cavernous-spongy shunt	1	1%
Survey /AINS	2	3%
Suture of the albuginea	1	1%
Medical treatment	20	28%
Palliative treatment	11	15%
Right ureterolithotomy	1	1%
Uretroplasty	1	1%
Total	72	100%

Retention was the main reason for the discovery of prostate tumours (47%) followed by urethral stricture (6%). Indeed, for socio-economic and cultural reasons, most people with these conditions do not seek medical attention until the complication phase.

However, in European countries, acute urinary retention is not the most common urological emergency. It represented 22% of the reasons for consultation in France [4].

The average age of our patients was 49.6 years, and 59% of them were 60 years or older; compared to 49.15 years in the study by Kodjo T [3].

The main etiologies of urine retention in our study were prostatic tumours and urethral stricture, respectively 47% and 1%. This result is lower than that of Ikuerowo *et al.* [5] in Nigeria, where benign prostatic hypertrophy was reported in 64%.

Urogenital infections as a whole accounted for 6% of cases compared to 18.2% [4].

Their particularities in our study were the frequency of acute prostatitis (4%) and acute obstructive pyelonephritis (1%).

Emergency drainage of acute obstructive pyelonephritis accounted for only 3% of cases compared to 3.4% of surgical procedures in this study, whereas in the French study by Mondet *et al.* [4] it accounted for 31% of procedures. This drainage consisted in all cases of a bypass nephrostomy. JJ catheterisation was not performed here due to lack of adequate equipment.

We believe that the real frequency of these acute obstructive pyelonephritis in our country is much higher, given the frequency of pathologies that can lead to obstruction of the upper excretory tract such as ureteral lithiasis and the sequelae of bilharzia.

Urological injuries were dominated by kidney injuries. They were most often benign and occurred during road accidents. They represented 4% of urological emergencies followed by urethral trauma 1%. Paparel *et al.* [6] found 43% of kidney trauma.

Fracture of the penis by coitus faux pas accounted for 1% of emergencies and treatment was an emergency suture of the albuginea.

5. Conclusion

The most common urological emergency in our study was acute bladder retention. The emergency management was drainage by transurethral catheterisation and cystostomy or cystocatheterism in case of proven impossibility of passing the ureterovesical probe. In addition, the cases of haematuria observed during our study period had their aetiology as an advanced bladder tumour whose treatment was palliative. Some pathologies such as bleeding adenoma, hyperalgesic nephritic colic, priapism and fracture of the penis required emergency surgical treatment.

Conflicts of Interest

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

References

[1] Fall, B., Diao, B., Fall, P.A., Diallo, Y., Sow, Y., Ondongo, A.A.M., Diagana, M., Ndoye, A.K., Ba, M. and Diagne, B.A. (2008) Urological Emergencies in University Hospitals in Dakar: Epidemiological, Clinical and Therapeutic Aspects. *Progrès en Urologie*, **18**, 650-653. https://doi.org/10.1016/j.purol.2008.04.004

[2] Diallo, A.B., Bah, J., Diallo, T.M.O., Bah, O.R., Amougou, B., Bah, M.D., Guirassy, S. and Bobo Diallo, M. (2010) Le profil des urgences urologiques au CHU de Conakry. *Progrès en Urologie*, **20**, 214-218. https://doi.org/10.1016/j.purol.2009.10.008

[3] Tengue, K., Kpatcha, T.M., Sewa, E., Adabra, K., Amavi, A.K. and Sikpa, K. (2017) Prise en charge des urgences urologiques au TOGO. *Uro-Andro*, **1**, 331.

[4] Mondet, F., Chartier-Kastler, E., Yonneau, L., Bohin, D., Barrou, B. and Richard, F. (2002) Epidemiology of Urological Emergencies in University Hospitals. *Progrès en Urologie*, **12**, 437-442.

[5] Ikuerowo, S.O., Ogunade, A.A., Ogunlowo, T.O., Uzodimma, C.C. and Esho, J.O. (2007) The Burden of Prolonged Indwelling Catheter after Acute Urinary Retention in Ikeja—Lagos, Nigeria. *BMC Urology*, **7**, 16. http://bmcurol.biomedcentral.com/articles/10.1186/1471-2490-7-16 https://doi.org/10.1186/1471-2490-7-16

[6] Paparel, P., N'diaye, A., Laumon, B., Caillot, J.L., Perrin, P. and Ruffion, A. (2006) The Epidemiology of Trauma of the Genitourinary System after Traffic Accidents: Analysis of a Register of over 43,000 Victims. *BJU International*, **97**, 338-341 https://doi.org/10.1111/j.1464-410X.2006.05900.x

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The Comparison of Acute Clinical Outcome between 30 and 40 Sessions of Hyperbaric Oxygen Therapy for Management of Visible Hematuria from Radiation-Induced Hemorrhagic Cystitis

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Abstract

Background: Radiotherapy is one of the most popular treatments for pelvic malignancy, which causes patients suffering from the adverse effect such as cystitis, hematuria, proctitis, hematochezia and distal ureteric stricture. The hematuria condition from radiation-induced hemorrhagic cystitis is the most common adverse event suffering the patients, losing properties, wasting time, and deteriorating quality of life. One of the most effective treatments for radiation-induced hemorrhagic cystitis is the hyperbaric oxygen therapy with no necessity for patients to be hospitalized, no need of anesthesia use, and also non-invasion. However, it requires that patients spend 90 - 120 minutes a day for 40 days administered out-patient treatment session. The transportation cost as well as the accommodation one will greatly burden the self-pay health care patients. In addition, there is still no definite standardized number of HBOT treatment session assignment at present. **Objectives**: To compare the treatment outcome (bladder mucosal characteristics, red blood cells in urine) between 30 and 40 sessions of HBOT for treatment of radiation-induced hemorrhagic cystitis. **Methods**: Prospective cohort observational study of patients (n = 15) who were diagnosed with radiation-induced hemorrhagic cystitis that were treated with hyperbaric oxygen therapy in Somdechprapinklao Hospital between October 2020 and September 2021. We compared the parameter about hemoglobin concentration, red blood cell number in urine during the course of HBOT treatment every 10 sessions and cystoscopic finding severity as EORTC/RTOG classification for radiation-induced hemorrhagic cystitis in Table 1 before treatment, and after 30 and 40 sessions of

treatment. **Results**: From 15 of treated patients, 93.3% of patients had evidence of posterior wall lesion. The mean duration from radiotherapy (radiation and brachytherapy) to the first episode gross hematuria is 112 months. This study shows no statistically different cystoscopic findings as EORTC/RTOG classification for radiation-induced hemorrhagic cystitis after 30 and 40 sessions of HBOT ($p = 0.653$) and statistically significant improvement after the treatment of more than 30 sessions ($p = 0.008$). No relationship was found with the hemoglobin concentration and red blood cell number in urine during the course of HBOT. **Conclusions**: Radiation-induced hemorrhagic cystitis can be treated with HBOT. There is no different treatment outcome between 30 and 40 sessions of HBOT.

Keywords

Radiation-Induced Hemorrhagic Cystitis, Irradiation Cystitis, Hematuria, RIHC, Hyperbaric Oxygen Therapy, HBOT

1. Introduction

Radiotherapy is one of the most often used treatments of pelvic malignancies such as initial stage of cervical cancer, localized or locally advanced prostate cancer, and rectal cancer. However, the adverse events of radiation are still frequent for example proctitis, ureteric stricture, and hemorrhagic cystitis. Many patients with irradiation cystitis suffer from frequent hospitalization for bladder irrigation, blood transfusion, chronic pain or obstructive uropathy from clot retention that would be treated with cystoscopy with clot evacuation and fulguration. Some patients might have failed with conservative treatments that are necessary to be treated with hyperbaric oxygen therapy (HBOT) which is a standard treatment for radiation-induced hemorrhagic cystitis, according to the guidelines from a number of international associations, such as: American Urological Association (AUA), European Association of Urology (EAU), and Canadian Urological Association (CUA) [1].

Based on "Canadian Urological Association Best Practice Report for Diagnosis and Management of Radiation-Induced Hemorrhagic Cystitis" which was published in Canadian Urological Association Journal 2019 and Campbell-Walsh-Wein Urology 12th edition, which was used as standard textbook for urologists, initiate evaluation with cystourethroscopy for evaluation urinary bladder pathology and additionally tissue biopsied of suspected cancer-invasive lesion and fulgurate on bleeding site [2]. In case of ongoing hematuria or blood clot retention, it would be treated with continuous bladder irrigation (CBI) with normal saline solution, aluminous salt solution or hyaluronic acid. If gross hematuria persists, the patient will be treated with hyperbaric oxygen therapy [3]. Bilateral nephrostomy might be performed in case of continuous gross hematuria during the course of HBOT. If there were a persistent bleeding after a complete course of HBOT, the

treatment would be aggressively progressed to 1% - 4% formalin solution and cystectomy with urinary diversion.

Hyperbaric oxygen therapy (HBOT), the principle of treatment applying high concentration of oxygen diffusion into the tissue causes a better healing process, strengthening tissue, stimulating strength neovascularization, and better decreasing tissue edema. Several studies found 80% - 90% of the patients respond to this treatment within 5 years, and 27% of the patients completely respond and delay time to recurrent gross hematuria to 2.5 years [4] [5] [6] [7] [8].

Somdechprapinklao Hospital, the Royal Thai Naval Medical Department has potential and experience of hyperbaric oxygen therapy to be used to treat the naval officers whose Royal Thai Navy military mission operating in deep-water (SEAL tactical combat operation) or high-altitude parachuting and non-military population (such as scuba diving, high altitude hiking or rescue mission) and in case they suffer from decompressive sickness or "Caisson disease" a barotrauma caused by a rapid alteration of pressure of water or air that results in nitrogen air-bubble in blood stream. Moreover, the role of HBOT could be used for any treatment of hard-to-heal wound from vasculopathy. Thus, radiation-induced hemorrhagic cystitis is one of the conditions that can be treated with HBOT when failures from previous conservative treatments exist [9]. Somdechprapinklao Hospital currently serves for the patients from Thai nationwide. In 2018 and 2019, the number of patients who had been diagnosed irradiation cystitis totaled 113 and 151 respectively, and be treated with HBOT 56 and 73.

For an HBOT treatment procedure, patients have to be assigned in the therapy chamber for 40 times, 90 minutes/time as a standard regimen. Each HBOT administration costs 2700 baht. National health care policy of Thailand does not cover the treatment cost for all patients requiring HBOT. The patients who are not entitled for government health welfare must have to pay not only for all medical treatment cost, but also for travel fare from their residences to the hospitals, or for the accommodation near the hospitals during a course of treatment. From literature reviews among HBOT for radiation-induced hemorrhagic cystitis treatment, the patient received an average of 29 - 33 HBOT sessions [4] [6] [10] [11] [12].

We aimed to make a comparison of clinical outcomes of the administration of HBOT between 30 and 40 sessions. If the result of this study shows indifference in outcome, it would be used as an evidence to decrease the number of treatment sessions, lessen a lot of time and save a lot of money, and it can also minimize adverse consequences, such as: tympanic membrane rupture, barotrauma. The decrease of treatment waiting time and decrease of treatment cost will definitely ensure an improvement of life quality of patients.

2. Methodology

2.1. Study Population

This study was conducted in the patients who were diagnosed with radia-

tion-induced hemorrhagic cystitis and treated with HBOT at Center of Hyperbaric Medicine, Somdechprapinklao Hospital, the Naval Medical Department, from October 2020 to September 2021 as a prospective observational cohort study. The study protocol obtained an approval from the Institution-Review Board of the Naval Medical Department, the Royal Thai Navy. COA-NMD-REC0.24/63.

Inclusion criteria were the patients who have been treated with radiation or a brachytherapy for pelvic cancer, aged 20 - 75 years, confirmed radiation-induced hemorrhagic cystitis, without contraindication for HBOT such as chronic obstructive pulmonary disease (COPD) or severe bronchial asthma, untreated pneumothorax, ongoing chemotherapy course, history of previous ear nose throat surgery, epilepsy, retinitis, uncontrolled hypertension, uncontrolled heart failure, Claustrophobia, and convenient patient for HBOT.

Exclusion criteria were the patients who have active or progressive cancer associated bladder and severe hematuria causing emergent surgical correction or urinary diversion with ileal conduit or ureterostomy.

2.2. Patient Preparation

All patients were evaluated with urinalysis, complete blood count with platelet count, coagulogram for exclusion of medical cause, flexible cystoscopy for diagnosis and exclusion of malignant lesion.

2.3. Intervention

All patients were assigned cystoscopy for a diagnosis of irradiation cystitis and classified as EORTC/RTOG classification of radiation-induced hemorrhagic cystitis as shown in Table 1, then later sent to the Center of Hyperbaric Medicine for further evaluation by maritime physicians for prescribing HBOT. The patients were exposed to 100% oxygen at 2 atm, in multiplaced hyperbaric chamber, for 90 minutes, once daily, 5 days a week. The patients were appointed to follow-up cystoscopy after attention of HBOT for 30 and 40 sessions for inspecting bladder mucosa as EORTC/RTOG classification for radiation-induced hemorrhagic cystitis. Urinalysis and complete blood count were evaluated before starting HBOT and every 10 sessions of HBOT until the treatment completion.

Table 1. Classification of radiation-induced hemorrhagic cystitis [1].

EORTC/RTOG classification (European Organization for Research and Treatment of Cancer/RTOG: Radiation Therapy Oncology Group)				
1	**2**	**3**	**4**	**5**
Slight epithelial atrophy; minor telangiectasia; microscopic hematuria	Moderate frequency, generalized telangiectasia; intermittent macroscopic hematuria	Severe frequency and dysuria, generalized telangiectasia (often with petechiae), frequent hematuria with decreased bladder capacity	Necrosis/contracted bladder, severe hemorrhagic cystitis	Death directly due to hemorrhagic cystitis

2.4. Outcome Measurement

Analyzed variables included sex, age (years), primary malignant disease, time between RT and hematuria (months), type of radiation administration, radiation dose, involved bladder wall, cystoscopic findings as EORTC/RTOG classification of radiation-induced hemorrhagic cystitis.

The primary clinical outcome compares the grading of bladder mucosa from cystoscopic findings after 30 and 40 HBOT sessions, categorized as grading as EORTC/RTOG classification of radiation-induced hemorrhagic cystitis include grade 1 as "mild", grade 2 as "moderate", grade 3 as "severe", and grade 4 as "necrosis" and also to compare RBCs in urine every 10 HBOT sessions.

2.5. Data Analysis

Clinical data were analyzed using SPSS, version 25. Descriptive statistics demonstrated as frequencies, percentage, mean, and median. Chi-square test was used. Statistical significance was considered for p-value < 0.05.

3. Results

3.1. Sample Characteristics

In total, 16 patients underwent HBOT in our hospital during October 2020-September 2021 and excluded one patient because of incomplete session of HBOT. The patient characteristics were shown in Table 2. From remaining patients in this study were 12 females and 3 males, aged between 49 - 80 years. The most common indications for pelvic radiation were cervical cancer (80%), colorectal cancer (13.3%), and prostate cancer (6.7%). With a mean radiation dose was 28.4 Fractions (20 - 39 fractions). A mean time between radiation to hematuria was 112 months. The most often involved bladder walls from radiation were posterior wall (93.3%), left lateral wall (80.0%), right lateral wall (73.3%), and trigone (53.3%). Pretreatment grading of severity according to EORTC classification for radiation-induced hemorrhagic cystitis in our samples showed 4 patients of grade 2, 10 patients of grade 3, and 1 patients of grade 4.

3.2. Outcomes

There was no significant difference between 30 and 40 sessions of HBOT with severity grading on cystoscopic findings as EORTC/RTOG classification (p = 0.653) [shown in Table 3] but either 30- or 40-sessions of HBOT showed statistically significant improvement compared with before HBOT (p = 0.008) [shown in Table 4]. There was no significant difference in relations of radiation dose and grading of severity according to EORTC/RTOG classification (p = 0.662) [shown in Table 5]. There was no significant difference in the level of red blood cell in urinalysis every 10 sessions of HBOT until completion 40-sessions (p = 0.276) [shown in Table 6].

Table 2. Patient characteristics.

***Gender* (%)**	Female	12 (80.0)
	Male	3 (20.0)
***Average age* (*Yrs.*)**		64.4 (49 - 80)
***Primary disease* (%)**	Cervical cancer	12 (80)
	Colorectal cancer	2 (13.3)
	Prostate cancer	1 (6.7)
***Average time from radiation to first hematuria episode* (*Months.*)**		112 (1 - 280)
***Mode of radiotherapy* (%)**	Radiation only	4 (26.7)
	Brachytherapy only	0 (0)
	Radiation and brachytherapy	11 (73.3)
***Average of radiation dose* (*Sessions*)**		28.4 (20 - 39)
***Involved bladder wall, Patients* (%)**	Anterior	3 (20.0)
	Dome	6 (40.0)
	Posterior	14 (93.3)
	Right lateral	11 (73.3)
	Left lateral	12 (80.0)
	Trigone	8 (53.3)
***EORTC/RTOG Classification of hemorrhagic cystitis before HBOT, Patients* (%)**	1	0 (0)
	2	4 (26.7)
	3	10 (66.7)
	4	1 (6.6)

Table 3. Comparison clinical outcome of HBOT 30 and 40 sessions as EORTC/RTOG classification.

HBOT	30 Sessions	40 Sessions	*p*-value
EORTC/RTOG classification			
Mild (*Grade* 1)	6 (40%)	8 (57.14%)	0.653
Moderate (*Grade* 2)	6 (40%)	4 (28.57%)	
Severe (*Grade* 3)	3 (20%)	2 (14.29%)	

Table 4. Comparison clinical outcome of before HBOT and after HBOT 30 and 40 sessions as EORTC/RTOG classification.

HBOT	Before HBOT	After HBOT 30 sessions	After HBOT 40 sessions	*p*-value
EORTC/RTOG classification				
Mild (Grade 1)	0 (0%)	6 (40%)	8 (57.14%)	**0.008***
Moderate (Grade 2)	4 (26.67%)	6 (40%)	4 (28.57%)	
Severe (Grade 3)	10 (6.67%)	3 (20%)	2 (14.29%)	
Necrosis (Grade 4)	1 (6.66%)	0 (0%)	0 (0%)	

Table 5. Relation of number of radiation dose and clinical outcome before HBOT as EORTC/RTOG classification.

Radiation dose (Sessions)	20 - 29 sessions	30 - 39 sessions	*p*-value
EORTC/RTOG classification			
Mild (Grade 1)	3 (20%)	1 (6.67%)	0.662
Moderate (Grade 2)	6 (40%)	4 (26.66%)	
Severe (Grade 3)	1 (6.67%)	0 (0%)	

Table 6. Comparison of red blood cell in 10-sessions interval HBOT urinalysis.

HBOT	10 Sessions	20 Session	30 Sessions	40 Sessions	*p*-value
Urinalysis (Blood)					
None	6 (46.15%)	6 (40.00%)	10 (71.43%)	9 (64.29%)	0.276
1+	2 (15.38%)	1 (6.67%)	0 (0.00%)	1 (7.14%)	
2+	1 (7.69%)	2 (13.33%)	3 (21.43%)	3 (21.43%)	
3+	4 (30.77%)	6 (40.00%)	1 (7.14%)	1 (7.17%)	

4. Conclusion

Radiation-induced hemorrhagic cystitis (RIHC) from treatment of pelvic malignancies (cervical cancer, prostate cancer, and colorectal cancer) in 15 patients who were treated in Somdechprapinklao Hospital between October 2020 and September 2021 found that the most often involved bladder walls from radiation were posterior and both lateral walls. Either 30 or 40 sessions of HBOT significantly decreased severity of RIHC according to EORTC/RTOG classification. Although there was no significant difference in outcome between 30 and 40 sessions but their trend to more decrease severity with an increased number of HBOT sessions. Level of red blood cell in urinalysis cannot be used as a treatment monitoring.

5. Discussion and Limitations

The radiation dose which is categorized into 20 - 29 sessions and 30 - 39 sessions (Table 5), does not relate with bladder mucosal grading on cystoscopic findings because the severity of bladder mucosa may result from many factors such as bladder characteristics during radiation (distension or collapse), previous treatment for hemorrhagic cystitis (Fulguration, Intravesical chemical treatment), and total radiation dose.

The Red Blood Cell (RBC) in urinalysis after 30-and 40-HBOT sessions were not different but there were reduced compared with pretreatment and in early treatment session (Table 6).

The number of samples in this study from the calculation was 44 patients. From data collection from medical record in Somdechprapinklao Hospital from 2019 to 2020, the patients who were diagnosed with irradiation cystitis with he-

maturia (ICD-10: N30.91) were 113 and 151 patients respectively and treated with HBOT were 56 and 73 patients but in our study, the target number of samples could not be achieved because of COVID-19 outbreak in Thailand resulting in a limited number of patient recruitment and referrals from other hospitals. Treatment cost of HBOT was unaffordable for some of our patients due to uncoverage of their medical insurance. The number of samples in our study that was lower than the desired ones caused a lower power of confidence of this research and assumingly led to an inaccurate conclusion.

Our study is prospective cohort study that can be used as a pilot study for further investigation about HBOT in the future as a randomized—controlled trial. Test of the relations of HBOT session in this study was performed in the same samples. The measurement method as a cystoscopic finding based on surgeon's experience might be varied. The number of radiation doses and times between radiation and hemorrhagic cystitis data was collected from patients' recalls that might not be accurate.

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Conflicts of Interest

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

References

[1] Goucher, G., Saad, F., Lukka, H. and Kapoor, A. (2019) Canadian Urological Association Best Practice Report: Diagnosis and Management of Radiation-Induced Hemorrhagic Cystitis. *Canadian Urological Association Journal*, **13**, 15. ttps://doi.org/10.5489/cuaj.5788

[2] Stephen, A.B., Jay, D.R. and Danial, A.B. (2021) Chapter 16: Evaluation and Management of Hematuria: In: *Campbell-Walsh-Wein Urology*, 12th Edition, Elsevier, Philadelphia, 253-255.

[3] Alesawi, A.M., El-Hakim, A., Zorn, K.C. and Saad, F. (2014) Radiation-Induced Hemorrhagic Cystitis. *Current Opinion in Supportive and Palliative Care*, **8**, 235-240. https://doi.org/10.1097/SPC.0000000000000073

[4] Oliai, C., Fisher, B., Jani, A., Wong, M., Poli, J., Brady, L.W. and Komarnicky, L.T. (2012) Hyperbaric Oxygen Therapy for radiation-Induced Cystitis and Proctitis. *International Journal of Radiation Oncology*Biology*Physics*, **84**, 733-740. https://doi.org/10.1016/j.ijrobp.2011.12.056

[5] Greenstein, A. (2013) Hyperbaric Oxygen Therapy for Hemorrhagic Radiation Cystitis. *Israel Medical Association Journal*, **15**, 106.

[6] Chong, K.T., Hampson, N.B. and Corman, J.M. (2005) Early Hyperbaric Oxygen Therapy Improves Outcome for Radiation-Induced Hemorrhagic Cystitis. *Urology*,

65, 649-653. https://doi.org/10.1016/j.urology.2004.10.050

[7] Oscarsson, N., Müller, B., Rosén, A., Lodding, P., Mölne, J., Giglio, D., Hjelle, K.M., Vaagbø, G., Hyldegaard, O., Vangedal, M. and Salling, L. (2019) Radiation-Induced Cystitis Treated with Hyperbaric Oxygen Therapy (RICH-ART): A Randomised, Controlled, Phase 2–3 Trial. *The Lancet Oncology*, **20**, 1602-1614. https://doi.org/10.1016/S1470-2045(19)30494-2

[8] Yoshida, T., Kawashima, A., Ujike, T., Uemura, M., Nishimura, K. and Miyoshi, S. (2008) Hyperbaric Oxygen Therapy for Radiation-Induced Hemorrhagic Cystitis. *International Journal of Urology*, **15**, 639-641. https://doi.org/10.1111/j.1442-2042.2008.02053.x

[9] El Oumri, A., Badi, H. and Khaloufi, S. (2018) Hyperbaric Oxygen Therapy: Focus. *Open Journal of Emergency Medicine*, **6**, 15-20. https://doi.org/10.4236/ojem.2018.61003

[10] Corman, J.M., McClure, D.A., Pritchett, R., Kozlowski, P. and Hampson, N.B. *(2003) Treatment of Radiation Induced Hemorrhagic Cystitis with Hyperbaric Oxygen. The Journal of Urology, **169**, 2200-2202.* https://doi.org/10.1097/01.ju.0000063640.41307.c9

[11] Ribeiro de Oliveira, T.M., Carmelo Romao, A.J., Gamito Guerreiro, F.M. and Matos Lopes, T.M. (2015) Hyperbaric Oxygen Therapy for Refractory Radiation-Induced Hemorrhagic Cystitis. *International Journal of Urology*, **22**, 962-966. https://doi.org/10.1111/iju.12857

[12] Shilo. Y., Efrati, S., Simon, Z., Sella, A., Gez, E., Fenig, E., Wygoda, M., Lindner, A., Fishlev, G., Stav, K. and Zisman, A. (2013) Hyperbaric Oxygen Therapy for Hemorrhagic Radiation Cystitis. *Israel Medical Association Journal*, **15**, 75-78.

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Fosfomycin—A Promising Oral Antibiotic for the Treatment of Urinary Tract Infection (UTI)

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Abstract

Background: Among the common morbid causes that are prevalent among all age groups, urinary tract infections top the list. In our country, most of the UTI patients visiting hospitals (OPD or IPD) are already on empirical antibiotics even before getting the sensitivity report in their hand. The purpose of this research was to examine the susceptibility patterns of commonly used antibiotics, particularly fosfomycin, against common uropathogens. **Methodology:** This was a prospective observational study conducted between January and March 2021 in four private tertiary hospitals in Dhaka, Bangladesh. All the urine samples referred to these four laboratories, obtained from patients of all ages and both genders, clinically diagnosed to have UTI, were included. Urine culture was performed by a semiquantitative method on blood agar media and MacConkey agar media. Following identification, antimicrobial sensitivity testing was performed using the modified Kirby Bauer disk diffusion method in accordance with CLSI standards. The data was put into Statistical Package for Social Sciences (SPSS) statistical software version 25 for the analysis. **Results:** A total of 5389 urine samples were received from four private hospitals in Dhaka over three months, and of these, 934 (17.33%) isolates were obtained from culture. About 95% of the isolates were gram-negative bacilli (GNBs). The most common isolate was *Escherichia coli* 615 (65.85%), followed by *Klebsiella* spp. 154 (16.49%), *Pseudomonas* spp. 64 (6.85%) and 51 (5.46%) isolates of Enterobacter. Among the gram-positive cocci, the most common were *Enterococci fecalis* 18 (1.93%) and *Staphylococcus aureus* 17 (1.82%). Of all the antibiotics tested, fosfomycin sensitivity was 98.4%, 88.88%, and 100% for *Escherichia coli*, *Enterococci fecalis*, and *Staphylococcus aureus*, respectively. All the isolates tested were susceptible to Meropenem (77% - 100%), Amoxiclav (78% - 100%) and Nitrofurantoin (45% - 94%). Sen-

sitivity amongst all the uropathogens for ceftriaxone, ciprofloxacin, and co-trimoxazole was nearly 50% - 77%. **Conclusion:** The positivity of urinary isolates is 17.33%, with the most common pathogen being *Escherichia coli*. Common uropathogens show the highest *in vitro* susceptibility to fosfomycin. So, fosfomycin should be considered as a highly potent and promising alternative oral antibiotic treatment for UTI.

Keywords

Antibiotic Susceptibility, Fosfomycin, Urinary Tract Infections

1. Introduction

Urinary tract infection (UTI) is one of the most prevalent infections diagnosed among all ages. Globally, about 150 million patients are infected with UTI every year, which may rise to 75% among females by the age of 24, and 15% - 25% of this group may suffer from recurrent UTI [1] [2] [3]. A urinary tract infection (UTI) is an infection of the bladder (cystitis) or the kidneys (pyelonephritis), and it could be either hospital-acquired or community-acquired. UTI is a morbid disease, causing loss of working days and treatment cost burden [4]. They are also an important source of sepsis, resulting in high mortality rates. Pregnancy, extreme age, spinal cord injuries, diabetes, multiple sclerosis, acquired immunodeficiency disease syndrome, or underlying urologic abnormalities increase the risk of UTI. In addition, catheter-associated UTI is the most common health care associated infection [2].

Escherichia coli is the most common causative agent of UTI in both hospital and community acquired infections showed by many previous studies. Hospital acquired UTI is associated with a higher prevalence of Enterococci and Coagulase-Negative Staphylococci [5] [6] [7]. Besides, *Klebsiella pneumoniae*, *Streptococcus agalactiae*, *Staphylococcus aureus*, *Klebsiella oxytoca*, *Pseudomonas aeruginosa*, *Citrobacter freundii*, *Enterobacter cloacae* and *Proteus mirabilis* have also been identified as etiologic agents of UTI [2]. In terms of reduction in complication, mortality rates and overall treatment costs, it is crucial to accurately identify and isolate bacterial uropathogens and also ascertain their antibiotic drug susceptibility.

However, the increasing emergence of bacterial resistance to a large number of antibiotics and lack of development of new antibiotic is causing major health concerns worldwide. Antibiotic use is the single most important modifiable risk factor for antibiotic resistance [8]. Several antibiotics are used for the treatment of UTIs, of which co-trimoxazole, fluoroquinolones, β-lactam antibiotics and nitrofurantoin are most commonly used [9] [10]. The 2010 IDSA guidelines recommend using nitrofurantoin and cotrimoxazole as first-line agents, followed by fosfomycin, fluoroquinolones, and β-lactam agents as second-line agents for uncomplicated UTI [11]. Fosfomycin trometamol is recommended as a single

3-g dose as a first-line treatment in some other international guidelines for the treatment of uncomplicated urinary tract infections [12] [13]. Surveillance reports demonstrate high rates of fosfomycin susceptibility, even among emergent multidrug-resistant (MDR) uropathogens [14] [15] [16] [17] [18]. As bacterial resistance to frequently used antibiotics (especially TMP/SMX, fluoroquinolones and β-lactam antibiotics) is rising, there is an increasing need for evidence-based prescribing. In the era of rising antimicrobial resistance seen globally, there is renewed interest in fosfomycin as an attractive therapeutic option [19]-[24].

Fosfomycin trometamol is an old, off-patent oral antibiotic, recommended as a single dose and well excreted in the urine [25] [26]. Most of the available literatures on fosfomycin resistance on *E. coli* according to CLSI guidelines [27] have fosfomycin zone diameter for Enterobacteriaceae and *Enterococcus* spp. only. There are a few studies [28] that have studied fosfomycin resistance in all gram-positive and gram-negative isolates. In the context of Bangladesh, fosfomycin for the treatment of UTI is not used very randomly, its potential has not been explored fully, and there is a lack of scarcity of data about this drug here. So, in view of the limited availability of novel antimicrobial agents, the reevaluation of older antibiotic agents seems to be an appealing option.

In this study we identify the common bacterial pathogens of Urinary Tract Infection (UTI) in four private hospitals of Dhaka, Bangladesh and determine the susceptibility of commonly used antibiotics for the treatment of UTI including fosfomycin as a new option because of uncontrolled and widespread use of antibiotics, the resistance pattern of uropathogens is changing drastically, specifically in developing countries like Bangladesh which is causing treatment failure.

2. Material and Methods

Study Area and Population—From January to March of 2021, urine samples were referred from both OPD (outpatients departments) and IPD (inpatients departments) at four private hospitals in Dhaka, Bangladesh (two from the south city corporation and two from the north city corporation). A total of 5389 urine samples were referred for culture during the study period. We included all with their consent, who were referred by a physician with the suspicion of UTI irrespective of their age, sex or physical condition. All the patients were tested between January and March 2021 in four private tertiary hospitals selected as study center in Dhaka, Bangladesh.

Sample Collection—All the patients were instructed very clearly to collect the urine sample aseptically to prevent contaminations from the urethra. So, clean-catch midstream urine and catheter urine was collected aseptically into a 10 ml sterile screw-capped container with proper labeling and transported to the laboratory for analysis.

Sample Processing—A calibrated loop technique was used to isolate bacterial pathogens from urine samples. A sterile loopful urine sample was inoculated in-

to blood agar media and MacConkey agar media (Oxoid, UK). The injected culture plates were incubated for 24 hours at 370 degrees Celsius. If the colony count was 105 CFU/mL or 104 CFU/mL and >5 pus cells per high-power field, the sample was ruled positive for UTI. Then the isolated bacteria were identified using standard microbiological methods up to genus and species level wherever applicable [29]. Urine samples that yielded multiple bacterial pathogens were subject to repeated culture to get pure culture.

Antibiotic Susceptibility Testing—Bacterial isolates were tested for antibiotic susceptibility testing by the standard Modified Kirby Bauer's disc diffusion method [30]. The zone of inhibition was measured and evaluated according to clinical and laboratory standards after 24 hours of incubation of Mueller Hinton agar plates at 300C with the antibiotic disc [27]. Fosfomycin (Fo), Amoxicillin/Clavulanate (AMC), Ciprofloxacin (CIP), Ceftriaxone (CRO), Meropenem (MEM), Nitrofurantoin (F), and Co-trimoxazole were used as standard antibiotic discs for the isolates in this study (CTX). In this investigation, standard strains of *E. coli* (ATCC 25922), *S. aureus* (ATCC 25923), and *P. aeruginosa* (ATCC 27853) were employed as a reference.

Method of data quality assurance and data analysis—After the collection of data, all questionnaires were checked for completeness, correctness and internal consistency to exclude missing or inconsistent data and those were discarded. Corrected data were entered into the Statistical Package for Social Sciences (SPSS) statistical software version 25 for the analysis. Quantitative variables were summarized by mean and standard deviation. On the other hand, qualitative variables were summarized by percentage. Necessary bivariate analysis and statistical tests were done.

3. Result

A total of 5389 urine samples were received from OPD and IPD patients of four hospitals, who were referred by their concern physicians with suspected UTI, over 3 months and of these, 934 (17.33%) isolates were obtained from the samples (**Figure 1**). Among these 934 isolates, 687 (73.56%) were female and 247 (26.44%) were male. Among female participants 18% had culture growths, whereas among male participants 10% had positive culture growths (**Figure 2**). The highly affected age groups were less than 15 years and more than 64 years (**Table 1**). In (0 - 14) age group 15.52% participants and in (>64) age group 24.19% had positive culture growth, whereas (15 - 24) age group had the lowest percentage of culture growth (8.45%) (**Table 1**). Around 95% of the isolate were gram-negative bacilli (GNBs). The most common isolate was *E. coli* 615 (65.84%), followed by *Klebsiella* spp. 154 (16.49%), *Pseudomonas* spp. 64 (6.8%) and 51 (5.46%) isolates of Enterobacter. Among the Gram-positive cocci, the most common were *Enterococcus fecalis* 18 (1.9%) and *Staphylococcus aureus* 17 (1.82%). There were also few isolates of Proteus, Acinatobacter, *S.saprophyticus* and *S.agalaticae.* The profile of the pathogens causing UTI is shown in (**Figure 3**). The susceptibility of the

GNBs and GPCs (*Staphylococcus* spp. and *Enterococcus* spp.) to the various antibiotics tested is shown in (Table 2).

Table 1. Distribution of cases of UTI in different age groups (n = 934).

Age	*E. coli* n (%)	Klebsiella n (%)	Pseudomonas n (%)	Enterobacter n (%)	Enterococci n (%)	Proteus n (%)	*S Saprophyticus* n (%)	*S. aureus* n (%)	Acinatobacter n (%)	*S. agalactiae* n (%)	Total n (%)
0 - 14	102 (70.3%)	22 (15.2%)	5 (3.5%)	15 (10.3%)	1 (0.7%)	0 0	0 0	0 0	0 0	0 0	145 (15.52%)
15 - 24	57 (72.2%)	15 (19%)	1 (1.3%)	2 (2.5%)	0 0	0 0	0 0	3 (3.8%)	1 (1.2%)	0 0	79 (8.45%)
25 - 34	83 (70.3%)	17 (14.4%)	6 (5.1%)	5 (4.2%)	2 (1.7%)	0 0	0 0	4 (3.4%)	0 0	1 (0.8%)	118 (12.63%)
35 - 44	79 (69.9%)	16 (14.2%)	4 (3.5%)	5 (4.4%)	4 (3.5%)	2 (1.8%)	1 (0.9%)	2 (1.8%)	0 0	0 0	113 (12.09%)
45 - 54	75 (65.8%)	20 (17.5%)	7 (6.1%)	6 (5.3%)	1 (0.9%)	2 (1.7%)	1 (0.9%)	2 (1.7%)	0 0	0 0	114 (12.20%)
55 - 64	83 (59.7%)	30 (21.6%)	12 (8.6%)	10 (7.2%)	1 (0.7%)	1 (0.7%)	0 0	1 (0.7%)	1 (0.7%)	0 0	139 (14.88%)
>64	136 (60.2%)	34 (15%)	29 (12.8%)	8 (3.5%)	9 (4%)	5 (2.2%)	0 0	5 (2.2%)	0 0	0 0	226 (24.19%)
Total	615 (65.84%)	154 (16.5%)	64 (6.8%)	51 (5.46%)	18 (1.9%)	10 (1.1%)	2 (0.21%)	17 (1.8%)	2 (0.21%)	1 (0.1%)	934 (100%)

Table 2. Antimicrobial susceptibility (% sensitivity) of isolated uropathogen.

Isolates	Fosfomycin N (%)	Meropenam N (%)	Amoxiclav N (%)	Nitrofurantoin N (%)	Ceftriaxone N (%)	Ciprofloxacin N (%)	Co-trimoxazole N (%)
Escherichia coli (N = 615)	605 (98.4%)	567 (92.2%)	517 (84.1%)	524 (85.2%)	332 (53.9%)	327 (53.2%)	325 (52.8%)
Klebsiella (N = 154)	85 (55.2%)	145 (94.1%)	121 (78.6%)	81 (52.6%)	99 (64.3%)	113 (73.4%)	104 (67.5%)
Enterobacter (N = 51)	36 (78.6%)	49 (96.1%)	44 (86.3%)	31 (60.8%)	23 (45.1%)	31 (60.8%)	29 (56.8%)
Pseudomonas (N = 64)	47 (73.6%)	50 (78.1%)	40 (62.5%)	29 (45.3%)	22 (34.3%)	41 (64.1%)	25 (39.1%)
Proteus (N = 10)	10 (100%)	10 (100%)	9 (90%)	4 (40%)	9 (90%)	5 (50%)	3 (30%)
Acinatobacter (N = 2)	2 (100%)	2 (100%)	2 (100%)	2 (100%)	2 (100%)	1 (50)	2 (100%)
Enterococcus fecalis (N = 18)	16 (88.88%)	14 (77.8%)	16 (88.9%)	11 (61.1%)	10 (55.6%)	9 (50%)	14 (77.8%)
S. aureus (N = 17)	17 (100%)	17 (100%)	17 (100%)	16 (94.11%)	13 (76.47%)	6 (35.3%)	9 (52.9%)
S. saprophyticus (N = 2)	1 (50%)	2 (100%)	2 (100%)	2 (100%)	1 (50%)	1 (50%)	1 (50%)
S. agalactiae (N = 1)	1 (100%)	1 (100%)	1 (100%)	1 (100%)	1 (100%)	0	1 (100%)

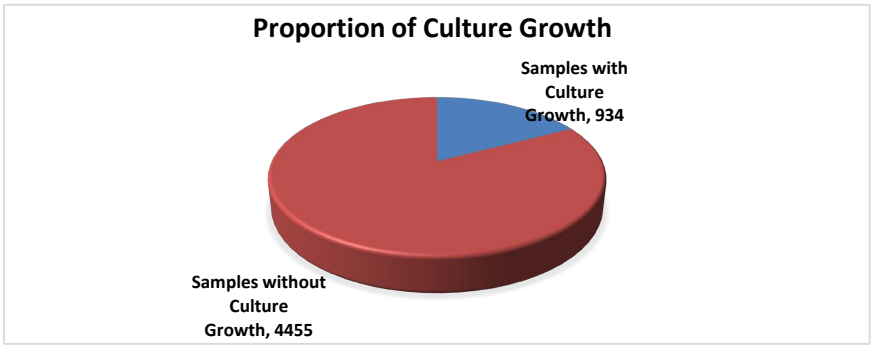

Figure 1. Proportion of culture growth found in total sample (n = 5389).

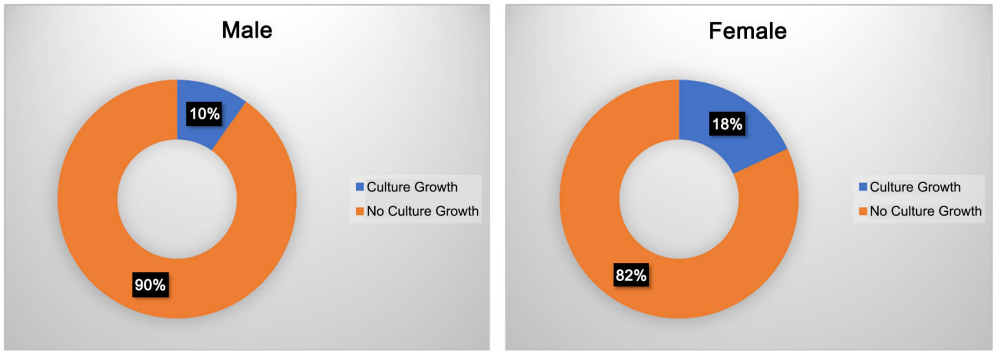

Figure 2. Proportion of culture growth according to gender.

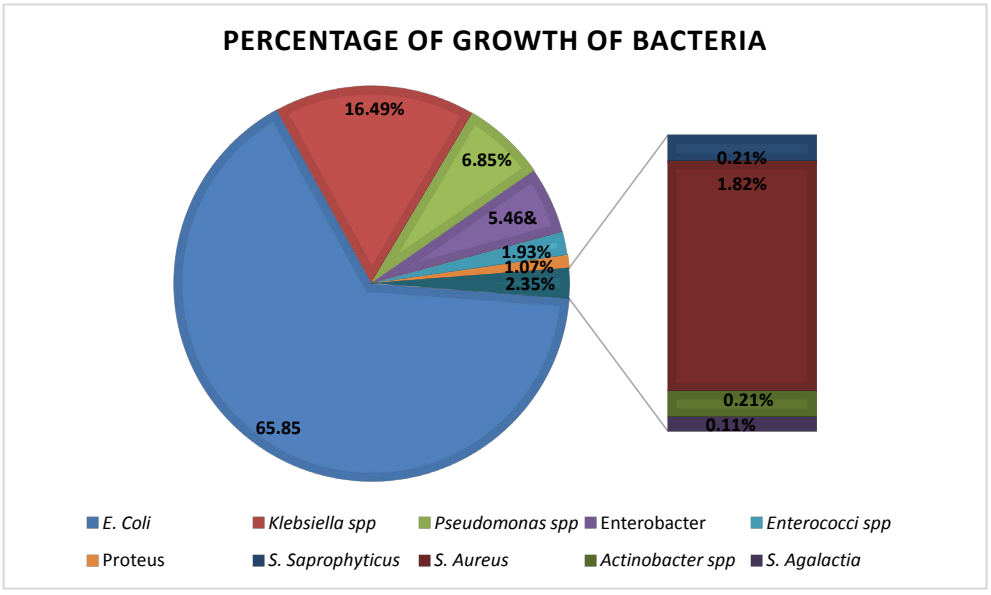

Figure 3. Distribution frequency of isolated bacterial uropathogen (n = 5389).

The most common *Escherichia coli* was predominantly sensitive to fosfomycin 605 (98.4%), meropenam 567 (92.2%), nitrofurantoin 524 (85.2%), amoxicillin/clavulanate 517 (84.1%), to a lesser extent to ceftriaxone (53%), ciprofloxacin (53.2%) and cotrimoxazole (52.8%). Among the 154 isolates of *Klebsiella* spp., the majority were susceptible to meropenam 145 (94.15%) and 85 (55.2%) iso-

lates were susceptible to fosfomycin. Among the 64 isolates of *Pseudomonas* spp. 50 (78.1%) isolates were susceptible to meropenem and 47 (73.6%) isolates were susceptible to fosfomycin. Comparatively lower susceptibility rates were seen against nitrofurantoin (45.3%), ceftriaxone (34.3%) and cotrimoxazole (39.1%). Among 51 isolates of Enterobacter, meropenem showed the highest susceptibility 49 (96.1%) followed by amoxiclav 44 (86.34%) and Fosfomycin 36 (78.6%). Ceftriaxone and co-trimoxazol showed the lowest sensitivity of 23 (45.1%) and 29 (56.8%) respectively. Among the 18 *Enterococcus* spp.., high susceptibility was seen against fosfomycin (88.88%), meropenem (77.78%), amoxicillin/clavulanate (88.88%) and cotrimoxazole (77.78%). All *Staphylococcus aureus* isolates (100%) were susceptible to fosfomycin, meropenem and amoxicillin/clavulanate and to a lesser extent to nitrofurantoin (94.11%). After testing all the antibiotics in all the isolates, fosfomycin was found to be most sensitive followed by meropenem, amoxicillin/clavulanate and nitrofurantoin for all the isolates tested. Besides, ceftriaxone, ciprofloxacin and co-trimoxazole were found to be 50% - 77% sensitive amongst all the pathogens that were isolated.

4. Discussion

The study was done in four microbiology laboratories in Dhaka city with the vision of determining the antimicrobial susceptibility, including Fosfomycin against the commonest bacterial uropathogens, isolated over a three-month span (January to March 2021). In this period, out of 5389 urine specimens, 934 (17.33%) samples showed significant bacterial growth. Variations in the frequency of isolation of urinary pathogens were observed among different previous studies. The frequency is close to the incidence reported by other studies conducted in Dhaka *i.e.*, 16.8% and 16.4% [31] [32], but is higher than another Indian study who reported 4.2% UTI in a community-based study [33]. Few other studies in Dhaka city reported higher frequency of UTI *i.e.*, 27% and 24.14% respectively in hospital or clinic-based study [34] [35]. Bangladeshi populations are reluctant to visit a doctor or go for laboratory tests unless experiencing severe health complications for a particular disease condition, this attitude may cause the variations between community and hospital or clinic-based studies. In other studies, researchers reported UTI frequency, *i.e.*, 20% and 12%, respectively, in hospital or clinic-based studies [36] [37]. As this study was done in urban set up, participants had a better risk awareness and better facilities for maintaining their personal hygiene. Also factors like education, good sanitary facilities etc. contributed to our finding which shows a lower frequency of bacterial growth among study participants.

Females had a higher prevalence of UTI (73.56 percent) than males (26.44 percent) in our study, which is consistent with earlier data that suggest females have a higher frequency of UTI than males [38] [39]. 18% female and 10% of male participants had bacterial growth in our study. The close closeness of the urethral meatus to the anus, the shorter urethra, sexual intercourse, inconti-

nence, and the inconvenience of using the toilet leads to the high prevalence of UTI in females [40] [41]. In the current study, relatively increase frequency of the UTI cases were found in the age group of less than 15 and more than 65 years which is dissimilar to reports demonstrated by some other studies [36] [42]. The high incidence of UTI at these age groups might be related to improper personal hygienic practice which includes improper toilet habit.

In this three-month period study, 95.9% of the total bacterial isolates were Gram negative bacilli while Gram positive cocci constituted only about 5%. In our study *E. coli* was the commonest cause of urinary tract infection (65.84%) followed by *Klebsiella pneumoniae* (16.49%), *Pseudomonas* spp. (6.8%), Enterobacter (5.46%), Enterococci (1.9%), *Staphylococcus aureus* (1.82%), Proteus (1.07%) and *S. saprophyticus* (0.21%) respectively. This is similar to other studies where *E. coli* was the most frequent pathogen causing UTI, as in a study conducted in Pakistan, where 62.6% cultures grew *E. coli* and in other studies also done in Pakistan, researchers found 66% and 70% *E. coli* positive culture cases [43] [44] [45]. These results were also similar with a study conducted in Karachi [46] which reflects that first two common organisms were *E. coli* and *Klebsiella pneumoniae*. Third prevalent organism in our study was Pseudomonas while in the above-mentioned study it was also Pseudomonas. In order for a successful infection and creating a satisfactory environment inside the host, strains of uropathogenic *E. coli* possess some special features that are achieved by expressing particular genes, called virulence factors. Two of the most important surface virulence factors of *E. coli* are type 1 fimbriae and P fimbriae that are crucial for the colonization process inside the urinary tract. For these reasons *E. coli* remains the predominant uropathogens in UTI.

Regarding the antibiotic sensitivity test in this study, gram negative bacteria exerted less sensitivity to the commonly used antibiotics in comparison to Gram positive bacteria, which correlates with the findings of other [47]. Among the Gram-negative isolates, the percentage of antibiotic sensitivity was as for amoxycillin/clavulanate (82.03%), meropenem (91.85%), nitrofurantoin (74.88%), cotrimoxazole (54.46%), ceftriaxone (54.35%) and ciprofloxacin (57.81%). In the present study, the overall percentage of antibiotic sensitivity for Gram-positive isolates was high for amoxycillin/clavulanate (94.73%), meropenem (92.1%), nitrofurantoin (79%), cotrimoxazole (65.78%) and ceftriaxone (65.78%) but least for ciprofloxacin (42.1%). Studies done in Bangladesh and India reported similar type of findings [48] [49]. The antibiotic resistance pattern of the bacteria causing UTIs varies from place to place and from time to time [50].

Fosfomycin gives coverage against both Gram-negative and Gram-positive bacteria like *Entererococcus* spp., *Staphylococcus aureus*, *E. coli*, *Salmonella* spp, *Shigella* spp., *Klebsiella*, *Enterobacter* sp., *Serratia* spp., *Citrobacter* spp. and *P. mirabilis* [51]. However, in our study 98.4% of *E. coli*, 55.2% *Klebsiella* spp., 78.6% *Enterobacter* spp. and 73.6 % Pseudomonas were susceptible to Fosfomycin. The most frequently identified Gram-positive uropathogen in this study was

Enterococcus fecalis (88.88%) and *Staphylococcus aureus* (100%) which were highly susceptible to fosfomycin. These findings also coincide to the findings of an Indian study [52].

When all the antibiotics were tested, maximum sensitivity was found to fosfomycin, followed by meropenem, amoxicillin/clavulanate, and nitrofurantoin for all the isolates tested. The low resistance rates detected for these antimicrobials may be attributed to less use in the empirical treatment of UTIs and may be the use of these antibiotics in hospitalized patients. Sensitivity amongst all the uropathogens for ceftriaxone, ciprofloxacin and cotrimoxazole was nearly 50% - 77%. Various studies have reported high resistance rates to these antibiotics [53] [54] [55]. Other studies have been reported similar resistance pattern to ciprofloxacin [56]. Thus, our study suggests that fosfomycin should be preferred over fluoroquinolones for use in the treatment of UTIs. By preferring fosfomycin over fluoroquinolones, they can be spared for use in other infections such as tuberculosis. It can also be seen that nitrofurantoin should be preferred over cotrimoxazole as a first-line agent for the treatment of uncomplicated UTI. Nitrofurantoin and Fosfomycin is specific for urine, resistance is quite low in almost all the isolates. Thus, these two antibiotics can be used in the treatment of UTI in outpatients sparing the other antibiotic classes (like fluoroquinolones, amoxicillin/clavulanate) for use in other illnesses.

The limitation of our study was lacking clinical information. This study was based on laboratory data only. So, we failed to provide information of UTI patients whether symptomatic or asymptomatic, complicated, or uncomplicated and distribution of patients based on the sources of infection like catheter-associated or community acquired. There were also technical limitations for the species level identification of Gram-negative bacteria.

5. Conclusion

The choice of empirical antimicrobial for UTI needs to be consistent with the antibiogram of the hospital and should be recommended based on sensitivity data. However, fosfomycin has a promising role in UTI as the level of sensitivity amongst both Gram-positive and Gram-negative uropathogens is very high. Fosfomycin represents a relatively old antibiotic, but it is not widely used in our country. So, it may be considered as a highly effective empirical oral treatment option for UTI until a urine culture analysis report is available.

Conflicts of Interest

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

References

[1] Hooton, T.M. (2001) Recurrent Urinarytract Infection in Women. *International Journal of Antimicrobial Agents*, **17**, 259-268. https://doi.org/10.1016/S0924-8579(00)00350-2

[2] Foxman, B. (2002) Epidemiology of Urinary Tract Infections: Incidence, Morbidity, and Economic Costs. *The American Journal of Medicine*, **113**, 5-13. https://doi.org/10.1016/S0002-9343(02)01054-9

[3] Pouwels, K.B., Visser, S.T. and Hak, E. (2013) Effect of Pravastatin and Fosinopril on Recurrent Urinarytract Infections. *Journal of Antimicrobial Chemotherapy*, **68**, 708-714. https://doi.org/10.1093/jac/dks419

[4] Foxman, B. and Frerichs, R.R. (1985) Epidemiology of Urinary Tract Infection: I. Diaphragm Use and Sexual Intercourse. *American Journal of Public Health*, **75**, 1308-1313. https://doi.org/10.2105/AJPH.75.11.1308

[5] Barrett, S.P., Savage, M.A., Rebec, M.P., Guyot, A., Andrews, N. and Shrimpton, S.M. (1999) Antibiotic Sensitivity of Bacteria Associated with Community Acquired Urinary Tract Infections in Britain. *Journal of Antimicrobial Chemotherapy*, **44**, 359-365. https://doi.org/10.1093/jac/44.3.359

[6] Jones, R.N., Kugler, K.C., Pfaller, M.A. and Winokur, P.L. (1999) SENTRY Surveillance Group: Characteristics of Pathogens Causing Urinary Tract Infections in Hospitals in North America: Results from the SENTRY Antimicrobial Surveillance Program, 1997. *Diagnostic Microbiology and Infectious Disease*, **35**, 55-63. https://doi.org/10.1016/S0732-8893(98)00158-8

[7] Manges, A.R., Natarajan, P., Solberg, O.D., Dietrich, P.S. and Riley, L.W. (2006) The Changing Prevalence of Drug-Resistant *Escherichia coli* Clonal Groups in a Community: Evidence for Community Outbreaks of Urinary Tract Infections. *Epidemiology and Infection*, **134**, 425-431. https://doi.org/10.1017/S0950268805005005

[8] Costelloe, C., Metcalfe, C., Lovering, A., Mant, D. and Hay, A.D. (2010) Effect of Antibiotic Prescribing in Primary Care on Antimicrobial Resistance in Individual Patients: Systematic Review and Meta-Analysis. *BMJ*, **340**, Article No. c2096. https://doi.org/10.1136/bmj.c2096

[9] Grabe, M., Bjerklund-Johansen, T.E., Botto, H., *et al.* (2011) EAU Guidelines on Urological Infections, Update March 2011. EAU Guidelines Office, Arnhem.

[10] Zalmanovici, T.A., Green, H., Paul, M., Yaphe, J. and Leibovici, L. (2010) Antimicrobial Agents for Treating Uncomplicated Urinary Tract Infection in Women. *Cochrane Database of Systemic Reviews*, No. 10, Article No CD007182. https://doi.org/10.1002/14651858.CD007182.pub2

[11] Gupta, K., Hooton, T.M., Naber, K.G., Wullt, B., Colgan, R., Miller, L.G., *et al.* (2011) International Clinical Practice Guidelines for the Treatment of Acute Uncomplicated Cystitis and Pyelonephritis in Women: A 2010 Update by the Infectious Diseases Society of America and the European Society for Microbiology and Infectious Diseases. *Clinical Infectious Diseases*, **52**, e103-e120. https://doi.org/10.1093/cid/ciq257

[12] Bonkat, G., Bartoletti, R.R., Bruyère, F., Cai, T., Geerlings, S.E., Köves, B., Schubert, S., Wagenlehner, F., Mezei, T., Pilatz, A., Pradere, B. and Veeratterapillay, R. (2019). EAU Guidelines on Urological Infections. European Association of Urology, Arnhem.

[13] Therapeutic Guidelines Limited (2019) Acute Cystitis in Adults in ETG Complete. Therapeutic Guidelines Limited, Melbourne.

[14] Mueller, L., Cimen, C., Poirel, L., Descombes, M.C. and Nordmann, P. (2019) Prevalence of Fosfomycin Resistance among ESBL-Producing *Escherichia coli* Isolates in the Community, Switzerland. *European Journal of Clinical Microbiology & Infectious Diseases*, **38**, 945-949. https://doi.org/10.1007/s10096-019-03531-0

[15] de Greeff, S.C., Mouton, J.W., Schoffelen, A.F. and Verduin, C.M. (2019) NethMap

2019: Consumption of Antimicrobial Agents and Antimicrobial Resistance among Medically Important Bacteria in the Netherlands. RIVM Report 2019-0038. National Institute for Public Health and the Environment, Bilthoven.

[16] Quaegebeur, A., Brunard, L., Javaudin, F., Vibet, M.A., Bemer, P., Le Bastard, Q., Batard, E., Montassier, E. and EuroUTI 2010-2016 Study Group (2019) Trends and Prediction of Antimicrobial Susceptibility in Urinary Bacteria Isolated in European Emergency Departments: The EuroUTI 2010-2016 Study. *Journal of Antimicrobial Chemotherapy*, **74**, 3069-3076. https://doi.org/10.1093/jac/dkz274

[17] Karlowsky, J.A., Lagace-Wiens, P.R.S., Adam, H.J., Baxter, M.R., Laing, N.M., Walkty, A.J. and Zhanel, G.G. (2019) *In Vitro* Susceptibility of Urinary *Escherichia coli* Isolates to First- and Second-Line Empirically Prescribed Oral Antimicrobials: CANWARD Surveillance Study Results for Canadian Outpatients, 2007-2016. *International Journal of Antimicrobial Agents*, **54**, 62-68. https://doi.org/10.1016/j.ijantimicag.2019.04.012

[18] Falagas, M.E., Athanasaki, F., Voulgaris, G.L., Triarides, N.A. and Vardakas, K.Z. (2019) Resistance to Fosfomycin: Mechanisms, Frequency and Clinical Consequences. *International Journal of Antimicrobial Agents*, **53**, 22-28. https://doi.org/10.1016/j.ijantimicag.2018.09.013

[19] Zowawi, H.M., Harris, P.N.A., Roberts, M.J., Tambyah, P.A., Schembri, M.A., Diletta Pezzani, M., *et al.* (2015) The Emerging Threat of Multidrug-Resistant Gram-Negative Bacteria in Urology. *Nature Reviews Urology*, **12**, 570-584. https://doi.org/10.1038/nrurol.2015.199

[20] Flores-Mireles, A.L., Walker, J.N., Caparon, M. and Hultgren, S.J. (2015) Urinary Tract Infections: Epidemiology, Mechanisms of Infection and Treatment Options. *Nature Reviews Microbiology*, **13**, 269-284. https://doi.org/10.1038/nrmicro3432

[21] Hawkey, P.M., Warren, R.E., *et al.* (2018) Treatment of Infections Caused by Multidrug-Resistant Gram-Negative Bacteria: Report of the British Society for Antimicrobial Chemotherapy/Healthcare Infection Society/British Infection Association Joint Working Party. *Journal of Antimicrobial Chemotherapy*, **73**, iii2-iii78. https://doi.org/10.1093/jac/dky027

[22] Falagas, M.E., Kastoris, A.C., Kapaskelis, A.M. and Karageorgopoulos, D.E. (2010) Fosfomycin for the Treatment of Multidrug-Resistant, Including Extended-Spectrum Beta-Lactamase Producing, Enterobacteriaceae Infections: A Systematic Review. *The Lancet Infectious Diseases*, **10**, 43-50. https://doi.org/10.1016/S1473-3099(09)70325-1

[23] Sastry, S., Clarke, L.G., Alrowais, H., Querry, A.M., Shutt, K.A. and Doi, Y. (2015) Clinical Appraisal of Fosfomycin in the Era of Antimicrobial Resistance. *Antimicrobial Agents and Chemotherapy*, **59**, 7355-7361. https://doi.org/10.1128/AAC.01071-15

[24] Seroy, J.T., Grim, S.A., Reid, G.E., Wellington, T. and Clark, N.M. (2016) Treatment of MDR Urinary Tract Infections with Oral Fosfomycin: A Retrospective Analysis. *Journal of Antimicrobial Chemotherapy*, **71**, 2563-2568. https://doi.org/10.1093/jac/dkw178

[25] Shrestha, N. and Tomford, J.W. (2001) Fosfomycin: A Review. *Infectious Diseases in Clinical Practice*, **10**, 255-260. https://doi.org/10.1097/00019048-200106000-00004

[26] López-Montesinos, I. and Horcajada, J.P. (2019) Oral and Intravenous Fosfomycin in Complicated Urinary Tract Infections. *Revista Española de Quimioterapia*, **32**, 37-44.

[27] Clinical and Laboratory Standards Institute (2016) Performance Standards for Antimicrobial Susceptibility Testing. 26th Edition, M100-S26, Clinical and Laboratory Standards Institute, Wayne.

[28] Maraki, S., Samonis, G., Rafailidis, P.I., Vouloumanou, E.K., Mavromanolakis, E. and Falagas, M.E. (2009) Susceptibility of Urinary Tract Bacteria to Fosfomycin. *Antimicrobial Agents and Chemotherapy*, **53**, 4508-4510. https://doi.org/10.1128/AAC.00721-09

[29] Collee, J.G., Miles, R.S. and Watt, B. (1996) Tests for the Identification of Bacteria. In: Collee, J.G., Fraser, A.G., Marmion, B.P. and Simmons, A. Eds., *Mackie and Mc Artney Practical Medical Microbiology*, Churchill Livingstone, London, 433.

[30] Jan Hudzicki, A. (2009) Kirby-Bauer Disk Diffusion Susceptibility Test Protocol. American Society for Microbiology, Washington DC.

[31] Rahman, S.R., Ahmed, M.F. and Begum, A. (2014) Occurrence of Urinary Tract Infection in Adolescent and Adult Women of Shanty Town in Dhaka City, Bangladesh. *Ethiopian Journal of Health Sciences*, **24**, 145-152. https://doi.org/10.4314/ejhs.v24i2.7

[32] Begum, N., Mamoon, A.B.A., Hossain, M., Begum, N., Chowdhury, S.A. and Rahman, M.F. (2006) UTI among Female Workers in a Selected Garment Industry of Dhaka City: A Cross Sectional Study. *The ORION Medical Journal*, **23**, 325-327.

[33] Singh, M.M., Devi, R., Garg, S. and Mehra, M. (2001) Effectiveness of Syndromic Approach in Management of Reproductive Tract Infections in Women. *Indian Journal of Medical Sciences*, **55**, 209-214.

[34] Bashar, M.A., Ahmed, M.F., Rahman, S.R. and Gomes, D.J. (2009) Distribution and Resistance Trends of *Escherichia coli* from Urinary Tract Infections Isolated in Dhaka City. *Bangladesh Journal of Medical Science*, **15**, 93-98.

[35] Rahman, F., Chowdhury, S., Rahman, M.M., Ahmed, D. and Hossain, A. (2009) Antimicrobial Resistance Pattern of Gram-Negative Bacteria Causing Urinary Tract Infection. *Stamford Journal of Pharmaceutical Sciences*, **2**, 44-50. https://doi.org/10.3329/sjps.v2i1.5815

[36] Yasmeen, B.H.N., Islam, S., Islam, S., Uddin, M.M. and Jahan, R. (2015) Prevalence of Urinary Tract Infection, Its Causative Agents and Antibiotic Sensitivity Pattern: A Study in Northern International Medical College Hospital, Dhaka. *Northern International Medical College Journal*, **7**, 105-109 https://doi.org/10.3329/nimcj.v7i1.25704

[37] Ahmed, S.M. and Avasaralam A.K. (2008) Urinary Tract Infections (UTI) among Adolescent Girls in Rural Karimnagar District, AP-K.A.P. Study. *Indian Journal of Preventive & Social Medicine*, **39**, 67-70.

[38] García-Morúa, A., Hernández-Torres, A., Salazar-de-Hoyos, J.L., Jaime-Dávila, R. and Gómez-Guerra, L.S. (2009) Community-Acquired Urinary Tract Infection Etiology and Antibiotic Resistance in a Mexican Population Group. *Revista Mexicana de Urología*, **69**, 45-48.

[39] Sood, S. and Gupta, R. (2012) Antibiotic Resistance Pattern of Community Acquired Uropathogens at a Tertiary Care Hospital in Jaipur, Rajasthan. *Indian Journal of Community Medicine*, **37**, 39-44. https://doi.org/10.4103/0970-0218.94023

[40] Ochei, J. and Kolhatkar, A. (2007) Medical Laboratory Science Theory and Practicereprint. 6th Edition, McGraw-Hill, New Delhi, India. Diagnosis of Infection by Specific Anatomic Sites/Antimicrobial Susceptibility Tests; pp. 615-643, 788-798.

[41] Orrett, F.A. and Davis, G.K. (2006) A Comparison of Antimicrobial Susceptibility Profile of Urinary Pathogens for the Years, 1999 and 2003. *West Indian Medical*

Journal, **55**, 95-99.

[42] Zakaria, M.M., Talukder, A.S. and Chowdhury, E.K. (2002) Prevalence and Drug Sensitivity of Microorganisms in Patients with Urinary Tract Infection Attending A Semi-Rural Hospital in Bangladesh. *Bangladesh Journal of Medical Science*, **8**, 111-114.

[43] Mehr, M.T., Khan, H., Khan, T.M., Iman, N., Iqbal, S. and Adnan, S. (2010) *E coli* Urine Super Bug and Its Antibiotic Sensitivity: A Prospective Study. *Journal of Medical Sciences*, **18**, 110-113.

[44] Naeem, M., Khan, M. and Qazi, S.M. (2010) Antibiotic Susceptibility Pattern of Bacterial Pathogens Causing Urinary Tract Infection in a Tertiary Care Hospital. *Annals of Pakistan Institute of Medical Sciences*, **6**, 214-218.

[45] Humayun, T. and Iqbal, A. (2012) The Culture and Sensitivity Pattern of Urinary Tract Infections in Females of Reproductive Age Group. *Annals of Pakistan Institute of Medical Sciences*, **8**, 19-22.

[46] Sheikh, D., Ashfaq, S., Sheikh, K. and Sheikh, M. (2005) Studies on Resistance/Sensitivity Pattern of Bacteria Related with Urinary Tract Infections. *Medical Journal of Islamic World Academy of Sciences*, **15**, 129-133.

[47] Shigemura, K., Tanaka, K., Okada, H., Nakano, Y., Kinoshita, S., Gotoh, A., Arakawa, S. and Fujisawa, M. (2005) Pathogen Occurrence and Antimicrobial Susceptibility of Urinary Tract Infection Cases during a 20-Year Period (1983-2002) at a Single Institution in Japan. *Japanese Journal of Infectious Diseases*, **58**, 303-308

[48] Saleh, A.A., Ahmed, S.S., Ahmed, M., Sattar, A.N.I. and Miah, M.R.A. (2000) Changing Trends in Uropathogens and Their Antimicrobial Sensitivity Pattern. *Bangladesh Journal of Medical Microbiology*, **3**, 9-12. https://doi.org/10.3329/bjmm.v3i2.5320

[49] Wattal, C., Sharma, A., Oberoi, J.K., Datta, S., Prasad, K.J. and Raveendr, R. (2005) ESBL—An Emerging Threat to Antimicrobial Therapy. *Microbiology Newsletter of Sir Ganga Ram Hospital,* **10**, 1-8.

[50] Manikandan, S., Ganesapandian, S., Singh, M. and Kumaraguru, A.K. (2011) Antimicrobial Susceptibility Pattern of Urinary Tract Infection Causing Human Pathogenic Bacteria. *Asian Journal of Medical Sciences*, **3**, 56-60.

[51] Falagas, M.E., Vouloumanou, E.K., Samonis, G. and Vardakas, K.Z. (2016) Fosfomycin. *Clinical Microbiology Reviews*, **29**, 321-347. https://doi.org/10.1128/CMR.00068-15

[52] Sultan, A., Rizvi, M., Khan, F., Sami, H., Shukla, I. and Khan, H.M. (2015) Increasing Antimicrobial Resistance among Uropathogens: Is Fosfomycin the Answer? *Urology Annals*, **7**, 26-30. https://doi.org/10.4103/0974-7796.148585

[53] Lorente-Garin, J.A., Placer-Santos, J., Salvado-Costa, M., Segura-Alvarez, C. and Gelabert-Mas, A. (2005) Antibiotic Resistance Transformation in Community-Acquired Urinary Infections. *Revista Clínica Española*, **205**, 259-264. https://doi.org/10.1157/13076148

[54] Maraki, S., Mantadakis, E., Michailidis, L. and Samonis, G. (2013) Changing Antibiotic Susceptibilities of Community-Acquired Uropathogens in Greece, 2005-2010. *Journal of Microbiology, Immunology and Infection*, **46**, 202-209. https://doi.org/10.1016/j.jmii.2012.05.012

[55] Haque, R., Laila Akter, M. and Salam, M.A. (2015) Prevalence and Susceptibility of Uropathogens: A Recent Report from a Teaching Hospital in Bangladesh. *BMC Research Notes s*, **8**, Article No. 416. https://doi.org/10.1186/s13104-015-1408-1

[56] Sorlozano, A., Gutierrez, J., De Dios Luna, J., Oteo, J., Liebana, J., Soto, M.J., *et al.* (2007) High Presence of Extended-Spectrum Beta Lactamases and Resistance to Quinolonesin Clinical Isolates of *Escherichia coli*. *Microbiological Research*, **162**, 347-354. https://doi.org/10.1016/j.micres.2006.02.003

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Intractable Hiccups, an Unusual Presentation of Renal Cell Carcinoma

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Abstract

Hiccups are involuntary spasms of the diaphragm with closure of the glottis. This involves a complex neural pathway which includes the phrenic, vagus and the sympathetic pathways, it is usually self-limiting and resolves within a few minutes after onset. Hiccups are described as chronic when it lasts more than 48 hours and intractable when it persists for more than a month. Intractable hiccups are said to have an organic cause in 80% of cases and the remaining 20% psychogenic in origin, Some of the organic causes of intractable hiccups include: liver cancer, adrenal tumours, and kidney tumours. We present a case of right renal cell carcinoma which presented as intractable hiccups and was successfully managed by performing a radical right nephrectomy.

Keywords

Hiccups, Intractable Hiccups, Renal Tumour, Case Report

1. Introduction

Renal cell carcinoma is a malignant tumor arising from the renal parenchyma and accounts for 2% - 3% of all adult malignancies, and 80% of all primary renal tumors [1]. The classic triad of flank mass, flank pain and hematuria present in about 30% of patients. They also present commonly with symptoms of metastasis to lungs, bone, liver and brain. Other rare documented presentations of renal cell carcinoma include cutaneous and intraoral metastasis [2], dysphagia from esophageal metastasis [3], and jejunal metástasis [4]. Renal cell carcinoma presenting only as intractable hiccup is an unusual presentation.

Hiccups are involuntary spasms of the diaphragm with closure of the glottis.

Based on the duration of symptoms, hiccups can be described as chronic, lasting more than 48 hours, or intractable, lasting more than one month [5]. The hiccup reflex is a complex one involving several neural pathways. The afferent limb includes the phrenic and vagus nerves and the sympathetic chain [6]. The central mediators are thought to be the medulla oblongata and reticular formation of the brainstem interacting with phrenic nerve nuclei and hypothalamus, and non-specific areas in the spinal cord between C3 and C5 [7], and the phrenic nerve with accessory neural connections to the glottis forming the efferent limb.

Most episodes of hiccups are benign, of acute onset and self-limiting, typically resolving within a few minutes of onset. Intractable hiccups, however, are reported to have an organic cause in 80% of cases, with the remaining 20% thought to be psychogenic [8]. Intractable hiccups have been reported in 4% of patients with advanced cancer [9]. Pathologies in the adrenal glands and kidney, particularly the superior pole, irritate the diaphragm and phrenic nerve, activating the hiccup reflex.

We report on a case of intractable hiccups from a right renal tumour which was successfully managed at the Korle Bu Teaching Hospital (KBTH), in Accra, Ghana and review the literature.

2. Case Presentation

A 66-year-old male with a 2-yr history of intractable hiccups was referred to KBTH on account of a right renal mass on USG for a non-specific abdominal pain.

Patient is a known hypertensive and diabetic of 20 and 15 years, both of which are well controlled on Atenolol, Lisinopril, nifedipine and glibenclamide respectively.

He had received several medications over the period without relief.

He had no symptoms suggestive of kidney cancer at presentation except for the incidental finding on ultrasound scan.

He smoked for a short period and stopped 40 years ago, he holds a diploma in industrial refrigeration but has been a trader for over 30 years. He has no personal history of cancer and has not had any exposure to agro-chemicals.

He is the second of eight children of his parents, has a strong family history of malignancies, two of his siblings are deceased, one due to a renal tumour and the other a liver disease, a third sibling is currently being treated for oesophageal cancer. Both his parents are deceased all due complications of hypertension. He has no family history of diabetes.

His examination was essentially normal His haemoglobin was 11.4 g/dl. He had an elevated creatinine level of 195 umol/l and eGFR of 30 ml/min. However, the electrolytes were all normal.

Abdomino-pelvic Computed Tomography (CT)-scan revealed a well-defined non enhancing mass measuring 9.0 × 7.5 × 6.7 cm originating from the superior pole of the right kidney and growing out into the peri-renal space with mixed densities, mainly solid with no cystic components (**Figure 1**).

Figure 1. Superior pole tumour of the right kidney, growing out into the peri-renal space with mixed densities (arrowed).

Histology of a CT-guided biopsy was positive for renal cell carcinoma (RCC) of the right kidney.

Radical nephrectomy was thus performed with histology of the gross specimen confirming the Renal cell carcinoma of the papillary subtype; stage pT2aN0M0.

Patient had uneventful recovery with complete resolution of his hiccups post operatively. He has been receiving follow-up care at the oncology department of KBTH.

3. Literature Review/Discussion

Various causes of intractable hiccups have been documented, these include irritations in the ears, nose and throat, other more serious causes like central nervous disorders; for example, Encephalitis, meningitis, multiple sclerosis and stroke, metabolic disorders and some drugs including diabetes, chronic kidney diseases, alcoholism, anaesthesia, barbiturates, steroids and tranquillizers have also been implicated.

Renal tumours presenting as intractable hiccups are rare, a few however, are documented in literature.

In a case by Neumann *et al.*, a 64 years old male was reported to have a left renal mass with bilateral hilar lymphadenopathy and pulmonary nodules for which he presented as persistent hiccups, this patient underwent a radical nephrectomy and lymphadenectomy and histological studies of his tumour was Sarcoidosis, he had relief of the hiccups following the surgery [10].

A case of subcapsular renal abscess which presented as persisted hiccups was reported by Flanagan *et al.*, in a 47 years old male. This patient also had fever, nausea, abdominal pain and vomiting, the hiccups resolved following percutaneous drainage of the abscess and antibiotics [8].

Liao *et al.* also reported an 82 years old male who presented with a two months history of persistent hiccups associated with a six months history of abdominal distension and nausea, imaging studies show a giant left hydronephrosis and a T2N0M0 transitional cell carcinoma, following drainage of the hydronephrosis and nephrectomy the hiccups resolved [11]. Another case of intractable hiccups was reported by Pathmanathan *et al.*, of a 65 years old male who also presented with significant weight loss and a CT-scan images showed bilateral suprarenal tumours, this patient had biopsy of the masses which showed a histology of bilateral adrenal lymphoma, he was managed with chemotherapy and had resolution of his hiccups [12]. A similar case was reported by Srirangalingam *et al.* in a patient who was later diagnosed with Addison's disease secondary to disseminated histoplasmosis, this patient presented with intermittent persistent hiccups, fever and hyperpigmentation of the palms. A CT-scan showed bilateral adrenal masses, patient's general condition improved including resolution of the hiccups following treatment [13].

4. Conclusion

Hiccups are usually acute in onset, benign in origin and mostly self-limiting. However it could be a symptom of a more severe illness including renal malignancies especially when it is persistent, intractable or recurrent, it always requires a high index of suspicion and a thorough and complete evaluation to reach the underlying diagnosis.

Conflicts of Interest

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

References

[1] Chueh, K.S., Yeh, H.C. and Li, C.C. (2013) A Huge Renal Cell Carcinoma: Case Report and Literature Review. *Urological Science*, **24**, 58-60. https://doi.org/10.1016/j.urols.2013.05.001

[2] Kishore, M., Chauhan, D.S. and Dogra, S. (2018) Unusual Presentation of Renal Cell Carcinoma: A Rare Case Report. J*ournal of Laboratory Physicians*, **10**, 241-244. https://doi.org/10.4103/JLP.JLP_153_17

[3] Cymet, T.C. (2002) Retrospective Analysis of Hiccups in Patients at a Community Hospital from 1995-2000. *Journal of the National Medical Association*, **94**, 480-483.

[4] Samuels, L. (1952) Hiccup; A Ten Year Review of Anatomy, Etiology, and Treatment. *Canadian Medical Association Journal*, **67**, 315-322.

[5] Flanagan, M., Jennings, K. and Krywko, D. (2013) Renal Abscess in a Patient Presenting with Persistent Hiccups. *Case Reports in Emergency Medicine*, **2013**, 1-3. https://doi.org/10.1155/2013/459453

[6] Porzio, G., Aielli, F., Verna, L., *et al.* (2010) Gabapentin in the Treatment of Hiccups in Patients with Advanced Cancer: A 5-Year Experience. *Clinical Neuropharmacology*, **33**, 179-180. https://doi.org/10.1097/WNF.0b013e3181de8943

[7] Kobayashi, Z., Tsuchiya, K., Uchihara, T., Nakamura, A., Haga, C., Yokota, O.,

Ishizu, H., Taki, K., Arai, T., Akiyama, H. and Mizusawa, H. (2009) Intractable Hiccup Caused by Medulla Oblongata Lesions: A Study of an Autopsy Patient with Possible Neuromyelitis Optica. *Journal of the Neurological Sciences*, **285**, 241-245. https://doi.org/10.1016/j.jns.2009.06.014

[8] Liao, X.X., Yang, J.H. and Xing, N.Z. (2020) Intractable Hiccup Due to Giant Hydronephrosis: A Rare Case Report and Literature Review. *International Journal of Surgery Case Reports*, **67**, 134-138. https://doi.org/10.1016/j.ijscr.2019.12.013

[9] Medic, I., Enriquez, M.L. and Somer, R.A. (2017) Metastatic Renal Cell Carcinoma to Jejunum: An Unusual Case Presentation. *Urology Case Reports*, **13**, 34-36. https://doi.org/10.1016/j.eucr.2017.03.011

[10] Neumann, M., Lazo, K.G. and Stover, D. (2020) Sarcoidosis Presenting as Hiccups. *Respirology Case Reports*, **8**, 1-5. https://doi.org/10.1002/rcr2.605

[11] Padda, M.S. and Si, W.M. (2019) Rare Presentation of Renal Cell Cancer as Dysphagia: A Case Report. *Journal of Medical Case Reports*, **13**, 6-10. https://doi.org/10.1186/s13256-018-1967-6

[12] Pathmanathan, K., Kodali, V. and Mohamad, A. (2020) Primary Adrenal Lymphoma: A Case of Hiccups. *Oxford Medical Case Reports*, **4-5**, 1-4. https://doi.org/10.1093/omcr/omaa030

[13] Srirangalingam, U., Selvaratnam, R., Monson, J.P. and Grossman, A.B. (2011) A Case of Hiccoughs. *Clinical Medicine, Journal of the Royal College of Physicians of London*, **11**, 366-368. https://doi.org/10.7861/clinmedicine.11-4-366

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Endoscopic Management of Bladder Stones: Initial Experience at a Single Center in Cameroon

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Abstract

Purpose: This study aimed to evaluate the efficacy and safety of endoscopic lithotripsy with the lithoclast (EMS, Switzerland) and laser Holmium YAG in the management of bladder calculi. **Materials and methods**: This was a retrospective study carried out from January 2013 to December 2019 on 32 patients with bladder calculi. All the patients underwent either Lithoclast or Laser lithotripsy using a 22F Storz cystoscope at the *Centre medico-chirugicale d'urologie* in Douala, Cameroon. Data on patients' ages, clinical symptoms, stone sizes, type of lithotripsy, surgery duration, and results of lithotripsy were collected and analyzed using Epi info 7. **Results:** We recruited 32 participants (24 men and 8 women) with a median age of 41.28 [22 - 68] years into this study. In 9 (28.12%) participants, macroscopic hematuria was the main presenting complaint, followed by lower urinary tract symptoms in 8 (25%) patients. A cystoscopy was performed in 17 (53.12%) patients to confirm the diagnosis of a bladder stone, and ultrasonography of the upper urinary tract was performed in 29 (90.6%) cases to certify the absence of another stone. Lithoclast EMS was used to manage the stones in 23 (71.87%) patients while laser lithotripsy was used in 9 (28.13%). A dormia basket was used to remove stone fragments in 10 (31.25%) patients. The mean surgery duration was 33.59 ± 14.2 minutes, and the bladder stones were successfully managed in all the participants of this study. Minor complications such as pain during micturition were found in 28 (87.37%) patients, with complete resolution occurring two weeks after surgery. **Conclusion**: Endoscopy with lithotripsy is

a safe and effective method of management of bladder stones. This technique is also associated with short surgical procedures and postoperative hospitalization periods. We believe that it is an excellent treatment modality in the management of bladder stones.

Keywords

Bladder Stone, Lithotripsy, Mini-Invasive Surgery, Dormia Basket

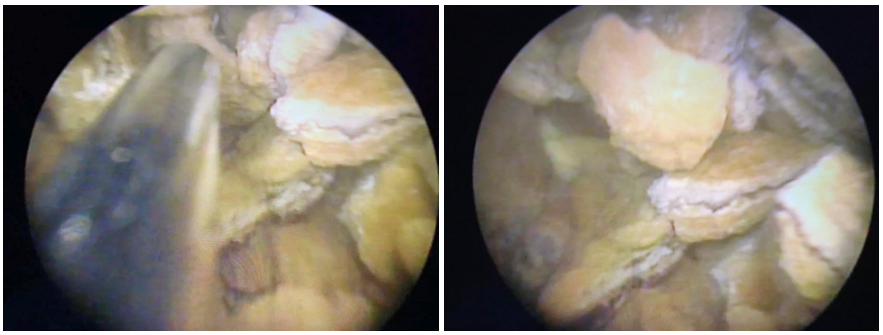
1. Introduction

The urinary bladder is a sac-like organ located in the pelvic cavity. The main function of this organ is to collect and store urine before its expulsion via micturition. The bladder, like other organs in the urinary tract, can be a location for urinary stones (calculi). These calculi develop when the minerals in urine crystalize to form stones. The minerals in question include urate, calcium oxalate, calcium phosphate, ammonium urate, cystine, and calcium-ammonium-magnesium phosphate [1]. In the literature, bladder stones are usually studied within the framework of urolithiasis and not as a separate entity. It has been reported that males are generally more predisposed to urinary stones than females [2]. Hence, as expected, the prevalence of bladder stones has also been reported to be higher in males than in females [3]. Bladder stones represent 5% of all urinary stones [4], and their clinical presentation is highly variable, ranging from being asymptomatic in some cases to having symptoms such as terminal macroscopic hematuria, suprapubic pain, recurrent infections, and irritable symptoms [5]. A CT image of a bladder stone is presented in **Figure 1**.

Bladder urolithiasis is mainly caused by urinary stasis, such as that due to benign prostatic hypertrophy or a neurogenic bladder. Foreign bodies that are left in the bladder and are not spontaneously expelled would eventually form layers of stone material and develop into bladder stones. In 36.7% of cases, bladder stones are associated with previous kidney stone disease [6]. The management of bladder stones depends on the clinical presentation and severity of the patient's symptoms. It ranges from conservative medical treatment to open surgery. It is important to manage large renal, ureteric, and bladder calculi in time because they could lead to more redoubtable medical conditions in the long run. Diniz *et al.* reported a case of renal failure due to a giant bladder stone in 2017 [7]. Medical treatment includes hyperhydration, non-steroidal anti-inflammatory drugs, and opioids in the case of refractory pain. Medical expulsive therapy (MET), which includes alpha-blockers such as doxazosin and tamsulosin, is sometimes used. Severe cases with large stones are managed surgically [8]. With recent advancements in technology, open surgery is gradually being replaced by mini-invasive procedures in the management of urolithiasis. Mini-invasive procedures have the advantages of being esthetic, being associated with shorter hos-

pitalization periods, having fewer complications, and being associated with less blood loss during the intervention, and having higher stone clearance rates than open surgery [9]. Currently, mini-invasive treatment options include extracorporeal shock wave lithotripsy (ESWL) and laparoscopic ureterolithotomy [10]. For bladder stones, mini-invasive lithotripsy techniques include transurethral cystolithotripsy (TUCL) and percutaneous cystolithotripsy (PCCL). According to current evidence, TUCL is the treatment of choice for bladder stones in adults and children [4]. As is the case with ureteral stones, lithotripsy of bladder stones can be performed either with the laser holmium YAG or the lithoclast (EMS, Switzerland) [11]. The long-term efficacy of mini-invasive techniques such as extracorporeal shockwave lithotripsy has been demonstrated in previous studies [12]. These techniques have also been demonstrated to have no significant adverse effects in the long term [13]. However, there is a paucity of studies comparing the results obtained using these two pieces of equipment in the management of bladder stones. The endoscopic view of a fragmented bladder stone during lithotripsy is presented in **Figure 2**.

Figure 1. Bladder stone on CT scan.



(a) (b)

Figure 2. Fragmentation of a stone using a lithoclast during surgery. (a) Lithoclast fragmenting the stone; (b) Fragments of the stone.

2. Materials and Methods

This is a retrospective study carried out from January 2013 to December 2019 at the *Centre medico-chirugicale d' urologie* in Douala, Cameroon. We included all patients with bladder stones who were diagnosed and managed at our center via either lithoclast or laser cystolithotripsy using a 22F Storz cystoscope and excluded patients whose files were missing some important information. We collected data from the clinical records of 32 patients with bladder calculi. The data collected for each patient included the age, sex, initial clinical presentation (which included lower urinary tract symptoms, recurrent urinary tract infections (two cases of infection with *E. coli* and one case each of infection with *Klebsiella pneumonaie*, *Staphylococcus saprophyticus*, and *Proteus mirabilis*), macroscopic hematuria, hypogastric pain, irritative symptoms, and acute urinary retention), diagnostic tool used, size of the bladder stone, duration of the surgical intervention, type of anesthesia used (locoregional anesthesia or general anesthesia), duration of hospitalization in days, postoperative complications, use of the dormia basket, and the outcome of the intervention. According to a previous study [14], we classified the bladder stones into small stones (<30 mm) and large stones (≥30 mm). These data were recorded in Microsoft Excel 2016 and later exported to Epi info 7 for analysis. Continuous variables were presented as mean values and standard deviations for normally distributed data and as median values with interquartile ranges for data with skewed distributions. Categorical variables were presented as frequencies and percentages. The Mann-Whitney U test and the independent-sample t-test were used to compare continuous variables for skewed and normally distributed data, respectively. The Chi-square test and Fisher's exact test were used to compare categorical variables. Values of $p < 0.05$ were considered statistically significant. This study was approved by the institutional review board of the Faculty of Medicine and Pharmaceutical Sciences of the University of Douala and by the ethics committee of the *Centre medico-chirugicale d'urologie* in Douala. The requirement for patients' informed consent was waived due to the retrospective nature of the study.

3. Results

We recruited a total of 32 patients into this study. Twenty-three (71.88%) of our participants underwent lithoclast lithotripsy and nine (28.12%) underwent laser holmium lithotripsy. The ages of our patients ranged from 22 years to 68 years, with a mean value of 41.28 ± 13.99 years. The patients who underwent lithoclast lithotripsy (45.83 ± 13.61 years) were significantly older than those who underwent laser holmium lithotripsy (29.67 ± 6.12 years) ($p = 0.002$). There were 24 (75%) men and 8 (25%) women in this study; however, the difference in gender distributions between the two groups was not statistically significant. Concerning the clinical presentations of the participants, the most common clinical presentation was macroscopic hematuria, which was manifested in 9 (28.13%)

participants. All participants with lower urinary tract symptoms, recurrent urinary tract infections, and acute urinary retention underwent lithoclast lithotripsy. Among the nine participants that underwent laser holmium lithotripsy, 6 (66.67%) presented with macroscopic hematuria, 1 (11.11%) presented with hypogastric pain, while 2 (22.22%) presented with irritative symptoms (Table 1).

The diameters of the stones ranged from 8 mm to 37 mm with a mean value of 19.09 ± 7.65 mm. There were 28 (87.5%) small stones and 4 (12.5%) large stones. All the patients who underwent laser holmium lithotripsy had small stones. There was no significant difference in the proportion of small and large stones between the two groups. The sizes of the stones of patients who underwent lithoclast lithotripsy ranged from 15 mm to 37 mm, with a mean value of 22.52 ± 6.14 mm, while those of patients who underwent laser holmium lithotripsy ranged from 8 mm to 13 mm, with a mean value of 10.33 ± 1.66 mm. The bladder stones in patients that underwent lithoclast lithotripsy were significantly bigger than those in patients that underwent laser holmium lithotripsy ($p < 0.001$). The positive diagnosis of these stones was done through cystoscopy in 17 (53.13%) cases, via ultrasound in 12 (37.5%) cases, and via antero-posterior tomodensitometry in 3 (9.38%) cases. Regarding the etiologies of the stones, there was no obvious etiology in 14 (43.75%) cases, the etiology was benign prostatic hypertrophy in 11 (34.38%) cases, non-resorbable sutures for vesicovaginal fistulas in two (6.25%) cases, calcified double-J stents in 3 (9.38%) cases, a neurogenic bladder and the presence of a prolapsed intrauterine contraceptive device in one case (3.13%) each (Table 2).

The surgery duration ranged from 15 minutes to 65 minutes, with a mean value of 33.59 ± 14.2 minutes. The mean duration of lithoclast lithotripsy was significantly higher than that of laser holmium lithotripsy. Lithotripsy was carried out under locoregional anesthesia in 29 (90.62%) cases and under general anesthesia in 3 (9.38%) cases. All cases of laser holmium lithotripsy were carried out under locoregional anesthesia. The duration of hospitalization ranged from 1 - 4 days with an average value of 1.219 days. There was no significant difference in the duration of hospitalization between the two techniques. There were no major postoperative complications except for two patients who experienced fever after undergoing lithoclast lithotripsy. Twenty-seven of the 32 study participants experienced painful micturition as a minor postoperative complication while five participants who underwent lithoclast lithotripsy did not experience any minor postoperative complication. However, this symptom completely was no longer present in all the participants who experienced it during their follow-up appointment that took place 15 days after the procedure. Ultrasound was used as the follow-up postoperative imaging method in 29 of the 32 study participants while anteroposterior tomodensitometry was used in three patients whose bladder stones resulted from calcified double-J stents. Dormia baskets were used in 10 (31.25%) participants but not used in 22 (68.75%) participants. There was a significant difference in the rate of use of the dormie basket between

the two groups. All the participants of this study survived the intervention (Table 3).

Table 1. Characteristics of the patients.

Parameter	Lithoclast	Laser Holmium	Total	p-value
Mean age	45.83 ± 13.61	29.67 ± 6.12	41.28 ± 13.99	**0.002**
Sex				
Males	17 (70.83%)	7 (29.17%)	24 (75%)	0.60
Females	6 (75%)	2 (25%)	8 (25%)	
Presentation				
Lower UT symptoms	8 (34.87%)	0 (0%)	8 (25%)	-
Recurrent UTIs	5 (27.74%)	0 (0%)	5 (15.63%)	-
Hematuria	3 (13.04%)	6 (66.67%)	9 (28.13%)	**0.005**
Hypogastric pain	2 (8.7%)	1 (11.11%)	3 (9.38%)	0.64
Irritative symptoms	1 (4.35%)	2 (22.22%)	3 (9.38%)	0.18
Acute urinary retention	4 (17.39%)	0 (0%)	4 (12.5%)	

*UT: Urinary tract; URI: Urinary tract infection.

Table 2. Characteristics of the stones.

Parameter	Lithoclast	Laser Holmium	Total	p-value
Mean diameter	22.52 ± 6.14	10.33 ± 1.66	19.09 ± 7.65	<**0.001**
Small stone (<30 mm)	19 (82.61%)	9 (100%)	28 (87.5%)	0.25
Large stone (≥30 mm)	4 (17.39%)	0 (0%)	4 (12.5%)	
Diagnosis				
Cystoscopy	11 (47.83%)	6 (66.67%)	17 (53.13%)	0.29
Ultrasound	9 (39.13%)	3 (33.33%)	12 (37.5%)	0.55
AP TDM	3 (13.04)	0 (0%)	3 (9.38%)	-
Etiologies of stones				
None obvious	5 (21.74%)	9 (100%)	14 (43.75%)	<**0.001**
BPH	11 (47.83%)	0 (0%)	11 (34.38%)	-
VVF suture	2 (8.7%)	0 (0%)	2 (6.25%)	-
Calcified JJ stent	3 (13.04%)	0 (0%)	3 (9.38%)	-
Neurogenic Bladder	1 (4.35%)	0 (0%)	1 (3.13%)	-
Prolapsed IUCD	1 (4.35%)	0 (0%)	1 (3.13%)	

*BPH: Benign prostatic hypertrophy; IUCD: Intrauterine contraceptive device; VVF: Vesicovaginal fistula; JJ stent: Double-J stent; AP TDM: Anteroposterior tomodensitometry.

Table 3. Characteristics of the lithotripsy.

Parameter	Lithoclast	Laser Holmium	Total	p-value
Surgery duration	37.83 ± 14.51	22.78 ± 4.41	33.59 ± 14.2	**0.005**
Hospitalization duration	1.219	1.3	1	0.25
Type of Anesthesia				
Locoregional	20 (86.96%)	9 (100%)	29 (90.62%)	0.36
General	3 (13.04%)	0 (0%)	3 (9.38%)	
Major post-op complications				
None	21 (91.30%)	9 (100%)	30 (93.75%)	0.51
Fever	2 (8.70%)	0 (0%)	2 (6.25%)	
Minor post-op complications				
None	5 (21.74%)	0 (0%)	5 (15.63%)	0.17
Painful micturition	18 (78.26%)	9 (100%)	27 (84.37%)	
Follow-up imaging				
Ultrasound	20 (86.96%)	9 (100%)	29 (90.62%)	0.36
AP TDM	3 (13.04%)	0 (0%)	3 (9.38%)	
Use of the dormia basket				
Yes	10 (43.48%)	0 (0%)	10 (31.25%)	**0.018**
No	13 (56.52%)	9 (100%)	22 (68.75%)	

*AP TDM: Anteroposterior tomodensitometry.

4. Discussion

This study aimed to evaluate the efficacy and safety of endoscopic lithotripsy with the lithoclast (EMS, Switzerland) and laser Holmium YAG in the management of bladder calculi. The mean age of our study participants was 41.28 ± 13.99 years, which is higher than the mean age of 13 years reported by Esposito *et al.* in 2021 [15] but lower than the 54.70 ± 9.80 years reported by Gong *et al.* in the same year [14]. This difference in age is mainly because Esposito *et al.* carried out their study in children and Gong *et al.* carried out theirs in older adults who were predisposed to bladder outlet obstruction issues such as prostatic hypertrophy while we studied young adults. There were 24 (75%) men and 8 (25%) women in our study, which is in line with a report stating that the incidence of stones in men is more than twice that in women [16]. A 15:1 male-to-female ratio was also reported by Karami *et al.* in 2016 [17]. In our study, macroscopic hematuria (28.13%) and acute urinary retention (12.5%) were among the main clinical presentations. This is in line with the report presented by Toricelli *et al.* in 2017 [18], as they reported macroscopic hematuria and acute urinary retention as the two main clinical findings in their 65-year-old patient. Other clinical presentations we enlisted, including lower urinary tract symptoms (25%) and bladder irritative symptoms (9.38%), which were also re-

ported by Chong *et al.* in 2021 [14], while pain was reported by Hammad *et al.* in 2006 [19]. As concerns the etiologies of the bladder stones, we reported no obvious etiology in 43.75% of cases, BPH in 34.38% of cases, VVF sutures in 6.25% of cases, calcified double-J stents in 9.38% of cases, prolapsed IUCDs in 3.13% of cases, and a neurogenic bladder in 3.13% of cases. As can be observed, all our obvious etiologies classify as bladder outlet obstruction, which is in line with the findings of the study by Douenias *et al.* who reported bladder outlet obstruction as the main cause of bladder stones [20]. As stated earlier, the bladder stones were managed either via lithoclast lithotripsy or laser holmium lithotripsy. The surgery duration was significantly longer in the lithoclast lithotripsy group than in the laser holmium lithotripsy group, which is in line with the results of the study carried out by Jeon *et al.* in 2005 [11]. However, unlike Jeon *et al.*, we found no significant difference in the duration of hospitalization between the two groups. This is probably because unlike Jeon *et al.* who recruited a similar number of participants in both groups, one of the groups in our study is made of 23 participants while the other is made of just 9 participants. Sajid *et al.* also reported a significantly shorter surgery duration with laser holmium lithotripsy than with lithoclast lithotripsy in 2021 [21]. All the 9 patients who underwent laser holmium lithotripsy did so under locoregional anesthesia, which is in line with the findings of Cicione *et al.* in 2018 [22]. As stated earlier, the only major postoperative complication reported among our study participants was fever, and no case of fever was reported in the laser holmium group. This is in line with the findings of Tipu *et al.* in 2007, who concluded that laser holmium lithotripsy was a superior technique to pneumatic lithoclast lithotripsy in terms of stone clearance and complications [23]. The age of the patients in the lithoclast lithotripsy group was significantly higher than that in the laser holmium lithotripsy group, which is also in line with the findings of Tipu *et al.* The mean stone size of the lithoclast lithotripsy group was significantly higher than that of the laser holmium lithotripsy group, which is contrary to the findings of previous studies [23] [24]. In this study, the stone clearance rate was 100% for both procedures, which is contrary to the findings of previous studies which report a higher stone clearance rate for laser holmium lithotripsy than for lithoclast lithotripsy [23] [24]. This is probably due to the fact that we recruited fewer participants and went further to use a dormia basket to extract stone fragments in certain cases to ensure a 100% stone clearance rate.

5. Conclusion

Both lithoclast lithotripsy and laser holmium lithotripsy are efficient in the management of bladder stones. However, laser holmium lithotripsy offers the additional advantage of a shorter surgery duration and significantly fewer postoperative complications.

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Conflicts of Interest

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

References

[1] Nevo, A., Moore, J.P., Humphreys, M.R., Salih, S., Keddis, M.A., Rose, K.M., *et al.* (2020) Does Bladder Stone Composition Predict Kidney Stone Composition? *The Canadian Journal of Urology*, **27**, 10450-10455.

[2] Liu, Y., Chen, Y., Liao, B., Luo, D., Wang, K., Li, H., *et al.* (2018) Epidemiology of Urolithiasis in Asia. *Asian Journal of Urology*, **5**, 205-214. https://doi.org/10.1016/j.ajur.2018.08.007

[3] Qaader, D.S., Yousif, S.Y. and Mahdi, L.K. (2006) Prevalence and Etiology of Urinary Stones in Hospitalized Patients in Baghdad. *EMHJ*, **12**, 853-861.

[4] Donaldson, J.F., Ruhayel, Y., Skolarikos, A., MacLennan, S., Yuan, Y., Shepherd, R., *et al.* (2019) Treatment of Bladder Stones in Adults and Children: A Systematic Review and Meta-Analysis on Behalf of the European Association of Urology Urolithiasis Guideline Panel. *European Urology*, **76**, 352-367. https://doi.org/10.1016/j.eururo.2019.06.018

[5] Stav, K. and Dwyer, P.L. (2012) Urinary Bladder Stones in Women. *Obstetrical & Gynecological Survey*, **67**, 715-725. https://doi.org/10.1097/OGX.0b013e3182735720

[6] Childs, M.A., Mynderse, L.A., Rangel, L.J., Wilson, T.M., Lingeman, J.E. and Krambeck, A.E. (2013) Pathogenesis of Bladder Calculi in the Presence of Urinary Stasis. *Journal of Urology*, **189**, 1347-1351. https://doi.org/10.1016/j.juro.2012.11.079

[7] Diniz, A.L., Vieiralves, R.R., Souza, T.A. and Favorito, L.A. (2017) Giant Bladder Stone and Renal Failure: A Case Report, Literature Review and Future Perspectives. *Open Access Library Journal*, **4**, 1-8. https://doi.org/10.4236/oalib.1103332

[8] Thakore, P. and Liang, T.H. (2021) Urolithiasis. In: *StatPearls* [*Internet*], StatPearls Publishing, Treasure Island (FL), 1-9. http://www.ncbi.nlm.nih.gov/books/NBK559101

[9] Charig, C.R., Webb, D.R., Payne, S.R. and Wickham, J.E. (1986) Comparison of Treatment of Renal Calculi by Open Surgery, Percutaneous Nephrolithotomy, and Extracorporeal Shockwave Lithotripsy. *British Medical Journal* (*Clinical Research ed.*), **292**, 879-882. https://doi.org/10.1136/bmj.292.6524.879

[10] Shafi, H., Moazzami, B., Pourghasem, M. and Kasaeian, A. (2016) An Overview of Treatment Options for Urinary Stones. *Caspian Journal of Internal Medicine*, **7**, 1-6.

[11] Jeon, S.S., Hyun, J.-H. and Lee, K.-S. (2005) A Comparison of Holmium:YAG Laser with Lithoclast Lithotripsy in Ureteral Calculi Fragmentation. *International Journal of Urology*, **12**, 544-547. https://doi.org/10.1111/j.1442-2042.2005.01087.x

[12] Tadenuma, H., Ishihara, T., Yamaguchi, T., Tsuchiya, S., Kobayashi, A., Nakamura, K., *et al.* (2005) Long-Term Results of Extracorporeal Shockwave Lithotripsy and Endoscopic Therapy for Pancreatic Stones. *Clinical Gastroenterology and Hepatology*, **3**, 1128-1135. https://doi.org/10.1016/S1542-3565(05)00530-6

[13] Wilson, W.T. and Preminger, G.M. (1990) Extracorporeal Shock Wave Lithotripsy. An Update. *Urologic Clinics of North America*, **17**, 231-242. https://doi.org/10.1016/S0094-0143(21)00324-4

[14] Gong, Z.-C., Wu, Z.-L., Wen, Y.-A., Zou, J.-P., Wang, X., Leng, X., *et al.* (2021) Sexual Dysfunction in Patients with Urinary Bladder Stones but No Bladder Outlet Obstruction. *Frontiers in Medicine*, **8**, Article ID: 704360. https://doi.org/10.3389/fmed.2021.704360

[15] Esposito, C., Autorino, G., Masieri, L., Castagnetti, M., Del Conte, F., Coppola, V., *et al.* (2020) Minimally Invasive Management of Bladder Stones in Children. *Frontiers in Pediatrics*, **8**, Article ID: 618756. https://doi.org/10.3389/fped.2020.618756

[16] Steggall, M.J. (2001) Urinary Tract Stones: Causes, Complications and Treatment. *British Journal of Nursing* (*Mark Allen Publishing*), **10**, 1452-1456. https://doi.org/10.12968/bjon.2001.10.22.9340

[17] Karami, H., Razaghi, M.R., Javanmard, B., Yaghoob, M., Hasanzadeh Hadad, A., Amani, M., *et al.* (2016) Outpatient Transurethral Cystolithotripsy of Large Bladder Stones by Holmium Laser. *Journal of Lasers in Medical Sciences*, **7**, 12-15. https://doi.org/10.15171/jlms.2016.03

[18] Torricelli, F.C.M., Chueh, S.-C.J., Shen, S. and Monga, M. (2017) Multiple Uric Acid Bladder Stones: Clinical Presentation and Endoscopic Management. *Journal of Endourology Case Reports*, **3**, 21-23. https://doi.org/10.1089/cren.2016.0134

[19] Hammad, F.T., Kaya, M. and Kazim, E. (2006) Bladder Calculi: Did the Clinical Picture Change? *Urology*, **67**, 1154-1158. https://doi.org/10.1016/j.urology.2005.12.038

[20] Douenias, R., Rich, M., Badlani, G., Mazor, D. and Smith, A. (1991) Predisposing Factors in Bladder Calculi. Review of 100 Cases. *Urology*, **37**, 240-243. https://doi.org/10.1016/0090-4295(91)80293-G

[21] Sajid, M.T., Ameen, M., Murtaza, B., Alvi, M.S., Khan, Z. and Kiani, F. (2021) Comparison of Mean Operative Time in Patients Undergoing Ho:YAG Laser Lithotripsy and Pneumatic Lithotripsy in Ureterorenoscopy for Ureteric Calculus. *Pakistan Journal of Medical Sciences*, **37**, 415-420. https://doi.org/10.12669/pjms.37.2.3049

[22] Cicione, A., de Nunzio, C., Manno, S., Damiano, R., Posti, A., Lima, E., *et al.* (2018) Bladder Stone Management: An Update. *Minerva Urology and Nephrology*, **70**, 53-65. https://doi.org/10.23736/S0393-2249.17.02972-1

[23] Tipu, S.A., Malik, H.A., Mohhayuddin, N., Sultan, G., Hussain, M., Hashmi, A., *et al.* (2007) Treatment of Ureteric Calculi—Use of Holmium:YAG Laser Lithotripsy versus Pneumatic Lithoclast. *Journal of Pakistan Medical Association*, **57**, 440-443.

[24] Abedi, A.R., Razzaghi, M.R., Allameh, F., Aliakbari, F., FallahKarkan, M. and Ranjbar, A. (2018) Pneumatic Lithotripsy versus Laser Lithotripsy for Ureteral Stones. *Journal of Lasers in Medical Sciences*, **9**, 233-236. https://doi.org/10.15171/jlms.2018.42

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Transurethral Resection of the Prostate (TURP)—An Experience of the Urology Department of the University Hospital of National Reference of N'Djamena (TCHAD)

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Abstract

Introduction: Transurethral Resection of the Prostate (TURP) is a multi-invasive technique in the management of Benign Prostatic Hyperplasia. It constitutes a reference in developed countries; however in sub-Saharan Africa, it is prostatic adenomectomy which is mostly used. The aim was to analyze the results of the TURP carried out at the General National Reference University Hospital in N'Djamena (Chad). **Patients and Methods**: This is a retro-prospective study which extended over a period of 2 years, from June 2014 to May 2016. The records of all patients who had undergone TURP during this period were listed and analyzed. We did frequencies and average calculations. **Results:** 59 patients' results that were treated with TURP were collected. TURP represented 33.4% of all interventions performed for prostate pathologies. The average age of our patients was 66 ± 8.06 years (50 to 92). Urinary retention was the main reason for consultation (45.7%; n = 27) followed by dysuria (27.1%; n = 16). TURP was associated with another procedure in 28.8% (n = 17). The average duration of hospitalization of our patients was 4.15 days with extremes of 2 to 9 days. Perioperative complications represented 13.6% of cases, early complications represented 15.3% of cases and late complications represented 6.8% of cases. The postoperative voiding status with an average follow-up of 6 months was judged to be good in 72.8% of cases (n = 43). **Conclusion:** TURP occupies an important place in the management of prostate pathologies with precise indications. It offers many advantages. It must be popularized in our countries; this will make it possible to limit morbidity and mortality rates and slow down medical evacuations abroad.

Keywords

RTUP, HBP, Complications, N'Djamena/Chad

1. Introduction

Transurethral resection of prostate (TURP) is a very old practice because already in the 16th century Ambroise Paré performed blind endocavitary resections, while the first true endoscopic resections date from the 1930s [1]. Now it has become the reference treatment for benign prostatic hyperplasia, for several decades in Europe and in the United States [2] [3] [4]. In Canada out of 8528 adenomectomies, TURP was performed in 92.6% of cases [5]. In Burkina Faso, out of 998 adenomectomies in seven years, 81 TURPs were performed [6]. In Chad, no study has been carried out in the past. This is due either to the difficulties of acquiring resection columns for certain health structures, or to the limited number of urologists or even to the often high cost of this mode of treatment for certain segments of the population. This practice is recent in our country. This work describes our experience by analyzing the epidemiological aspects, the result, the complications and the constraints of the practice of TURP at the National Reference Hospital of Ndjamena.

2. Materials and Method

This is a retrospective study carried out over a period of two years from July 2014 to June 2016 at the Urology Department of the CHU of National Reference. During this period, 59 files were collected. Included in the study were all patients in whom a transurethral resection of the prostate for BPH was performed, and whose operative report and postoperative follow-up, with a follow-up of at least 6 months, appeared in the case.

Variables studied:

Sociodemographic variables:

• Age, profession, terrain

Clinical variables:

Reasons for consultation, duration of symptoms, • Rectal Examination data

Paraclinical variables:

• Total PSA level; Ultrasound data of the urinary tree (prostatic volume, RPM, state of the bladder, kidneys);

Therapeutic variables:

• The indication of the TURP; the type of anesthesia used; The associated gestures; duration of intervention;

Evolutionary variables

• Per and postoperative complications. Intraoperative complications (all complications occurring during the operation). Early post-operative complications (all complications occurring within the first 30 days). Late post-operative com-

plications: those that were noted beyond the first 30 days of the operation.

- The duration of postoperative bladder drainage;

Length of hospital stay.

Results

Functional result: postoperative voiding quality:

The results were clinically evaluated. We took into account two parameters: the study of urination and urinary continence. Thus, the results were judged:

Good:

When the patient shows normal urination with bladder continence during the voiding test: absence of dysuria, good voiding stream and absence of urine leakage after urination.

Means:

When he presents with dysuria or UAR on removal of the probe requiring reinsertion of a probe for 1 to 2 days with restoration of normal urination thereafter. When he also has urine leaks between urinations which disappear before 3 months of postoperative follow-up.

Bad:

Due to the persistence of dysuria or episodes of AUR or urinary incontinence beyond the 3rd postoperative month.

The sources of the data were the files, the registers of hospitalization and operating room. A data collection sheet was developed, the data was compiled in Excel and analyzed with SPSS 18. The quantitative variables were expressed as means and the qualitative variables as percentages. A statistical correlation was sought between the variables using the Chi2 test. It was considered significant if $p \leq 0.05$.

3. Results

During the study period, 59 files meeting our inclusion criteria were collected. TURP accounted for 31.3% and 33.4% respectively of the department's endoscopic activities and interventions for prostate pathologies.

The mean age of patients was 66 ± 8.06 years with extremes ranging from 50 to 92 years. The age group between 60 - 69 years was the most represented (45.7 %) according to Figure 1.

Urine retention was the main reason for consultation (45.7%; n = 27) followed by dysuria (27.1%; n = 16). Digital rectal examination was performed in all our patients, it was suspicious in 6.8% of cases (n = 4). The prostate specific antigen (PSA) was less than or equal to the norm in 76.3% of cases (n = 45) with an average prostate volume of 50.20 ml on ultrasound. In half of our patients, a fighting bladder was found (55.9%).

Seventeen of our patients (28.8%) had at least two episodes of urinary retention, which raised the indication for surgical treatment of TURP (Table 1). All our patients were operated under spinal anesthesia, of which 6 cases, or 10.2%, were converted to general anesthesia. TURP was associated with another proce-

dure in 17 cases, *i.e.*, 28.8%. Cystolithotomy, hernia repair and endoscopic urethrotomy (UIE) were the procedures associated with TURP, respectively in 10.2%; 8.4% and 6.8%.

The average duration of the intervention was 54.80 minutes with extremes of 30 and 90 minutes. The average catheter wearing time was 3.5 days with extremes of 2 to 10 days. The average length of hospitalization of our patients was 4.15 days with extremes of 2 to 9 days.

Peroperative complications accounted for 13.6% of cases, dominated by hemorrhage in 8.5% and subtrigonal detachment in 5.1%. Early complications represented 15.3% of cases, dominated by acute urinary retention (6.8%); urinary and genital infection (5.2%). Late complications represented 6.8% of cases, dominated by dysuria 5.1% and urinary incontinence 1.7%. The feeling of the patients on their postoperative voiding state with an average follow-up of 6 months was judged to be good in 43 cases, *i.e.*, 72.8% (Table 2).

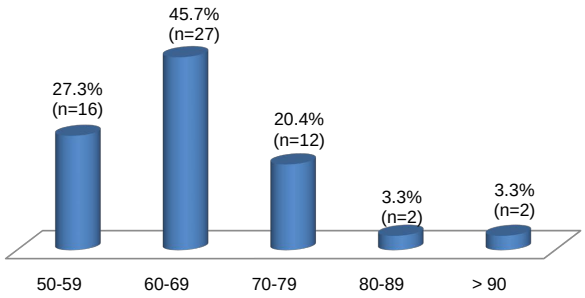

Figure 1. Distribution of patients according to age groups.

Table 1. Distribution of patients according to indications.

Indication	NOT	%
Failure of medical treatment	9	15.3
Iterative RAU	17	28.8
RCU	10	16.9
Hematuria	9	15.3
Bilateral ureterohydronephrosis with ARF	8	13.6
Bladder stones	6	10.1
Total	59	100

Table 2. Distribution of patients according to postoperative voiding status.

Voiding state	not	%
Good	43	72.8
Fair	10	16.9
Bad	6	10.2
Total	59	100

4. Discussion

During our study period, 177 surgeries were performed for prostate pathologies, including 59 by TURP. TURP accounted for 33.3% returns after prostatic adenomectomy which was 57.6%. This frequency is close to that of Kane *et al.* [7] in Senegal who found 29%. Nouri [8] in Morocco and Loussaief [9] in Tunisia reported a frequency of 52.18% and 58.12% respectively. Our result is lower than that observed by other authors from clearly equipped countries. This low rate in our series could be explained by the fact that TURP is a technique recently introduced into our therapeutic arsenal and therefore less practiced.

The average age was 66 ± 8.06 years with extremes ranging from 50 years to 92 years. The age group most concerned is that between 60 - 69 years with a percentage of 47%. Other series report similar results [10]. The occurrence of the pathology increases with the aging of the population and the increase in life expectancy.

Urinary retention is the main reason for consultation (45.7%; n = 27) followed by dysuria (27.1%; n = 16). It was acute retention of urine in 17 cases and chronic retention in 10 cases. Our results can be superimposed on those of Kane *et al.* [7] in Senegal who found a frequency of 29 cases of urine retention, including 17 cases of acute retention and 12 cases of chronic retention. In the North African series, at Nouri [8] in Tunisia, retention of urine is the most frequent cause with respectively 31.1% and 40% of cases. The risk of recurrence is high and estimated at 60% within a year [11]. Acute iterative urinary retention is often an indication for surgery [12]. The high rate of urinary retention in our study and in other series demonstrates that the majority of patients consult themself at the stage of complications.

The symptomatology evolved for more than 6 months in 76.3% of our patients. This could be explained by the lack of information of the population, the lack of financial means, the first-line use of traditional treatments.

All the patients in our series had benefited from a PSA assay. The average rate was 3.5 ng/ml. This rate is similar to that of Ghozzi [13] in Tunisia which was 3.3 ng/ml.

The average volume of the prostate was 50.2 ml with extremes of 28 to 60 ml. Diakité *et al.* [14] in Mali in 2016, Kane *et al.* [7] in Senegal in 2013 and Ghozzi *et al.* [13] in Tunisia in 2013 respectively reported a volume of 50 ml, 51.6 ml and 49.5 ml.

In our series, acute iterative urinary retention was the main indication for surgical treatment (28.8%; n = 17). This result is similar to that of the literature [12].

TURP was associated with another procedure in 17 of our patients, *i.e.* 28.8% of cases. This rate can be superimposed on that of Kane *et al.* [7] and Ham *et al.* [15] who respectively report 26.3% and 33.68% of cases.

Endoscopic urethrotomy was associated with TURP in 6.8% of cases. This result is significantly higher than that of Kane *et al.* [7] who find a frequency of

4.3% and 2.3% respectively. This difference could be explained by the frequency of urogenital infections in our untreated or poorly treated regions which are a source of urethral stricture.

Intraoperative complications were 13.6%. This rate is similar to that of Kane *et al.* [7] who found 15.4%. However, our results are relatively high compared to the series of Fourcade [4] which reports 3.11%. These intraoperative complications are dominated by haemorrhages in 8.5% (n = 5), who had received a postoperative blood transfusion.

We noted cervico-prostatic detachment in 5.1% of cases. This result is higher than that of Abdallah M *et al.* [9] who noted 2 cases, ie 0.16%, whose management was to extend the survey to 10 days.

Early complications accounted for 15.3% of cases in our series, dominated by acute urinary retention (6.8%); The frequency of acute urinary retention on removal of the catheter after TURP in our series is higher than that of Fourcade [4] who reported 4.8% of cases in his series.

Three of our patients (3.5%) had presented epididymo-orchitis, this result is comparable to that found by Abdallah *et al.* [10] who noted 3.6% of cases.

The frequency of occurrence of this complication in our study falls within the range of the literature where it varies between 2% and 25% according to Normand [16]. In our series, late complications were reported in 4 patients (6.77%). Three patients (5.08%) had dysuria for a follow-up of 6 months. However, these patients were subsequently lost to follow-up before an etiology was identified. Abdallah M. [10] found 5% dysuria in his series. In our series, the average duration of catheter wearing was 3.5 days with extremes of 2 to 8 days. This duration is comparable to that of Kane [7] in his series finding an average of 4 days. However Ghozzi [13] reports an average duration of 1.5 days. The long duration of our series compared to that of the literature could be explained by the occurrence of early per and postoperative complications in our series which required an extension of catheterization and hospital stay for better management. The average length of hospital stay in our series is 4.15 days. This duration is similar to that of. Ghozzi [13] in his series found an average duration of 1.17 days. We can say that TURP allows a reduction in the average length of stay and therefore hospital discharge. In our series, the postoperative voiding state was judged on the feeling of voiding quality judged to be good in 72.8%. Result superimposable on that of Fourcade [4] which finds a good result in 75% of cases. On the other hand, Diakité *et al.* [14] in Mali report a rate of 80.1% which is clearly higher than our results. An objective assessment could be obtained by a flow meter—not feasible in our environment.

5. Conclusion

The RTUP occupies an important place and exhibits good results. But its practice is confronted with many obstacles, still leaving adenomectomy a major place. It offers more advantages in terms of morbidity, mortality, and hospital stay, thus allowing better surgical management of BPH.

Conflicts of Interest

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

References

[1] Mathieu, F. (1994) Les premières résections endoscopiques. *La Revue du Praticien* (*Paris*), **44**, 235.

[2] Chen, Y.-K. and Lin, H.-C. (2008) Association between Urologist's Caseload Volume and In-Hospital Mortality for Transurethral Resection of Prostate: A Nationwide Population-Base Study. *Urology*, **72**, 329-335. https://doi.org/10.1016/j.urology.2008.03.016

[3] Baazeem, A. and Elhilali, M.M. (2008) Surgical Management of Benign Prostatic Hyperplasia: Current Evidence. *Nature Clinical Practice Urology*, **5**, 540-549. https://doi.org/10.1038/ncpuro1214

[4] Fourcade, R.O. and Vallancien, G. (2000) Morbidity of Endoscopic Resection of the Prostate: Prospective Study at 3 Months. *Progrès en Urologie*, **10**, 48-52.

[5] D'hoore, W., Sicotte, C. and Tilquin, C. (1993) The Epidemiological Approach to the Evaluation of Hospital Care: Study of Mortality and Complications Following Prostatectomy. *Computers and Health*, **6**, 235.

[6] Zango, B., Kambou, T. and Sanou, A. (2002) Transurethral Resection of the Prostate at the Sanou Souro Hospital in Bobo-Dioulasso: About 68 Cases. *African Journal of Urology*, **8**, 1-5.

[7] Kane, R., Ndiaye, A. and Ogougbemy, M. (2013) Transurethral Resection of Prostate. Experience of the Principal Hospital of Dakar, Senegal. *Medecine Afric Black*, **60**, 110-114.

[8] Nouri, M., Elkkhadri, K., Elfassi, J., Koutani, A., Ibn Attya, A., Hachimi, M. and Lakrissa, A. (1999) Benign Prostatic Hypertrophy: Clinical and Therapeutic Aspects about 1280 Operated Cases. *Annales d'Urologie*, **33**, 243-251.

[9] Loussaief, H., Bennis, M., Ben Hassine, L., Chebril, M. and Ayed, M. (1995) Treatment of Prostate Adenoma. Open Surgery or Transurethral Resection? About 681 Cases. *Tunis Chirurgy*, **6**, 110-115.

[10] Abdalla, M., Davin, J.L., Granier, B., *et al.* (1989) Complications of Transurethral Resection in the Cure of Benign Prostatic Hypertrophy: Apropos of a Series of 1180 Adenomas. *The Journal of Urology*, **95**, 15-21.

[11] Klarskov, P. anderson, J.T., Asmussen, C.F., *et al.* (1987) Symptoms and Signs Predictive of the Voiding Pattern after Acute Urinary Retention in Men. *Scandinavian Journal of Urology and Nephrology*, **21**, 23-28. https://doi.org/10.3109/00365598709180285

[12] Fourcade, R.O., Lanson, Y. and Teillac, P. (1993) Results of Surgical Treatment of Benign Prostatic Hypertrophy. Report of the 87th AFU Congress. *Progrès en Urologie*, **3**, 828-906.

[13] Ghozzi, S., Ghorbel, J., Ben Ali, M., Dridi, M., Maarouf, J., Khiari, R. and Ben Rais, N. (2014) Bipolar versus Monopolar Transurethral Resection of the Prostate: A Prospective Randomized Study. *Progrès en Urologie*, **24**, 121-126. https://doi.org/10.1016/j.purol.2013.08.307

[14] Diakite, M.L., Berthe, H.J.G., Diallo, M.S., Kambou, D., Banou, P., Diakite, A.S., Sangare, D., Sissoko, I. and Tembely, A. (2016) Endoscopic Bipolar Resection: Ex-

perience of the CHU Urology Department of the Point. *Uro-Andrology*, **11**, 264-268.

[15] Ham, W.S., Kim, W.T., Jeon, H.J., *et al.* (2009) Long-Term Outcome of Simultaneous Transurethral Resection of Bladder Tumor and Prostate in Patients with Non-muscle Invasive Bladder Tumor and Bladder Outlet Obstruction. *The Journal of Urology*, **181**, 1594-1599. https://doi.org/10.1016/j.juro.2008.11.099

[16] Normand, G., Guignet, J., Briffaux, R., *et al.* (2006) "Bullet Fall" after Endoscopic Resection of the Prostate. *Progrès en Urologie*, **16**, 461-463.

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Epidemiological and Clinical Aspects of Bladder Tumours at the Nianankoro Fomba Hospital in Segou in the Urology Department

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Abstract

Objectives: To study the epidemiological, diagnostic and prognostic aspects of bladder tumours in Segou Hospital. **Patients and Methods:** We conducted a descriptive cross-sectional study of bladder tumours over the period from 1 April 2012 to 1 April 2017, in the urology department of the Nianankoro Fomba Hospital in Segou. The first three years were used for patient recruitment, and the last two years for follow-up of the patients in the series. **Results:** Over a period of three years, we collected 165 cases of bladder tumours hospitalised out of 1308 hospitalisations from 7007 consultations, *i.e.* 12.6% of hospitalisations and 2.3% of consultations. The sex ratio was 1.2 in favour of men. A history of treated bilharzia was reported in 78.8% of cases and untreated bilharzia in 9.1% of cases. Haematuria was the most common reason for consultation. The majority of our patients were at stage T4 and T3 at the time of diagnosis, *i.e.* 53.3% and 44.3% respectively. Most patients consulted within 13 to 24 months after the first sign, *i.e.* 44.8%. **Conclusion:** The prognosis is still clouded by the delay in management. All the patients diagnosed had a bladder tumour infiltrating the muscle.

Keywords

Bladder Tumour, Bladder Cancer, Epidemiological and Clinical Aspects

1. Introduction

Bladder tumours are a major public health problem despite technical and technological advances. A bladder tumour is diagnosed or treated in 2.7 million

people worldwide each year and the majority of cases occur after the age of 60 [1]. In France, this disease, with an estimated 13,074 new cases and 5335 deaths in 2018, 80% of which were in men, ranks 4th[e] in incidence and 7th[e] in deaths for all cancers combined (Institut de Veille Sanitaire (In, Vs, 2018)) and is the second most common cancer after prostate cancer [2]. In developed countries, the main risk factor is tobacco intoxication [3], but in our context, urinary bilharziasis linked to *Schistosoma haematobium*, the most widespread with a high prevalence in the Office du Niger of 62.8% [4], is a proven risk factor for bladder tumours. It predisposes to squamous cell bladder tumour. This is the most common case in Africa [4] [5].

Diagnosis remains late in our country. Almost all patients are in stages T3 and T4, at the time of diagnosis 55% in stage T3 and 25% in stage T4 [6].

According to the cancer registry in Mali (2010), bladder tumour is the third[e] most common cancer in men, the fifth[e] most common in women and the fifth[e] most common cancer in both sexes combined.

Bladder tumour is the leading cause of cancer mortality in the urology department of the Point G University Hospital.

The bilharzia endemic in the Segou region and especially in the Office du Niger zone justified our study of bladder tumours in a local hospital centre, knowing the role of bilharzia in the genesis of this pathology.

Thus, the general objective of this study was to study the socio-demographic and clinical characteristics of patients diagnosed with bladder tumours at the Nianankoro Fomba Hospital. The specific objectives were to:

- Identify history and risk factors in patients with bladder cancer;
- Assess the stage of development at the time of diagnosis;
- Study the survival of patients admitted with bladder cancer.

2. Patients and Methods

2.1. Type of Study, Period and Location

This was a descriptive cross-sectional study of bladder tumours at the Nianankoro Fomba Hospital over a period of 5 years (from 1[er] April 2012 to 1[er] April 2017), *i.e.* 3 years for patient recruitment and 2 years for follow-up of each patient.

2.2. Inclusion Criteria

The study included patients hospitalised during the study period, for whom the diagnosis of bladder tumour was retained on clinical and para-clinical examination, confirmed or not by histological examination.

2.3. Data Collection and Analysis

The data collection was based on the hospitalization register, hospital records, consultation register, and surgical protocol register. The following parameters were studied: -age -sex -ethnicity -occupation -residence in relation to endemic

areas -clinical and non-clinical parameters. Data entry and analysis were done with epi-info 3.5.1 version 6. Fr World Microsoft software.

3. Results

Over a period of three years, we collected 165 cases of bladder tumours hospitalised out of 1308 hospitalisations from 7007 consultations, *i.e.* 12.6% of hospitalisations (Table 1) and 2.3% of consultations. The sex ratio was 1.2 in favour of men (Figure 1).

The 30 - 45 age group was the most represented with 31.5% (Table 2). Housewives and farmers were the most represented with 46% and 36.4% respectively because of activities related to risk factors (Table 3). A history of treated bilharzia was reported in 78.8% of cases and untreated bilharzia in 9.1% (Table 4).

Haematuria was the most common reason for consultation 96.4% (Table 5).

The majority of our patients were in stage T4 and T3 at the time of diagnosis, 53.3% and 44.3% respectively (Table 6). Most patients consulted within 13 to 24 months after the first sign, 44.8%. The survival of patients exceeded 36 months in only 5 cases (Figure 2).

The origin of the patients was mainly the areas covered by the rice-growing and market gardening activities of the Office du Niger, with 40.6% coming from Niono and 32.2% from Macina, this being related to the bilharzia endemic (Figure 3).

Table 1. Frequency of bladder tumours among other inpatient conditions during the 3-year period.

Pathologies	Frequency	Percentage
Benign prostatic hyperplasia	446	34.5%
Bladder tumour	165	12.6%
Hernia	133	10.3%
Renal lithiasis	16	1.2%
Bladder lithiasis	32	2.5%
Hydrocele	63	4.9%
Urogenital infection	20	1.5%
Gynephrosis	23	1.8%
Narrowing of the urethra	65	5.0%
Cystocele	35	2.7%
Prostate cancer	23	1.8%
Gangrene in the stock market	32	2.5%
Renal failure	12	0.9%
Pelvic ureteral stenosis	72	5.6%
Other	171	13.2%
TOTAL	**1308**	**100%**

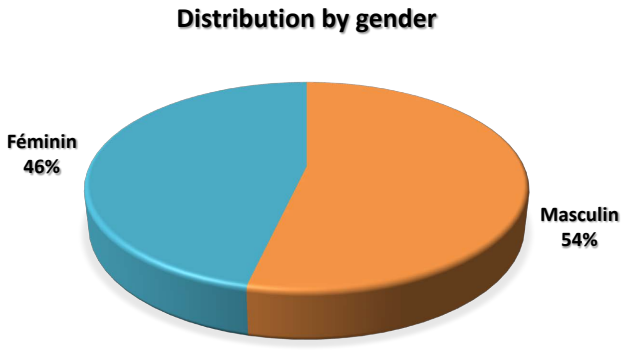

Figure 1. Distribution of patients by gender.

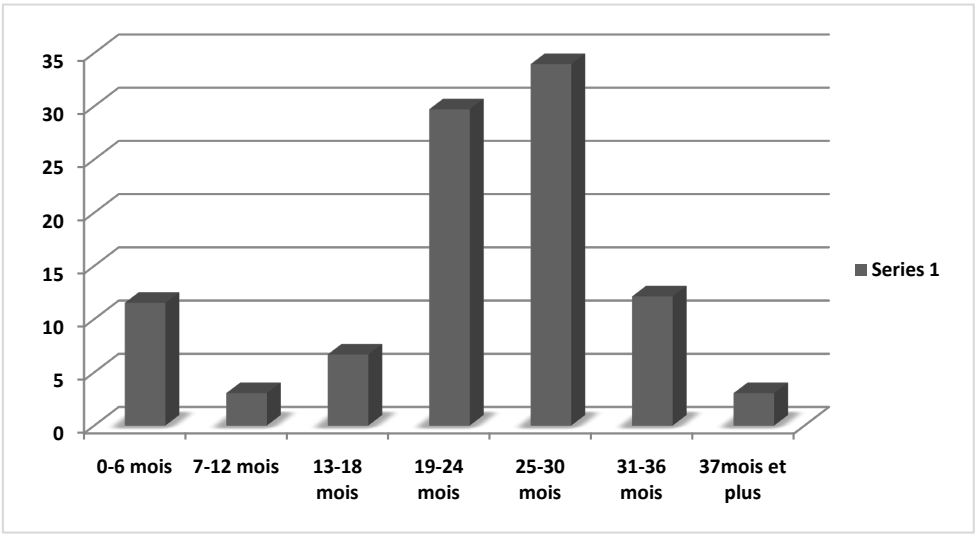

Figure 2. Distribution of patients by survival time.

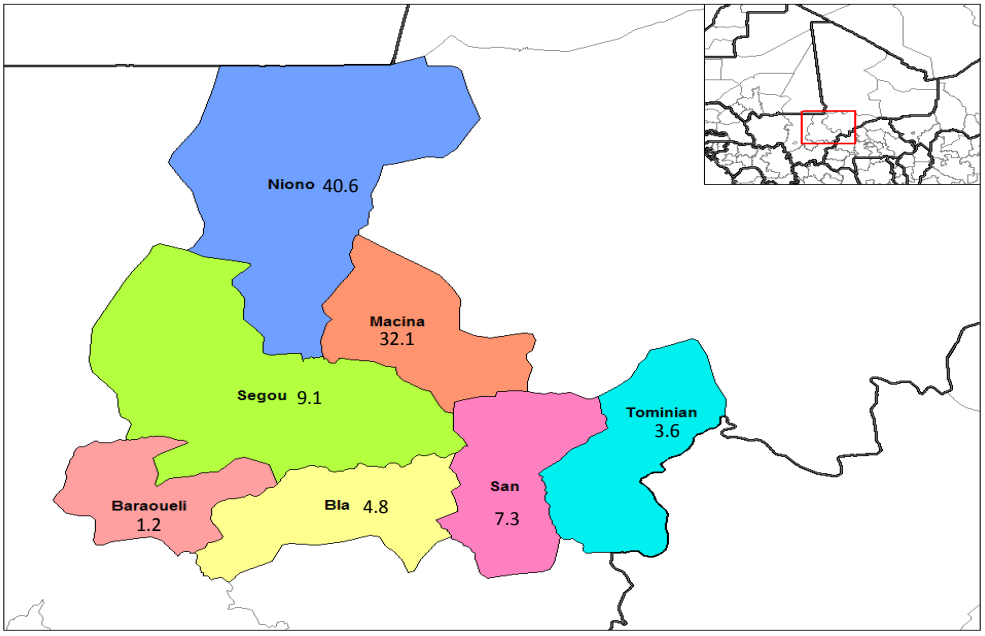

Figure 3. Distribution of patients by residence.

Table 2. Age distribution.

Age group	Frequency	Percentage
15 - 30	12	7.3
31 - 45	52	31.5
46 - 60	48	29.1
61 - 75	50	30.3
More than 75 years	50	30.3
Total	**165**	**100**

Table 3. Distribution of patients according to socio-professional activities.

Profession	Frequency	Percentage
Cultivator	60	36.4
Housekeeper	76	46.0
Worker	4	2.4
Trader	6	3.6
Driver	4	2.4
Breeder	6	3.6
Fisherman	5	3.0
Teacher	2	1.2
Other	2	1.2

Table 4. Distribution of patients according to urological history.

Past history		Frequencies	Percentages
Bilharzia	**Processed**	130/165	78.8
	Untreated	15/165	9.1
Recurrent urinary tract infections		25/165	15.1
Prostatic hypertrophy		20/165	12.1
Treated bladder lithiasis		3/165	1.8

Table 5. Distribution of patients by reason for consultation.

Reason for consultation	Frequency	Percentage
Hematuria	159/165	96.4
Dysuria	86/165	52.1
Suprapubic pain	62/165	37.6
Pollakiuria	78/165	47.3
Lumbar pain	30/165	18.2
Burning of the bladder	42/165	25.4
Acute urine retention	12/165	7.3
Hypogastric mass	40/165	24.2
Urine leakage	2/165	1.2

Table 6. Distribution of patients according to the stage of development at the clinic.

Progressive stage	Frequency	Percentage
T2	4	2.4
T3	73	44.3
T4	88	53.3
Total	165	100

4. Discussion

4.1. Frequency

Over a period of three years, we recorded 165 cases of bladder tumours out of 1308 hospitalisations from 7007 consultations at NIANANKORO FOMBA hospital, *i.e.* 12.6% of hospitalisations and 2.3% of consultations. This frequency, which was estimated at 12.6% of admissions, is higher than those reported by OUATTARA in Benin [7] and Odzébé in Congo Brazzaville [8], which were respectively 3.4% and 4.78%.

This can be explained by the high prevalence of bilharzia in our study area, which is the Office du Niger. Bilharzia is a proven risk factor for bladder tumours.

4.2. Socio-Demographic Study

4.2.1. Sex

In our study the sex ratio was 1.2, which is identical to that of B. Diao [9] in Senegal who reported a sex ratio of 1.25. However, Avakoudjo in Benin [10] found a sex ratio of 3/1. This can be explained by the high involvement of men in professional activities exposing them to the main risk factor of bilharzia; also some men were smokers

4.2.2. Ethnicity

The Bambaras were the most represented in our study with 41.2%, followed by the Bozos with 19.4% and the Peulhs with 12.1%.

These ethnic groups are involved in agriculture, particularly rice growing, market gardening, fishing, livestock breeding and the continuous search for pasture along the waterways. Thus these ethnic groups remain exposed to the main risk factor of bilharzia in the study area.

This result is similar to that of Tangara [11] where Bambara were the most represented.

4.2.3. Age

In our study, the 31 - 45 age group is the most represented with 31.5%. The average age of our patients, estimated at 38 years, is lower but close to that of B. Diao in Senegal, which is 45.5 years [9], and of OUATTARA in Benin, which is 49.7 years [7]. Our result is much lower than the average age reported in western countries such as France where Irani *et al.* reported an average age of 69 years for men and 71 years for women [12]. J. Palou reported an average age of 65 years [13].

This can be explained by the fact that Schistosomiasis is endemic in the study

area and has affected most patients in childhood or adolescence. In contrast, in Western or developed countries the risk factors are smoking and occupational exposure.

4.3. The Profession

Housewives and farmers were the most represented in our study with 46% and 36.4% respectively.

These results are in agreement with those of other studies of bladder tumours [11] [14].

Residence

Niono and Macina were the most common residences with 40.6% and 32.2% respectively, in relation to the main coverage area of the Office du Niger.

Ségou is the third most common residence reported with 9.1%, Ségou being the area with the highest concentration of the region's population, professional exposure activities, it is also the town where the reception and treatment centre is located.

4.4. Clinical Study

The Delay of Consultation

In our series 44.8% of the patients consulted between 13 and 24 months; 34.5% of the patients consulted between 7 and 12 months. Only 12.2% of the patients consulted between 0 and 6 months. This shows the delay in consultation of the patients in our study.

These results are comparable to those of other authors such as Benchakroun *et al.* who found that the average delay in consultation was 10 months [15]. This neglect is common as bladder tumours often occur in a disadvantaged population and access to care is not always easy.

4.5. The Reason for Consultation

The most common reason for consultation in our study was haematuria. It was present in 96.4% of cases. Haematuria was also the main reason for consultation in the study by Dembélé [5] with 73.9% for total haematuria and 23.9 for terminal haematuria. B Diao reported haematuria in 88% of cases in his series in Senegal [9].

The signs associated with this haematuria were dysuria, pollakiuria and suprapubic pain in 52.1%, 47.3% and 37.6% respectively.

This result is close to those of other authors [11] [14].

The finding of a hypogastric mass justified consultation in 24.2%; this testifies to the advanced stage of these tumours and the delay in consultation of the patients in our study.

4.6. Urological History

Treated bilharzia was reported in 78.8%, untreated bilharzia in 9.1%.

Bilharzia was the main history found in our study patients.

4.7. Inspection

Pallor was found in 61.8% of patients in our study.

This result is superior to that of A Elmahfoudi in Morocco who found a discoloration of the conjunctiva in 36% of cases [16]. This difference can be explained by the long delay in consultation while haematuria exposes to blood spoliation. Weight loss was the 2nd[e] sign of inspection with 44.2% contrary to the study conducted by Dembélé [5] where it was the first sign of inspection with 54.3%. This result reflects the advanced stage of bladder tumours at the time of diagnosis. This is in agreement with the results of all local authors.

4.8. Abdominal Palpation and Pelvic Touch

In our study, induration of the bladder floor was found in 62.4% of cases. Tangara found 84% infiltration of the bladder floor.

In our study, pelvic shielding was found in 36.4% of patients. This result is superior to that of Dembélé [6] who found pelvic shielding in 23.9% of patients.

A palpable suprapubic mass was found in 34.5% of patients in our study. Also seven (7) cases of vesico-vaginal fistula and three (3) cases of neoplastic vesico-rectal fistula were found in our study. All this shows that there is a significant delay in consultation and management, leading to the recruitment of patients at an already advanced stage.

4.9. Para-Clinical Study

4.9.1. Imaging

Ultrasound was performed in all patients in our study either for diagnosis or for extension or for both. For diagnosis, ultrasound was performed on all our patients, *i.e.* 100% Dembélé reported 84.8% of cases [6].

This ultrasound noted an absence of impact on the upper urinary tract in 59.4% of cases. Benchakroun *et al.* [15] found a ureterohydronephrosis, *i.e.* no impact on the upper urinary tract in 79% of cases, which is higher than in our series. Four (4) cases of hepatic metastases (2.4%) were reported.

Urethrocystoscopy was performed in four (4) cases, while it confirmed the presence of a bladder mass in 71.4% of cases in the study by Dembélé [6] and in 70% of cases in the study by Tangara [11]. This is explained by the non-availability of uretrocystoscopy in our facility during the study period.

In our study:

IVU was performed in 27 cases, *i.e.* 16.36%. This rate is much lower than that of Lougue [17] who reported 100%, however U-I-V whenever performed was suggestive of tumour, often with hydronephrosis.

This sensitivity of V.I.U. was also recognised in the Lougue series [17] where 100% of bladder tumours were evoked by IVU.

Chest X-rays were performed in 24 cases and revealed lung metastases in four

(4) cases.

CT scans were performed elsewhere in six (6) patients in our series and revealed one (1) case of metastases.

These results do not contradict those of some authors in the literature who state that metastases are rare in bladder tumours.

The performance of CT in our study patients was influenced by the lack of financial means and the non-availability of this examination in the vicinity.

4.9.2. Stage of Development

In our series, the majority of our patients were in stage T4 and T3 at the time of diagnosis, *i.e.* 53.3% and 44.3% respectively.

4.10. Survival

In our study

Patient survival exceeded 36 months in only 5 (five) cases.

The largest number of patients had a survival of 25 - 30 months or 33.94%. 29.7% of the patients survived for 19 - 24 months, death of the patient during the first ère year after diagnosis was observed in 24 cases or 14.5%.

Dembélé [5] reported that six (6) out of 26 patients died within one year of diagnosis, or 23.07%.

Tangara [11] observed 66% of deaths within one year of diagnosis.

5. Conclusion

Bladder tumours remain a major public health problem in the Segou region because of the high frequency of this pathology and the problems associated with its management. Bilharzia is the most common risk factor. The diagnosis is late and all the patients in our series had a bladder tumour infiltrating the muscle, so the prognosis remains poor for these patients.

Conflicts of Interest

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

References

[1] Siegel, R.L., Miller, K.D. and Jemal, A. (2020) Cancer Statistics, 2020. *CA*: *A Cancer Journal for Clinicians*, **70**, 7-30. https://doi.org/10.3322/caac.21590

[2] Roupret, M., Pignot, G., Masson-Lecomte, A., Compérat, E., Audenet, F., Roumiguié, M., Houédé, N., Larré, S., Brunelle, S., Xylinas, E., Neuzillet, Y. and Méjean, A. (2018) French Recommendations of the AFU Cancer Committee-Update 2018-2020: Bladder Tumoursprogurol, Supplement 1, 28, R48.

[3] Richters, A., Aben, K.K.H. and Kiemeney, L.A.L.M. (2019) The Global Burden of Urinary Bladder Cancer: An Update. *World Journal of Urology*, **38**, 1895-1904. https://doi.org/10.1007/s00345-019-02984-4

[4] Sangho, H., Dabo, A., Sangho, O., Diawara, A. and Doumbo, O. (2005) Prevalence and Perception of Schistosomiasis in Irrigated Rice-Growing Areas in Mali. *Mali*

Médical, Tome XX N 3.

[5] Traore, M. (1994) A Study of the Epidemiology of Schistosomiasis in Mali toward a Rationally Based National Program. PHD Thesis, Faculty of Medicine, University of London, London.

[6] Dembélé, A. (2012) The Management of Bladder Tumours in the Urology Department of the Gabriel Touré University Hospital. Medical Thesis Bamako.

[7] Ouattara, A., Hodonou, R. and Avakoudjo, J. (2012) Epidemiology of Urological Cancers at the Hubert Koutoukou Maga National University Hospital. *Progress in Urology*, **22**, 261-265. https://doi.org/10.1016/j.purol.2011.12.003

[8] Odzébé, A.W.S., Bouya, P.A., Kouambon, J.B.N. and Kat, M.H.E. (2011) Tumours of the Bladder: Epidemiological and Therapeutic Aspects in Brazzaville. *African Journal of Cancer*, **3**, 36-39. https://doi.org/10.1007/s12558-010-0135-8

[9] Diao, B., Amath, F., Fall, B., Fall, P.A., Diémé, M.J., Steevy, N.N., Ndiaye, A.K. and Ba, M. (2008) Bladder Cancer in Senegal: Epidemiological, Clinical and Histological Particularities. *Progress in Urology*, **18**, 445-448. https://doi.org/10.1016/j.purol.2008.04.016

[10] Avakoudjo, J.D.G., Hannasso, P.P., Gouissi, S.A.G., AGounkpe, M.M., Natchagande, G., Dandjelessa, O. and Lossitode, F. (2015) Bladder Tumour Epidemiological and Diagnostic Aspects at the National Hospital and University Centre of Cotonou (Rep. of Benin). *Journal de la société de Biologie clinique du Benin*, **22**, 77-80.

[11] Tangara, S. (2008) Study of Bladder Tumours in the Urology Department of the CHU Gabriel Touré. Thesis of Medicine, Bamako, No. 143, p. 84.

[12] Iranj, B.S., Davin, J.L., *et al.* (2008) Superstring Bladder Tumours No Longer Exist. *Progrès en Urologie*, **18**, 204-205.

[13] Palou, J. and Sylvester, R.J. (2012) Female Gender and Carcinoma *in Situ* in the Prostatic Urethra Are Prognostic Factors for Recurrence, Progression, and Disease-Specific Mortality in T1G3 Bladder Cancer Patients Treated with Bacillus Calmette-Guerin. *European Urology*, **62**, 118-125. https://doi.org/10.1016/j.eururo.2011.10.029

[14] Zongo, B. (2002) Bilharzia Bladder Cancer: A Case Report of 9 Patients in Burkina Faso. *Bulletin de la Societe de Pathologie Exotique*, **95**, 244-247.

[15] Benchakroun, A., El AlJ, H.A., EL Sayegh, H., Lachkar, A., Nouini, Y., Benslimane, L., Belahnech, Z. and Falk, M. (2003) Superficial Bladder Tumours pT1G3: About 24 Cases. *Annals of Urology*, **37**, 199-202. https://doi.org/10.1016/S0003-4401(03)00069-X

[16] Elmahfoudi, A. and Sarf, I. (2013) Epidemiological Profile of Vesicular Tumours in the Marrakech Region.

[17] Lougué-Sorgho, Cisse, L.C., Kagone, R.M., Bamouni, Y.A. and Sanou, A. (2002) Radiography and Ultrasound in the Management of Bladder Tumours about 71 Cases at the Yalgado Ouedraogo National Hospital (Burkina Faso). *Bulletin de la Societe de Pathologie Exotique*, **95**, 244-247.

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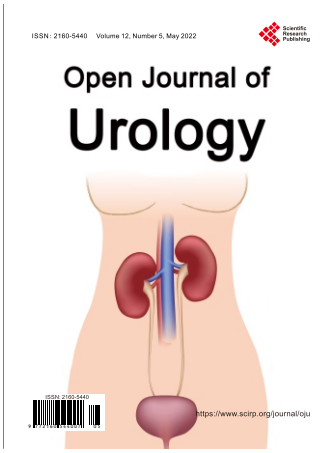

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