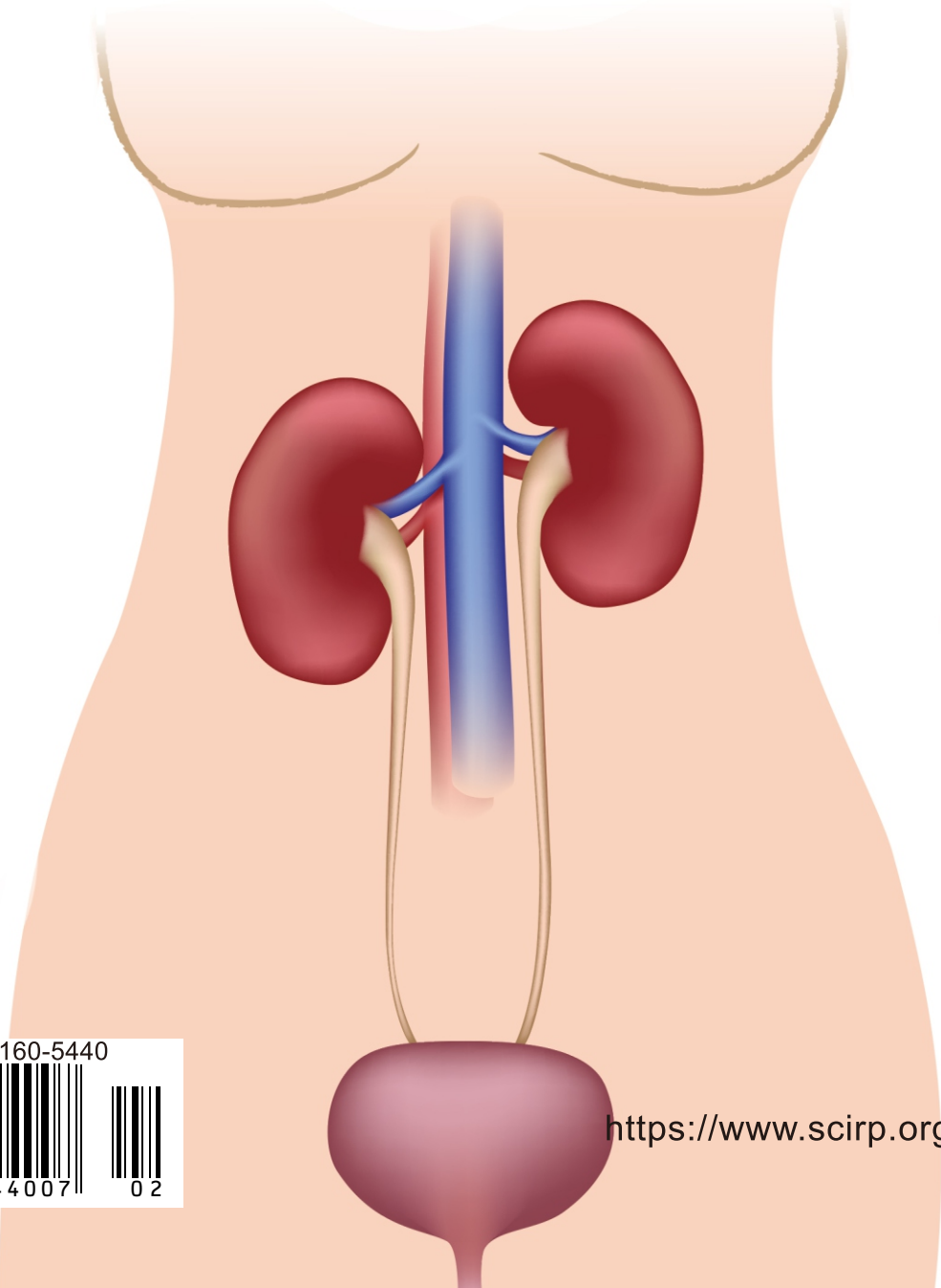


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# Trauma of the Male Genitals in the Teaching Hospital Sylvanus Olympio of Lomé: Lesional and Therapeutic Aspects

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## Abstract

**Introduction:** Trauma of the external male genital organs (TEMGO) is multifaceted and rare. The objective of this work was to provide an overview of these lesions by describing the epidemiology, the diagnostic approach, their therapeutic and prognostic aspects. **Materials and Methods:** It was a retrospective study carried out over a ten-year period, from January 1, 2009 to December 31, 2018. It included male patients, admitted and treated in surgical emergencies and in the urology department of the Sylvanus Olympio Teaching Hospital in Lomé for trauma of male external genital organs. **Results:** Thirty-five cases had been collected. They had represented 1.5% of urological emergencies. The subjects were young with a mean age of  $29.6 \pm 3.1$  years, with extremes of 18 and 60 years. Trauma to the penis was more frequent and found in 60% of cases, with the mechanism of coitus misstep in 54.3%, leading to a fracture of the penis. Testicular contusions were found in 22.9% of the cases. The ultrasound was performed in 6 patients. Four orchidectomies were performed for an unsustainable testicle found at scrototomy. The postoperative had been simple in all cases. Fifteen patients (42.8%) had been regularly followed on 18 months. Residual testicular pain and moderate erectile dysfunction was noted respectively in 3 and 2 patients. **Conclusion:** TEMGO, although rare, require perfect knowledge for adequate therapeutic decisions, as they can compromise the functional prognosis of concerned organs.

## Keywords

Genital Organs, Trauma, Scrototomy, Togo

## 1. Introduction

Trauma of the male genitals includes various penis and bursa lesions, which occurred during an assault [1]. They can affect the functional and vital prognosis of the organs affected. These traumas are poorly described in the literature in developing countries though they are potentially serious and can come within the scope of polytrauma [2] [3]. In the study of Diabaté *et al.* [4], they represented 3.36% of all urological emergencies. Their rarity is confirmed by Coulibaly *et al.* [5] who had a frequency of 2 cases by year in their study about bursae trauma. In order to provide an overview of these lesions, we undertook this work aiming at describing the epidemiology, the diagnostic approach as well as their therapeutic and prognostic aspects in our practice.

## 2. Materials and Methods

This work was carried out at the Teaching Hospital Sylvanus Olympio of Lomé (TOGO). It was a retrospective study over a ten-year period, from January 1, 2009 to December 31, 2018. It included male patients admitted in the emergency unit of this hospital for trauma of the genitals. We did not include in this study patients admitted for urinary tract trauma. Patient files had been used to collect the data which were registered on a survey form. The parameters studied were: age, circumstances of the trauma, lesional diagnosis, paraclinical assessment, treatment and short and long-run follow-up. The data, had been processed with Epi info Version 6.0 computer software. The quantitative variables are expressed as means with standart deviation, and qualitative variables in the form of tables.

## 3. Results

During the study period, 35 cases of trauma of the male genitals were registered. They represented 1.5% of the urological emergencies. The average age of the patients was  $29.6 \pm 3.1$  years, with extremes of 18 and 60 years. There were 21 cases of penis trauma and 14 cases of bursa trauma. Coitus misstep was the most common mechanism of occurrence, in 54.2% of cases, as shown in **Table 1**.

Among the patients who had a road accident, 4 cases of polytrauma with cranioencephalic trauma and abdominal contusion were registered. The diagnosis of genitals trauma was clinical in all cases: pain was found in all patients and a vaginal hematocele in 9 cases. Nevertheless, an ultrasound was carried out with 6 patients: these were two cases of a penis fracture, and 4 cases of trauma of the bursa with vaginal hematocele. The lesion assessment of these traumas is recorded in **Table 2**.

Therapeutically, 94.3% of the patients had undergone surgery and two patients had received medical treatment. This treatment consisted of the administration of analgesics, anti-inflammatories and antibiotics. It involved 1 case of spermatic cord hematoma and 1 case of testicular contusion. The surgical procedures are listed in **Table 3**.

The operative suites had been simple in all cases. On an average follow-up of

**Table 1.** Distribution of patients by mechanism.

	<b>n</b>	<b>%</b>
Coitus misstep	19	54.2
Road Accident	14	40
Physical Assault	1	2.9
Self-harm	1	2.9
<b>Total</b>	<b>35</b>	<b>100</b>

**Table 2.** Report of lesions in genital trauma.

	<b>n</b>	<b>%</b>
Penile fracture	19	54.3
Testicular contusion/intra testicular hematoma + hematocele	8	22.9
Scrotum injury	3	8.6
Partial penile amputation	2	5.7
Spermatic cord hematoma	2	5.7
Testicular fracture + hematocele	1	2.8
<b>Total</b>	<b>35</b>	<b>100</b>

**Table 3.** Surgical procedures.

	<b>n</b>	<b>%</b>
Repair of cavernous body albuginea	19	57.6
Hematocele drainage and hemostasis	5	15.2
Orchiectomy	4	12.1
Scrotum injury repair	3	9
Regularization of amputation stump	2	6.1
<b>Total</b>	<b>33</b>	<b>100</b>

18 months, 15 patients (42.8%) had been regularly followed. We had noted residual testicular pain with 3 patients along with bursa trauma. Moderate erectile dysfunction had been noted with 2 patients carrying broken cavernous body.

#### 4. Discussion

Trauma to the genitals is relatively rare and very often described in publications concerning urogenital trauma in general; they had been indeed 10.5% and 12.9% in the respective works of Dekou *et al.* [2] and Kambou *et al.* [1]. In this study, they were 1.5% of urological emergencies, below the rate found by Diabaté *et al.* [4] in Senegal, which had recovered 3.36%. This difference would result from the inclusion of urinary trauma in their work; our study had only taken into account trauma of the genitals. The potential seriousness of these lesions lies in their possible impact on the sexuality and fertility of patients, since the subjects af-

ected are most often young. Our average age of 29.6 years agrees with that of several authors as regards trauma [5] [6]. Indeed, young people are very active subjects and more exposed to all kinds of trauma, particularly those resulting from road accidents. The latter mechanism is quite common because there is a particularity for lesions of the penis; they are more vulnerable during an erection. According to Simonin *et al.* [6], there is a human defense instinct for the external genitalia, which protects the penis from trauma. Nevertheless, during erection, the rigid penis is more exposed and the albuginea of cavernous body thins and becomes more fragile. In our work, trauma to the penis was often caused by a coitus misstep. Sow *et al.* [7] also found this.

A meticulous clinical examination usually enables to make the diagnosis in trauma of the penis. The lesions during an amputation are diagnosed at the inspection whereas the rupture of the cavernous body requires a series of questions specifying the very evocative mechanism and a meticulous physical examination before its diagnosis. In fact, the “Rollin sign” of the fracture focus enable the diagnosis to be made [6]. However, in some cases of doubt, it may be necessary to carry out additional examinations including ultrasound, which allows to find the defect on the albuginea [3]. Our two cases were about patients with significant edema of the penis with questioning that was not very suggestive. However, even though this examination is accessible and easily achievable it can be defective. Thus, for Turpin *et al.* [8], MRI is the examination of choice in the exploration of lesions; it has a medico-legal value in this pathology whose subsequent complications can impair erectile function. In our context, MRI is a very expensive examination and therefore inaccessible for most the patients.

Although we do not need ultrasound in trauma of the penis, it is required in the case of bursa trauma. Indeed, for Lardellier *et al.* [9], ultrasound remains the reference examination, especially when it is coupled with Doppler. Though the place of this examination remains controversial for the fact that its results are “operator dependent” [5] [10]; it was carried out in our work in 4 patients who had bursa trauma. However, its realization should not delay treatment, especially since the hemocele, witness to a hemorrhage, should lead to the decision to explore by scrototomy.

Therapeutically, the treatment of broken cavernous body was surgical in all our patients, by albugineorraphy as recommended by Grima *et al.* [11]. There is no longer place for drug therapy nowadays [7]. The problem with the amputations of penis is essentially the viability of the amputated stump. In our work a regularization of the stump with creation of a neo-meatus had been carried out. According to Diabaté *et al.* [12], reimplantation should be attempted as far as possible to maintain the body pattern and enable sexual activity. As far as bursa trauma is concerned, the treatment depended on the lesions observed during the scrototomy. Evacuation of the hemocele enables a complete lesion assessment. That is how 4 orchidectomies were performed for testicular fractures and intratesticular hematomas with necrosis of the pulp.



## 5. Conclusion

Genital trauma is rare in our practice but requires a good knowledge. Their evolution can lead to loss of testicle and erectile dysfunction. The management is most often surgical.

## Conflicts of Interest

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

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# Spectrum of Bladder Cancer Patients Morbidity and Mortality in a Tertiary Hospital of Northwestern Nigeria: A 7-Year Review

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## Abstract

**Background:** Bladder cancer is a common cause of morbidity and mortality in our institution due to the late presentation. Morbidity is defined as a development of complications that may lead to mortality. Uraemia is a common presentation that constitutes a management challenge in our patients. We study the spectrum of morbidity and mortality in bladder cancer patients in our institution. **Materials and Methods:** This is a retrospective study of patients with clinical, radiological, cytological and or histological features of bladder cancer that had a morbidity and or mortality managed at Usmanu Danfodiyo University Teaching Hospital Sokoto from January 2011 to December, 2017. Data were retrieved from patients' case notes via a proforma and analyzed using SPSS 20.0 version for windows. The results were presented in number percent, tables and chart. **Results:** There were morbidity and or mortality in 234 bladder cancer patients within the study period with a mean age of  $48.4 \pm 14.1$  years and a range of 3 - 106 years. There were 219 males (91.5%) and 20 females (8.5%) with a male to female ratio of 11:1. There were haematuria and lower urinary tract symptoms (LUTS) in 230 patients (98.3%). There were necroturia  $\pm$  weight loss and anorexia in 126 patients (53.8%). There was urinary tract infection (UTI) in 75 patients (32.1%), anaemia in 131 patients (56.0%) and uraemia in 161 patients (68.8%). Mortality was recorded in 84 patients (35.9%) which was due to uraemia in 52 patients (22.2%), urosepsis in 22 patients (9.4%) and anaemia in 8 patients (3.4%), intestinal obstruction and blood transfusion reaction in 1 patient each (0.4%). **Conclusion:** Anaemia, urosepsis and uraemia are the most common causes of morbidity and or mortality in bladder tumour patients in Sokoto. This poses great diagnostic and therapeutic dilemma to the urologist, patients and their relatives.

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## Keywords

Bladder Cancer, Morbidity, Mortality, Urosepsis, Uraemia, Anaemia

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### 1. Introduction

Bladder cancer is the 10<sup>th</sup> common cancer worldwide. It is associated with occupational and environmental factors such as cigarette smoking, chemicals and schistosomiasis [1]. The commonest histological type is transitional cell carcinoma accounting for 95% - 97% worldwide [2]. In Africa, transitional cell carcinoma accounts for 60% - 70% while squamous cell carcinoma accounts for 30% - 40% of cases [2] [3]. The 5-year survival rate in patients with metastatic disease is 5%. In Sokoto North-western Nigeria, bladder cancer is the second most common cancer in men [4] with the commonest histological subtype being squamous cell carcinoma in 65% of the patients [5]. This is due to the endemicity of schistosomiasis in our environment [3] [5]. Patients usually present late with manifestations of loco-regional spread. In our clinical setting, patients present with haematuria, necroturia, weight loss, anorexia, anaemia, urinary tract infection and uraemia [6] [7]. At times, patients develop urosepsis, gross haematuria or uraemia which if unaddressed promptly may lead to mortality [7].

The associated morbidity seen in bladder cancer patients can result into mortality and constitutes a significant challenge to these patients, their caregivers and the attending urologist. This is because in addition to the bladder cancer burden, patients with anaemia could develop anaemic cardiac failure. Those with uraemia may require regular dialysis. While others with urosepsis may progress into multiple organ dysfunction or failure. The consequences of these include prolonged hospital stay and increased financial cost of treatment on patients and caregivers who are already exhausted financially even prior to presentation. Also, the degree of severity of the morbidities can impact negatively on these patients performance status which is a key consideration in the available options of their treatment. The mortality of these predominantly young cohort of patients in their very active productive age and who are mostly farmers and the family's breadwinners serve as a big setback and disruption to the family economic set up. Therefore, there is a need to study these important variables among bladder cancer patients. These pose great challenges to the emergent treatment and cystoscopy for confirmation of the diagnosis. There is no previous study done in our environment to assess these morbidities and mortality of bladder cancer.

The objective of this study is to assess morbidity and mortality of bladder cancer patients in our environment.

### 2. Methods

This is a retrospective study of patients with clinical, radiological, cytological and or histological features of bladder cancer that had a morbidity and or mortality

managed at Usmanu Danfodiyo University Teaching Hospital, Sokoto, from January 2011 to December, 2017. Data was retrieved from patients' case notes into a proforma and analyzed using SPSS 20.0 version for windows. The data included socio-demographic parameters, clinical presentation, complications, examination findings, morbidity, mortality, ultrasound scan findings, laboratory investigations findings, cystoscopy findings, histological findings. Laboratory investigations findings included full blood count, serum electrolyte, urea/creatinine, urine microscopy, urine cytology and urinalysis. The bladder cancer patients included were those with documentation of morbidities such as anaemia, uraemia, urosepsis, and fistula or mortality with complete record as per the design proforma. Patients without documentation of morbidities or mortality as above or incomplete or missing records were excluded from this study. The results were presented in number percent, tables and chart.

### 3. Results

There were 234 patients with morbidity and or mortality from bladder cancer with a mean age of  $48.4 \pm 14.1$  years. Other details of the socio-demographic characteristics of the patients' are shown in **Table 1** below.

Haematuria and lower urinary tract symptoms were the most common presentations which were found in 230 patients (98.3%) each. Other presentations are shown in **Table 2** below.

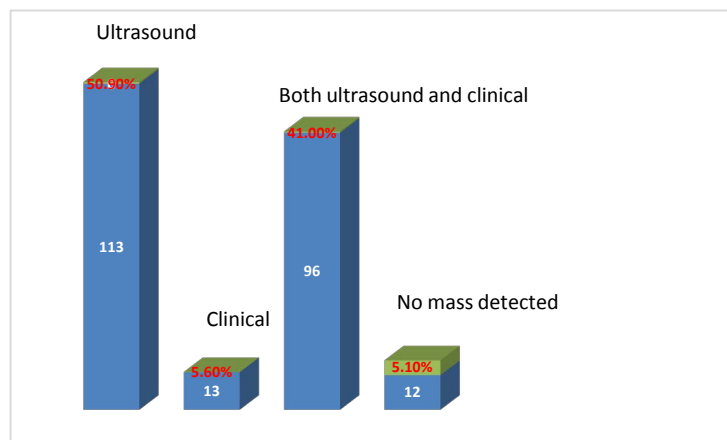
The risk factors for bladder cancer found in the patients were schistosomiasis in 160 patients (68.4%), smoking in 5 patients (2.1%) and the both risks in 20 patients (8.5%). Bladder mass is a feature of advanced disease. The rate of detection of bladder mass by various methods is shown in **Figure 1**.

**Table 1.** Socio-demographic characteristics of the patients with bladder cancer.

Socio-demographic variable	mean $\pm$ SD/number of patients (%) n = 234	Remarks
<b>Mean age</b>	<b>48.4 <math>\pm</math> 14.1 years</b>	
<b>Age range</b>	<b>3 - 106 years</b>	
<b>Sex distribution</b>		
Male	219 (91.5%)	
Female	20 (8.5%)	
M:F	11:1	Farming was the
<b>Occupation</b>		commonest occupation
Farmers	145 (62.0%)	and these patients had
Civil servant	29 (12.4%)	schistosomiasis in the
Business man	28 (12.0%)	childhood which was
House wife	18 (7.7%)	poorly treated
Student	6 (2.6%)	
Driver	4 (1.7%)	
Clergyman	2 (0.8%)	
Butcher	1 (0.4%)	
Mechanic	1 (0.4%)	

**Table 2.** Presentations of patients with morbidity and mortality from bladder cancer.

Parameters	Number of patients (n = 234)	Percentage (%)
Haematuria	230	98.3
LUTS	230	98.3
Uraemia	161	68.8
Childhood haematuria	160	68.4
Anaemia	131	56
Necroturia	126	53.8
Weight loss	114	48.7
Anorexia	112	47.9
Bladder mass	109	46.6
Urinary tract infection (UTI)	75	32.1
Hypertension	8	3.4
Open exploration	3	1.3
Rectovesical fistula	3	1.3
Vesico-cutaneous fistula/suprapubic cystostomy	2	0.9

**Figure 1.** Detection of bladder mass by ultrasound and clinical examination.

Abdominopelvic ultrasound detected bladder mass and hydronephrosis in 115 patients (49.1%) and bladder mass only in 104 patients (44.4%). The patients with hydronephrosis are candidates for uraemia which is a common morbidity of bladder cancer in our environment.

The results of laboratory investigations revealed uraemia in 68.8%, anaemia in 56%, positive urine microscopy in 22.2%, and urine cytology in 4.3%. The commonest microorganism isolated in the urine was *E coli* (13.1%). Other details of the laboratory findings are shown in **Table 3**.

Cystoscopy confirmed presence of bladder tumour in 72 patients and the histology revealed squamous cell carcinoma in 22 patients (9.4%), transitional cell carcinoma in 19 patients (8.1%), adenocarcinoma in 2 patients (0.9%), rhabdomyosarcoma in 2 patients (0.9%) and premalignant conditions in 27 patients (11.5%).

All the patients were admitted and resuscitated with antibiotics, intravenous fluid with or without blood transfusion and haemodialysis. Patients (75) with uro-

sepsis (32.1%) received ceftriaxone sulbactam till the resolution of symptoms. Blood transfusion was given to 63 patients (26.9%), haemodialysis was done in 23 patients (9.8%), chemotherapy in 10 patients (4.3%), radical cystectomy in 2 patients (0.9%), transurethral resection of bladder tumour (TURBT) in 2 patients (0.9%) and percutaneous nephrostomy in 1 patients (0.4%). Those that did not respond to antibiotics were changed based on the microscopy results or recommendations of the medical microbiologist.

The rate of morbidity was 96.6% and mortality rate was 35.9%. The commonest cause of morbidity and mortality from bladder cancer was uraemia as shown in **Table 4**.

There was positive association between uraemia and risk factors for bladder cancer ( $p = 0.03$ ), anaemia with uraemia ( $p = 0.02$ ) and bladder mass (0.00), UTI and anorexia ( $p = 0.02$ ). The detailed analysis of the association of presentation with various morbidities is shown in **Table 5**.

There is a positive association of bladder mass with mortality ( $p = 0.02$ ). Other associations of the presentation with mortality are shown in **Table 6**.

The factors associated with the morbidity and mortality are late presentations, presence of multiple severe life-threatening complications like urosepsis, severe uraemia and financial constraints. Most of these patients (62%) were also peasant farmers.

Most (122) of the patients (52.1%) defaulted from follow up, 86 patients (36.8%) died, 21 patients (9.0%) left against medical advice, and 4 patients (1.8%) were referred for further treatment

**Table 3.** Laboratory investigations findings.

Laboratory Test	Number of patients	Percentage (%)
<b>Urea</b>		
>6.5 mg%	161	68.8
<6.5 mg%	44	18.8
<b>Creatinine</b>		
>1.5 mg%	150	64.1
≤1.5 mg%	56	23.9
<b>Packed cell volume</b>		
<30%	<b>131</b>	<b>56.0</b>
>30%	<b>33</b>	<b>14.1</b>
<b>Urine microscopy</b>		
Growth present	<b>52</b>	<b>22.2</b>
Growth absent	<b>55</b>	<b>23.5</b>
<b>Organism</b>		
<i>E. coli</i>	<b>31</b>	<b>13.1</b>
<i>S. aureus</i>	<b>12</b>	<b>5.1</b>
<i>Streptococcus</i> spp.	<b>5</b>	<b>2.1</b>
<i>Klebsiella</i>	<b>3</b>	<b>1.3</b>
<i>Salmonella</i> spp.	<b>1</b>	<b>0.4</b>
<b>Urine cytology</b>		
Positive	10	<b>4.3</b>
Negative	29	12.4

**Table 4.** Morbidity and mortality from bladder tumour.

Parameter	Number of patients (n = 234)	Percentage (%)
<b>Morbidity</b>	<b>226</b>	<b>96.6</b>
uraemia	161	68.8
Anaemia	62	26.5
UTI ± urosepsis	75	32.1
Rectovesical fistula	3	1.3
<b>Mortality</b>	<b>84</b>	<b>35.9</b>
Uraemia	52	22.2
Urosepsis	22	9.4
Anaemia	8	3.4
Intestinal obstruction	1	0.4
Blood transfusion reaction	1	0.4

**Table 5.** Association of the presentations with morbidity.

Presentation	Yes (%)	No (%)	p value (Fisher exact test)
<b>Uraemia</b>			
Haematuria	159 (78.3)	44 (21.7)	1.00
LUTS	160 (78.8)	43 (21.2)	1.00
Weight loss	91 (88.3)	12 (11.7)	0.15
Anorexia	90 (89.1)	11 (10.9)	0.11
Necroturia	93 (84.5)	17 (15.5)	0.58
Bladder mass	8 (88.9)	1 (11.1)	0.63
Risk factors*	130 (78.8)	35 (21.2)	<b>0.03</b>
<b>Anaemia</b>			
Haematuria	129 (79.6)	33 (20.4)	1.0
LUTS	130 (79.8)	33 (20.2)	1.0
Weight loss	79 (80.6)	19 (19.4)	0.48
Anorexia	80 (82.5)	17 (17.5)	0.45
Necroturia	84 (82.4)	18 (17.6)	0.55
Bladder mass	8 (81.8)	2 (18.2)	<b>0.02</b>
Uraemia	109 (88.6)	14 (11.4)	<b>0.001</b>
UTI	44 (80)	11 (20)	0.39
<b>Urinary Tract Infection</b>			
Haematuria	74 (69.8)	32 (30.2)	1.0
LUTS	74 (69.8)	32 (30.2)	1.0
Weight loss	32 (62.7)	19 (37.3)	0.62
Anorexia	32 (65.3)	17 (34.7)	<b>0.02</b>
Necroturia	35 (60.3)	23 (39.7)	0.56
Bladder mass	1 (50.0)	1 (50.0)	0.38
Risk factors*	61 (70.9)	25 (29.1)	0.88

\*Risk factors for bladder cancer (schistosomiasis and smoking).

**Table 6.** Association of presentation with mortality.

Presentation	YES (%)	No (%)	p value (Fisher exact test)
Haematuria	84 (36.5)	146 (63.5)	0.13
LUTS	86 (37.4)	144 (62.6)	1.00
Weight loss	70 (61.4)	44 (38.6)	0.15
Anorexia	68 (60.7)	44 (39.3)	0.39
Necroturia	63 (50.0)	63 (50.0)	0.36
Bladder mass	55 (57.3)	44 (42.7)	<b>0.001</b>

## 4. Discussion

Bladder cancer is the 10<sup>th</sup> most common malignancy worldwide [1] and second most common malignancy in Sokoto Northwestern Nigeria [4]. The commonest histological type is squamous cell type which is invasive denovo [6]. Patients present with advanced disease with presence of necroturia, weight loss, anorexia, uraemia and recurrent urinary tract infection which may lead to mortality [3] [7]. Furthermore, the attendant morbidities in these patients can lead to prolonged hospital stay and increased financial cost of treatment on patients and caregiver who are already exhausted financially even prior to presentation.

The mean age of patients in this study of 48.4 years is lower than, but almost similar to 54.3 years reported by Rambau *et al.* [3] in Tanzania. The similarities may be accounted for by the endemicity of schistosomiasis which is a predominant predisposing factor of bladder cancer in the two studies. Most of the patients (91.5%) were males, this is contrary to what was reported by Ramabu *et al.* [3]. This may be sociocultural or religious related, particularly in our environment where men are the predominant farmer who are supposed to fend for their wives who stay at home to take care of the domestic problems. Most of the patients in this study were farmers, a finding earlier reported by previous studies [5] [6].

The sixty-two percent of the farmers in this study engaged in subsistence farming. Hence, these are people with poor socio-economic status which correlates with short life expectancy and mortality from bladder cancer. Consequently, this leads to late presentation and coupled with the high prevalence of squamous cell carcinoma of the bladder and inability to afford or because of out-of-pocket payment for treatment, the treatment outcome of even those that may present relatively early may be poor [8].

The most common presentations were haematuria, LUTS, necroturia, anaemia, weight loss, anorexia and uraemia as reported by the previous studies [5] [6]. These are features of advanced disease and signal poor treatment outcomes. In addition, the patients have reduced quality of life and require multiple admissions for treatment of infections, blood transfusion and dialysis or nephrostomy. This has a tendency of exhausting the patient's income giving way for the possible mortality.

The most common causes of morbidity were anaemia, uraemia, urinary tract infection, urosepsis and rectovesical fistula, this is in agreement with the previous studies [3] [6] [7].

Uraemia was the commonest cause of mortality, which was higher than what was reported by the previous studies [6] [7]. The finding of anaemia and urosepsis as cause of mortality is similar to the previous studies [5] [6]. But the finding of mortality from intestinal obstruction and blood transfusion reaction is a rare finding in this study. The positive association between risk factors for bladder cancer and uraemia is in agreement with what is found in literature [2] [7]. Schistosomiasis predisposes the patients to bladder cancer and other pathologies such as recurrent infections and schistosomal obstruction which can predispose the



patients to uraemia [3] [5] [6] [7]. The bladder cancer itself arises around the trigone, and with progression, it tends to occlude the ureteric orifices leading to uraemia. This is common with squamous cell carcinoma [3] [5]. This has not been established by the present study due to the small number of patients that underwent cystoscopy and biopsy. Most of the unconfirmed cases were unfit for cystoscopy biopsy and later left against medical advice due to inability to cope with the medical bills and unwillingness to spend money for a disease that is incurable. Similarly, the positive association of anaemia with uraemia and bladder mass is consistent with the previous studies [3] [6] [7]. Bladder mass is a feature of advanced disease which correlates with anaemia and uraemia. Anaemia may also be a feature of uraemia. In uraemic state, there is increased haemolysis of red blood cells, depression of bone marrow, decrease intake and absorption due to anorexia, bowel oedema and decrease production of erythropoietin by a failing kidney. A patient that presents with bladder mass is more likely to have a disease that has involved the trigone and ureteric orifices. The finding of association of the bladder mass with mortality is in agreement with the previous reports [2] [3] [6] [7]. These patients have advanced disease which can even be metastatic. The patients might not be fit for chemotherapy or may need renoprotective regimen when there is uraemia which the patients might not afford. The standard chemotherapy for bladder cancer is Methotrexate, Vincristine, Adriamycin and Cisplatin [MVAC] [2]. Cisplatin is substituted with carboplatin when there is renal impairment. Some patients were explored at the referral hospital with the presumption of prostatic enlargement or bladder stone which upstaged the bladder tumour leading to rapid mortality due to urosepsis from rectovesical or vesicocutaneous fistula. The mortality may also be due to metastatic disease. Other presentations such as weight loss, necroturia, rectovesical fistula did not show positive association. This may be explained by several factors among which include small numbers of such presentations such as rectovesical fistula as found in only 3 patients.

Generally, the factors that were associated with the morbidity and mortality included late presentations (bladder mass {0.01}, anorexia,  $p = 0.002$ ), presence of multiple severe life-threatening complications like urosepsis, severe uraemia (0.001) and financial constraints. The significance of financial constraint was not assessed. Most of these patients are farmers who have already spent money in the peripheral hospital before referral to our hospital and with the out-of-pocket payment, as no insurance cover for the average citizen that is not in the federal government service. This is in keeping with previous reports of the health system, challenges and management of patients in 3rd world countries [8].

The limitations of this study include retrospective nature of the study, data retrieval, inability to do cystoscopy for many patients because of their haemodynamic instability, the reliance on history of haematuria and necroturia, ultrasound finding of bladder mass, and urine cytology for diagnosis. The bladder tumour biopsy histology result of some of the patients with extensive necroturia,

yielded necrosis and benign finding. Some patients did not consent to repeat biopsy and defaulted subsequently. The significance of financial constraint should have been assessed.

We propose a prospective study that is going to be informative in terms of histology and factors that affect morbidity and mortality in these patients.

## 5. Conclusion

Bladder tumours are associated with high morbidity and or mortality in our environment. The morbidity and mortality are due to anaemia, rectovesical fistula and urosepsis. It poses great diagnostic and therapeutic dilemma to the urologist, patients and their relatives. There is positive association between bladder mass and anorexia with anaemia, uraemia, urinary tract infection and mortality from bladder cancer.

## Conflicts of Interest

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

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# Combined Detrusor and External Urethral Sphincter BTX-A Injections for Detrusor Overactivity and Detrusor External Sphincter Dyssynergia Secondary to Spinal Cord Injury

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## Abstract

**Objective:** To evaluate the efficacy and safety of Combined detrusor and external urethral sphincter BTX-A injections for detrusor overactivity (DO) and detrusor external sphincter dyssynergia (DESD) secondary to spinal cord injury. **Study Design:** Prospective study. **Methods:** The study was carried out in 18 SCI patients with detrusor overactivity (DO) and detrusor external sphincter dyssynergia (DESD) receiving Combined detrusor and external urethral sphincter BTX-A injections treatment. Contain 200 U botulinum toxin intradetrusor and 100 U external urethral sphincter injections. The effective outcomes included maximum detrusor pressure at first DO and DESD (PdetmaxDO-DESD), volume at first DO and DESD (VDO-DESD), maximum urethral closure pressure (MUCP), and Incontinence-Specific Quality-of-Life Instrument (I-QoL). Adverse events were recorded. **Results:** All patients experienced a significant mean reduction in PdetmaxDO-DESD (50.75%), maximum urethral closure pressure (26.34%) and a significant mean increase in VDO-DESD (63.00%) 12-weeks post-injection. Significant ( $p < 0.001$ ) improvement in mean Incontinence-Specific Quality-of-Life Instrument was also found. No obvious adverse event and toxic effect was observed. **Conclusion:** Combined detrusor and external urethral sphincter BTX-A injections is a good choice for patients with DO and DESD secondary to spinal cord injury. It could not only protect the upper urinary tract but also improve quality of life.

## Keywords

Detrusor Overactivity, Detrusor External Sphincter Dyssynergia, BTX-A,

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## Spinal Cord Injury

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### 1. Introduction

In patients with neurologic disorders, a major health problem is represented by bladder dysfunction associated with detrusor overactivity (DO), which constantly impairs quality of life (QoL) and often poses a threat for the upper urinary tract (UUT) [1]. Detrusor sphincter dyssynergia (DSD) most often occurs in patients with suprasacral spinal cord injuries or lesions (e.g., MS). Similar to NDO, patients often experience urinary urgency, frequency, nocturia, and incontinence as well as urinary retention and obstructive voiding symptoms [2]. In 2000, Stohrer and Schurch were the first to report the value of intradetrusor injections of botulinum toxin A (BTXA) as a treatment of NDO secondary to SCI refractory to anticholinergic treatment [3]. Since then, numerous studies have further evaluated the efficacy and safety of BTXA and clarified its indications, mainly in patients with SCI, MS or sometimes other conditions such as myelomeningocele or myelitis [4]. In recent years, BTX-A injection has been widely used in the treatment and research of lower urinary tract dysfunction [5]. The site of BTX-A injection is classified into simple detrusor injection for detrusor overactivity or simple sphincter injection, but few study about detrusor-sphincter combined injection for sphincter spasm or detrusor sphincter dysfunction. The aim of this study was evaluate the effect of combined detrusor and external urethral sphincter BTX-A injections in patients with DO and DESD secondary to SCI.

### 2. Material and Methods

From January 2018 to May 2020 a total of 18 patients whose urodynamic result reveal detrusor overactivity (DO) and detrusor external sphincter dyssynergia (DESD) receiving Combined detrusor and external urethral sphincter BTX-A injections were included in this study. All eligible inpatients over 18 years of age with chronic SCI (*i.e.* no progression in neurological symptoms in the previous 3 months) were screened for enrolment. Inclusion criteria were: 1) presence of DO and DESD; and 2) inadequate response or intolerance to oral anti-muscarinic agent (oxybutynin, trospium, tolterodine, propiverine, darifenacin and solifenacin) or spasmolytic agents (hyoscine butylbromide), skeletal muscle relaxant (baclofen) and alpha blockers (doxazosin mesylate and terazosin). Exclusion criteria were: 1) allergy to BTX-A; 2) coagulopathy disease and myasthenia gravis; 3) acute urinary tract infection; 4) other causes of bladder outlet obstruction (*i.e.* Urethral stricture and benign prostatic hyperplasia); and 5) previous sphincterotomy.

Before treatment, all patients underwent urodynamic examination according to the International Continence Society standard, and maximum detrusor pres-

sure at first DO and DESD (PdetmaxDO-DESD), volume at first DO and DESD (VDO-DESD), maximum urethral closure pressure (MUCP) were recorded as baseline evaluation, at week 12 after injection, we reevaluate them. The Incontinence-Specific Quality-of-Life Instrument (I-QoL), Voiding volume, urinary incontinence (UI) episodes and Complete dryness were determined from 7 consecutive days of the patient's bladder diary. Voiding volume is defined as voided volume by clean intermittent catheterization (CIC) plus spontaneous voids. Complete dryness is defined as less than one incontinence episode per 24 h.

Injections were performed in the operating room with no anaesthesia or under epidural anaesthesia. The bladder was filled with 100 - 150 ml sterile saline to achieve adequate visualization so as to avoid blood vessels during injections. A 23-gauge needle (Cook Urological Incorporated, Bloomington, IN, USA) was used for injections through a 21F rigid cystoscope (Ackermann, Schaffhausen, Switzerland), to a depth of approximately 2 mm into the detrusor. Firstly, 200 U Botox<sup>®</sup> vials (100 U each) were reconstituted in 30 ml sterile saline (6.7 U/ml) and administered in 30 injections of 1 ml each, spaced 1 cm apart across the detrusor, and additional 4 1-ml (total 100 U) BTX-A injections into the external urethral sphincter to a depth of approximately 1 cm at 3, 6, 9 and 12 o'clock positions in approximately equal aliquots. A 16 Foley catheter was inserted into the bladder and kept for 3 - 5 days. Oral prophylactic antibiotics (except aminoglycosides) were administered on the day of treatment.

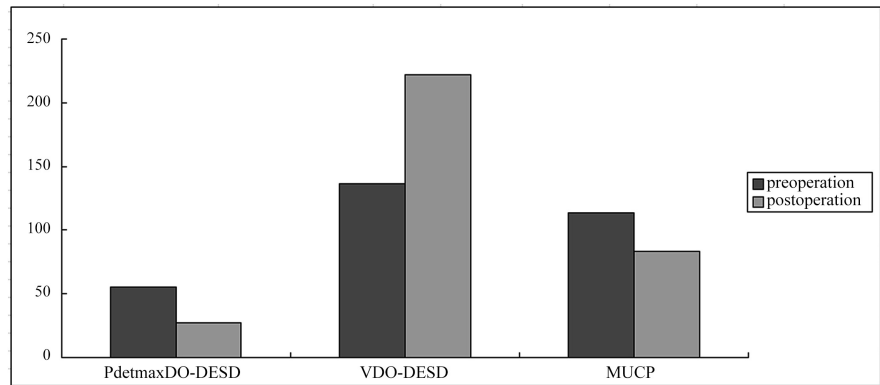
Student's paired samples t-test was used as appropriate to compare PdetmaxDO-DESD, VDO-DESD, MUCP and I-QoL, of pre-injection and post-injection. The results are shown as mean values and standard deviation (SD). All statistical tests were 2-sided, and a p-value of 0.05 or less was considered statistically significant. Statistical analyses were performed with SPSS 13.0 software (SPSS Inc., Chicago, IL, USA).

### 3. Results

A total of 18 patients included in our study, the mean age was 27.78 years, mean injury duration 34.28 months (**Table 1**). The distribution of SCI levels was 13 (72%) cervical and 5 (28%) thoracic. The distribution of the American Spinal Injury Association Impairment Scale (AIS) scores was: 12 (66.7%) Grade A, 4 (22.2%) Grade B, and 2 (11.1%) Grade C.

**Table 2** shows that the significant difference resulted from preinjection and post-injection PdetmaxDO-DESD, VDO-DESD and MUCP (all p-value < 0.05). Comparing the urodynamic parameters at baseline, all patients experienced a significant mean reduction in PdetmaxDO-DESD (50.75%), maximum urethral closure pressure (26.34%) and a significant mean increase in VDO-DESD (63.00%) at 12 weeks, respectively (**Figure 1**).

Significant improvement in mean I-QoL, voiding volume, UI episodes and complete dryness were present at week 12 (**Table 3**).



**Figure 1.** The urodynamic parameters of patients at baseline and at 12-weeks followup. PdetmaxDO-DESD: maximum detrusor pressure at first DO and DESD, VDO-DESD: volume at first DO and DESD, MUCP: maximum urethral closure pressure.

**Table 1.** Demographic characteristics of the participants.

Number of patients	18
Age, years, mean (SD)	27.78 ± 7.647
Injury duration, months, mean (SD)	34.28 ± 2.327
Neurological injury level, n (%)	
Cervical	13 (72%)
Thoracic	5 (28%)
AIS, n (%)	
Grade A	12 (66.7%)
Grade B	4 (22.2%)
Grade C	2 (11.1%)

AIS = American Spinal Injury Association Impairment Scale (AIS).

**Table 2.** The urodynamic parameters of patients at baseline and at 12-weeks followup.

	Baseline	Postoperation (12-weeks followup)	p-value
PdetmaxDO-DESD	55.17 ± 5.044	27.17 ± 2.449	<0.05
VDO-DESD	136.33 ± 18.372	222.22 ± 12.225	<0.05
MUCP	113.5 ± 4.014	83.6 ± 3.302	<0.05

PdetmaxDO-DESD: maximum detrusor pressure at first DO and DESD, VDO-DESD: volume at first DO and DESD, MUCP: maximum urethral closure pressure.

**Table 3.** Baseline and change from baseline in I-QoL, UI episodes, complete dryness and voiding volume.

	Baseline	Week4	Week12
I-QoL	32.11	50.23	61.75
voiding volume	185.68	243.75	286.97
UI episodes	11.54	9.33	5.12
complete dryness	2	5	8

I-QoL = Incontinence-Specific-Quality-of-Life Instrument, UI = urinary incontinence.

## 4. Discussion

Spinal cord injury (SCI) is a significant cause of morbidity and mortality in developing countries, with the worldwide incidence of SCI reported in the literature ranges from 12.1 to 57.8 per million [7]. In chronic SCI patients, the main problems of neurogenic lower urinary tract dysfunction (NLUTD) are failure to store due to detrusor overactivity (DO), or urethral incompetence. Another problem is failure to empty due to detrusor areflexia, bladder neck dysfunction, or detrusor sphincter dyssynergia (DSD), and a usually-combined failure to store and empty, such as due to DSD or DO and impaired contractility [8]. If not well managed, high intravesical pressure may damage the upper urinary tract, causing renal scarring and chronic renal insufficiency, which greatly impairs the quality of life [1]. The application of BoNT-A in urology started from urethral sphincter injections for the treatment of DSD in patients with SCI and MS [6]. After that, the treatment was extended to treat DO and urinary incontinence in NVD and NNVD patients [9] [10]. Double-blind placebo-controlled studies of therapeutic efficacy of BoNT-A urethral sphincter injection have also confirmed the validity and durability of this treatment in patients with SCI and DSD [9] [11].

According to our study, after treatment the patients had a significant decrease in PdetmaxDO-DESD (50.75%), maximum urethral closure pressure (26.34%) and a significant mean increase in VDO-DESD (63.00%) 12 weeks post-injection. Since 2000, minimally invasive BoNT-A injections into the detrusor have been reported to improve clinical and urodynamic parameters and quality of life in patients with refractory NDO in several open-label studies [12] [13] [14] [15]. The high bladder pressure in SCI patients with DO and DESD is probably connected not only to involuntary detrusor contractions, but also to spontaneous obstruction of the outlet. Significantly reduce urethral pressure Combined detrusor and urethral external sphincter BTX-A injections would help to relieve the spontaneous obstruction of the outlet, which might have a certain effect on reducing bladder pressure, besides relieve the symptoms of autonomic dysreflexia (AD) in with neurological level above thoracic 6. Some studies also have reported that BTX-A injection in the external urethral sphincter could restore bladder emptying and reduce detrusor pressure [16] [17]. The dosage of BTX-A we inject to urethra is small, which would not cause stress urinary incontinence. Smith *et al.* reported that only one female patient developed stress urinary incontinence among 68 patients who received intramuscular injection of external urethral sphincter [18].

Combined detrusor and urethral external sphincter BTX-A injections also improved the quality of life of these patients, which is another important point in the treatment of neurogenic lower urinary tract dysfunction [19]. The reasons we propose for this were that the patients showed greater improvement in voiding volume and 8 patients developed complete dryness than those at baseline, besides most of the patients experienced significant decreases in the symptoms

of autonomic dysreflexia (AD).

According to the follow-up results, except for slight hematuria, there was no obvious discomfort and postoperative complications

## 5. Conclusion

Combined detrusor and external urethral sphincter BTX-A injections is a good choice for patients with DO and DESD secondary to spinal cord injury. It could not only protect the upper urinary tract but also improve quality of life.

## Funding

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## Conflicts of Interest

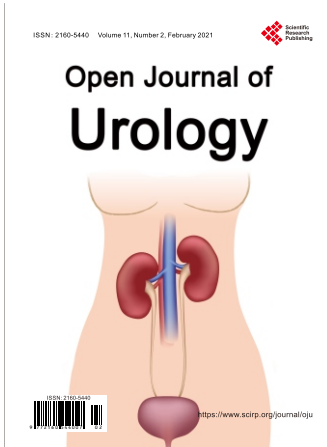
The authors declare no conflicts of interest regarding the publication of this paper.

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