

Outcome of urological injuries associated with pelvic trauma in two hospitals in Douala, Cameroon

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Introduction: Urological injuries are anatomical alterations resulting from an attack on the urogenital tract. Delayed diagnosis can lead to adverse outcomes. Their management remains challenging, controversial, and multidisciplinary. This study aimed to outline the epidemiological, clinical, therapeutic, and evolutionary particularities of urological injuries associated with pelvic trauma in Douala.

Methods: We conducted a retrospective study at the Douala General Hospital (DGH) and Laquintinie Hospital of Douala (LHD) from 1 January 2012 to 31 December 2022. We included records of patients with pelvic trauma with a clinical, radiological, and/or postoperative diagnosis of associated urological lesions, managed and followed up during the study period. Our survey form contained sociodemographic, clinical, therapeutic, and follow-up information.

Results: We collected 121 records of patients aged 4–77 years. The mean age was 32.61 ± 13.43 years, with 92 male patients (76%). Students were the most affected (26.4%). Road traffic accidents were the most frequent (76.9%). Clinical signs were haemodynamic instability (28.9%), urethrorrhagia (25.6%), haematuria (24.8%), and acute urinary retention (15.7%). Tile B classification was the most common type of pelvic fracture (53.7%). Urethral injury was the most frequent (62.8%). Orthopaedic treatment was the priority (74.4%). Suprapubic cystostomy was performed urgently (53.7%), and endoscopic internal urethrotomy was performed electively (55.8%). Common complications were decubitus ulcers (6.6%) and urethral strictures (41.7%) in the long term. The mortality rate was 4.1% ($n = 5$). The long-term survival rate was 90.8%.

Conclusion: Urological injuries associated with pelvic trauma are uncommon and occur in young male patients. Urethrorrhagia and haematuria are almost always present. Their long-term prognosis is favourable

Keywords: urological injury, pelvis, urethra, trauma

Introduction

Pelvic trauma is usually associated with urethral and bladder injuries.¹ Road traffic accidents remain the most common aetiology.^{2,3} The clinical diagnosis is indicated by micturition difficulties (dysuria, acute urine retention), haemorrhage (haematuria, urethrorrhagia), and/or haematoma (butterfly wing, penile, penoscrotal). The initial work-up is a pelvic X-ray to diagnose and classify the pelvic fracture (Tile classification).² Management of urological injury depends on the location and severity of the lesion. It is carried out in an emergency to minimise complications and sequelae (urethral stricture, erectile dysfunction, urinary incontinence, etc.).³ A multidisciplinary approach is required, with urological, visceral, orthopaedic, and intensive care surgeons playing key roles. This study aimed to investigate the epidemiological, clinical, therapeutic, and evolutionary characteristics of urological lesions associated with pelvic trauma in two hospitals in Douala.

Materials and methods

We conducted a retrospective study in two hospitals in Douala (DGH and LHD) over 10 years from 1 January 2012 to 31 December 2022. Ethical approval was obtained from the ethical review board of the two institutions. Inclusion criteria were radiologically documented pelvic trauma and one or more urinary and/or genital lesions associated with the trauma. Incomplete files were excluded. The collected data included sociodemographic characteristics, mechanism of injury, associated extra-urological lesions, clinical,

therapeutic, and follow-up information. These data, collected in a survey form, were entered and analysed using the Statistical Package for the Social Sciences (SPSS) version 23.0.

Results

A total of 121 cases of urological lesions associated with trauma to the pelvis were collected: 78 cases in DGH and 43 cases in LHD, with a respective hospital prevalence of 17.6% and 18.1% (Figure 1).

The most represented age group was 21–30 years, with a male-to-female ratio of 3.17. The mean age was 32.61 ± 13.43 years (median 29) (Table I). The majority of the study population were students (Table II). Urethrorrhagia and haematuria were the most common urological presenting symptoms (Table III). Haemodynamic instability was found in 28.9% of the patients. A hypogastric swelling was noted in 30.6% of the study population (Table IV). Road traffic accidents were the most common cause of urological injuries (76.9%) (Table V). Urethral lesions occurred in 62.8% ($n = 76$), with posterior urethral rupture being predominant ($n = 59$, 77.6%) (Table VI). Tile B pelvic fractures were the most common type encountered ($n = 65$, 53.7%) (Table VII). Pubic symphysis disjunction was predominant in 45.4% of the study population ($n = 55$) (Table VIII). Partial rupture of the urethra occurred in 71% of our study population ($n = 76$) (Table IX). Cystorraphy was performed in majority of the cases as part of the emergency treatment ($n = 10$, 8.3%) (Table XI).

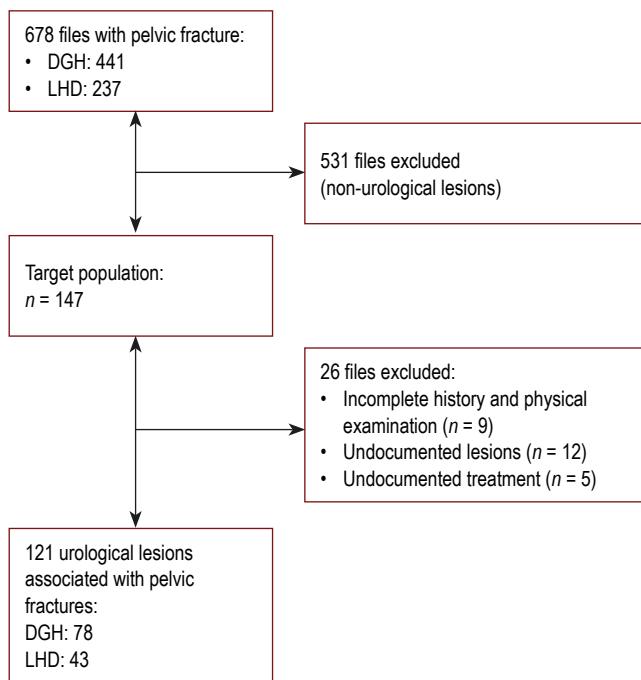


Figure 1: Study flow diagram
DGH – Douala General Hospital, LHD – Laquintinie Hospital of Douala

Table I: Patient distribution by age and gender

Age range (years)	n	%
≤ 21	15	12.4
21–30	53	43.8
31–40	28	23.2
41–50	11	9.1
51–60	9	7.4
> 60	5	4.1

Table II: Patient distribution according to profession

Profession	n	%
Student	32	26.4
Business	26	25.6
Unemployed	17	14.1
Civil servant	16	12.2
Driver	13	9.7
Military	6	4.0
Other	6	3.8
Retired	3	2.5
Farmer	2	1.7

Table III: Patient distribution according to presenting symptoms

Symptoms	Urethra n (%)	Bladder n (%)	Scrotum n (%)	Bladder-urethra n (%)	Total (n)
Haematuria	12 (21.8)	16 (29.1)	25 (45.4)	2 (3.6)	55
Urethrorrhagia	29 (54.7)	0	23 (43.4)	1 (1.9)	53
Hypogastric pain	11 (26.2)	6 (14.3)	22 (52.4)	3 (7.1)	42
Acute urinary retention	14 (34.1)	2 (4.9)	23 (56.1)	2 (4.9)	41
Initial loss of consciousness	10 (24.4)	6 (14.6)	23 (56.1)	2 (4.9)	41
Post-void residual volume	12 (32.4)	4 (10.8)	21 (56.8)	0	37
Perineal wound	9 (24.3)	4 (10.8)	24 (64.9)	0	37
Lower back pain	7 (21.9)	0	23 (71.9)	2 (6.2)	32
Scrotal pain	5 (45.4)	0	6 (54.6)	0	11

Table IV: Patient distribution according to physical signs

Variables	n	%
Haemodynamic instability	35	28.9
Hypogastric mass	37	30.6
External rotation of lower limb	29	24
Positive Larrey's manoeuvre	23	19
Perineal haematoma	17	14
Vaginal bleeding	8	6.6
Vulvar laceration	6	4.9
Prostate not palpable	5	4.1
Anal margin wound	5	4.1
Testicular exposure	3	2.5
Loss of scrotal tissue	2	1.7
Vulvar haematoma	2	1.7
Rectorragia	2	1.7

Table V: Patient distribution according to aetiology

Aetiologies	n	%
Road traffic accident	93	76.9
Work accident	13	10.7
Fall from height	11	9.1
Household accident	2	1.7
Sports accident	1	0.8
Crush injury	1	0.8

Table VI: Patient distribution according to urological lesions

Urological lesions	n	%
Urethral lesions	76	62.8
Posterior extravasation	59	77.6
Partial rupture	45	59.2
Complete rupture	18	23.7
Urethral contusion	11	14.5
Anterior extravasation	4	5.3
Urethral stricture	2	2.6
Bladder lesions	38	31.4
Extraperitoneal rupture	19	50
Bladder contusion	12	31.6
Intraperitoneal rupture	7	18.4
Scrotal lesions	26	21.5
Scrotal haematoma	11	42.3
Haematocele	6	23.1
Albuginea rupture	4	15.4
Testicular haematoma	3	10.3
Testicular dislocation	1	3.8
Scrotal contusion	1	3.8

Table VII: Patient distribution according to pelvic X-ray findings

Pelvic X-ray	n	%
Tile A	31	25.6
Tile B	65	53.7
Tile C	25	20.7

Table VIII: Patient distribution according to pelvic lesion types and urological organs

Pelvic lesion types	Urethra n (%)	Bladder n (%)	Scrotum n (%)	Total n (%)
Pubic disjunction	41 (74.5)	14 (25.5)	0	55 (45.4)
Double obturator frame fracture	20 (62.5)	12 (37.5)	0	32 (26.4)
Sacroiliac disjunction	8 (50)	7 (43.7)	1 (6.3)	16 (13.2)
Iliac wing fracture	5 (41.7)	7 (58.3)	0	12 (9.9)
Single obturator fracture	6 (50.0)	5 (41.7)	1 (8.3)	12 (9.9)
Ischiopubic ramus fracture	5 (50.0)	5 (50.0)	0	10 (8.3)
Complex fracture	3 (50.0)	1 (16.7)	2 (33.3)	6 (4.9)
Malgaigne fracture	2 (66.7)	1 (33.3)	0	3 (1.6)

Table IX: Patient distribution according to the findings of voiding retrograde urethrocytography (VCUG)

VCUG	n	%
Urethra	76	71
Partial rupture of the urethra	45	42
Complete rupture of the urethra	18	16.8
Elongation of the urethra	11	10.3
Urethral stricture	2	1.9
Bladder	26	24.3
Extravasation of the dye product out of the bladder	26	24.3
Bladder and urethral rupture	5	4.7

Treatment of urological lesions

Suprapubic cystostomy was done in 71.9% of our case series ($n = 87$) (Table X).

Table X: Methods of urinary diversion

Method	n	%
Suprapubic cystostomy	65	53.7
Transurethral catheterisation	56	46.3

Table XI: Breakdown of patients according to the type of emergency treatment

Emergency treatment	n	%
Laparotomy-cystorrhaphy	10	8.3
Diverting colostomy	8	6.6
Vulvo-vaginal debridement	8	6.6
Scrotal incision and drainage	7	5.8
End-to-end urethroplasty	6	5.0
Perineal debridement	5	4.1
Bladder repair	5	4.1
Albuginea repair	4	3.3
Scrotal debridement	3	2.5
Endoscopic internal urethrotomy	2	1.7
Orchidopexy	1	0.8

Emergency treatment

Treatment of pelvic fracture

Orthopaedic treatment methods were the most utilised (74.4%), and rehabilitation was done in 95% of cases (Table XII). Treatment of urethral lesions in the long-term was anastomotic urethroplasty in 48.6% of cases ($n = 17$) (Table XIII).

Table XII: Patient distribution according to pelvic fracture treatment

Treatment	n	%
Orthopaedic treatment	90	74.4
Strict bed rest	78	86.7
Hammock suspension	9	10
Continuous traction suspension	3	3.3
Surgical treatment	31	25.6
External fixator	21	67.7
Screw plate	7	22.6
Screw-retained	2	6.4
Screw-retained plate	1	3.2
Rehabilitation	115	95

Table XIII: Patient distribution according to deferred management

Deferred treatment	n	%
Anastomotic urethroplasty	17	48.2
Endoscopic internal urethrotomy	13	36.1
Urethral dilation	5	13.3
Fistulectomy	1	0.8
Cystolithotomy	1	0.8
Debridement	1	0.8

Short-term complications

Decubitus ulcers represented 6.6% of early complications (Table XIV). The mortality rate was at 4.1%.

Table XIV: Patient distribution according to early complication types

Early complications (< 3 months)	n	%
Intraoperative		
Haemorrhagic shock	5	4.1
Blood clots	5	4.1
Death	3	2.5
Urinoma	1	0.8
Postoperative		
Decubitus ulcer	8	6.6
Surgical site infection	3	2.5
Fistula (urethro-cutaneous, vesico-cutaneous, vesico-vaginal)	3	2.5
Haemorrhagic shock	2	1.6
Death	2	1.6
Wound dehiscence	1	0.8

Immediate complications

Urethral stricture occurred in 33.9% of the study population ($n = 35$) (Table XV).

Table XV: Patient distribution according to immediate complications

Immediate complications (3–6 months)	n	%
Urethral stricture	35	33.9
Hydronephrosis	1	1.0
Bladder calculi	1	1.0
Fournier gangrene	1	1.0

Long-term complications

Urethral stricture occurred as a long-term complication in 41.7% of the cases (Table XVI).

Table XVI: Patient distribution according to late complications

Long-term complications (> 6 months)	n	%
Urethral stricture	43	41.7
Erectile dysfunction	14	13.6
Urinary incontinence	8	7.8
Infertility	1	1.0

Discussion

Over 10 years, there were 78 cases in DGH, and over five years, there were 43 cases in LHD, resulting in a hospital prevalence of 3% and 5%, respectively, and an average incidence of 12 cases per year. Bah et al.² reported a 3% increase in cases over five years. The reported frequency of urological lesions during pelvic girdle fractures was between 3% and 10%.^{4,5} The mean age was 32.61 ± 13.43 years, with a median of 29, and extremes ranging from 4 to 77. The most common age group was 21–30 years (43%), followed by 31–40 years (23%). These results are similar to those of Diallo et al.⁶ and Bah et al.,² who reported a mean age of 33.8 and 33 years, respectively, in their series. This could be explained by the fact that

young people and adults represent the most active segment of the population and are therefore more exposed to accidents. At the extremes of age, certain particularities come into play, notably the flexibility and great deformability of the pelvis in children, exposing them to fewer types of pelvic injury.

Road accidents are the most common aetiology in the literature. This finding was well illustrated in our series, with 76% of cases ($n = 93$) and a high frequency of car-motorcycle pairs in 53% of cases. Similarly, Djè et al.,³ Flancbaum et al.,⁷ and Ngongang et al.⁸ found 75%, 86%, and 80%, respectively. This aetiology is reinforced by several factors linked to the population's lack of civic-mindedness, improved road infrastructure, and the high number of two-wheelers and car drivers.

Contrary to the literature, which reports a predominance of signs of obstruction (acute urine retention, dysuria) or haematuria, we observed the most frequent functional sign to be pelvic pain (90.1% of cases), followed by functional impotence (70% of cases), and haemorrhagic urinary signs, notably urethrorrhagia (29%) and haematuria (27%).^{3,5} This could be explained by the fact that urological injuries do not always appear in the foreground of symptomatology.⁹

Clinical examination was dominated by hypogastric swelling (urinary retention) ($n = 37$, 30.6%) and perineal haematoma ($n = 17$, 14%); a lower rate than reported by Diallo et al.,⁶ who found acute urine retention in seven cases. We noted that urological lesions involving the pelvis were observed in 12% of polytrauma cases, similar to the findings of Dakouré et al.,¹⁰ whose injury pattern had a rate of 12.06% polytrauma cases. This could be explained by the fact that traumatic urological lesions usually occur in high-energy accidents associated with polytrauma.¹¹

An average of 110 laboratory tests were performed, including 55% of patients with anaemia and 10% with acute kidney injury and elevated creatinine levels. This could be explained by the hypovolaemia generated by the haemorrhage, either pelvic or from associated lesions. On imaging, pelvic X-rays were used to diagnose pelvic trauma in 96% of cases ($n = 117$), and abdominal and pelvic computed tomography scans in 3% of patients. According to the Tile classification, partially stable and stable lesions predominated (53% type B, 25% type A), with pubic disjunction predominating ($n = 55$). These data are similar to those of Ngongang et al.,⁸ Lawson et al.,¹¹ and Pavelka et al.,¹² with 42%, 42%, and 57%, respectively, for type B. The literature reports a higher incidence of type A fractures. However, all agree that this type is unlikely to be implicated in urological complications, as it does not generate traction on the ligamentous formations or fascia of the lesser pelvis, as can be observed in symphyseal (Tile B) and vertical (Tile C) disjunctions, except fractures involving the four ilio-ischio-pubic rami.^{13,14}

Voiding retrograde urethrocytography (VCUG) ($n = 105$) showed urethral ruptures in 72.4% of cases ($n = 76$), 42% of which were partial ruptures; however, the most frequent urological lesion was urethral involvement in 62% ($n = 76$), with a predilection for the posterior portion in 77% ($n = 59$), followed by bladder involvement in

31% ($n = 38$), and scrotal involvement in 21% ($n = 26$). In addition, bladder injuries were found in 31% of patients ($n = 38$), and scrotal injuries in 21% ($n = 26$). Our data are in line with the literature, where authors agree on the predominance of urethral lesions in the membranous portion, followed by bladder lesions during pelvic trauma.^{3,15} Different proportions were observed by Paparel et al.¹⁶ and Bariol et al.,¹⁷ who respectively counted 43% kidney injuries followed by 24% testicular injuries, and 67% of kidney injuries followed by 18% bladder injuries, then 17% male external genitalia injuries, and finally 16% urethral injuries, with series of 43 056 and 24 666 patients, respectively. The much larger sample size and wide variability of epidemiological profiles and mechanisms of occurrence in the West, on the one hand, and the performance and variability of diagnostic means on the other, could explain this difference.

Blood transfusion was required in 32% of anaemic patients ($n = 36/67$). In this respect, Cryer et al.¹⁸ and Demetriades et al.¹⁹ showed a correlation between severe pelvic fractures and the need for blood transfusion, linked to the risk of massive haemorrhage. Bone lesions were mainly treated with orthopaedic implants (74%), even though some were displaced and unstable. Strict bed rest on a hard surface was one of the treatment modalities used for 86% of the case series, and osteosynthesis was used for 67% of the study population. This result is similar to that of Abou El Farah et al.,²⁰ who favoured orthopaedic treatment in 81% of cases. This may be justified by the availability of resources and the variable choice of method, depending on whether the decision was taken in an emergency involving an intervention to stabilise the haemodynamic state first, and thereby save the patient's life, or whether it was taken in a calmer situation, allowing better fixation of the bone lesion.

Suprapubic cystostomy as a means of urinary diversion was performed in 53% of the study population. In the early phase of the urethral lesion, endoscopic internal urethrotomy was done in 19% ($n = 24$). Bladder lesions were repaired urgently by laparotomy and suture of the breach in 8% ($n = 10$). Treatment was deferred in 38 patients, i.e. 35 patients with urethral strictures by anastomotic urethroplasty in 44% (17 cases), and the remaining three patients, respectively, by fistulectomy, cystolithotomy, and debridement indicated for bladder fistula, bladder lithiasis, and Fournier gangrene.

Remotely, we recorded 43 urethral strictures managed by endoscopic internal urethrotomy in 55% (24 cases). This result is similar to that of Ngaroua et al.,²¹ who reported that endoscopic internal urethrotomy was the most frequently performed surgical procedure (58%) for treating urethral strictures. In the short term, acute kidney injury was present in 6% of cases. This could be explained by hypovolaemia caused either by pelvic haemorrhage related to pelvic trauma or associated lesions.²¹

The mortality rate was 4% ($n = 5$) and was related to haemorrhagic shock in 100% of cases. In the immediate period following the injury, urethral stricture was the most common complication in our series, occurring in 33% of cases ($n = 35$). This result was similar to that of Odz  be et al.,²² who reported urethral stricture in 41% of cases. This may be linked to the fact that the initial management

of urethral lesions consisted of urinary diversion, thus conceding wound healing with or without stricture.

Males predominated with a male-to-female ratio of 3.17. This male predominance was also reported by Fouelifack et al.²³ and Ngongang et al.,⁸ who found rates of 94% and 60%, respectively. In the long term, since we had no information on our patients' erectile function prior to surgery, it was not easy to differentiate between erectile dysfunction due to pelvic trauma and due to surgical treatment. However, according to Malavaud et al.²⁴ and Le Fort et al.,²⁵ there is an alteration in overall sexual satisfaction and a specific reduction in erectile function associated with pubic disjunction, linked to damage to the cavernous nerves at the time of diastasis. In our series, erectile dysfunction was transient in 92% of patients ($n = 13$), who reported a satisfactory reappearance of erection within six months postoperatively. This result is close to that of Diallo et al.,⁶ where 21% of patients ($n = 19$) presented with erectile dysfunction, and 89% ($n = 17$) recovered within the same period.

A total of 103 patients were followed up, 87 of whom developed complications, including eight with urological sequelae. Six patients had recurrent urethral strictures, persistent urinary incontinence despite perineo-sphincter repair, and erectile dysfunction despite pharmacological management (phosphodiesterase type 5 inhibitors, intracavernous prostaglandins), i.e. a long-term prognosis of 90%. Our result is close to that of Fouelifack et al.,²³ who observed a favourable prognosis in 88% of cases. This may be explained by the marked growth in indications for endoscopic internal urethrotomy, which the literature suggests gives satisfactory results in cases of urethral stricture.

Conclusion

Urological injuries associated with trauma to the pelvis are frequent, affecting patients of all ages, with men being the most affected. The main cause is road traffic accidents. The diagnosis is indicated by signs such as urethrorrhagia, haematuria, perineal haematoma, and acute urinary retention. In emergencies, suprapubic cystostomy is the most commonly used means of drainage, while endoscopic internal urethrotomy is the most widely used elective therapeutic procedure. Careful management will help reduce the 4% mortality rate. Prevention by observing safety measures on the road and in the workplace remains the only effective means of reducing the mortality and morbidity rates accompanying urological lesions associated with pelvic trauma.

Authors' Contribution

All the authors contributed to the research work. They read and agreed to the final version of the manuscript.

Conflict of interest

The authors declare no competing financial or personal interests.

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Ethical approval

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