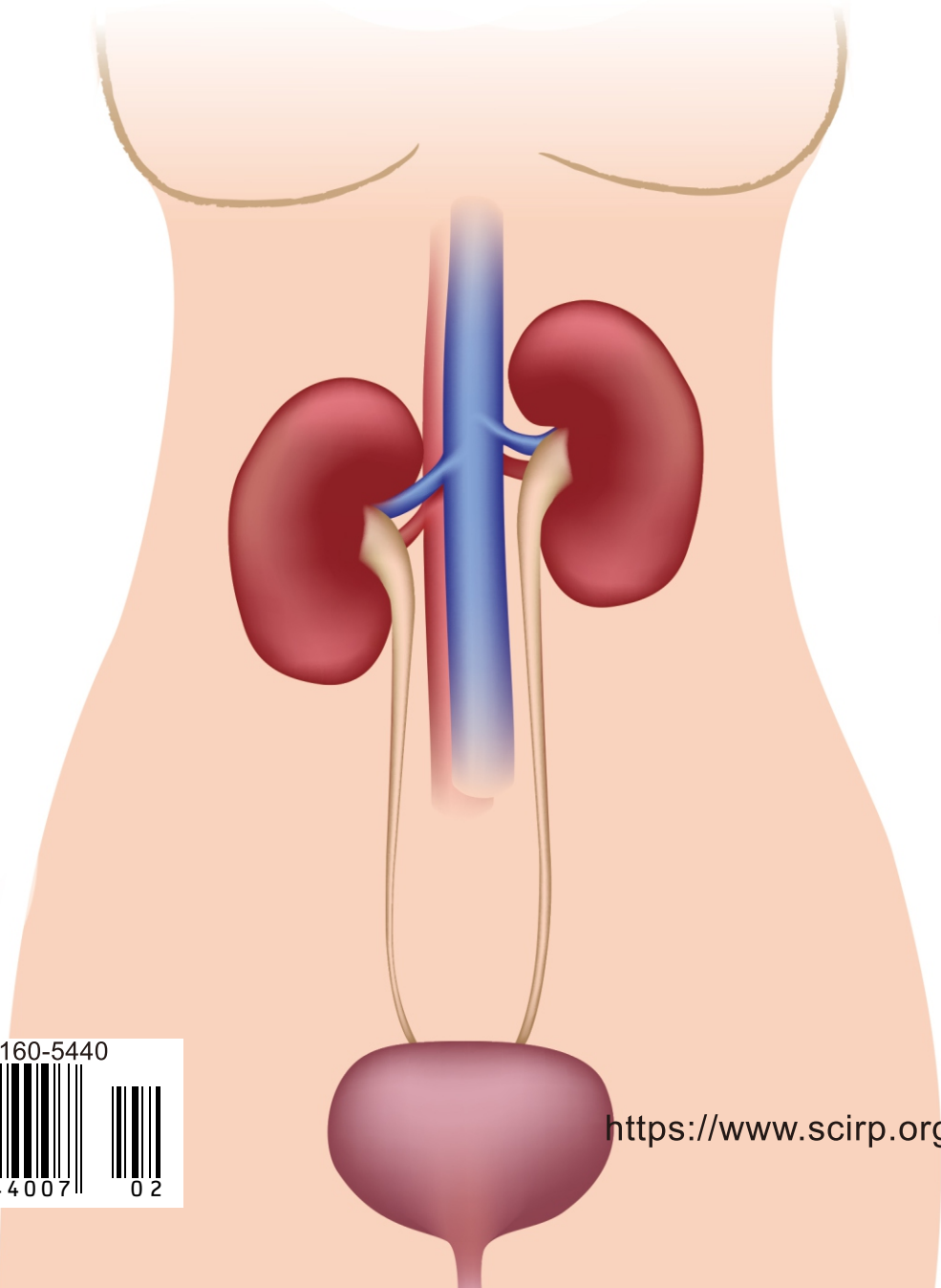


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Table of Contents

Volume 13 Number 2

February 2023

Bladder Perforation during Transurethral Resection of Bladder Tumor Is Not an Innocent Accident: Literature Review Based on a Clinical Case Experience

Z. Zalaquett, M. C. R. Hachem, C. Kattan, J. Kattan.....49

Retrospective and Prospective Study on Injuries during Coital Accidents at the Central Hospital of Yaounde: A Study of 23 Cases

P. F. Owon'Abessolo, F. J. Cedrick, M. M. J. Barthelemy, N. M. A. Stephane, E. P. Cecile, B. A. Ivon,
N. B. Dorcas, M. M. C. Reine, E. A. Quentin, F. P. Joseph.....55

Urogenital Trauma by Pelvic Impalement: A Case Reported at Bouake University Hospital

N. Akassimadou, K. P. Avion, K. Dje, B. Aguia, E. E. Gowe, F. J. Zouan, D. V. Alloka, S. Kamara,
R. Lebeau.....64

Retrocaval Ureter: A Case Series of Three Cases Managed with Uretroretrostomy

A. Elrashidy, E. Ibrahim, R. Mattar, M. Eleiba, A. Elshazly, S. Elsharkawy.....73

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Bladder Perforation during Transurethral Resection of Bladder Tumor Is Not an Innocent Accident: Literature Review Based on a Clinical Case Experience

Ziad Zalaquett*, Maria Catherine Rita Hachem, Clarisse Kattan, Joseph Kattan

Department of Hematology-Oncology, Hôtel-Dieu de France University Hospital, Saint Joseph University, Beirut, Lebanon

Email: *ziadzalaquett@gmail.com

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Abstract

Urothelial Carcinoma (UC) is one of the most frequent cancers worldwide. Transurethral Resection of Bladder Tumor (TURBT) is a standard treatment in the disease's early stages, with bladder perforation being a possible and classical complication. However, extravesical tumor seeding resulting from perforation is a rare phenomenon. We hereby report the case of a 76-year-old man with a history of smoking diagnosed with high-grade T1 urothelial carcinoma. TURBT was performed and bladder perforation occurred during the procedure. Radical cystectomy after neoadjuvant chemotherapy failed to reveal an invasive tumor. However, the patient experienced peritoneal recurrence with liver metastasis 3 years following the operation. This case left physician wondering whether the bladder perforation and the resulting tumor seeding are the cause behind the late peritoneal recurrence of an early-stage urothelial carcinoma.

Keywords

Bladder Cancer, Transurethral Resection of Bladder Cancer, Bladder Perforation, Peritoneal Carcinomatosis

1. Introduction

With over 550,000 cases annually, bladder cancer is one of the ten most prevalent cancers worldwide [1]. Urothelial Carcinoma (UC), also known as transitional cell carcinoma, is by far the most common histologic subtype, accounting for 90% of bladder cancer cases [2]. Notable risk factors of UC include tobacco

smoking, occupational exposure to aromatic amines, or certain medical conditions and pharmaceutical agents, with men being more at risk [3]. Painless hematuria, lower urinary tract symptoms, flank pain, or pelvic mass are typical symptoms and signs [4]. Treatment options highly depend on tumor staging: they include a combination of surgical treatment, intravesical *Bacillus Calmette-Guérin* (BCG) instillations, intravesical or systemic chemotherapy, and/or immunotherapy [5].

Transurethral Resection of Bladder Tumor (TURBT) has become one of the most common surgical approaches to eradicate non-muscle invasive bladder tumors. While technically safe, bladder perforation can occur in 0.9% to 5% of cases and remains one of the most common complications [6]. Urologists consider bladder perforation a classical complication, easily managed by either supportive care or open surgery [6]. However, tumor seeding as a result of bladder perforation is a very rare form of recurrence and an infrequently reported entity.

We hereby report the case of a 76-year-old man with UC recurrence as, most probably, a result of tumor seeding following bladder perforation during transurethral resection.

2. Case Presentation

A 76-year-old man presented with painless hematuria in February 2019. Past medical history included hypertension and diabetes. Social history included smoking stopped ten years ago and a daily single glass of alcohol intake. He underwent TURBT which revealed a high-grade urothelial carcinoma infiltrating the bladder muscle. Bladder perforation occurred during the transurethral resection, leading to surgery the next day for bladder reparation. The patient received neoadjuvant chemotherapy consisting of 4 cycles of Gemcitabine and Cisplatin followed by radical cystoprostatectomy with an orthotopic neobladder in August 2019. The histologic study failed to show any invasive residual tumor albeit the persistence of superficial papillary foci in the anterior wall of the bladder. He did not receive any treatment after his surgery, and he was lost to follow-up.

In July 2022, the patient presented to our clinic with diffuse abdominal pain, nausea, anorexia, and spectacular weight loss. Total body CT scan showed diffuse hepatic and splenic metastasis, and peritoneal carcinomatosis (**Figure 1**). It also showed bilateral hydronephrosis and enlarged retroperitoneal lymphadenopathies (**Figure 2**). Transcutaneous biopsy of the liver masses showed a high-grade carcinoma with malpighian differentiation, compatible with the patient's primary bladder tumor (**Figure 3**). Serum creatinine was increased to 4 times the normal with a creatinine clearance of 15 ml/min, deemed irreversible despite bilateral pyelostomy. A nasogastric tube was placed to relieve gastric occlusion symptoms and the patient became progressively icteric. Immediate initiation of Pembrolizumab failed to stop disease progression and the occurrence of hepatic function insufficiency, resulting in patient death one month after his hospitalization.

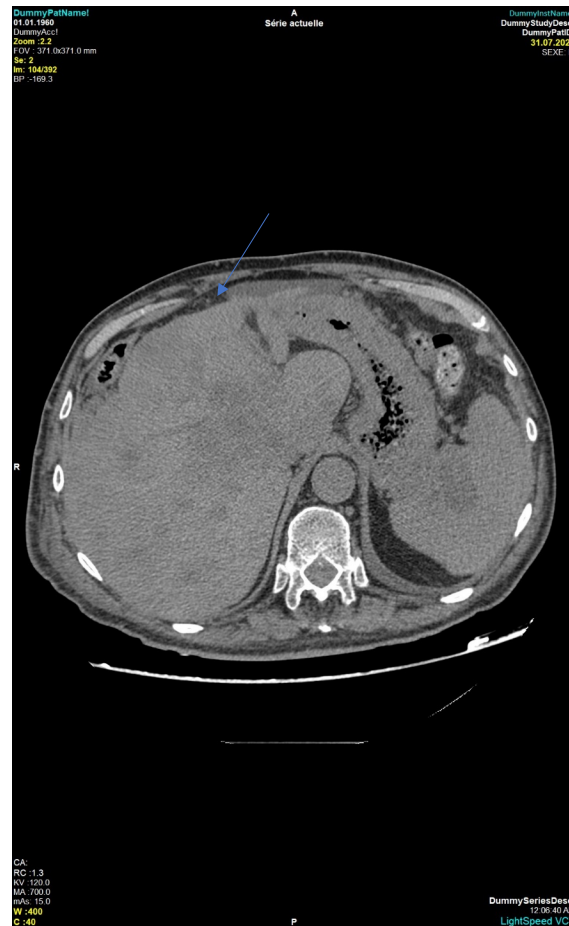


Figure 1. CT scan showing diffuse hypodense metastatic nodules in the liver and the spleen. Micronodular aspect of the peritoneum compatible with peritoneal carcinomatosis (blue arrow).

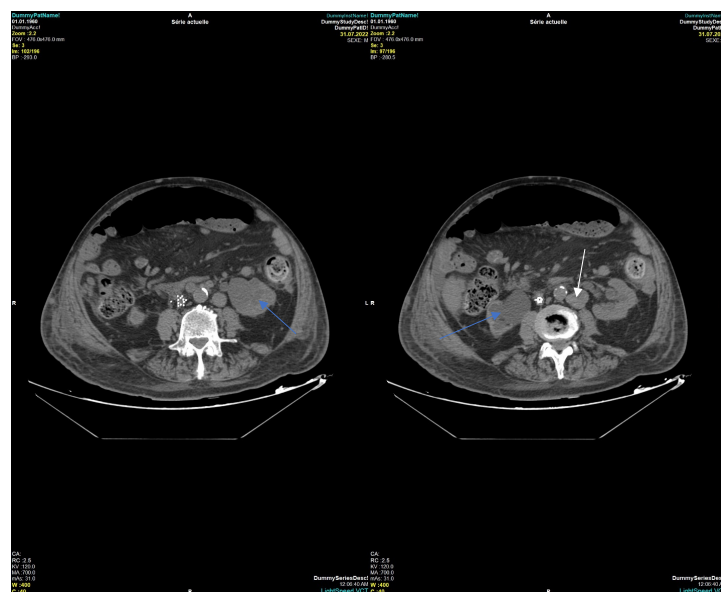


Figure 2. CT scan showing left and right hydronephrosis (blue arrows), and multiple retroperitoneal lymphadenopathies (white arrow).

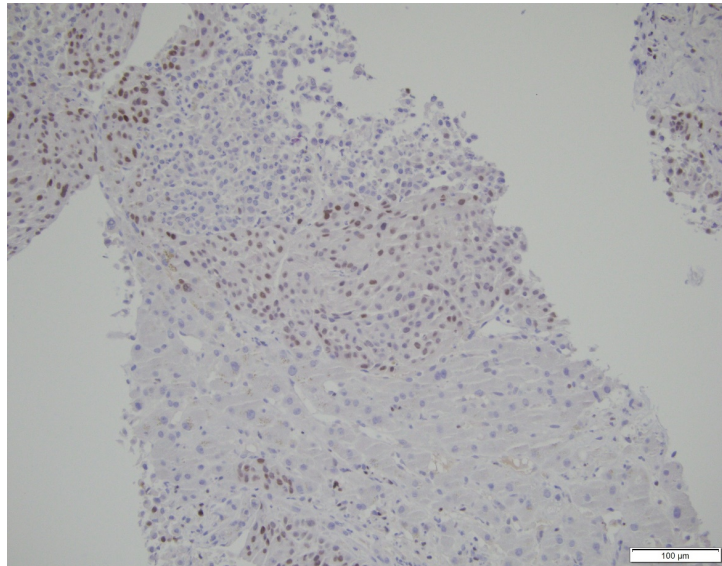


Figure 3. Liver biopsy with GATA3 immunohistochemical stain, a sensitive marker for UC.

3. Discussion

TURBT has become a standard diagnostic and therapeutic procedure in patients with non-muscle invasive bladder cancer. However, it is far from perfect as multiple complications can occur, such as bladder perforation, obturator nerve stimulation, or infection [6]. Bladder perforation, being one of the most common complications, is more frequent with risk factors such as low Body Mass Index, resection depth, and low surgical experience [7]. It is associated with an increased risk of urinary tract infection, fever, septicemia and transfusion, and a decreased 5-year survival rate [8].

In our patient's case, bladder perforation could have resulted in an extravascular tumor seeding, which is an uncommon form of recurrence in UC. Whether extravascular seeding increases the risk of recurrence is still controversial. In fact, Lonati *et al.* reported that only 7 cases out of 521 patients with bladder perforation experienced tumor seeding [7].

Moreover, a frequently discussed risk factor for extravascular tumor seeding is the requirement of open surgery. A retrospective study by Skolarikos *et al.* found that all 4 patients who required open surgery following bladder perforation presented extravascular recurrence. In comparison, none of the 30 patients who did not require open surgery experienced extravascular progression [9]. On the contrary, Golan *et al.* stated that bladder perforation requiring surgical repair does not significantly enhance the chance of extravascular recurrence [10]. Nevertheless, reoperation could therefore be a potential mechanism that increases tumor seeding risk in our patients.

Extravascular tumor seeding and metastasis may be seen at a higher frequency in patients with high-grade UC. While it could have increased the risk of recurrence in our patient, the initial excellent response and the delayed recurrence-free

interval further incriminate the initial perforation as a plausible cause of our patient's recurrence and metastasis.

Few cases resembling ours have been described in the literature by Kim *et al.*, Bus *et al.*, Corfitsen *et al.* and Lim *et al.* who reported one patient each with UC recurrence following bladder perforation [11] [12] [13] [14]. Sites of metastasis were unusual such as the adnexa [11] [12], the peritoneum [11], the pelvis [13] and the sigmoid colon [14]. Time elapsed between the perforation and the recurrence discovery in these patients ranged between 4 and 15 months. Our patient, on the other side, despite an initial impressive response to neoadjuvant chemotherapy, had mainly peritoneal carcinomatosis, and a relatively long recurrence-free interval, with more than 3 years elapsed between perforation and recurrence.

Intraperitoneal chemotherapy has been proven to be effective in preventing tumor spillage from bladder perforation in a rat model. Following laparotomy, rats treated with intraperitoneal Mitomycin showed no sign of tumor recurrence compared to rats who underwent lavage with water [15]. This experiment could provide positive insight for future treatment of this complication. However, this topic has never been investigated in a human study, and no decision or guideline has ever been issued, most likely because of the rarity of the situation.

4. Conclusion

UC is one of the most frequent cancers worldwide, and TURBT is increasingly being used as a treatment option. While many complications can occur, bladder perforation is regarded as an innocent event that can be managed successfully, but it could hide a real risk of extravesical tumor recurrence. This report highlights the importance of a good surgical technique, a high index of suspicion regarding perforation during the procedure, and the avoidance of such complications. It also highlights the possibility of implementing a close surveillance plan in patients who experience bladder perforation or suggest preventive intraperitoneal measures in the future.

Consent

Consent to report this case has been obtained from the patient's family.

Conflicts of Interest

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

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Retrospective and Prospective Study on Injuries during Coital Accidents at the Central Hospital of Yaounde: A Study of 23 Cases

Philip Fernandez Owon'Abessolo^{1,2*}, Fouda Jean Cedrick^{2,3},
Mekeme Mekeme Junior Barthelemy^{2,3}, Nwaha Makon Axel Stephane³,
Etohe PONDY Cecile³, Beling Abanda Ivon³, Nyanit Bob Dorcas^{2,3},
Mendouga Menye Coralie Reine³, Essomba Armel Quentin³, Fouda Pierre Joseph^{2,3}

¹Department of Surgery and Specialties, Faculty of Medicine and Pharmaceutical Sciences, University of Douala, Douala, Cameroon

²Urology Unit, Central Hospital of Yaounde, Yaounde, Cameroon

³Department of Surgery and Specialties, Faculty of Medicine and Biomedical Sciences, University of Yaounde 1, Yaounde, Cameroon

Email: *owonoabessolophilipfernandez@gmail.com

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Abstract

Introduction: A penile fracture is the traumatic rupture of the tunica albuginea of one of both cavernous bodies of an erect penis. It is a urologic emergency in young adults. The objective of our study is to determine the epidemiologic, clinical, and therapeutic aspects and evaluate the complications at the Yaounde Central Hospital (YCH). **Methodology:** It was a cross-sectional retrospective and descriptive study, carried out for a period of five years, from 2015 to 2020, followed by a prospective phase for a period of 1 year, from December 2020 to 2021 at the Urology Unit of Yaounde Central Hospital. **Results:** Our study involved 23 patients. The mean age was 34 ± 4 years with extremes of 23 - 65 years. Married men were the most involved, with 16 cases (69.6%). The majority of patients presented for consultation within the first 6 hours (60.9%). The mean delay time before the consultation was 5 [3 - 24] hours, with extreme values of 1 - 72 hours. Sitting position during sexual intercourse was mainly found (56.5% of cases), while alcohol consumption was the main environmental risk factor found (47.8% of cases). Penile pain (100.0%) and deformation of the penile shaft (91.3%) were the most encountered symptom during admission. The frequency of cavernosa involvement was 87.0%. The injury was partial in the majority of cases (95.0%), involving both corpus cavernosa (55.0%) and mostly on the right (60.0%). The mean management delay

was 5 hours standard deviation [5 - 7], with extremes of 2 - 48 hours. The intra-cavernous hematoma was the essential per-operative finding in all the operated cases (100.0%). Most patients resumed sexual intercourse 2 - 3 months following management (65.3% of cases). After one year of treatment, 78.3% of patients declared satisfactory sexual activity. **Conclusion:** Penile fracture is an anthological emergency in young adults. The management is essentially surgical. Functional prognosis depends on the promptitude of surgical intervention.

Keywords

Penile Fractures, Young Adults, Sexual Activity

1. Introduction

A penile fracture is the traumatic rupture of the tunica albuginea of one of both cavernous bodies, and is one of the traumatic injuries of the penis. It is an accident that occurs in a swollen penis and occasionally, lacerated albuginea of the cavernous bodies, with extravasation of contents into its envelopes. It can be associated with a rupture of the spongy urethra and result in maturation [1]. Diagnosis is clinical; its actual incidence in Cameroon is unknown since few studies have been carried out. The objective of our study is to determine the clinical and therapeutic aspects and evaluate complications

2. Materials and Methods

It was a cross-sectional descriptive study with retrospective recruitment of cases, carried out for a period of 5 years: from 2015 to 2020, followed by a prospective period of one year, from December 2020 to 2021 at the Urology Unit of the Central Hospital of Yaounde.

In the retrospective phase, data collection was done using theatre registers, hospitalisation registers, and archives of medical files in the theatre and at the Urology Unit. Incomplete and inexploitable medical files were excluded. Complete and exploitable medical files were included. Sociodemographic characteristics, clinical presentations, and different therapeutic modalities were the main variables studied. Analysis was done using the data analysis program, Epi info 7.0.

3. Results

3.1. Epidemiological Aspects: Sociodemographic

During our study period, 23 patients with penile fractures, confirmed by the surgical team at the Urology and Andrology Unit of the Central Hospital of Yaounde were included. The mean age of our patients was 34 years with extremes of 23 - 65 years. Regrouping by 10-year ranges revealed a peak frequency range of 30 - 40 years. Married men were mostly involved (69.9% of cases). We did not find any significant religious or professional correlation (**Table 1**).

Table 1. Sociodemographic characteristics of the population (N = 23).

Variables	Value	%
Age (in years)		
[20 - 30[	5	21.7
[30 - 40[	13	56.5
[40 - 50[	2	8.7
≥50	3	13.0
Marital status		
Married	16	69.6
Single	7	30.4
Profession		
Moto-taximan	3	13.0
Military	2	8.7
Sports	2	8.7
Others	16	69.6
Religion		
Muslim	6	26.1
Christian	6	26.1
Others	11	47.8

3.2. Clinical and Paraclinical Aspects

3.2.1. Delay in Consultation, Methods, and Associated Circumstances

A majority of patients presented within 6 hours (60.9%). The median delay time was 5 hours with extreme values of 1 - 72 hours. Sitting position during sexual intercourse was mainly found (56.5% of cases), while alcohol consumption was the major environmental risk factor found (47.8% of cases) (**Table 2**).

3.2.2. Symptoms on Admission

Penile pain (100.0%) and shaft deformation (91.3%) were the main symptoms found on admission (**Table 3**).

3.2.3. Echographic Findings: Cavernous Involvement

The frequency of cavernous involvement was 100%. The lesion was mostly partial in a majority of cases (95.0%), involving both cavernous bodies (55.0%), and mostly on the right (60.0%) (**Table 4**).

3.2.4. Urethral Involvement

The frequency of urethral involvement was 95.7%, with a majority involving the penile site (90.9%) (**Table 5**).

3.2.5. Surgical Management

Most patients were managed within 6 hours following admission (60.9% of cases). The median management delay timing was 5 [5 - 7] hours, with extremes of 2 - 48 hours. The frequency of surgical treatment and trans-urethral catheterisa-

tion was 100% of cases respectively (**Table 6**).

All the patients were operated upon under spinal anaesthesia. The main surgical approach was degloving (75.0% of cases). Most of the surgeries lasted for 30 - 60 minutes (35.0%). The mean duration of surgery was 74.05 ± 34.76 minutes, with extremes of 18 - 150 minutes. Intra-cavernous hematoma was the main per-operative finding in all the operated cases (100.0%) and cavernous bruises. The mean hematoma volume was 34.00 ± 14.38 ml, with extremes of 10 - 60 mL. With respect to blood loss, the mean was 153.50 ± 62.21 ml, with extremes of 80 - 300 mL. No patient was transfused of blood. Most of the trans-urethral catheters were left in place for 15 - 21 days in 65.3% of cases. The mean duration was 20.09 ± 8.24 days, with extremes of 10 - 33 days.

Table 2. Distribution of population with respect to delay in consultation, method and associated circumstances (N = 23).

Variables	Value	%
Delay in consultation (in hours)		
<6	14	60.9
[6 - 12[	1	4.3
[12 - 24[	1	4.3
[24 - 48[	5	21.7
[48 - 72[	1	4.3
≥ 72	1	4.3
Follow up method		
Sitting position	13	56.5
Auto-manipulation of penis	5	21.7
Four-leg position	5	21.7
Associated circumstances		
No associated circumstance	10	43.5
Alcohol consumption	11	47.8
Erection booster	6	26.1
Narcotic intake	2	8.7

Table 3. Population distribution with respect to admission symptoms (N = 23).

Symptoms on admission	Value	%
Penile pain	23	100.0
Penile shaft deformation	21	91.3
Bruise	20	87.0
Penile swelling	19	82.6
Urethrorrhagia	7	30.4

Table 4. Echographic characteristics of cavernous involvement.

Variables	Value	%
Cavernous body lesion (N = 23)		
Yes	20	87.0
No	3	13.0
Number of erectile body lesions (N = 20)		
1	5	25.0
2	11	55.0
3	4	20.0
Laterilisation of cavernous lesion (N = 20)		
Left	8	40.0
Right	12	60.0
Type of cavernous lesions (N = 20)		
Partial	19	95.0
Total	1	5.0

Table 5. Characteristics of urethral involvement.

Variables	Value	%
Urethral involvement (N = 23)		
Yes	22	95.7
No	1	4.3
Urethral site affected (N = 22)		
Penile	20	90.9
Bulbar	2	9.1

Table 6. Population distribution with respect to means of management (N = 23).

Means of management	Value	%
Delay in mamangementy (in hours)		
<6	14	60.9
[6 - 12[	7	30.4
[12 - 24[	1	4.3
≥24	1	4.3
Surgery		
Yes	20	87.0
No	3	13.0
Trans-urethral catheterisation		
Yes	23	100.0
No	0	0.0

3.3. Evolution

Most patients restarted sexual activity within 2 - 3 months following management (65.3% of cases). After one year of follow-up, 78.3% of patients declared satisfactory sexual activities satisfais carried out (Table 7).

4. Discussion

4.1. Age

Most patients were between the age ranges of 30 - 40 years (56.5% of cases). The median age was 34 [30 - 37] years, with extreme values of 23 - 65 years. Our values are similar to those of Sylla *et al.* [1] in Senegal; a hose median age was 31.6 + 6.7, with extremes of 23 - 45 years. This predorminanc e can be explained by the fact that this age corresponds to intense sexual activity and use of aphrodisiacs. This age is also noted for concurrence of sexual performance in line with erotic films, most often acrobatic sexual intercourse.

4.2. Marital Status

Married men were mostly involved, 16 cases (69.6%) without precising if sexual activity was with the spouse or an extra-marital partner or a context of rape. Ndiaye *et al.* [2] found an elevated frequency of predorminance to single patients which can be explained by freedom of sexual activity which is common and absence of pre-marital abstinence which is on the rise.

5. Clinical Characteristics

5.1. Delay in Consultation

The median delay was 5 hours. This delay is similar to many results of other authors like Diarra *et al.* [3] in Mali who had a delay of 6 hours, and 4 hours in the findings of Prunet *et al.* [4] reported cases of penile fractures seen sequellae of erectile disfunctionns or curved penis or fibrosis of cavernous bodies. This delay in consultation can be justified by the misunderstanding of urgency in the management of this pathology.

5.2. Associated Circumstances

The most associated circumstance found in our study and also in literature were coital errors [5] [6] [7]. The preferred coital position was often with "the woman on top" limiting all control of the man. Coital error results from violent contact by the penis in erection and collision with the symphysis pubis, perineum and internal aspects of the thigh or gluteus of the partner [3]. Other causes of penile fractures accounted for 21.7% of cases in our study resulting from penile manipulations aimed at stopping morning erections or in brutal re-introduction of the penis in the course of a masturbation session. These and linked to developing countries or socio-economic conditions imposing co-habitation, promiscuity hence causing subjects to conceal morning erections [8] [9].

Table 7. Outcome of patients following management (N = 23).

Variables	Value	%
Delay in restarting sexual activity(in months)		
<2	3	13.0
[2 - 3[	15	65.3
≥3	5	21.7
Evaluation of sexual activities after one year		
Satisfactory	18	78.3
Non satisfactory	5	21.7

5.3. Clinical Evaluation

It is worth noting that clinical presentation is variable depending on the early or late presentation of the fracture, involvement of one or two cavernous bodies, and the existence of one or two associated urethral lesions. Pain (100%), lateral axes deviation of the penile shaft (91.3%), swelling (82.6%) and bruises (87%) were present in our patients, likewise other publications [1] [10]. Seven patients presented with urethrorrhagia on clerking, with associated urethral lesions on exploration. These urethral lesions gave a picture of the violence of the trauma. Concomitant urethral involvement aggravates morbidity, especially in the long run, with risk of stenosis. Based on the findings of Mangin *et al.* [11] urethra rupture la rupture is reported in about 10% of cases. This rupture partial or total is most often transverse.

6. Echographic Characteristics

In our study, rupture of cavernous bodies was partial in most cases and the most affected site was the right and at the level of the inferior third of the penis. These findings are similar to those of Sow *et al.* [12] in Senegal in 2008, in a similar study on *urethral involvement*: The urethral lesions displayed a picture of the violence of trauma [12]. The anatomic feature of the urethra with respect to the spongy bodies predisposes to it to associated concomitant urethral involvement aggravates morbidity, especially in the long run, with risk of stenosis. Urethral involvement was found in 95.7% of patients in our: these results were contrary to those of several authors like Diarra *et al.* in Mali who didn't find urethral lesions in his study. Touiti *et al.* [13] reported that the level of urethral involvement in the rupture of cavernous bodies is from 10% - 20%. This can be explained by major alcohol consumption in our study population. This state can potentiate kinetic energy and resolution in lesions.

7. Therapeutic Modalities

Based on management, preference was made on urgent surgical treatment in order to prevent complications like fibrosis, curvature of cavernous bodies, as well as erectile dysfunction and urethral stenosis in case of associated urethral rupture,

as demonstrated by Amer *et al.* [14] in a meta-analysis of 58 articles 3213 cases. In our study, surgery was done in 20 patients, 100% of cases with a mean operative duration of 74.05 ± 34.76 minutes.

The circumferential surgical approach was preferred in our study, same as several authors [13] [15] [16], since this approach involves a complete view of the lesions and leaves an esthetic scar m; whereas, Mansi *et al.* [17] criticises this surgical approach and attributes it to cause oedema and skin necrosis. We have never noted any complication associated with this approach regularly applied in our practical experience. Other associated urethral lesions in this study were managed by end-to-end urethrhaphy during the same surgical intervention.

After early surgical intervention, 11 patients presented with mild anemia. Early management therefore significantly reduces the risk of hemorrhage.

Most patients restarted sexual activity 2 - 3 months after management, in 65.3% of cases. After one year of treatment, 78.3% of patients declared satisfactory sexual activities. Most authors [3] [7] [13] [15] [16] agree with the fact that surgical repair is less related to complications. The level of complications in conservative management varies between 10% - 53% and brings about risks of painful erections, persistent hematoma with infection tendency and evolution into abscess formation, artero-venous fistulae, erectile dysfunction and urethral rupture [15] [16]. Meanwhile, according to Mydlo *et al.* [18], for 5 patients who refused surgery, 4 had a normal erection and only one presented with a curved penile shaft as sequellae after treatment.

8. Conclusion

Penile fracture is an anthological emergency in young adults. Pain and deformation of the penis are the main symptoms. Ultrasound of the corpora cavernosa is a reliable means of diagnosing cavernous lesions. The involvement of the corpora cavernosa is partial in most cases and the site of injury is mainly the penile area. Management is essentially surgical by disgorgement of the penis and remains the most effective means of exploration and management of lesions in this condition and the prognosis depends on the speed of the surgical intervention.

Conflicts of Interest

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

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Urogenital Trauma by Pelvic Impalement: A Case Reported at Bouake University Hospital

N'Diamoi Akassimadou^{1*}, Kouassi Patrice Avion¹, Koffi Dje¹, Brice Aguia¹, Edi Edmond Gowe², Freddy Junior Zouan¹, Dago Venance Alloka¹, Sadia Kamara¹, Roger Lebeau³

¹Urology Department, Bouaké University Hospital, Bouaké, Ivory Coast

²Urology Department, Abidjan Cocody University Hospital, Abidjan, Ivory Coast

³General and Digestive Surgery Department, Bouaké University Hospital, Bouaké, Ivory Coast

Email: *ndiamoi74@gmail.com, avionkouassi@yahoo.fr, djekoffi1958@gmail.com, gowedti@yahoo.fr, donbricofr@gmail.com, docteurzouan@gmail.com, alvendamed@gmail.com, docteur.ben.sadia93@gmail.com, lebeauroger@yahoo.fr

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Abstract

Urogenital impalement trauma is a particular form of penetrating trauma to the pelvis. They are rare, spectacular or dramatic because they can be responsible for serious vascular and/or visceral lesions. This study reports a case of hypogastric impalement in a 19-year-old young man that caused musculoaponeurotic and urogenital lesions. Emergency surgical exploration was carried out urgently by a multidisciplinary team.

Keywords

Urogenital Trauma, Impalement, Emergency, Surgery, Cystorrhaphy

1. Introduction

Impalement trauma is a special form of penetrating trauma and is usually related to direct impact or falling onto a sharp or blunt object [1].

These lesions are rare and spectacular, but also dramatic because they can be responsible for serious vascular and/or visceral lesions that can be life-threatening [2] [3].

We report a case of hypogastric impalement in a young subject that caused musculoaponeurotic and urogenital lesions.

The rarity of this serious accident deserves our attention. We are interested in the mechanism of occurrence of this accident and the visceral lesions it caused. We report our therapeutic attitude and the postoperative follow-up of the lesions treated.

2. Our Observation

This is a 19-year-old patient, a student, evacuated by the Regional Hospital Center of Yamoussoukro to the surgical emergencies of the Hospital and University Center of Bouake for an open trauma of the abdomen by impalement following an accident from the public road.

The accident would have occurred 8 hours before his admission. The patient, the motorcyclist would have left the road following a false maneuver. It would have collided head-on with a pile of wood piled up in bundles. One of the branches of the antlers would have traumatically penetrated him from the pelvis to the gluteal region from front to back. He would have felt a sharp pain in the pelvis and presented a little peri-lesional bleeding. He would have been evacuated to the regional hospital which then referred him to the surgical emergencies of the university hospital for better care.

The examination on admission revealed a patient in good general condition with colored conjunctivae and hemodynamically stable. The urogenital examination revealed an absence of suprapubic swelling. We noted the presence of a branch of wood inserted at the level of the hypogastrium (**Figure 1** and **Figure 2**) and coming out at the level of the right buttock (**Figure 3** and **Figure 4**). There was a urine outlet at the hypogastric portal of entry. The external genitalia were unremarkable and on digital rectal examination, the anal margin was healthy, the anal sphincter toned, the prostate looked normal but tender, and the finger cot was clean.



Figure 1. Gateway to trauma.

Figure 2. Gateway of trauma.



Figure 3. Way out of trauma.

Figure 4. Branch section before surgery.

Examination of the digestive system was normal (no signs of peritoneal irritation) as well as that of the other systems.

We concluded at the end of our clinical examination to a hypogastric impalement with probable bladder pinning in a hemodynamically stable patient. And we put the indication of a surgical exploration.

After a satisfactory preoperative assessment, the patient was admitted to the operating room for surgical exploration and therapeutic management of his lesions. A multidisciplinary team composed of urologists, digestive and general surgeons, vascular surgeons and traumatologists was brought together for the intervention.

We proceeded to the partial ablation of the branch at the level of the exit orifice to allow the positioning of the patient in the dorsal decubitus position (**Figure 4**). This branch measured 122 cm in length and 4.8 cm in diameter.

On surgical exploration, after enlargement of the portal of entry and rigorous control of haemostasis, we proceeded to remove the foreign body. There was a hypogastric oval wound 6 cm long, slightly hemorrhagic, which was stained with urine. This wound (entrance orifice) communicated with a wound in the right buttock (exit orifice) also oval and measured 5 cm long axis. This wound was located 3 cm from the anal margin and was not very hemorrhagic.

The laparotomy allowed us to objectify that the intestinal loops were normal

with no lesion of the rectum. On the other hand, there was a bladder breach of around 5 cm on the right side, a deteriorating, hemorrhagic wound in the bladder neck with prostatic involvement and a lesion of the prostatic urethra (**Figure 5**). The gestures performed were to make hemostatic stitches at the level of the bladder neck with a crimped wire, then a cystorrhaphy on the bladder wound and a difficult repair of the prostatic urethra (**Figure 6** and **Figure 7**). Then, we put in place a 3-way transurethral catheter associated with irrigation, bladder washout, abdominal washing and abdominal closure. Then, we carried out a trimming of the entrance and exit doors associated with dressings.

Postoperatively, the patient was put on tri-antibiotic therapy, analgesics, low molecular weight heparin therapy associated with dressings every 2 days. The immediate post-operative follow-up was simple (**Figure 8**). The AP pelvic X-ray performed on D3 of surgery did not show any osteoarticular lesions (**Figure 9**).

Then, on D4, the patient presented with parietal suppuration at the level of the hypogastric wound and the gluteal wound followed by an exteriorized urinary fistula at the level of this wound (**Figure 10** and **Figure 11**). This fistula was treated with daily dakin dressings until drying up on D17 combined with a secondary suture (**Figure 12**). In view of the good clinical evolution, the patient was discharged on D20 postoperatively. The retrograd ureterocystography with permictional cliches was normal (**Figure 13**).

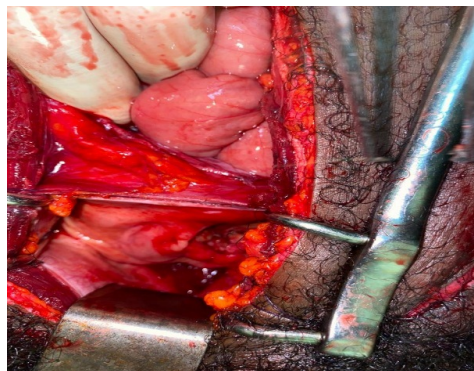


Figure 5. Bladder breach + desintegration of bladder neck + healthy digestives loop.

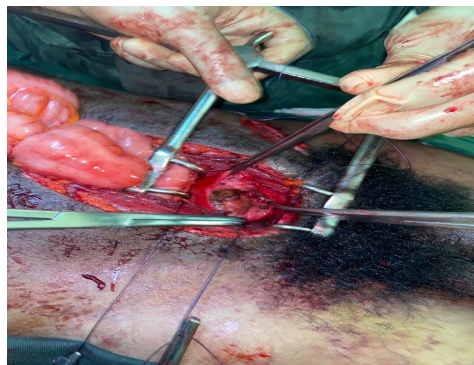


Figure 6. Hemostatic suture.



Figure 7. Cystorraphy.



Figure 8. Suppuration at Day 4.

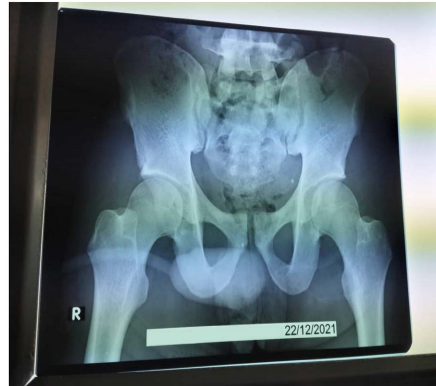


Figure 9. Normal X-ray of the bony pelvis.

Figure 10. Good evolution at Day 10.



Figure 11. Suppuration and urination.



Figure 12. Closing of fistula + secondary suture.



Figure 13. Normal retrograd uretrocytography.

3. Discussion

Impalement wounds have been documented since the beginning of history, particularly in ancient Egypt [4].

According to Eachempati [5], impalement trauma is of two types: in type I, the lesions result from the fact that the body is impaled against a stationary ob-

ject such as in the case of a collision. It is common in adults as reported in our case. In type II, the lesions result from the fact that a fast object comes to penetrate a stationary body. This is common in children in the pelvic, anorectal and vaginal region in cases of sexual assault or rape [6].

Several regions of the body can be affected by an impalement lesion, but that of the hypogastric region is very rare or even exceptional. It can be responsible for bladder, anorectal and even vascular lesions that can be life-threatening.

The quality of the initial care will condition the evolution of the lesions encountered during the exploration, which must be cautious and attentive. The first steps must be meticulous at the site of the trauma followed by evacuation in a qualified center. This was the case of our patient.

Whatever the region of the impalement and in particular the hypogastric region, the object must not be mobilized or removed outside an operating room [7] [8] [9].

Most authors agree on a buffer effect of the injuring object. If the removal of the object is not controlled, it can result in a cataclysmic hemorrhage that is uncontrollable [10].

In our case, the impaled object was removed in the operating room under careful vascular control.

Intraoperative lesion diagnosis must be precise. Bladder and urethral wounds are rarely isolated in penetrating trauma to the pelvis [11]; as in our case where we objectified a bladder wound of 5 cm, a hemorrhagic deterioration of the cervico-prostatic block associated with a wound of the prostatic urethra. Urethral wounds are serious because of potential sequelae: urinary incontinence, erectile dysfunction and urethral stricture.

The treatment of these lesions is based on bladder drainage associated with trimmings and sutures. Immediate urethral repair is always desirable but it can be delayed [12]. It was possible in our observation to perform cystorrhaphy after haemostasis and trimming of the lesions. Management of urethral lesions has been deferred, and we were able to place a bladder catheter via the transurethral route.

However, some authors argue in favor of immediate repair because the severity and rate of secondary stenosis would be lower [13].

Postoperative follow-up must be rigorous because of the high risk of local complications such as suppuration and fistulas [13]. Also, during this strict monitoring, disorders such as urinary incontinence, erectile dysfunction and urethral stenosis will be sought. It will be based on clinical and paraclinical signs, in particular, retrograde urethrocytography

4. Conclusions

Pelvic impalement responsible for urogenital lesions is rare and exceptional. Its management is essentially surgical and allows precise lesion diagnosis and effective treatment.

Our observation allowed us to understand bladder, urethral and prostatic lesions, their therapeutic approach and prognosis.

Urinary incontinence, erectile dysfunction and urethral stricture constitute the pejorative evolution of these lesions; hence, the multidisciplinary management of this trauma to obtain a convincing result.

Conflicts of Interest

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

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Retrocaval Ureter: A Case Series of Three Cases Managed with Uretroretrostomy

Abdullah Elrashidy¹, Emad Ibrahim², Rasha Mattar³, Mohab Eleiba²,
Ayman Elshazly¹, Suzan Elsharkawy^{4*}

¹Urology Department, King Khalid Hospital, Hail, Saudi Arabia

²Urology Department, Kafr El-Shikh General Hospital, Kafr El-Shikh, Egypt

³radiology Department, King Khalid Hospital, Hail, Saudi Arabia

⁴Gynecology and Obstetrics Department, Alexandria University, Alexandria, Egypt

Email: Aboufahdelrashidy2@yahoo.com, mohabeliba@gmail.com, dr_ayman_ezzat2010@yahoo.com,

*Samirsuzan6@gmail.com

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Abstract

Retrocaval ureter is a very rare congenital malformation. We report a 10 years' experience in the diagnosis and treatment of retrocaval ureter, a case series of 3 cases in two different countries of the Middle East. This is a retrospective study that included 3 cases of retrocaval ureters in Egypt and Saudi Arabia. Standard open ureteroureteric anastomosis was performed through a flank incision for each case. Patients' symptoms were re-evaluated after two to four months. Complete recovery from symptoms occurred, and hydroureter and hydronephrosis regressed in all cases. Early diagnosis and treatment are the keys to prevent hydronephrosis and deterioration of renal functions.

Keywords

Loin Pain, Hydroureter, Hydronephrosis, Retrocaval Ureter, Preureteric Vena Cava Inferior, Uretroretroic Anastomosis

1. Introduction

Since its first description by Hochstetter in 1893 [1], approximately 250 cases of retrocaval ureter have been reported all over the world. The retrocaval ureter is a very rare congenital malformation; the incidence of 1 in 1000 live births has been reported [2], with a prevalence of around 0.06% [3]. It is more common in males than females (ratio = 3:1) and appears more commonly in the right ureter [3]. But it may be seen in the left side on cases with situs inversus or duplication of the Inferior Vena Cava (IVC) [4].

Retrocaval ureter (or circumcaval, postcaval ureter) is all misleading names, as the anomaly affects the IVC and not the ureter. So, “preureteric vena cava inferior” is aetiologically the most correct one.

During the embryonic development of the IVC, the Posterior Cardinal Vein (PCV) undergoes a complete regression, allowing the ureter to have an anterior position to the definitive IVC [5]. If there is abnormal development, the ureter is forced to surround the vein; initially located posteriorly, then anteriorly to it at a lower level [5].

According to Huntington and McClure [6], there is a theoretical probability of fifteen different forms of preureteric IVC, only five variants have been described in humans (Table 1, Figure 1), and the other twelve have been observed in animals.

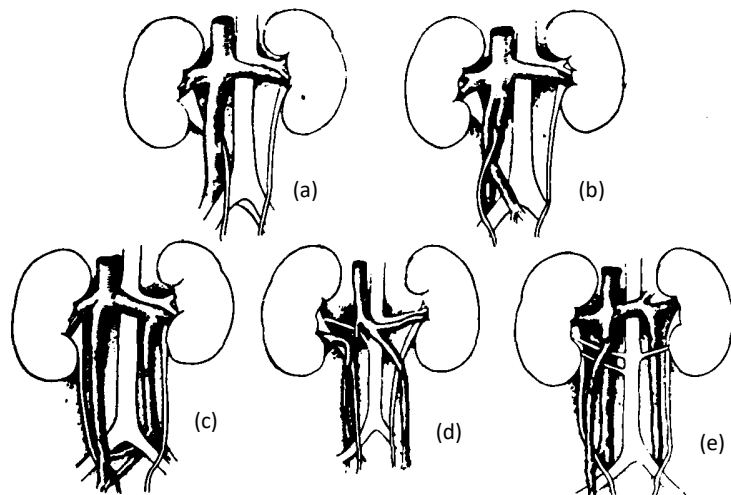


Figure 1. Graphic representation of the five types of retrocaval ureter found in man (after GOYANNA).

Table 1. Variants of preureteric Inferior Vena Cava in human.

	Possible mechanism
Group I Figure 1(a)	Unilateral right-sided single preureteric vena cava. Persistence of the right postcardinal vein, disappearance or failure of development of the right supracardinal vein.
Group II Figure 1(b)	Unilateral right-sided double Inferior Vena Cava. Ureter between the two veins. Persistence of the right supracardinal vein and of the right postcardinal vein.
Group III Figure 1(c)	Bilateral, single Inferior Vena Cava, the right being preureteric and the left postureteric. Persistence of the right postcardinal vein and the left supracardinal vein.
Group IV Figure 1(d)	Bilateral single preureteric Inferior Vena Cava. Persistence of the right and left postcardinal veins.
Group V Figure 1(e)	Double right vena cava, ureter between the two veins, single postureteric left vena cava. Persistence of the right supracardinal and postcardinal veins as well as of the left supracardinal vein.

The etiology of retrocaval ureter remains uncertain, but some authors have reported that maternal exposure to substances such as monomethyl ether could be related to the development of this anomaly [7]. Simultaneous congenital anomalies are sometimes associated, such as horseshoe kidney, ureteropelvic junction obstruction, double IVC, congenital lack of the vas deferens, hypospadias, extra vertebra, diverticulum, anterior urethral calculus, renal agenesis, syndactyly in both feet, intestinal malrotation, and Goldenhar syndrome [8] [9].

Patients typically remain asymptomatic until their thirties, when the disease usually manifests itself with attacks of right loin pain, hematuria, lithiasis, and/or recurrent Urinary Tract Infection (UTI) [2]. An earlier diagnosis is not common except if it was associated with another symptomizing condition, e.g. hydronephrosis [10]. Abdominal ultrasound is the first investigation that raises the suspicion of this pathology, which usually shows right hydronephrosis and right hydroureter at its upper part. Classically, this is followed by Intravenous Pyelogram (IVP), Computed axial Tomography (CT) abdomen with contrast, or Magnetic Resonance Urogram (MRU). All will identify a “fish hook”, inverted “J” or “S”-shaped ureter, and a dilation of the collecting system [3] [8]. Retrocaval ureters are classified into two types [11], shown in **Table 2**. Care must be taken to diagnose any possible associated malformations [9].

We report a 10-year experience in the diagnosis and treatment of retrocaval ureter, a case series of three cases in two different countries of the Middle East.

2. Methods

A retrospective study included 3 cases of retrocaval ureters from 2 countries; Egypt and Saudi Arabia, in the period between 2013 and 2023. The study protocol was approved by the Ethics Committee of the Faculty of Medicine, Alexandria University.

Age, gender, side of the affected kidney, admission symptoms, radiological examinations, and grade of hydronephrosis were recorded. All patients underwent surgical treatment. A standard open ureteroureterostomy was performed through a flank incision. Ureter with a dilated proximal segment that crossed the IVC from the posterior aspect and coursed in the medial direction was dissected. Stay sutures were placed proximal and distal to the crossing point, and an oblique cut was done. Then, the ureter was brought in front of vena cava. Cut ends were spatulated, and end-to-end anastomosis was performed over a double J catheter

Table 2. Classification of Bateson and Atkinson for retrocaval ureter.

Type 1	Type 2
Most common (90% of cases)	Less common (10% of cases)
The ureter crosses at the height of the third lumbar vertebra	The ureter crosses at the level of the renal pelvis
Deformity in the form of fish hook or “S”	Sickle-shaped deformity
Marked hydronephrosis	Minimal hydronephrosis

(6 Fr) using 4 - 0 gauge Vicryl sutures, and a retroperitoneal non-suction drain was inserted before wound closure. Transurethral Foley catheter was removed on the third day, drain was removed on the fifth day, and the double J catheter was removed after 6 weeks postoperatively. Patients' symptoms were re-evaluated after two to four months. A follow-up CT scan was obtained in order to check the grade of hydronephrosis, hydroureter, and ureteric relation to the IVC.

2.1. Case 1 (Kafr El-Shikh, Egypt, 2013)

A 22-year-old man presented to the outpatient urology clinic at Kafr El-Shikh General Hospital with complaints of dull intermittent right loin pain interfering with his daily activity for the past year. Clinical examination of the abdomen was free. A laboratory evaluation was done. It included a urinalysis, complete blood picture, urea, creatinine, and electrolytes; all were within normal limits. Ultrasonography (US) of the kidney, ureters, and bladder showed Grade II right hydroureteronephrosis until the upper third of the ureter. CT scan with IV contrast revealed a dilated right renal pelvicalyceal system and upper ureter with the fish-hook sign (**Figure 2**). The diagnosis of retrocaval ureter was confirmed, the patient was operated in **Figure 3** and **Figure 4**, and no intra- or post-operative complications occurred. After 3 months, the patient was totally symptom-free, and the hydronephrosis decreased significantly.

2.2. Case 2 (Kafr El-Shikh, Egypt, 2017)

A 39-year-old married woman complained of right sided lower back pain for four years. She had no history of fever, dysuria, hematuria, or weight loss. She had an Ultrasonography (US) examination that revealed moderate right hydronephrosis and upper part hydroureter. Then, she had a failed ureteroscopy in private sector before she was presented to Kafr El-Shikh General Hospital's outpatient urology clinic. An Intravenous Pyelogram (IVP) and Magnetic Resonance Urorogram (MRU) were performed, which revealed the classic fish-hook sign of the right ureter associated with hydronephrosis Grade II (**Figure 5**). A complete laboratory evaluation, including urinalysis, complete blood picture, kidney function tests, and electrolytes, were within normal limits. She was operated on and no intra- or post-operative complications were reported. After 6 weeks, the symptoms regressed and the hydronephrosis decreased dramatically.

2.3. Case 3 (Hail, Saudi Arabia, 2022)

A 29-year-old man had complained of intermittent right flank pain for 7 years. His US and IVP (**Figure 6**) showed hydronephrosis and hydroureter Grade II. He was treated conservatively for a year by inserting a double "J" catheter (**Figure 7**) followed by intermittent courses of antibiotics and analgesics to relieve pain and prevent recurrent UTI. In 2022, he came for consultation in the outpatient urology clinic at King Khalid hospital. A CT with IV contrast was ordered and showed mild hydronephrosis of the right kidney, right proximal ureteric dilatation with medial deviation, and an abrupt change in the mid ureteric caliber

without detectable stones, likely a retrocaval ureter (**Figure 8**). All laboratory tests were normal, and the patient was operated on with smooth post-operative period. After 4 months, CT showed right the proximal ureter running in its normal course lateral to the IVC (**Figure 9**). Patient was totally symptom-free.

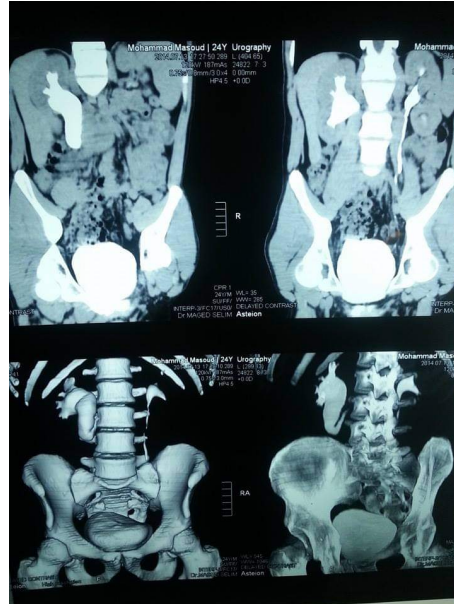


Figure 2. CT scan with IV contrast of Case 1 revealed a dilated right renal pelvicalyceal system and upper ureter with the fish-hook sign.

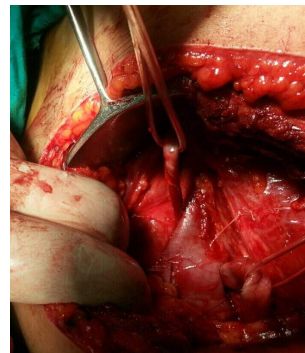


Figure 3. Case 1 before repairing retrocaval ureter, IVC crossing in front.



Figure 4. Case 1 after suturing retrocaval ureter in a correct anatomical position anterior to the IVC.



Figure 5. An Intravenous Pyelogram (IVP) of Case 2 revealed the classic fish-hook sign of the right ureter associated with hydronephrosis Grade II (Intra-uterine device is apparent in the lower part).

Figure 6. IVP of Case 3 showed right hydronephrosis and hydroureter Grade II.

Figure 7. Plain X-ray of Case 3 showing a double “J” catheter in the right ureter.

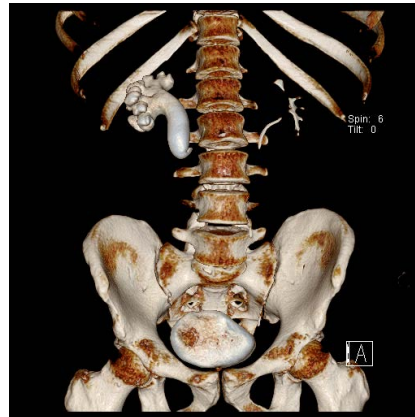


Figure 8. A CT with IV contrast of Case 3 showed mild hydronephrosis and hydroureter of the right kidney.

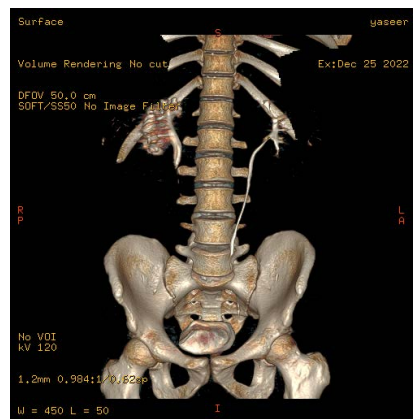


Figure 9. Post-operative CT with IV contrast of Case 3 showed right the proximal ureter running in its normal course lateral to the IVC.

3. Discussion

Although surgical treatment of the retrocaval ureter is not indicated except in symptomatic patients, the natural course of conservative management is not known in the literature. Almost all patients are diagnosed with this congenital anomaly due to their symptoms, which start later in the 3rd or 4th decade of life, and thus require intervention.

Surgical reconstruction can be done through open or laparoscopic approaches. Open surgery is the first line treatment described. However, laparoscopic surgery (transperitoneal or retroperitoneal) is associated with decreased postoperative pain and hospital stay time [12]. Recently, Laparoendoscopic Single-site Surgeries (LESSs) have been used to improve the cosmetic outcome and decrease the number of ports needed [13].

There are multiple techniques for open correction of retrocaval ureter. Some authors reported resection of the dilated renal pelvis, transposition, and re-anastomosis [14]. Others suggested the ureteropelvic anastomosis (Harril method), by which

a section is made at the level of the pelvis just above ureteropelvic junction. This technique has the advantage of decreasing postoperative stricture at the anastomotic site due to good vascular supplies of the pelvis and upper ureter [14]. Rarely, nephrectomy for the nonfunctioning kidney because of severe hydronephrosis and infection could be proposed.

In this study, we described the successful repair of three cases of retrocaval ureters by open ureteroureterostomy with anteriorization of ureter. The prognosis and post-operative follow-up were satisfactory. Complete recovery from symptoms occurred, and hydroureter and hydronephrosis regressed in all cases. Early diagnosis and prompt treatment can preserve renal functions and prevent future complications.

4. Conclusion

Although a rare clinical presentation, retrocaval ureter should be suspected whenever its radiological signs are present. Surgical correction can be done by open or laparoscopic approaches, both with satisfactory results. Early diagnosis and treatment are the keys to prevent hydronephrosis and deterioration of renal functions.

Authors' Contribution

Abdullah Elrashidy: main surgeon, processing, revising manuscript, and critical analysis. Emad Ibrahim, Mohab Eleiba, Ayman Elshazly: assistant surgeons in different cases. Rasha Mattar: in a correct anatomical position anterior to the IVC. Suzan Elsharkawy: data collection, writing manuscript, and proofreading.

Patient Consent

Obtained.

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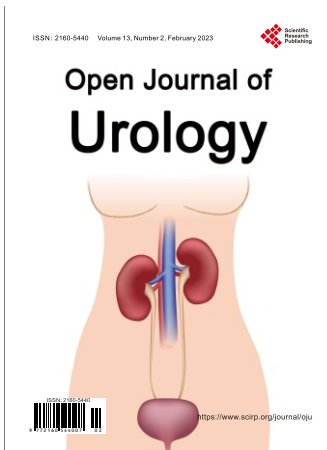
Conflicts of Interest

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

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