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Management of the Torsion of Spermatic Cord in the Urology-Andrology Department of the Ignace Deen National Hospital in Conakry

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Abstract

Introduction: Torsion of the spermatic cord is an emergency whose delay in treatment conditions the functional prognosis of the testicle. The aim of this study was to analyze the management of spermatic cord torsion in the Urology Andrology Department of the Ignace Deen National Hospital in Conakry. Material and methods: This was a ten-year retrospective descriptive study from January 1, 2012 to December 31, 2021. It involved all patients admitted for torsion of the spermatic cord, confirmed at surgical exploration. Results: We identified 21 cases of torsion of the spermatic cord. The mean age of the patients was 17.9 ± 4.4 years. The average consultation time was 19.2 ± 21.4 hours with extremes of [2 h and 98 h]. Only 6 patients (28.6%) consulted before the sixth hour. All patients presented with scrotal swelling. At scrototomy, all torsions were intravaginal with two turns of spiral in 13 cases and three turns in 8 cases. Orchiectomy followed by contralateral orchidopexy was performed in 6 cases. In the other cases, bilateral orchidopexy was performed after detorsion. The average hospital stay was 4.5 days. We recorded 4 cases of testicular atrophy after orchidopexy. Conclusion: Spermatic cord torsion is an infrequent emergency in our department. The delay in consultation remains the main predictive factor of testicular necrosis. Emergency exploratory scrotomy should be the rule.

Keywords

Spermatic Cord Torsion, Delay in Consultation, Orchidopexy, Orchiectomy, Testicular Atrophy

1. Introduction

Spermatic cord torsion is a frequent surgical emergency with two peaks of frequency: the neonatal period and adolescence [1]. Diagnosis is essentially clinical. No imaging examination should delay its management. Unilateral scrotal pain of sudden onset in a child or adolescent is a torsion of the spermatic cord until proven surgically otherwise [2]. Suspicion of spermatic cord torsion therefore requires immediate surgical intervention [3]. This delay in treatment determines the functional prognosis of the testicle. Indeed, the sudden interruption of the flow blood to the testicles leads to acute ischemia, then testicular necrosis in a few hours if no treatment is undertaken. Many studies report that surgical management within the first six hours can, in most cases, prevent irreversible testicular ischemia [2] [4] [5]. Unfortunately, on scrotal exploration, a third of the testicles will be considered dead and an orchiectomy performed. For preserved testicles, many will atrophy with possible damage to the contralateral testicle and impact on fertility [6] [7].

In view of this observation, torsion of the spermatic cord remains a major concern for practitioners. This is even more marked in our context where patients consult late in the majority of cases [8]. In 2010, a study carried out in our department collected 27 cases of torsion of the spermatic cord over a period of 15 years, leading to orchiectomy in 5 cases [9].

The aim of this study is to analyze the evolution of the management of spermatic cord torsion in the Urology Department of the Ignace Deen National Hospital in Conakry.

2. Material and Methods

This was a retrospective descriptive study conducted at the Urology Department of the Ignace Deen National Hospital in Conakry over a ten-year period from January 1, 2012 to December 31, 2021.

We included all patients admitted for torsion of the spermatic cord, confirmed on surgical exploration. Patients operated on for suspicion of torsion of the spermatic cord without confirmation of the diagnosis on surgical exploration were excluded from the study.

Study variables included: age, mode of admission, reasons for consultation, time to consultation and care, number of turns of the turns, viability of the testicle judged after detorsion and maneuver of recolouring, the procedure performed, the length of hospitalization and the postoperative evolution.

Data were collected from a questionnaire in the patient files found in the hospital archives. We performed a descriptive analysis using Excel software. Quantitative data were described by mean and standard deviation. Qualitative variables were described using proportions.

3. Results

During the study period, 23 patients underwent surgical exploration for sus-

pected spermatic cord torsion. Two patients were excluded for torsion not confirmed on surgical exploration (acute orchiepididymitis). We retained 21 cases of surgically confirmed spermatic cord torsion.

The mean age of the patients was 17.9 ± 4.4 years with extremes of [6 to 27 years]; 47.6% of patients (n = 10) were between 15 and 19 years old.

The average consultation time was 19.2 ± 21.4 hours with extremes of [2 h and 98 h]. Only 6 patients (28.6%) consulted before the sixth hour (**Figure 1**).

Concerning the mode of admission, 7 patients (33.3%) consulted directly in the department and 14 patients (66.7%) were referred from a private clinic (9 cases) or from a municipal medical center (5 cases) from Conakry. All patients who consulted before the 6th hour came directly to the service, without passing through another health structure.

The time to management (time between arrival at the service and admission to the operating room) was specified in 15 patients, with an average time of 75 minutes and extremes of [60 to 190 minutes].

All patients had scrotal swelling. Pain was reported in 18 patients (85.7%), vomiting in 2 patients and fever in one case.

Scrotal Doppler ultrasound was performed in 4 patients (19.04%). In all these cases, it made it possible to confirm the diagnosis with images suggestive of testicular necrosis in two cases.

The patients were operated under general anesthesia in 17 cases (80.9%), under spinal anesthesia in 4 cases.

At the exploratory scrototomy, all torsions were intravaginal with two turns in 62% of cases (n = 13), three turns in 7 cases and one turn in 1 case.

After detorsion, we found 4 immediately viable testicles (**Figure 2** and **Figure 3**), and after recoloring maneuvers and a maximum waiting time of 15 minutes, 11 viable testicles and 6 necrotic testicles (**Figure 4**).

Orchidectomy followed by contralateral orchidopexy in the same operation was performed in 6 patients (28.6%). In the remaining 15 cases (71.4%), bilateral orchidopexy was performed as a matter of principle.



Figure 1. Distribution of patients according to consultation time limit.



Figure 2. Torsion of the spermatic cord with two turns. Blue coloration of the testicle.



Figure 3. Gradual recoloration of the testicle after detorsion.



Figure 4. Necrotic testicle.

In the group of patients who underwent orchiectomy (n = 6), the mean time to consultation was 46.4 ± 12.5 hours. The turns were 2 in number in 2 cases, and 3 in 4 cases. In the orchidopexy group (n = 15), the mean consultation time was 22.2 ± 13.7 hours. There were 2 turns in 11 patients, 3 turns in 3 patients and 1 turn in 1 case.

 Table 1 presents the procedures performed according to the patient consultation time.

| | Surgical procedures | | |
|-------------------------|----------------------|---------------------|--|
| Consultation time limit | Orchidopexy (n = 15) | Orchiectomy (n = 6) | |
| <6 hours (n = 6) | 6 | - | |
| 6 - 12 hours (n = 4) | 4 | - | |
| 12 - 24 hours (n = 6) | 4 | 2 | |
| 24 - 48 hours (n = 3) | 1 | 2 | |
| >48 hours (n = 2) | - | 2 | |

Table 1. Surgical procedures according to the consultation time limit.

The average duration of hospitalization was 4.2 days with extremes of [3 to 6 days]. The postoperative follow-up was favorable in all cases, with first-line healing.

After an average follow-up of 18 months [6 and 30 months], we recorded 4 cases of atrophy of the preserved testicles.

4. Discussion

This study analyzed the management of spermatic cord torsion in the Urology-Andrology Department of the Ignace Deen National Hospital in Conakry.

The incidence of torsion remains low in the department, with approximately 2 cases per year in our study and 1.8 cases per year in that of Bah *et al.* in 2008 [9]. In our hospital, spermatic cord torsion is treated both in our department and in the general surgery department. Our data collection only interested the urology department.

Torsion of the spermatic cord is an absolute emergency. Odzébé AWS [10] reports that the consultation period is often delayed in Africa because of the ignorance of this pathology and its complications by patients and certain health personnel. In our study, less than a third of the patients had consulted before the sixth hour. This delay in consultation could be explained by the therapeutic course of our patients who consulted in 66.7% of cases, firstly the closest structures before being referred to our service. The absence of an emergency medical service in the country pushes patients to use traditional means of transport, which causes a lot of delays.

Unlike our study, some authors in developed countries have reported that distancing patients and transferring them to another establishment have no impact on the outcome of the testicle after torsion [11] [12]. This suggests a better knowledge of the pathology by doctors in the periphery, allowing patients to be identified and transferred in a timely manner.

The diagnosis remains essentially clinical and should be considered in the presence of any large acute purse in children and adolescents [3]. Pain was absent in 3 cases, all of whom presented testicular necrosis. The absence of pain is thus a predictive factor of testicular necrosis. Fever may be present in cases seen late, when testicular necrosis has set in [2]. At this stage, scrotal Doppler ultra-

sound remains useful for the differential diagnosis with orchiepididymitis.

In the acute phase, scrotal Doppler ultrasound could be falsely reassuring because the arterial vascularization may be normal during this phase, the initial ischemia being venous. It cannot in any case replace surgical exploration [2].

Testicular prognosis correlates with the earliness of the operation. The overall rate of testicular preservation after torsion is 100% before 3 hours, 90% before 6 hours, and less than 50% after 10 hours [5]. In our study, the mean time to consultation was twice as high in the group that underwent an orchiectomy than in the group that presented with viable testicles. On the other hand, there was no notable difference in the number of turns of turns between the two groups. Cimador *et al.* note that the recovery capacity was independent of the degree of torsion [13].

The patient must be warned of the risk of orchidectomy and subsequent subfertility before any treatment, and parental authorization must be obtained for minors [2].

All our patients had intravaginal torsion which occurs regardless of age with a peak frequency at puberty. While the extravaginal form is found in the perinatal period and exceptionally in adults [2].

At exploration, in cases of viable testicles after detorsion, we performed bilateral orchidopexy. Contralateral orchidopexy for preventive purposes is a principle because it is common for both testicles to be affected by the same anatomical anomaly favoring torsion [3] [14].

Faced with testicular necrosis, we performed an orchiectomy followed by a preventive contralateral orchidopexy in the same operation. The orchiectomy rate in our study (28%) is lower than that found by Sarr in Senegal who reported 52% orchiectomy [15]. Some teams recommend postponing contralateral orchidopexy after orchiectomy for testicular necrosis, because of the risk of infection [4] [15]. However, in our context, where we performed the orchidopexy at the same time, we did not record any complications, particularly infectious ones.

There is controversy over the attitude to adopt in cases seen late after 24 hours: detorsion and preservation of the testicle or orchiectomy from the outset in order to preserve the function of the contralateral testicle and fertility [2]. Our attitude was to keep all the testicles that recolored after detorsion, regardless of the time taken for treatment. Orchiectomy from the outset could have a significant psychological impact, especially since we do not have a testicular prosthesis. Moreover, recent studies have shown that hormonal functions and sperm quality were comparable after orchiectomy or orchidopexy [2] [16].

All our patients have progressed well surgically with first-line healing. However, Sarr reported one case of scrotal hematoma and two cases of scrotal suppuration [15].

Testicular atrophy is an important complication of testicular torsion. We recorded 4 patients out of 15 (26.7%) who presented testicular atrophy. Bah reported approximately 10% testicular atrophy after a median follow-up of 60 months [9]. Grimsby *et al.* [17] identified predictive factors for testicular atrophy after orchidopexy for cord torsion: duration of pain greater than 12 hours, black or hemorrhagic testicle 5 min after detorsion and preoperative ultrasound showing parenchymal heterogeneity.

Our study has limitations due to its retrospective nature and the small sample size.

5. Conclusion

Spermatic cord torsion is an infrequent emergency in our department. Our study emphasizes the delay in consultation of patients who consulted in 2/3 of cases after the sixth hour. This diagnostic delay compromises the functional prognosis of the testicle. We recorded 6 cases of orchiectomy for testicular necrosis. Hence, there is the need to intensify the education and information of populations and doctors practicing in the periphery on the consequences of the delay in the management of testicular torsion.

Conflicts of Interest

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

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Practice of Endo-Urology in the Centre of Ivory Coast: Overview and Results

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Abstract

Background: Endoscopic exploration and treatment of urinary tract disorders, whether by retrograde, percutaneous or endoscopic approach, defines endo urology. Objective: To report the results of endo urology practice in Bouaké during the two practice sessions. Patients and Methods: Cross-sectional and descriptive study of patients followed up and had benefited from exploration and/or endoscopic surgery in Bouaké. Our study was carried out in a facility in Bouaké, for two years, from January 2021 to December 2022. The parameters of interest were clinical, diagnostic, endoscopic procedure and results. Results: During the study period, 157 patients underwent endoscopic exploration and/or intervention. The mean age was 58.9 years (range 28 - 90 years). Males predominated with 95.5% (n = 150). Acute urinary retention was the most frequent reason for consultation (55.41%). Benign prostatic hyperplasia (BPH) was the most frequent pathology at 22.92% (n = 36). Urethrocystoscopy was performed in 52 cases (33.12%), Transurethral resection of the prostate (TURP) in 36 cases (22.92%), Endoscopic resection of secondary cervical sclerosis in 23 cases (14.64%), Endoscopic internal urethrotomy (EUI) in 15 cases (9.55%) and Transurethral resection of the bladder (TURB) in 10 cases (6.36%). Post-operative management was straightforward in 93.63% of cases (n = 147). Operative times of between 21 and 35 minutes were more frequent in 55.41% of cases (n = 87). Urinary tract infections accounted for 3.8% (n = 6) of surgical morbidity. The germ responsible for the infections was essentially Escherichia coli (E. coli). The mean duration of post-operative urinary drainage was 5.5 days (range: 4 - 6 days) for patients who underwent TURP, TURB and endoscopic resection of secondary sclerosis of the bladder neck. The mean duration of drainage after endoscopic internal ureterotomy was 21.6 days (range 14 - 30 days). Of the 157 endoscopies performed, 154 patients (98.08%) had a favourable outcome, with adenomyofibroma of the

prostate being the most common histological type (52.17%, n = 36). Mortality was 1.27% (n = 2) in our series. **Conclusion:** Endo urology should be the urologist's first choice for both exploration and surgery, given the satisfactory results.

Keywords

Endo Urology, Uretrocystoscopy, TURP, EIU, TURB

1. Introduction

Endoscopy in urology brings together all the minimally invasive techniques used to explore and treat certain pathologies of the urinary tract by means of optical equipment called an endoscope. It dominates the practice of urology in developed countries. Endoscopic exploration and treatment of disorders of the urinary tract, whether by retrograde, percutaneous or laparoscopic route, defines endo-urology [1]. Endo-urology has revolutionised the practice of urology, as it allows operations to be carried out through natural passages without opening the walls, under the control of a device called an endoscope. Endoscopic surgery is a minimally invasive, elegant and attractive technique, with many undeniable advantages for the patient. It is less invasive than laparotomy, can be performed at any age, requires no incision, causes less cosmetic damage, has a low risk of adhesion, reduces the length of hospital stay, is comfortable post-operatively, allows patients to return to work quickly and reduces morbidity and mortality [2] [3] [4]. It was introduced into the therapeutic armoury of urologists in Côte d'Ivoire in 1982 by Dje et al. [5], but in Bouaké the practice of endo-urology is recent. To this end, we conducted a preliminary study with the aim of reporting the various explorations and/or endoscopic procedures performed and the results in Bouaké.

2. Patients and Methods

• Study design and approval

After obtaining the approval of the ethics committee of the private facility and the university hospital of Bouaké (Ivory Coast), we conducted a cross-sectional and descriptive study of the medical records of patients followed and having undergone exploration and/or endoscopic surgery. This study was conducted in a private facility in Bouaké for two years, from 01 January 2021 to December 2022.

Inclusion and non-inclusion criteria

All patients who underwent endoscopic exploration and/or surgery were included in the present study. Patients who underwent any other means of exploration or open surgery were excluded from our study. All endoscopies were performed on sterile urine. Patients who underwent endoscopic surgery were systematically subjected to a preoperative work-up consisting of: haemogram, partial thromboplastin time (PTT), prothrombin rate (PT), uremia, creatinemia, electrocardiogram, pulmonary radigraphy, and urine cytobacteriological examination (UCE).

The endo-urological equipment consisted of:

- ✓ A urethrotome
- ✓ A CH 21 cystoscope
- ✓ Sheath resector 26CH
- ✓ 30 degree optics
- ✓ Monopolar electric current
- ✓ A continuous irrigation system using glycine with cut/coagulation set at 130/70 W
- ✓ ELLIK bulb for recovery of swarf after resection
- ✓ A cold light source

Data were collected using a survey form containing the parameters studied and entered using Word software. EPI-Infos 7 software was used to analyze the data.

The parameters studied were: Age, sex, reason for consultation, pre and per operative diagnosis, endoscopic procedure performed, duration of operation, outcome of operations, duration of post operative drainage and mortality.

3. Results

During our study period, 157 patients underwent endoscopic exploration and/or endoscopic intervention, the results are as follows.

3.1. Epidemiological Data

3.1.1. Age

The mean age of the patients was 58.9 years, ranging from 28 to 90 years.

The most represented age group was 61 - 70 years in 58.5% (n = 92), Table 1.

3.1.2. Sex

In our series, men represented the majority of patients with 96.1% (n = 151), Table 2.

 Table 1. Distribution of patients by age group.

| Parameters | Numbers | Percentage |
|------------|---------|------------|
| 28 - 38 | 11 | 7 |
| 39 - 50 | 15 | 9.5 |
| 51 - 60 | 17 | 10.8 |
| 61 - 70 | 92 | 58.5 |
| 71 - 80 | 19 | 12.1 |
| 81 - 90 | 3 | 1.9 |
| Total | 157 | 100 |

| Numbers | Percentage |
|---------|----------------------------|
| 6 | 3.8 |
| 151 | 96.1 |
| 157 | 100 |
| | Numbers 6 151 157 |

Table 2. Distribution of patients by sex.

3.2. Clinical Data

Reason for Consultation

Acute retention of urine was the most frequent reason for consultation with 55.41% (n = 87), followed by dysuria 25.47% (n = 40) and haematuria 9.55% (n = 15), **Table 3**.

3.3. History and Comorbidity

The majority of patients had no urological history 61.78% (n = 97). 15 patients had hypertension and 9 had diabetes as comorbidities. These represented 9.55% and 5.73% respectively.

3.4. Diagnosis

3.4.1. Pre-Operative Diagnosis

The diagnosis of benign prostatic hyperplasia (BPH) predominated in 22.92% (n = 36), **Table 4**.

3.4.2. Intraoperative Diagnosis

The intraoperative diagnosis was dominated by benign prostatic hyperplasia with 33.12% (n = 52), Table 5.

3.5. Endoscopic Procedures

Urethrocystoscopy was the most common endoscopic procedure with 33.12% (n = 52) followed by TURP 22.92% (n = 36), **Table 6**.

3.5.1. Associated Procedures

We performed procedures associated with endoscopy in 49 patients, and dilatation with a benique was most often associated with endoscopy 15.92% (n = 25), **Table 7**.

3.5.2. Duration of Procedure

Procedures lasting between 21 and 35 minutes were the most common, 55.41% (n = 87), Table 8.

3.5.3. Anatomopathology

Adenomyofibroma of the prostate accounted for 52.17% (n = 36) of the 69 pathological findings.

3.5.4. Operative Follow-Up

Post-operative follow-up was straightforward in 93.63% (n = 147) of cases.

| Reason for consultation | Numbers | Percentage |
|-----------------------------|---------|------------|
| Dysuria | 40 | 24.47 |
| Haematuria | 15 | 9.55 |
| Urinary frequency | 3 | 1.91 |
| Chronic retention | 2 | 1.27 |
| Acute Urine Retention (AUR) | 87 | 55.41 |
| Urinary urgency | 3 | 1.91 |
| Urinary burning | 3 | 1.91 |
| Haemospermia | 2 | 1.27 |
| Lumbar pain | 2 | 1.27 |
| Total | 157 | 100 |

Table 3. Breakdown of patients by reason for consultation.

Table 4. Distribution of patients according to preoperative diagnosis.

| Diagnosis | Numbers | Percentage |
|-------------------------------------|---------|------------|
| Secondary sclerosis of the cervix | 23 | 14.64 |
| Sclerosis of the prostatic cavity | 10 | 6.36 |
| Urethral stricture | 15 | 9.55 |
| Bladder lithiasis | 4 | 2.54 |
| ВРН | 36 | 22.92 |
| Obstructive prostate adenocarcinoma | 13 | 8.28 |
| Acute prostatitis | 2 | 1.27 |
| Pyeloureteral junction | 5 | 3.18 |
| Urethral stricture | 3 | 1.91 |
| Bladder tumour | 10 | 6.36 |
| Ureteral lithiasis | 5 | 3.18 |
| Bladder neck disease | 31 | 19.74 |
| Total | 157 | 100 |

Table 5. Breakdown of patients by intraoperative diagnosis.

| Diagnosis | Numbers | Percentage |
|------------------------------|---------|------------|
| Cervical disease | 47 | 29.93 |
| Benign prostatic hyperplasia | 52 | 33.12 |
| Urethral stricture | 15 | 9.55 |
| Bladder tumour | 10 | 6.36 |
| Bladder lithiasis | 3 | 1.91 |

| Continued | | |
|-----------------------------------|-----|------|
| Obstructive ADK | 12 | 7.64 |
| Sclerosis of the prostatic cavity | 9 | 5.73 |
| Pyeloureteral junction | 5 | 3.18 |
| Ureteral stenosis | 4 | 2.54 |
| Total | 157 | 100 |

 Table 6. Distribution of patients according to endoscopic procedure performed.

| Procedure | Numbers | Percentage |
|--|---------|------------|
| Uretrocystoscopy | 52 | 33.12 |
| TURP | 36 | 22.92 |
| TURB | 10 | 6.36 |
| EIU | 15 | 9.55 |
| Resection of secondary sclerosis of the cervix | 23 | 14.64 |
| Endo-bladder cystholitotomy | 3 | 1.91 |
| Double J catheter rise | 9 | 5.73 |
| Double J removal | 9 | 5.73 |
| Total | 157 | 100 |

Table 7. Distribution of patients according to the procedure associated with endoscopy.

| Procedure associated | Numbers | Percentage |
|----------------------------|---------|------------|
| Removal of cystostomy tube | 15 | 9.55 |
| Dilatation with a benique | 25 | 15.92 |
| Bladder tumour biopsy | 5 | 3.18 |
| Bilateral pulpectomy | 2 | 1.27 |
| Bilateral orchiectomy | 2 | 1.27 |
| No associated procedure | 108 | 68.78 |
| Total | 157 | 100 |

Table 8. Distribution of patients according to length of procedure.

| Time in minutes | Numbers | Percentage |
|-----------------|---------|------------|
| 0 - 20 | 10 | 6.36 |
| 21 - 35 | 87 | 55.41 |
| 36 - 45 | 27 | 17.19 |
| 46 - 55 | 23 | 14.64 |
| 56 - 65 | 10 | 6.36 |
| Total | 157 | 100 |

3.5.5. Morbidity

Morbidity was dominated by urinary tract infections in general 3.82% (n = 6); Table 9.

3.5.6. Germs Found on Antibiotic Susceptibility Testing

The most frequent germ was *E. coli*, accounting for 66.66% of cases.

3.5.7. Length of Hospital Stay

The average length of hospital stay was 4.7 days, with extremes of 1 to 7 days.

3.5.8. Outcome of Endoscopic Procedures

Out of 157 endoscopies performed, only 1.9% resulted in failure of the procedure (n = 3).

3.5.9. Average Post-Operative Drainage Time

The average duration of post-operative drainage was:

- Average of 5.5 days, with extremes of 4 to 6 days for patients who had undergone TURP, TURB and endoscopic resection of secondary sclerosis of the cervix.
- Average of 21.6 days, with extremes ranging from 14 to 30 days, for patients who underwent EIU.

3.5.10. Mortality

Mortality was 1.27% (n = 2) in our series.

4. Discussion

Endo-urology has revolutionised the practice of urology, both in exploration for aetiology and in surgical management, and its introduction into our therapeutic arsenal has reduced the major complication of open surgery such as surgical site infections in our practice. In our series, the average age of patients was 58.9 years. This result, which shows an age greater than 50 years, is in line with that reported by MAHAMAT in his study in N'DJAMERA, who reported an average age of 53.54 years [1]. Other authors such as DIAKITE [6] in MALI and OFOHA [7] in NIGERIA reported an average age of 62 and 63.8 years respectively. However, cases of patients under 50 years of age were reported by COULIBALY and colleagues in Côte d'Ivoire in their study of prostatic adenomectomy in twins [8]. Our result could be explained by the prevalence of

Table 9. Distribution of patients according to morbidity.

| Morbidity | Numbers | Percentage |
|------------------------------|---------|------------|
| Urinary tract infection | 4 | 2.54 |
| Recurrent urethral infection | 1 | 0.63 |
| Orchi-epididymitis | 2 | 1.27 |
| Vesico-rectal fistula | 1 | 0.63 |
| Haemorrhage | 2 | 1.27 |

cervicoprostatic pathologies, which increases from the age of fifty (50), and also by physiological ageing. Male patients predominated in our study (95.5%). The same observation has been made in the literature [3] [4] [5]. Our result could be due to the high frequency of urogenital pathologies in men, as opposed to women. We found that acute retention of urine was the most frequent reason for consultation, at 55.41%. This finding was made by MAHAMAT [1], LOTTERSTATTER [3] and DIALLO [9]. The high frequency of urinary retention in our series reflects the long evolution of the pathologies and also the delay in patient consultation.

From a diagnostic point of view, benign prostatic hyperplasia was the most frequent pathology with 22.92%. This is consistent with studies by SAHIN [10], WANG [11] and SHABBIR [12] in which benign prostatic hyperplasia was the urogenital disease with the highest frequency. Our results confirm the thesis that adenomyofibromatous hyperplasia of the prostate is the most frequent benign pathology in men over fifty (50) years of age. In our study, we found that ureth-rocystoscopy was the most frequently performed endoscopic procedure (33.12%). This result is close to that of other authors. It was 36.3% in the MAHAMAT study in N'Djamena [1]. The common practice of urethrosystoscopy in urology consultations could justify our results.

The exploration and surgical treatment of pathologies of the upper urinary tract require appropriate endoscopic tools such as rigid or flexible urethroscopy for diagnostic urethroscopy and interventional urethroscopy for stone fragmentation [13]. As we did not have this equipment, we mainly used double J endoprostheses, *i.e.* 5.73%. This is much lower than the results reported by ZAKOU in SENEGAL [14] and PEDJA in Morocco [15], which were 54.55% and 30.12% respectively.

Transurethral resection of the prostate accounted for 22.92% of endoscopic procedures performed. Our rate is lower than that of DIAKITE in MALI [6], LOUSAIEF in TUNISIA [16] and NOURI in MOROCCO [17] which were respectively 57.7%, 58% and 52.18%. But higher than the rates reported by other authors such as KANE in SENEGAL [18], KAMBOU [19] and ZONGO [20] in BURKINA FASSO who noted respectively 18.5%, 10% and 8.11%. Our results show the importance of trans-urethral resection in the surgical management of benign prostatic hyperplasia.

We performed 23 endoscopic resections of the bladder neck, *i.e.* 14.64%. This was the second most common endoscopic procedure in our series. It was used to treat secondary sclerosis of the bladder neck by removing the sclerotic and fibrous tissue stenosing the bladder neck. In 2000, XAVIER GAME *et al.* [21] experimented with this technique for the treatment of chronic retention of urine after urinary incontinence. These spectacular results led him to describe the technique as effective, quick to perform, minimally invasive and without morbidity or mortality.

Endoscopic internal urethrotomy (EIU) accounted for 9.55% of endoscopic procedures performed during the study period. It alone accounted for 28.7% in

the series by MAHAMAT [1]. EIU is a simple technique, which can be repeated, with simple postoperative follow-up and a shorter hospital stay. In our series, it was the third most common endoscopic procedure. It was indicated for short, simple strictures. Complicated or complex forms of urethral stricture were reserved for uretroplasty.

Trans-urethral resection of the bladder (TURB) accounted for 6.34% in our study. This result is close to that of MAHAMAT [1] in N'Djamena, who reported 7% of TUR in his study. TUR remains an essential examination for the diagnosis of bladder tumours on the one hand, and on the other hand occupies a place of choice in the initial treatment of these tumours. The low number of trans-ureteral bladder resections could be explained by the unavailability of endo-urological equipment in our public centres. 55.41% of operations last less than 1 hour. MAHAMAT *et al.* [1] reported average times of 23.2 minutes for UIE and 45.98 minutes for RTUP. In 2016, DIAKITE in MALI reported an average duration of 40 minutes [6]. These short endoscopic times reflect the skill and experience of the surgeon and the quality of the endoscopic equipment.

The post-operative course was simple in 93.63% of cases. However, we observed 3.8% complications, mainly urinary tract infections with *Escherichia coli* as the main germ. DIAKITE reported 5% complications [6], MAHAMAT [1], 27.3% haemorrhagic complications. Other authors have reported cases of bladder explosions during endoscopic manipulations [22]. This low complication rate in our study could be explained by the mastery of the different procedures and the scrupulous respect of the different endoscopic intervention times.

The average length of hospital stay was 4.7 days. DIAKITE [6] reported 3 days, DJE [5] 12.53 hours. These different lengths of hospital stay confirm the thesis that endo-urology has a short hospital stay.98.08% of operations were successful. Three (3) procedures (1.9%) were unsuccessful. This low failure rate has been noted by several authors in the literature [5]-[10].

Our study finds its strength in the rigorous methodology, the first carried out to our knowledge in Bouaké in the center of the Ivory Coast. It lifted the veil on the panorama of endoscopic explorations and/or interventions over two years of practice of endourology. However, it has its limits. It is a cross-sectional and descriptive study therefore these results deserve external validation with an independent and larger sample. It would be helpful if future studies with a larger sample size were done to substantively judge our results. We believe, however, that these results are clinically relevant due to their strong characterization in the real-life context.

5. Conclusion

The results of our study have enabled us to assess the extent of endoscopic procedures performed in Bouaké. The results show that uretrocystoscopy and trans-ureteral resection of the prostate are the most common endoscopic procedures, both in terms of diagnostic exploration and surgical management. The reduced intervention time, the reduction in morbidity and mortality, and the short length of stay all bear out the reliability of endo-urology.

Authors' Contributions

AVION Kouassi Patrice, AKASSIMADOU N'diamoi, AGUIA Brice: statistical analysis and re-reading of the article as well as its drafting.

ZOUAN Freddy, ALLOKA Venance, KAMARA Sadia, DJE Koffi: documentary research and editing of the work.

Ethical Considerations

We have protected the confidentiality of the information gathered during the survey. Thus, an anonymity number was assigned to each survey form with authorisation obtained from the administrative and health authorities.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Comparison of Transrectal Prostate Digital and Ultrasound-Guided Core Biopsies in 400 Men in a Low-and-Middle Income Country

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Abstract

Background: The diagnosis of prostate cancer (PCa) relies on clinical assessment with digital rectal examination, serum PSA and histological examination. Limitations in our technical facilities, high financial cost of ultrasound-guided biopsy often prevent us from implementing the guidelines on the practice of prostate biopsy. Methods: We conducted a retrospective and cross-sectional descriptive study comparing digital-guided and ultrasound-guided transrectal prostate biopsy of 400 patients over a period of 12 years in the Yaounde Central Hospital. We reviewed files of patients who underwent digital and ultrasound guided biopsy procedures. Data was analyzed using EPI info 7.0. Parametric variables were reported as means and standard deviations and percentages and counts were used to report categorical variables. Results: Out of the 400 patients, 292 digital-guided transrectal biopsies (73%) and 108 ultrasound-guided transrectal biopsies (27%) were performed in patients who were suspected of having prostate cancer (PCa). Patients were aged between 39 to 90 years. Both procedures were effective in identifying prostate cancer. Gleason score between 2 to 10 detected prostate adenocarcinoma for 301 patients (75.2%). The complications included anal pain, rectal bleeding, hematuria and urinary tract infections, with an occurrence rate similar for both ultrasound-guided (2.25%) and digitally-guided techniques (2.5%). Seven patients (1.75%) required hospitalization for management of complications. The

mortality rate was null. **Conclusion:** Both techniques are effective in detecting PCa with the similar complication rates. Digital-guided trans-rectal prostate biopsy still has its place in a resource-limited setting like ours.

Keywords

Prostate, Biopsy, Digital Guided, Ultrasound Guided, Adenocarcinoma, Gleason Score

1. Introduction

Prostate cancer (PCa) is the most prevalent cancer and the second leading cause of cancer death in men [1]. Confirmation of diagnosis of prostate cancer is through histopathologic analysis of tissue cores obtained during a prostate biopsy. The common indications for prostate biopsy include abnormal findings on digital rectal examination, an increase in total PSA and the presence of suspicious lesions on prostate magnetic resonance imaging (MRI). It is an invasive procedure whose overall morbidity is between 3% and 23% and whose mortality is low but not zero [2] [3].

In the past, prostate biopsies were digital-guided through the perineal or transrectal route. Today, new prostate biopsy techniques are possible thanks to advances in radiological imaging. MRI-guided prostate biopsy has a higher sensitivity than ultrasound-guided prostate biopsy, but its realization requires a dedicated interventional Radiologist, specific equipment and certain technical aspects, which are not yet available in our context. As a result, prostate biopsies, either ultrasound or digital-guided, are commonly practiced. Transrectal ultrasound-guided prostate biopsy is the recommended technique, which has better diagnostic yield than digital-guided technique [4].

From a financial standpoint, the ultrasound-guided prostate biopsy has an estimated cost of 400\$ USD on average compared to that of the digital-guided prostate biopsy which is around 120\$ USD. Our patients often present late at advanced stages with complications. This delay in consultation often prevents the implementation of best practice guidelines with regards to the technique for prostate biopsy. However, the latter is pivotal in the histologic diagnosis, prognosis and management of prostate tumors.

In Cameroon, there is limited data on the techniques used for prostate biopsy. Thus, the purpose of this study was to report the experience of the Urology and Andrology Unit of the Yaounde Central Hospital of (YCH) on this subject.

2. Material and Methods

We retrospectively reviewed records of 400 patients over a period of 12 years (July 2008 to July 2020) who underwent transrectal ultrasound or digital-guided prostate biopsy at the urological surgical unit of Yaounde Central hospital

Yaounde (YCH). Our inclusion criteria were an abnormality on digital rectal examination, an increase in total serum PSA greater than 4 ng/ml, a free/total PSA ratio < 15% or the detection of suspicious lesions on imaging (ultrasound or prostate MRI) at the Urology and Andrology Unit of the Yaounde Central Hospital between January 2008 to December 2020. All patients who did not meet at least one of the criteria listed above were excluded from the study. Sociodemographic characteristics, clinical and paraclinical data, indications for biopsy and technique, post-biopsy complications and results of histopathologic analysis of biopsy cores or surgical specimens were obtained from medical records and relevant cancer registers.

2.1. Pre-Operative Preparation

Prior consultation with a urologist was done to verify the use of an anticoagulant or platelet aggregation inhibitors, recent urinary tract infection and the exclusion of any contraindications to the procedure. Pre-biopsy assessment and patient preparation was done which include:

- Complete blood count with hemoglobin level and platelets counts; Urine culture and antibiotic sensitivity; Prothrombin time (PT); Activated partial thromboplastin time (APT).
- Rectal enema with water at room temperature using a 100 ml syringe the day before and the day of the procedure or taking a sachet of Sennosides A and B in a glass of water the day before the biopsy.
- Antibiotic prophylaxis with quinolones: Ciprofloxacin 500 mg in two daily doses the day before the examination and to continue for two days after the procedure.
- Post-biopsy re-adjustable analgesia: Paracetamol 1000 mg in three daily doses for three days after the procedure.
- Oral tranexamic acid 1000 mg after the procedure or three daily doses for three days after the procedure.

2.2. Biopsy Site and Anesthesia

Most of the time, the preferred technique of performing a biopsy is by dividing the prostate into two lobes delimited in three zones: the base, the middle part and the apex. Two samples per zone are collected, a median and a lateral, thus giving 12 cores of 12 mm each. In order to improve the detection of cancer, additional samples could be taken in suspicious areas (nodule on DRE or hypo-echoic areas on ultrasound).

Local anesthesia of the prostate was performed in the periprostatic area by infiltrating 10 ml of 2% lidocaine. For ultrasound-guided biopsies, a size 22 lumbar puncture needle mounted on a lubricated endorectal probe covered with a condom and inserted into the lower 1/3 of the anal canal under ultrasound guidance. While for the digital-guided biopsies, a gloved and lubricated index finger helped guide the lumbar puncture needle into the lower 1/3 of the anal canal.

2.3. Digital-Guided Technique for Prostate Biopsy

After obtaining informed consent the patient was placed either in the lateral decubitus or gynecological position on the examination or operating table. A digital rectal examination was systematically carried out in order to assess the prostate, emptiness of the rectum and prepping of the perineum and the anal margin were done using gauze soaked in povidone iodine 10%.

A single 18 Gauge needle (blue), mounted on a single-use type or recyclable M coloplast[®] automatic trigger gun (**Figure 1**) was used for sampling. The index of the right or left finger lubricated with 2% lidocaine gel, 10 grams was used to orient the needle through the anal orifice unto the surface of the prostate. When the sample-collecting angle was optimal (**Figure 2**), the trigger button was pressed using the thumb firing the needle to obtain a 22 mm core length.

Each sample of 2 cores per zone was preserved separately in a vial of 30% aqueous solution with formalin diluted to 10% in normal saline 0.9% (Figure 3). Each sample identified according to the site and the date of sampling. The biopsy specimens were sent to the pathologist with a request form on the number of positive cores, percentage involvement of each positive core, the Gleason score/ISUP grade group, status of the peri-prostatic tissue (perineural involvement). At the end of the procedure, a gauze pack soaked in povidone iodine was introduced into the rectum about 4 cm from the anal margin and kept in place for at least 2 hours.



Figure 1. Digital-guided biopsy: sterile equipment and automatic biopsy gun (Source: Urology service YCH).



Figure 2. Digital-guided prostate biopsy technique (Source: Urology service YCH).



Figure 3. Vial containing biopsy samples preserved in formalin (Source: Urology service YCH).

2.4. Ultrasound-Guided Technique for Prostate Biopsy

A decontaminated endorectal ultrasound probe (Figure 4) protected by a condom with a sterile needle guidance system, coated with a sterile ultrasound gel was necessary. A single 18 gauge (pink) needle was used, mounted on a reusable automatic trigger gun (Figure 5). The probe was inserted into the rectum and the prostate was marked in transverse or sagittal sections (Figure 6). The path for sampling was visible on the screen thanks to a preconfigured dotted line and the shot only triggered when the collecting angle was optimal. It was necessary to avoid perforation of the peri-prostatic vein (risk of sepsis) or perforating the prostatic urethra (risk of hematuria). As previously described, the biopsy cores were preserved in vials labelled according to the site and date of collection. The biopsy specimens were then sent to the pathologist for analysis as previously elaborated. At the end of the examination, the endo-rectal biopsy probe is removed, and a gauze pack soaked in an antiseptic solution was placed in the rectum as described above.

2.5. Protocol for Prostate Biopsy Core Analysis

Regardless of the technique for collecting prostate biopsy samples, the analysis of these parts in the pathology unit is done according to the following protocol:

Prostate core biopsies are fixed in 10% neutrally buffered formalin for 48 hours. They were then included in their entirety after evaluation of the volume. They were dehydrated with alcohols of increasing degree (50°, 70°, 80°, 90°, 95°, 100°), cleansed with xylene and embedded in hot liquid paraffin in a Leica-type automaton for 18 hours. Then they were coated with paraffin to form blocks. These were cut at 5 microns stained with hematin-eosin and observed under a Leica DM 1000 optical microscope (Figure 7).



Figure 4. Ultrasound machine with rectal probe (Source: Urology service YCH).



Figure 5. Reusable automatic biopsy gun, needle guidance system, biopsy needle (Source: Urology service YCH).



(a)

Figure 6. Ultrasound-guided sample collection of the prostate (Figure 6(a)), transrectal ultrasound section of the prostate (Figure 6(b)) (Source: Urology service YCH).

Specimens obtained from open prostatectomy were fixed in 10% neutrally buffered formalin for 48 to 72 hours. After being weighed, measured and stained (different color ink depending on the left or right side), oriented samples were taken (apex, base and intermediate zones) ensuring the piece has been included in full. The samples were dehydrated with alcohols of increasing degree (50°, 70°, 80°, 90°, 95°, 100°), cleansed with xylene and embedded in hot liquid paraffin, in a Leica-type automaton for 18 hours. Then they were coated with paraffin to form blocks. These were cut at 5 microns, stained with hematin-eosin and observed under a Leica DM 1000 optical microscope (Figure 7).





(c)

Figure 7. Slides of histopathology under an optical microscope ((a), (b), (c)). (a) Grade 3 prostate adenocarcinoma: simple glands, separated from each other, with well-defined contours; (b) Grade 4 prostate adenocarcinoma: presence of fused glands, irregular contours; (c) Grade 5 prostatic adenocarcinoma: fused glands, cells in sheets with clear cytoplasm with an anaplastic contingent.

2.6. Statistical Analysis

Data on sociodemographic characteristics, clinical and paraclinical features, indications for biopsy and technique, post-biopsy complications and results of histopathologic analysis of biopsy cores or surgical specimens were recorded for each patient. Data collection was achieved using structured questionnaires by consulting patient records and post-biopsy reports. Data was analyzed using EPI info 7.0. Parametric variables were reported as means and standard deviations and percentages and counts were used to report categorical variables.

3. Results

A total of 400 files of patients who underwent digital-guided and ultrasound guided transrectal ultrasound were collected. We registered 292 digital-guided transrectal biopsies (73%) and 108 ultrasound-guided transrectal biopsies (27%) which were performed in patients suspected of having prostate cancer (PCa).

3.1. Socio-Demographic Characteristics

The mean age of patients who underwent a transrectal prostate biopsy was 68.1 \pm 8.5 years with extremes of 44 years and 90 years. For those who had a digital-guided puncture the mean age was 66.8 \pm 9.3 years with extremes of 48 and 90 years while those who had an ultrasound-guided puncture, 68.1 \pm 7.9 years with extremes of 44 and 90 years (**Table 1**).

Patients aged 61 to 70 years were the most represented age group in this series.

3.2. Clinical Features

Most of the patients who underwent digital-guided and ultrasound-guided prostate biopsy presented in an advanced stage of disease (n = 297, 74.25%) urinary retention as (n = 281, 70.25%) followed by obstructive lower urinary tract symptoms (n = 251, 62.75%) (Table 2).

| Table 1. Distribution | 1 of patients a | ccording to age | group and | prostate | biopsy techni | que. |
|-----------------------|-----------------|-----------------|-----------|----------|---------------|------|
|-----------------------|-----------------|-----------------|-----------|----------|---------------|------|

| Age range (years) | 41 - 50 | 51 - 60 | 61 - 70 | 71 - 80 | 81 - 90 |
|--------------------------|---------|---------|---------|---------|---------|
| Ultrasound-guided biopsy | 21 | 34 | 17 | 21 | 4 |
| Digital-guided biopsy | 2 | 62 | 146 | 67 | 26 |
| Total cases | 23 | 96 | 163 | 88 | 30 |

Table 2. Clinical presentation of patients at the time of consultation.

| Clinical presentation | Number of cases | Percentage |
|---|-----------------|------------|
| Poor general state of health | 297 | 74.25 |
| Obstructive lower urinary tract symptoms | 281 | 70.25 |
| Acute urinary retention | 251 | 62.75 |
| Irritative urinary lower urinary tract symptoms | 119 | 29.75 |
| Referrals for prostate biopsy examinations | 60 | 15 |
| Routine consultation for annual check-up | 46 | 11,5 |
| Hematuria | 46 | 11,5 |
| Post laminectomy and biopsy of vertebral metastasis | 18 | 4.5 |
| Paraplegia | 16 | 4 |

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The indication for prostate biopsy varied according to the patient. Some consulted directly at the urology service or were referred to us by a colleague, mainly from neurosurgery, with neurologic complications secondary to probable metastases. Patients presented a total serum PSA > 4 ng/ml, during the etiological workup for back pain and/or the presence of spinal cord compression syndrome and/or lower motor neuron lesion and/or partial neurologic deficit, appearance of secondary lesions on imaging of the spine or histopathology results of laminectomy specimens suggestive of metastatic bone lesions secondary to prostate cancer (Table 2).

There was a variation in PSA as a function of age shown in **Table 3**. Younger patients had a low PSA and so ultrasound-guided ultrasound was mostly done because these patients have a high probability of having the localized form of prostate cancer.

We performed a transrectal prostate biopsy on all our patients. We performed 292 digital-guided prostate biopsies versus 108 ultrasound-guided prostate biopsies over the entire study period in 2018, we performed the highest number of prostate biopsies (**Figure 8**).

The most common histological type identified by both techniques was adenocarcinoma (Figure 9).

Digital-guided prostate biopsy detected 203 cases of PCa while ultrasound-guided biopsy picked up 85 cases (**Figure 10**).

The majority of cases (222) had a Gleason score \geq 7, affecting mainly the age group of 61 to 70 years. 73.7% of the cases were high risk according to D'AMICO's classification (**Table 4**). The most frequently reported post-procedure complication were pain and rectal bleeding which was present in patients who underwent the digital-guided technique as compared to ultrasound-guided technique (**Figure 11**).

Table 3. Variation of PSA as a function of age.

| Age group (years) | 41 - 50 | 51 - 60 | 61 - 70 | 71 - 80 | 81 - 90 | P-value |
|----------------------|---------------------|-----------------------|-------------------|-----------------------|-----------------------|---------|
| Median (Q1, Q3) | 11,6 (5.0, 19.3) | 33.7 (12.0, 106.8) | 62.6 (22, 232) | 63.7 (24.4, 206.0) | 246.0 (73.2, 91.8) | 0.003 |
| Number of patients | 5 | 57 | 151 | 98 | 26 | |

Table 4. Gleason score according to patient age.

| Age/Gleason Score | 41 - 50 | 51 - 60 | 61 - 70 | 71 - 80 | 80 - 90 | Total |
|-------------------|---------|---------|---------|---------|---------|-------|
| <5 | 00 | 11 | 00 | 00 | 00 | 11 |
| >5 and <7 | 00 | 24 | 26 | 18 | 00 | 68 |
| ≥7 | 03 | 12 | 103 | 80 | 24 | 222 |
| Total | 03 | 47 | 129 | 98 | 24 | 301 |



Figure 8. Distribution of patients by year according to prostate biopsy technique.



Histological types according to patient age group

Figure 9. Histological types according to patient age group.

Histological types according to patient age group



- digital-guided - diffusionid guided

Figure 10. Detection of prostate adenocarcinoma according to the type of biopsy technique.





Figure 11. Clinical Complications following prostate biopsy.

4. Discussion

Prostate biopsy is essential for the diagnosis of prostate cancer (PCa), with the exception of cancers discovered after analysis of surgical specimens during the surgical treatment of benign prostatic hyperplasia (BPH). Like digital rectal examination, any other suspicious finding on paraclinical or imaging assessment suggestive of PCa is an indication for a biopsy. Several studies show similar sensitivity and specificity rates between ultrasound and digital guided biopsy techniques [5] [6]. Although it is possible to detect non-palpable organ-confined prostatic lesions on ultrasound. The additional cost and time required do not allow ultrasound guidance to be a routine diagnostic procedure in the detection of prostate cancer in our setting. In our study, the presence of prostatic induration and/or a suspicious nodule during digital rectal examination was an indication for a prostate biopsy.

Ultrasound-guided prostate biopsy was introduced at the Yaounde Central Hospital in the 2000s. The advent of prostate biopsy by a transrectal approach using an endorectal ultrasound probe has advantageously replaced the digital-guided approach. [7]. Endorectal ultrasound probe guidance has become routine for prostate biopsy because it provides details and better localization of the lesion than digital guided technique [7]. Current guidelines recommend prostate biopsy for all patients with serum PSA > 4 ng/ml and/or abnormal prostate morphology on digital rectal examination sometimes confirmed by positive lesions on prostate MRI. Before HOLM [8] in 1981 proposed guiding the needle using an endorectal probe, the biopsy needle was guided intra-rectally by the finger.

Out of 400 transrectal prostate biopsies performed in our study, ultrasound-guided biopsy was done in 108 cases while 292 cases in our series were digital-guided. It is possible that the absence of ultrasound machine, the cost of this procedure or a long-standing practice of biopsy without ultrasound were the reasons for these practices department [9] [10] [11].

Resnick *et al.* [12] evaluated 45 patients with both prostate biopsy techniques and detected one case of prostate cancer histologically in 14 patients, whereas ultrasound-guided biopsy detected cancer in 12 and digital-guided biopsy detected cancer in 13. Resnick concluded that guided biopsies were not necessary when a distinct nodule was palpable [10] [12]. In our study, the late consultation of our patients at a very advanced stage of the disease and their increasing number per year as presented in Figure 8 could explain the high number of digital-guided biopsies. There was therefore the need to find histological evidence before starting palliative treatment. Weaver et al. [13] evaluated 51 patients with prostatic abnormalities and digital-guided biopsy detected 9 cases of prostate cancer whereas ultrasound-guided biopsy detected prostatic adenocarcinoma in 23 patients, including all those detected digitally. This latter study suggests that ultrasound-guided biopsy is mandatory in the evaluation of palpable abnormalities. In our study, younger patients under the age of 60 were more likely to have localized prostate cancer and could benefit from curative treatment, which justifies the high number of ultrasound-guided biopsies in this age group as presented in Table 1. Weaver et al. evaluated 151 patients using transrectal prostate biopsy method, and 75 cases of prostate cancer were diagnosed [14]. Only one more cancer was detected by ultrasound-guided biopsy as compared to digital-guided puncture. It therefore seems that the two techniques are comparable in patients with nodules palpable on rectal examination. This would frequently be the case in our daily practice, given the late consultations of our patients at a very advanced stage of the disease, as shown in Figure 8. Türkeri et al. [15] in their study showed that the combination of the two biopsy techniques did not improve the cancer detection rate, as all cancers were detected by ultrasound-guided biopsies. The prostates of two patients with prostate cancer appeared benign on endorectal ultrasound, but symmetrical ultrasound-guided biopsies detected cancer in these patients. In our work, saturation biopsies were not performed through the digital guided technique because all our patients under 60 years of age with a suspicious PSA level mostly benefited from an ultrasound-guided biopsy as shown in **Table 4**. Therefore, in the presence of a suspicious digital rectal exam with no abnormalities on endorectal ultrasound, standard ultrasound-guided biopsies are recommended. This was not the case in our work in patients over 60 years of age who, under the same conditions, benefited in the majority of cases from a digital-guided biopsy as shown in Table 1.

In our study, prostate cancer was detected in 301 patients, representing a frequency of 75%, which is similar to a study carried out in Mali [16]. Digital-guided prostate biopsy detected prostate cancer in 203 patients (67.4%) in the current study, which is higher than the 45% detected by Türkeri *et al.* [15]. As for ultrasound-guided biopsy, 85 patients with prostate cancers were diagnosed (78%) higher than the 54% detection rate observed by Ndiaye [17].

The average age of patients who underwent a biopsy was 68.1 ± 8.5 years with extremes of 44 and 90 years which is similar to a study carried out in Bamako [16]. The majority of cases were between the ages of 61 to 70. This confirms that it is essential to initiate screening campaigns for prostate cancer in our country.

In our series, the PSA assay was always available before the biopsy. Regarding the serum PSA level, it varied between 6 and 11165.8 ng/ml in our series with a median of 62.6 ng/ml. In the cohort of digital-guided prostate biopsies, the median was 73.6 ng/ml with extremes of 27.0 and 316.0 ng/ml and for those who had an ultrasound-guided prostate biopsy, the median was 15 ng/ml with extremes 10.2 and 60.5 ng/ml. Indications for prostate biopsy included elevation of PSA level greater than or equal to 4 ng/ml. The median PSA in our series is higher than that of 19.8 ng/ml found by Ndiaye in Senegal [17]. This difference could be attributed to the disparities between our studies in terms of study period of 12 years and 2 years respectively and also due to sample size difference of 400 and 231 respectively.

In our series, Gleason score \geq 7 was the most represented. These data are similar to those reported in Mali by Diarra *et al.* [16].

Regarding complications following transrectal prostate biopsy, the severity is usually minimal if antibiotic prophylaxis is administered. According to the literature, in the absence of antibiotic prophylaxis, post-biopsy urinary tract infections account for about 4% to 25% and 0% to 7% of severe infections [18]. Infectious complications depend on the absence of rectal preparation, absence of antibiotic prophylaxis and a diameter of the biopsy needle size greater than 14 [19]. The complication rate varies between 3% to 23% of cases [18] [19]. Infectious and hemorrhagic complications are the main complications of transrectal prostate biopsy, which is similar to the results in our series.

5. Conclusion

The ultrasound-guided technique according to the guidelines is still recommended though there has been a recent drift towards the use MRI/ultrasoundguided fusion biopsies whose acquisition and use requires a suitable software and a highly skilled personnel.

We believe that in settings where the technical platform is limited, patients present at advanced clinical stages of the disease, the digital-guided transrectal biopsy technique remains relevant for a histologic diagnosis. The financial cost of the digital-guided transrectal biopsy technique is low, but the quality of the examination depends on the experience of the practitioner. Both prostate biopsy techniques were well tolerated in our study thanks to good preparation and the results are seemingly satisfactory.

Limitation

This study was carried out in one center, but we wish to extend the study to other centers.

Ethical Clearance

Study was approved by institutional ethics committee.
Conflicts of Interest

The authors declare no competing financial or personal interests.

Authors' Contribution

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

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Complications of Circumcision: Epidemiological, Anatomo-Clinical and Therapeutic Aspects

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Abstract

Circumcision refers, in its most widespread form, to the total or partial removal of the foreskin, leaving the glans exposed. It is a ritual practice imposed by Mosaic law for Israelites, a tradition for Muslims, a rite of passage to adulthood for many people of Africa and the East. Circumcision is also a widely used therapeutic surgical procedure for a number of balanopreputial affections. The aim of this study was to list cases of circumcision complications received in a urological hospital (CHR Saint Louis) and to analyze their epidemiological, anatomo-clinical and therapeutic aspects. Patients and methods: This was a retrospective, descriptive study of circumcision complications, carried out in the urology department of the Saint Louis regional hospital in Senegal over a 5-year period (January 1, 2013 to December 31, 2017). Results: Thirty-three (33) complications of circumcision were collated. The mean age of patients was 7.63 years [9 months - 16 years]. Duration of time for Consultation varied according to the type of complication, with an average of 1.6 years [1 day - 10 years]. Penile granuloma accounted for 36.3% of the complications (n = 12), local infection for 30.3% (n = 10) and urethro-cutaneous fistula for 18.2% (n = 6). For six patients with urethro-cutaneous fistula, we performed urethro-cutaneous splitting in 5 patients, while the same complication necessitated urethroplasty in another patient. We noted five cases of verge plasty for verge granuloma, one glan reimplantation and one glan plasty for the two patients with glans amputation. Conclusion: Circumcision is a medical procedure widely practised throughout the world for medical, cultural and aesthetic reasons. In Africa, the lack of health coverage and the shortage of doctors explain why this surgical procedure is so common. In Senegal, circumcision is still carried out in the majority of cases by paramedical staff, which explains the high rate of complications.

Keywords

Circumcision, Complications, Penile Fistula, Glans Amputation

1. Introduction

Mutilation imposed on oneself or others for religious reasons or to mark one's membership of a community is an ancient practice that spares no region of the body [1]. Circumcision (peritomy, posthectomy), from the Latin circumcisio, "to cut around, to cut out", refers, in its most widespread form, to the total or partial removal of the foreskin, leaving the glans exposed. It is a ritual practice imposed by Mosaic law for Israelites, a tradition for Muslims, a rite of passage to adulthood for many people of Africa and the East. Circumcision is also a widely used therapeutic surgical procedure for a number of balanopreputial affections [2]. Due to multiple reasons (religion, cultural or therapeutic), the prevalence of male circumcision varies by continents and is common in countries of North America, Australia, Africa, the Middle East, has interintercountry variations throughout Asia, and is uncommon in Europe and South America [3]. Risk of complications is about four per hundred circumcisions and higher risk of complications is determined by therapeutic circomcisions and aged 2 - 18 years at circumcision as compared to infants [4]. The aim of this study was to list the cases of circumcision complications received in urological hospitals, and to analyze their epidemiological, anatomo-clinical and therapeutic aspects.

2. Patients and Method

This was a retrospective, descriptive study of 33 patients presenting with complications of circumcision, collated at our center over a 5-year period (January 1, 2013 to December 31, 2017). We included any patient received for a circumcision complication during the study period. Patients with incomplete medical records were not included in the study. The different parameters studied were: age, consultation time, chief complain, types of complications, treatments carried out and therapeutic results. The data was collected from the consultation registers, recorded on Excel and processed by SPSS software.

3. Results

Thirty-three cases of circumcision complications were collected over a 5-year period. The mean age of the patients was 7.63 years (9 months - 16 years) (**Figure 1**). Time to consultation varied according to the type of complication, with an average of 1.6 years (1 day - 10 years). The chief complains were dominated by urine leakage from the ventral surface of the penis (18.2%) and swelling of the penis (15.1%). In anatomical terms, granuloma of the penis accounted for 36.3% of the complications (n = 12). It was followed by local infection (30.3%, n = 10) and urethro-cutaneous fistula (18.2%, n = 6) (**Table 1**). The treatment



Figure 1. Distribution according to age groups.

Table 1. Complications.

| Type of complication | Effectif (Number of cases) | Percentage (%) |
|---------------------------|----------------------------|----------------|
| urethro-cutaneous fistula | 06 | 18.18% |
| Urethral meat stenosis | 03 | 9.09% |
| Glan amputation | 02 | 6.06% |
| Granuloma of the penis | 12 | 36.36% |
| Infections | 10 | 30.30% |
| Total | 33 | 100 |



Penile Fistula

Urethro-cutaneous fistula



Necrosis of the Glan after reimplantation

technique used depended on the nature of the lesion. Urethro-cutaneous splitting was performed in 5 patients with urethro-cutaneous fistula, while the same complication necessitated urethroplasty in another patient. We noted five cases of verge plasty for verge granuloma, one glan reimplantation and one glan plasty for the two patients with glans amputation. All patients underwent antibiotic prophylaxis after repair of the lesion. The eight cases of local infection were managed with antibiotic therapy and local care, while the one case of tetanus was treated specifically for tetanus with antibiotics, tetanus serum and tetanus vaccine.

Post-treatment follow-up was straightforward in all patients, with the exception of the two cases of glans amputation, which necrotized after re-implantation, necessitating a second stage penile plasty.

4. Discussion

The mean age of our patients was 7.6 years, with extremes of 9 months and 16 vears. The various series reported show a similar age. SYLLA [5] and DIABATE [6] respectively report a mean age of 7.6 and 7.1 years, close to that found in our series. On the other hand, some authors report a different mean age from ours: RIMTEBAYE [7] (9.68 years), DIALLO [8] (14.9 years) and DIETH [9] (28 months, i.e. 2 years 4 months). This difference in age could be explained by the diversity of cultures and customs in African countries. In some countries, circumcision is performed in an early age, while in others it is performed in late age. In European countries, circumcision is performed in the neonatal period. The time taken for consultation varied widely, depending on the mentality of the population concerned and, above all, on the type of accident. In our series, the average consultation time was 1.6 years, with extremes of one day and 10 years. The latter was different from that of some authors [5] [7] [8] [10]. It was shorter for hemorrhage and glans rupture, and later for urethral fistula and penile granuloma. This delay in consultation could be explained by a lack of awareness of the subsequent consequences that could affect the boys' aesthetic and sexual prognosis. In our series, urinary leakage from the ventral surface of the penis accounted for 18.18% of cases (n = 6), dysuria and hemorrhage for 3 cases each. Other signs were less frequent. These results are close to those of some authors [5] [7] [10]. Urinary leakage, a direct consequence of urethro-cutaneous fistula, was the lesion most frequently reported in the literature [8] [11] [12]. Granuloma of the penis was the most frequent lesion, accounting for 36.36% (n = 12). It was the lesion least frequently found in the literature, as reported by other authors. SYLLA [5], over 11 years, found 2 cases of granuloma of the penis secondary to circumcision, SOW [13] (2 cases), BA [14] (5 cases), OZDEMIR [15] (3 cases), TLIL [16] (4 cases). It is due to a local reorganization of lymphatic drainage after circumcision [10]. This could be explained by the trivialization of the lesion by victims, who tend to hide it from their parents. Treatment of this lesion is based on excision of the pseudo-elephantiasis mass (penile plasty) and

antibiotic therapy. Urethro-cutaneous fistula was the second most frequent lesion in our study, accounting for 18.18% (n = 6). Most authors agreed on the location of fistula in the balanoprepucial groove, where the urethra is more superficial. Variable mechanisms have been put forward to explain the occurrence of fistula. The most common mechanism is probably the capture of part of the urethral wall by a too-deep suture at the time of hemostasis of the brake artery [10], resulting in secondary urethral necrosis, followed by fistulization. However, other penile anomalies, such as the mega urethra, have been incriminated in the occurrence of urethral fistula. Random or insufficient anatomical knowledge and non-compliance with anesthesia rules have also been implicated. We used the urethro-cutaneous splitting technique for fistula cure in 5 cases. Only one case of Davis urethrorrhaphy was performed. The first method was the one most used by many other authors: SOW [17], RIMTEBAYE [5], SYLLA [5]. Stenosis of the ureteral meatus occurs most often at a distance from circumcision and seems to be a direct consequence of the latter, as it is a pathology rarely found in uncircumcised patients [18]. There is fibro-sclerotic tissue around the urethral orifice. It is secondary to infection or trauma, sometimes minimal, of the urethral meatus, often unnoticed at the time of circumcision [10]. Meatoplasty was the method of cure used in our series, the technique of choice for other teams [5] [10]. Amputation of the glans penis is the most dramatic complication, since it jeopardizes aesthetic, urinary and sexual prognosis. In our series, we found two cases of total glans amputation, all secondary to circumcision performed by a paramedic. The consultation time was 5 hours for one of the cases, and the other was seen seven days later. However, the incidence of glans amputation is unknown. Its frequency is differently reported in the literature. MSEDDI et al. [19] reported eight cases of glans amputation following traditional circumcision in Tunisia, whereas in Côte d'Ivoire, Dieth et al. [9] collected four cases in fourteen years. Contributing factors cited were: the child's flailing during foreskin sectioning, live circumcision (without anesthesia), and failure to follow the various stages of circumcision [10]. These consist in first decapping and cleaning the glans smegma, then incising the foreskin and its mucous membrane longitudinally and transversely 4 mm from the balanoprepucial groove along lines marked in advance with a felt-tip pen. Circumferential mucocutaneous suture is made with 5/0 absorbable thread. For ritual circumcision, particularly in our country, the foreskin and its mucous membrane are cut transversely at the same time, after good traction on the foreskin by the operating assistant. This section is performed after wedging and pushing down the glans between the thumb and forefinger, or at best, after placing a clamp over the glans previously located by the fingers [19]. Therapeutic management depended on how soon the patient was seen after the accident, and the conditions under which the severed glans was transported. In our series, balanic reimplantation was attempted in one case, but the therapeutic outcome was glansal necrosis. In the second case, a late-stage meatoplasty was performed for comfort. However, many authors recommend attempting balanic reimplantation regardless of the delay in management. DIABATE [20] et al. reported a case of successful glansal reimplantation of a patient admitted 15 minutes after amputation. ESSID [21] reported a case of amputation successfully reimplanted after a delay of 2 hours and a half. SYLLA [5] reported a case of failed reimplantation. SOW [10] had attempted four reimplantations, all of which failed. This therapeutic failure explains all the difficulties in managing glansal amputations involving microsurgery. This type of lesion can be avoided by correct traction on the foreskin, placing a clamp over the glans penis and wedging the thumb over the glans penis [21]. The frequency of post-circumcision infections is highly variable, and can be significantly elevated when circumcision is performed by inexperienced hands whose asepsis rules are often ignored. Infections may be local (localized suppuration) or general (sepsis), and may be life-threatening. In our series, ten cases of infection were recorded, including eight local infections and two cases of septicemia (tetanus) secondary to circumcision by a traditional practitioner and a community agent. One of the two cases of tetanus died in intensive care, while the other recovered. TAMBO [22] reported one case of suppuration in his series. SOUMARE et al. [23] reported 54 cases of tetanus in seven years. DIABATE [6] found 9 and 10 cases of infection respectively in two of his studies, including one case of necrotizing fasciitis. The frequency of these infectious complications can be explained by failure to observe basic asepsis rules and to master the circumcision technique. They were higher when circumcision was performed by a paramedic or traditional practitioner.

The limitations of this study are the retrospectivity and a smaller number of participants.

5. Conclusion

Circumcision is a medical procedure widely practiced throughout the world for cultural, health, religious or aesthetic reasons. The particularity in Africa, and specifically in Senegal, lies in its trivialization, carried out mainly by paramedical staff or traditional practitioners with mass circumcisions for cultural reasons. The serious complications encountered in our study, such as glans amputation, should encourage health authorities to provide a legal framework for this surgical procedure, and to facilitate its performance by qualified personnel.

Conflicts of Interest

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

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Epidemiological Aspect and Evaluation of the Management of Urologic Emergencies at the Urology Unit of Labe Regional Hospital

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Abstract

Aim: To contribute to improving the management of urological emergencies at Labé Regional Hospital. Patients and Method: This was a dynamic, descriptive study lasting six months from July 1 to December 31, 2017. Results: Urological emergencies represented 45.14% (n = 218) of all admissions to the urology unit. The mean age of our patients was 56.60 years with extremes of fifteen days and 93 years. The 71 - 80 age group was the most represented with 28.03% (n = 61) followed by 61 - 70 years with 24.31% (n = 53). Our patients' activities were dominated by agriculture, with 35.77% (n = 88), and the city center was most affected by urological emergencies, with 39.44% of cases (n = 86). 70.18% (n = 153) of our patients had bladder retention on admission, and 53.21% (n = 116) underwent urethral catheterization, including 3 women. The etiology of bladder retention in these 3 women was dominated by two cases of bladder lithiasis and one case of neurological bladder. Conclusion: The management of urological emergencies requires specific material and human resources. Their knowledge will enable us to better understand this problem and could serve as a basis for a broad reflection on the organization of the management of urological emergencies in our region.

Keywords

Urological Emergencies, Epidemiology, Labé Regional Hospital

1. Introduction

Urological emergencies are critical situations or suffering that require immediate

and appropriate care.

They account for a significant proportion of consultations and hospitalizations in emergency departments [1].

In France, there are an average of five emergency urology consultations a day, and emergency hospitalization accounts for 8% of hospital admissions [2].

In sub-Saharan Africa, the inadequate equipment of most emergency services and the lack of qualified nursing staff in peripheral areas, combined with epidemiological contexts marked by endemo-epidemic diseases, have led health authorities to prioritize preventive medicine and put curative medicine on the back burner. The management of urological emergencies is still in its infancy. Real emergency services only exist in large hospitals [3].

A study carried out in Mauritania by Ould Tfeil Y. *et al.* [4] in 2009 reported 1200 urological emergencies, 31% of which were hospitalized in the urology department of the Nouackchott national hospital. Fifty-three percent (53%) of these urological emergencies were dominated by bladder retention, with urogenital infections accounting for 16.8% of urological emergencies. Emergency placement of a cystocatheter was the most frequently performed emergency procedure (59.7%).

In Togo, Tengue K. *et al.* [5] in 2017 reported 442 urological emergencies over 3 years. Acute retention of vesical urine accounted for 64% of cases, with infectious pathologies taking second place in 22.2% of cases. Urethral and suprapubic catheterization were the most common emergency procedures, respectively 58.8% and 41.2%.

In a study of 508 patients carried out by Diabate I *et al.* in Louga, the hospital incidence rate was 15.80% for all urological consultations in the department, and 6.52% for all emergencies received in the emergency department [1]. The only study carried out in Guinea, Diallo A. B. *et al.* in 2009 on medical-surgical emergencies in the urology department, reported 22% of all urological emergency admissions, dominated by UVR (73.9%). Therapeutically, urethral catheterization and suprapubic catheterization were the most frequently performed emergency procedures (55.25% and 24.14% respectively) [6]. The aim of this study was to contribute to improving the management of urological emergencies at Labé Regional Hospital.

2. Patients and Methods

This was a retrospective, descriptive-type study lasting six months from July 1 to December 31, 2017. We included in this study, all patients received and treated in emergencies for urogenital affections with all clinical, paraclinical and therapeutical data in the emergency department and the urology unit of the regional hospital of Labé. This is the only urology unit in mid-Guinea, with an estimated 30-minute turnaround time. This urology unit covers five prefectures and the urban center of Labé. We did not include the hospital's other non-urological emergencies. The variables studied were epidemiological (frequency, age, sex, origin, profession), clinical (history, terrain, reasons for consultation and pathologies diagnosed) and therapeutic (patient management and outcome). We proceeded to an exhaustive recruitment of all the files of the patients received for the urological urgencies during the period of study, the data were collected using a form of pre-established survey. Data analysis was performed using Epi.info 7.2 statistical software.

The number of patients who met the selection criteria constituted our sample size.

Under-reporting of urological emergencies, lack of emergency care kits and unavailability of emergency medical imaging were the main difficulties encountered in this study.

3. Results

The Urological emergencies accounted for 45.14% of all admissions to the department (Figure 1), or 218/483 patients seen during our study period. The mean age of our patients was 56.60 years, with extremes of 15 days and 93 years. The 71 - 80 age group was the most represented with 28.03% (n = 61), followed by the 61 - 70 age group with 24.31% (n = 53) (Table 1). Thirty-nine percent of our patients (Figure 2) lived in the urban center of Labé, where the urology unit of the middle Guinean region is located. The other urological emergencies were referred by other health facilities in the administrative region, which comprises 05 prefectures In terms of occupation, farmers were the most represented, at 35.78% (n = 78), followed by shopkeepers and workers at 24.77% and 18.35% respectively (Table 2). Urinary bladder retention was the most common urological emergency in our patients, accounting for 70.18% of cases (n = 153), followed by urogenital infections in 16.05% (n = 35) of cases (Table 3) Urogenital trauma accounted for 3.67% (n = 8) of cases, half of which were urethral trauma (n = 4), followed by external genital trauma (n = 4) (Table 3). In the emergency department, 97.25% had received early treatment within 30 minutes of admission, and 78.44% (n = 171) had been admitted for observation within 24 hours of emergency treatment. Hematuria with vesical caittotage was observed in 08 cases, and management consisted in placing an indwelling transurethral vesical catheter with a vesical irrigation system (Table 3). Three cases of hematuria had benefited from etiological treatment, and the other hematuric patients were referred to CHU Ignace Deen for further management.

Urethral trauma associated with massive uretrorrhage, surgical cystostomy was performed in the operating room with the urology unit's on-call team.

A case of trauma to the urethra occurred in the context of polytrauma associated with a pelvic fracture. Prostatic tumors (benign hyertrophy and prostate cancer) were the main cause of urine retention, accounting for 43.78% of cases, followed by prolonged use of a transurethral bladder catheter with calcification in 22.82% of cases (Table 4). Transurethral bladder catheterization was performed most frequently in emergencies, accounting for 53.21% of cases (n = 116), and 21.55% of patients had undergone minimal cystostomy (Table 5). We



Figure 1. Distribution of patients by type of reception.



Figure 2. Distribution of patients by origin.

| Table 1. Répartition de | s patients selon | la tranche d'âge. |
|-------------------------|------------------|-------------------|
|-------------------------|------------------|-------------------|

| Tranche d'âge | Effectif | Pourcentage |
|---------------|----------|-------------|
| 0 - 10 | 11 | 5.04 |
| 11 - 20 | 9 | 4.13 |
| 21 - 30 | 11 | 5.04 |
| 31 - 40 | 12 | 5.50 |
| 41 - 50 | 13 | 5.90 |
| 51 - 60 | 17 | 7.80 |
| 61 - 70 | 53 | 24.31 |
| 71 - 80 | 61 | 28.03 |
| >à 80 | 31 | 14.21 |
| TOTAL | 218 | 100.00 |

Average age: 56.60 ans extremes: 15 jours et 93 ans.

| Profession | Effectif | Pourcentage (%) |
|---------------|----------|-----------------|
| Farmer | 78 | 35.78 |
| Shopkeeper | 54 | 24.77 |
| Worker | 40 | 18.35 |
| Civil servant | 32 | 14.68 |
| Student | 14 | 6.42 |
| TOTAL | 218 | 100 |

 Table 2. Distribution of patients by socio-professional category.

 Table 3. Distribution of patients by type of emergency.

| Type d'urgence | Effectif | Pourcentage |
|------------------------|----------|-------------|
| Urinary retention | 153 | 70.18 |
| Infectious pathology | | |
| Orchiepididymitis | 23 | 10.55 |
| Acute prostatitis | 07 | 3.21 |
| OGE Gangrene | 05 | 2.21 |
| Nephritic colic | 10 | 4.59 |
| Hematuria | 08 | 3.67 |
| Genital trauma | 08 | 3.67 |
| Spermatic cord torsion | 03 | 1.38 |
| Priapism | 01 | 0.46 |
| Total | 218 | 100.00 |

Table 4. Distribution of patients by etiology of bladder retention.

| Etiologie | Effectif | Pourcentage (%) |
|--|----------|-----------------|
| Prostate tumors | 67 | 43.78 |
| Calcification of the indwelling catheter | 35 | 22.87 |
| Urethral stricture | 30 | 19.6 |
| Neurogenic bladder | 10 | 6.53 |
| Cervical sclerosis | 4 | 2.61 |
| Urethral trauma | 4 | 2.61 |
| Prostatitis | 2 | 1.30 |
| Tumor of the penis | 1 | 0.65 |
| TOTAL | 153 | 100 |

| Geste en urgence | Effectif | Pourcentage |
|--|----------|-------------|
| Transurethral bladder drainage | | |
| Indwelling urethral catheter | 75 | 34.4 |
| Bladder detachment | 02 | 0.91 |
| Urethral catheter + Prostatic adenomectomy | 03 | 1.37 |
| Urethral tube renewal | 35 | 16.05 |
| Urethral tube + ultrasound + referral to hospital | 01 | 0.45 |
| Suprapubic bladder drainage | | |
| Cysto-catheter | 47 | 21.55 |
| Surgical cystostomy + debridement of necrotic tissue | 05 | 2.29 |
| Medical treatment | 45 | 20.64 |
| OGE Surgery | | |
| Distal cavernospongiosus shunt | 01 | 0.45 |
| Detorsion + Orchidopexy | 03 | 1.37 |
| Hemostasis + dressing | 01 | 0.45 |
| TOTAL | 218 | 100 |

Table 5. Summary of emergency patient management.

performed three emergency hemostasis adenomectomies in the operating room. Urological emergencies required hospitalization due to their severity, such as gangrene of the external genitalia, chronic urine retention requiring progressive drainage and vascular filling to avoid complications, notably obstruction leaver syndrome and vacuo hematuria. Overall, 171 patients (78.44%) had been under observation for 48 hours after admission, compared with 16.06% (n = 35) who had been hospitalized in our department. Five point fifty percent of patients were referred to other departments for management.

4. Discussion

The management of urological emergencies is a major part of the activity of our urology unit, accounting for 45.14% of all admissions to the department. Our results are superior to several studies, notably by Tengue K *et al.* [5] Halidou M *et al.* [7] and Diallo TO at the Kolda regional hospital [8], who reported only 147.3 urological emergencies per year, 506 cases of emergencies with 24% of all admissions to the department in 42 months and 20.40% of all admissions to the department. Our results can be explained by the fact that our department was unique in the Middle Guinea region, which was made up of five prefectures, and all urological emergencies were referred directly to our department. The average age of our patients was 56.60 years, with extremes of 15 days and 93 years. This shows that the majority of urological emergencies in our region occurred in people over 50 years of age. Farmers were the most represented in our series

35.78% (n = 78) followed by traders). Our results were identical to those found by Diallo A. B. et al. who, in their study, observed that farmers were dominant, 40.6% (n = 307) followed by workers and civil servants with 21% (n = 159) and 12.9% (n = 98) [6]. This predominance of farmers and merchants could be explained by the geographical location of the Labé region, where agriculture and commerce are the most common professions. Prostatic tumors were the most frequently diagnosed pathologies on admission, and most patients had consulted a specialist for complications (bladder retention). The same observation was made by Diallo A. B. et al. [6] and Tengue K et al. [5]. The sex ratio favored men (Figure 3). We found that our sex ratio was higher than the sex ratios found in sub-Saharan Africa, notably Senegal and Mauritania [7] [8]. In European series, the sex ratio was even lower, at 1.5, 3.19 and 3.55 [2] [9] [10]. This male predominance in our series can be explained by the fact that certain urological emergencies concern men exclusively (orchiepidymitis, priapism, prostate tumours, cord torsion, bladder retention). The city center and surrounding areas were the most frequent source of urological emergencies, with 39.44% (n = 86). This frequency can be explained by the region's demographic explosion, and by the fact that the prefecture is home to the only referral urology service in the Middle Guinea region. Only urological emergencies beyond the competence of the on-call team are referred to CHU Ignace Deen, five hundred and twenty km from the capital. Urinary retention was the most frequent urological emergency. Our results were similar to those of Tengué K et al. in Togo [5] and Ould T Feil Y et al. [4], who reported 64% and 53% of cases respectively. This may be explained by the fact that it is one of the main circumstances for the discovery of obstructive sub-bladder pathologies (prostate tumours and urethral stricture). Prostatic tumors were the leading cause of bladder retention, accounting for 43.78% of cases. In a similar study carried out in Togo by Tengué K et al. [5], the main etiologies of bladder retention were prostate tumours, responsible for bladder retention in 74% of cases. Calcification of the indwelling catheter was



the second most common cause of bladder retention in our study, accounting for 22.87% (n = 35). This latter situation can be explained by the poverty of the patients on the one hand, and on the other by the negligence of certain patients to come to the department or to a medical center to change their indwelling catheter. Urogenital infections were relatively high (16.08% of cases) in our series, in contrast to the studies by Halidou M. et al. [7] in Niger and A. B. et al. [6] in Guinea, who reported an incidence of nine cases per year and 4.5% respectively. They were dominated by orchiepididymitis, acute prostatitis and bursal necrosis, with 60.71% (n = 17), 39.28% (n = 11) and 25% (n = 7) respectively. Bursal necrosis was less frequent, accounting for 20% (n = 7) of urogenital infections in our series. In the Labé region, disorders of the urogenital sphere are perceived as a shameful and sometimes mysterious pathology, leading patients to consult a traditional practitioner or a healer, before later consulting a hospital at the stage of complications. Urogenital trauma accounted for 3.67% (n = 8) of cases, dominated by urethral and OGE trauma with 50% (n = 4) and 25% (n = 2) of cases respectively. In one case of closed trauma to the right kidney, grade II according to the AAST classification, with stable hemodynamic parameters, the patient was admitted for observation with vascular filling with physiological serum. In our series, we recorded a case of post-circumcision hemorrhage. This circumcision was performed by a paramedic in a room set up in the patient's home, where he provided medical care (dressings, infusion of solutions, injections, etc.). This is a common accident, most often benign, but can sometimes be severe due to profuse bleeding, and remains frequent in countries where these rituals are widespread [11] [12]. Spermatic cord torsion accounted for 1.38% (n = 3) of all urological emergencies received in our department. Urogenital infections were relatively high (16.08% of cases) in our series, in contrast to studies by Halidou M. et al. [7] in Niger and A. B. et al. [6] in Guinea, who reported an incidence of nine cases per year and 4.5% respectively. They were dominated by orchiepididymitis, acute prostatitis and bursal necrosis, with 60.71% (n = 17), 39.28% (n = 11) and 25% (n = 7) respectively. Bursal necrosis was less frequent, accounting for 20% (n = 7) of urogenital infections in our series. In the Labé region, disorders of the urogenital sphere are perceived as a shameful and sometimes mysterious pathology, leading patients to consult a traditional practitioner or a healer, before later consulting a hospital at the stage of complications. Urogenital trauma accounted for 3.67% (n = 8) of cases, dominated by urethral and OGE trauma, with 50% (n = 4) and 25% (n = 2) of cases respectively. In one case of closed trauma to the right kidney, grade II according to the AAST classification, with stable hemodynamic parameters, the patient was admitted for observation with vascular filling with physiological serum. In our series, we recorded a case of post-circumcision hemorrhage. This circumcision was performed by a paramedic in a room set up in the patient's home, where he provided medical care (dressings, infusion of solutions, injections, etc.). This is a common accident, most often benign, but can sometimes be severe due to profuse bleeding, and remains frequent in countries where these rituals are widespread [11] [12].

Spermatic cord torsion accounted for 1.38% (n = 3) of all urological emergencies received in our department. All these torsions of the spermatic cord were managed immediately after admission, enabling us to save the testicles and avoid orchiectomy Hematuria was present in eight cases (3.67% of cases). None of our patients had benefited from uretrocystoscopy, as our department did not have a cystoscope, and all hematuria patients had been referred to Conakry University Hospital for treatment. All profuse hematuria had been treated with a bladder irrigation system before referral. Regardless of the nature and type of emergency, 97.25% of patients were managed early, 30 minutes after admission. Tengue K et al. found a management time of two hours, and six patients (2.75%) were managed late. Urethral catheterization was the most frequently performed emergency procedure, with 34.4% (n = 75). Tengué K. et al. [4] similarly found that urethral catheterization was the most frequently performed procedure for the management of bladder retention (58.8%). The remaining 26.60% of patients required surgical management in the operating theatre. The same observation was made by d'Ould T Feil et al. in Mauritania and Fall B. in Senegal, who reported that 25% and 26.75% [4] [13] of their urological emergencies were managed in the emergency operating room. Suspubital derivation was the most common surgical procedure performed on an emergency basis, accounting for 83.93% of cases. The opposite result was reported by Fall B. et al. in Senegal and Ould T Feil et al. in Mauritania, with 59.7% and 59.67% respectively [4] [13]. Togo's Tengué K et al. [5] found that debridement of external genital gangrene was the most common surgical procedure, accounting for 46.8% of cases. The majority of our patients, 78.44%, had been under observation for less than 24 hours after their emergency management. After emergency management, some patients were discharged for subsequent etiological treatment.

5. Conclusion

The management of urological emergencies is a common activity in our practice, and requires specific material and human resources. Urological emergencies can have both functional and vital consequences if they are not attended to promptly and by specified personnel.

Conflicts of Interest

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

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Annexe: Fiche Survey Sheet

| | 1) General information |
|---|--|
| | Name |
| | First name |
| | Age |
| | Sex |
| | Profession |
| | Background: Labé: Periphery: |
| | Nationality: Guinean: Other: |
| | 2) Complaint |
| - | Urine retention: Acute Chronic: complete incomplete |
| - | Urinary Burning: |
| | Yes No |
| - | Dysuria: |
| | Yes No |
| - | Pollakiuria: |
| | Yes No |
| - | Fever: |
| | Yes No |
| - | Urethralgia: |
| | Yes No |
| - | Haematuria: |
| | Yes No |
| - | Low back pain: |
| | Yes irradiation |
| | soothing factor factor aggravating intensity |
| | No |
| - | Anuria: |
| | Yes No |
| - | Other: |
| | Evolution: |
| | History |
| - | Medical: |
| - | Surgical: |
| - | Gynecological: |
| | Field: HTA Diabetes Sickle Cell Disease Neurological Gout |
| | Diagnostic: |
| | 3) Conduct |
| | Emergency procedures |
| | a) Bladder drainage: transurethral bladder catheterisation |
| | b) Medical: |
| | Antibiotic: |
| | Analgesic: |
| | Other: |
| | |

| c) Surgical: |
|-----------------------|
| Route of first: |
| Gestures: |
| Progressive follow-up |
| Favorable: Yes No |
| Unfavourable: |



Urinary Lithiasis Secondary to Urethral Duplication: A Case Report

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Abstract

Urethral duplication is a rare congenital anomaly, mainly involving boys, although cases in girls have been reported. The majority of duplications of the urethra are asymptomatic and the discovery of this malformation can be done at any age. Diagnosis and determination of its type are based on urethrocystography with mid-void images, which helps to guide the surgical approach. The treatment is not yet well codified and the therapeutic attitude varies from one author to another. We report a clinical observation of a urethral duplication with a calculus in a six-year-old boy who underwent a partial urethrectomy of the supernumerary urethra in whom a lithotomy and a urethrectomy were performed via a suspension approach. This observation illustrates the possibility of urinary stone formation after partial urethrectomy of the supernumerary urethra.

Keywords

Urethra, Duplication, Calculus, Child

1. Introduction

Urethral duplication is a rare congenital malformation [1] characterized by the juxtaposition of two or more ducts with a smooth muscular structure and an excreto-urinary mucosal lining [2] [3]. It may be complete or incomplete and usually occurs in a sagittal plane [4], and the ventral urethra is most often functional and contains a sphincter mechanism [5]. Most urethral duplications are asymptomatic, with mild episodes of urinary incontinence in the most frequent cases [6], and can be discovered at any age. Diagnosis is made after careful ex-

amination. Treatment is not yet well codified, and therapeutic attitudes vary from one author to another. Asymptomatic forms are generally respected [7].

We report a clinical observation of a urethral duplication with a calculus embedded in the supernumerary urethra in a six-year-old boy who underwent partial urethrectomy of the supernumerary urethra and circumcision at a hospital in the Labé region.

2. Observation

6-year-old male boy who consulted for suspensory pain and urinary leakage evolving for 14 days with the history of a circumcision and an excision of the urethra epispade complete February 08, 2018 in a hospital structure in the region of Labé.

The clinical examination found a good general condition, well colored, afebrile with a temperature of 37.4°C. Locally, penis circumcised, presence of a glandular scar on the dorsal surface, the meatus is apical, there is a small mass at the root of the penis, of firm circumstance, well circumscribed and mobile in relation to the deep plane, urination possible with slight pain. The testicles in place are normal in size and appearance.

The cytobacteriological examination of the urine carried out was negative, then the retrograde and voiding urethrocystography (UCRM) revealed a stone wedged in the supernumerary urethra (Figure 1(a) and Figure 1(b)) and finally an ultrasound carried out to suggest the presence of a lithiasis at the urethro-vesical junction.

The diagnosis of a lithiasis on a urethral duplication was retained and the indication of a lithotomy and a uretrectomy were posed and carried out under general anesthesia by a suprapubic approach by a pfanenstielle incision, dissection and individualization of the mass under the pubic symphysis, dissection and identification of the bifid urethra followed by its opening which allowed us to extract a large stone (**Figure 2(a)** and **Figure 2(b)**), let's continue the dissection of the bifid urethra (**Figure 2(c)** and **Figure 2(d)**) on a length of 3.5 cm to the base followed by its ligation and resection with PDS 4/0. Closing of the different planes and the urethral probe kept for 24 hours.



Figure 1. UCRM image showing duplicity and enclave calculus.



Figure 2. (a) and (b): Demonstration of the calculus in the supernumerary urethra, (c) and (d): Supernumerary urethra and urethral sound.

The immediate post-operative follow-up was simple with removal of the probe at J1 and the exit was J3.

3. Discussion

Urethral duplication or accessory urethra is a rare congenital anomaly mainly affecting boys, although cases in girls have been reported [1]. In the literature worldwide less than 500 cases have been reported [6] [7]. It is defined by the juxtaposition of two or more canals with a smooth muscular structure with an excreto-urinary mucosal coating [2]. The age of discovery is early most often before the age of 1 year [8]. The age of discovery in our patient is 18 months. This malformation results from a disorder of the organogenesis of the penis. Normally, the urethra develops from the urogenital sinus whose pelvic segment will form the posterior urethra and the phallic segment of the anterior urethra [9].

A number of hypotheses have been put forward to explain the embryopathogenesis of urethral duplication, but none of these alone can explain all the anatomical forms of this malformation. Some authors have suggested a delay in the formation of the balanic lamina in relation to the portion of the urethra originating from the urogenital sinus, which first reaches the dorsal part of the genital tubercle; for Mollard, cited by several authors, for Mollard, cited by several authors, this anomaly results from an embryological disturbance identical to that of bladder exstrophy and true epispadias and, finally, for Williams and Kenawi, an anomaly of median fusion of lateral mesoblastic flows at the level of the cloacal membrane [4] [10] [11].

Several classifications have been proposed, but two are widely used: that of Williams and Kenawi and that of Effmann-Lebowitz. The Effmann classification has been widely adopted to classify the different types of urethral duplication. It is considered the most comprehensive classification from a clinical and functional point of view, but is based on male forms only and does not distinguish sagittal from coronal duplications [6] [10].

Type I: Incomplete urethral opening

Type IA: Opening on dorsal or ventral surface of penis without communication with urethra or bladder. • Type IB: Proximal communication with the urethra, but no opening on the surface of the penis.

Type II: complete duplication of the urethra

- Type IIA1: two totally independent urethras arising separately from the bladder.
- Type IIA2: the accessory urethra arises from the main urethra and runs independently to its own meatus.
- Type IIA2-Y: a special form of type IIA2 with a ventral urethra opening into the perineum, known as congenital posterior urethroperineal fistula (PPUF).
- Type IIB: two urethras arise separately from the bladder and join distally to open into a single meatus.

Type III: Urethral duplication associated with a caudal duplication.

In our patient, it was a complete sagittal epispade duplication with two urethral orifices (IIA2), the accessory urethra was located above and anterior to the normal bladder neck. It passed anteriorly to the normal urethra, behind the pubic symphysis and terminated at the dorsal surface of the penis. After partial resection of the supernumerary urethra, it was transformed into a blind epispade duplication with a blind canal that terminates at the dorsal surface of the penis. This canal emerges from the bladder and terminates anterior to the symphysis, with no external connection. It should be noted that the presence of anatomical abnormalities can favour the appearance of a calculus, by impairing the flow of urine. They may be responsible for urinary tract infections, leading to the development of lithiasis. These anomalies promote lithogenesis through urinary stasis in a diverticulum, as in our patient's case, and allow microbial proliferation and crystallization [12].

The circumstances of discovery are variable and depend on the anatomical type of the duplication. Generally, the supernumerary urethra is asymptomatic; the most frequently reported clinical signs are represented by double urinary stream, urinary incontinence, recurrent urinary tract infections and curvature of the penis. However, fortuitous discovery represents a circumstance of discovery frequently reported in the literature, mainly concerning blind forms [6] [13].

Complementary investigations are essential for the diagnosis of the anatomical form of the accessory urethra. Retrograde urethrocystography with per mictional films (UCRM) is the diagnostic key, and was performed in our patient to confirm the diagnosis. UCRM is the complementary examination of choice, enabling a morphological study of the main urethra and possibly the accessory urethra [8]. Endoscopy represents a diagnostic complement to better appreciate the anatomical type and helps guide the therapeutic attitude [1], but may miss the orifice of the supernumerary urethra [14]. It should be noted that UCRM coupled with endoscopy enables a better appreciation of the anatomical aspect of urethral duplication [15]. It should not be forgotten that an unprepared abdominal X-ray can reveal any associated bony malformations, such as the pubic disjunction seen in these cases of episcleral duplication, and can also show the presence of a calculus in the lower urinary tract, as was the case in our patient. Ultrasound examinations of the kidneys, bladder and prostatic region are useful for searching for associated malformations and describing the structures surrounding the urethra [7] [9]. Some authors suggest replacing these ultrasound examinations with MRI, which enables a much more precise study of the penis, perineum, prostate region and lower urinary tract in a single examination. This has the advantage of not requiring intravenous injection of contrast medium, and of presenting an objective image that can be used as a reference for subsequent examinations [7].

The treatment of the supernumerary urethra is not yet well codified and the therapeutic indication varies from one author to another; the only consensus is that the asymptomatic forms are respected [5] [11]. On the other hand, in the symptomatic forms, the treatment is essentially surgical, which consists of total excision of the supernumerary urethra, at the neckline of the penis if there is a dorsal curve of the latter. For our patient, the lithotomy was associated with excision of the supernumerary urethra approximately 3.5 cm in length. However, an incomplete uretrectomy can lead to complications such as diverticula (causes of repeated urinary tract infections), fistulas [2] [4] and stones in the urethral residue, as is the case in our patient whose formation can be done by urinary stasis in the blind urethra causing microbial pullulation and maintaining crystallization.

To prevent this, some authors suggest a double penile and transverse suprapubic approach, particularly in the treatment of complete urethral duplication [3]. In our patient, the approach was penile for the first operation where the urethrectomy was partial and the second was suprapubic in which a lithotomy was performed then the total uretrectomy.

4. Conclusions

Urethral duplication is a rare birth defect. This observation illustrates the possibility of urinary calculus formation after partial uretrectomy of the supernumerary urethra.

In this context, any unusual mass at the base of the penis after urethral resection can evoke the diagnosis, urethrocystography with mid-void images is the diagnostic key, and it is this that guides the surgical attitude.

Conflicts of Interest

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

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Robot-Assisted Nephrotomy as a Nephron-Sparing Approach for Completely Intraparenchymal Renal Tumors

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Abstract

Introduction: The diagnosis of small renal masses and the endophytic tumor approach have become challenging. This study aims to describe exclusively robot-assisted surgery as an alternative nephron-sparing approach for renal intraparenchymal tumors. Patients and Methods: We retrospectively analyzed all patients with completely endophytic tumors undergoing robot-assisted partial nephrectomy, treated under the Da Vinci System®, aided by intraoperative ultrasound. The patients' demographic characteristics, perioperative and oncological outcomes were assessed. Results: From a total of 13 partial nephrectomies performed between 06/2010 and 10/2021, all patients underwent nephrotomy. The patients' mean age was 52 years and the tumor measured mean 2.6 cm. Warm ischemia time was 24 minutes and histopathological analysis revealed that 12 patients had renal cell carcinoma. In a mean 36-month follow-up, no significant renal function alterations were found and no local or systemic recurrences occurred. Conclusion: Robot-assisted access is a safe and effective option for the nephron-sparing technique in completely intraparenchymal renal tumors.

Keywords

Robotic Surgical Procedures, Kidney Neoplasms, Organ Sparing Treatment, Nephrectomy, Renal Mass

1. Introduction

With the development of image diagnosis techniques and the larger number of exams requested, the incidence of small renal tumors has increased as well as the

indication for nephron-sparing surgery, with excellent oncological and functional outcomes [1]. Incidental lesions account for more than 60% of the renal tumors detected [2].

Partial nephrectomy is being increasingly used for small renal masses (<4 cm) and, in selected cases, up to 7 cm renal tumors, with similar outcomes compared to radical nephrectomy [3] [4] [5].

Completely intraparenchymal renal tumors imply greater technical difficulties for location and resection, which may increase the chances for complications [6]. The exact location of the tumor during surgical resection is provided by intraoperative ultrasonography [7].

Currently, despite the group's experience in open partial nephrectomy, including removal of intraparenchymal tumors [8], there is a natural transition towards minimally invasive techniques [9], the robotic one in particular [10] (Figure 1).

This study aims to present a robot-assisted surgical approach for the removal of completely intraparenchymal renal tumors.

2. Materials and Methods

We retrospectively analyzed 13 patients undergoing RAPN, all with completely endophytic tumors. Patient demographics, perioperative, functional and oncological outcomes were assessed. All patients underwent RAPN between August/ 2016 and July/2021 by a single senior surgeon (MFD), with large previous experience in open partial nephrectomy, including cases of intraparenchymal tumors. This retrospective study had been approved by Institutional Ethical Committee, the formal consent was not required because the images are anonymous from which the individual cannot be identified.



Figure 1. ((A) and (B)) Patient position; (C) Change of position; (D) robotic docking.

The detailed surgical technique is described below:

1) The transperitoneal approach for RAPN was followed in all cases.

2) Access was gained through four robotic trocar positions, the kidney was dissected and exposed, and the renal artery was clamped;

3) Ultrasound was used to identify the tumor margins and depth. Before the renal hilum was clamped, 12.5 g and 20% manitol was administered for nephron protection during warm ischemia.

4) Shortly after the renal artery was clamped with a bulldog clamp, nephrotomy was performed on a marked area aided by the US. Tumor enucleation was then performed by using a bipolar fenestrated grasper and a blunt and sharp dissection Scisor.

The surgical specimen was promptly forwarded for histopathological analysis of the margins during renal reconstruction (**Figure 2**). Hemostasis was done with 2.0 v-lock parenchymal suture. The kidney was then sutured using Vicryl 0 running suture;

5) In all cases a suction drain was placed around the gerota fascia.

3. Results



Figure 2. A 44-year-old patient with a left side 2.6-cm interpolar completely endophytic renal mass (R.E.N.A.L. nephrometry score 10×). RAPN was performed without perioperative complications, with a WIT of 25 min. Pathology showed renal cell carcinoma (RCC), clear cell type, Fuhrman nuclear grade 2, and margins coincident with the tumor (tumor enucleation). (A) CT transverse section; (B) use of intraoperative US and appointment for nephrotomy; (C) enucleated tumor; (D) surgical piece.

In a total of thirteen patients assessed, the mean age was 52 years, all being males. The mean tumor size was 2.6 cm, with a mean 24 min warm ischemia time. Mean preoperative serum creatinine was 0.9 mg/dl and the postoperative value was 1.0 mg/dl (Table 1 and Table 2).

Histopathological analysis showed only one lesion of benign etiology, and among the renal cell carcinomas, eight were clear cells and four were papillary (**Table 3**). Most were low Fuhrman grade lesions and no positive surgical margins were found in this series (**Table 4** and **Table 5**).

| Variables | Mean (min - max) |
|-----------------|------------------|
| Age (years) | 52 (30 - 59) |
| Gender | |
| Male | 13 (100%) |
| Tumor side | |
| Left | 8 (61.5%) |
| Right | 5 (38.5%) |
| Tumor size (cm) | 2.6 (0.6 - 4.5) |
| Tumor location | |
| Upper | 2 |
| Middle | 7 |
| Lower | 4 |
| R.E.N.A.L Score | |
| Low | 1 |
| Intermediary | 11 |
| High | 1 |

Table 1. Demographic data.

Table 2. Perioperative results.

| Variables | Mean (min - max) |
|-----------------------------------|------------------|
| Operative time (min) | 150 |
| Warm ischemia time (min) | 24 (15 - 45) |
| Negative margins | 100% |
| Conversion to radical Nephrectomy | 0 |
| Trifecta | 69% |
| Hospital stays time (days) | 3 |

Table 3. Pathological data.

| Variables | Mean or number |
|---------------------|----------------|
| Malignant histology | 12 (92.5%) |
| Clear cells | 8 (66.5%) |
| Papillary | 4 (33.5%) |
| Furhmann Grade | |
| 1 | 4 |
| 2 | 4 |
| 3 | 4 |

Continued

| Negative margins | 100% |
|--------------------------|----------|
| Angio-lymphatic invasion | 0 |
| Benign tumors | 1 (7.5%) |

Table 4. Demographic data, tumor characteristics, and warm ischemia time.

| Patient | Gender | Age (years) | Tumor size (cm) | Tumor location | Warm ischemia time (min) |
|---------|--------|----------------|--------------------|-------------------|-----------------------------|
| 1 | М | 41 | 0.6 | Upper | 15 |
| 2 | М | 69 | 0.9 | Lower | 24 |
| 3 | М | 46 | 0.8 | Lower | 21 |
| 4 | М | 68 | 2.5 | Middle | 44 |
| 5 | М | 38 | 2.4 | Middle | 23 |
| 6 | М | 34 | 4.5 | Middle | 45 |
| 7 | М | 69 | 4.5 | Middle | 21 |
| 8 | М | 52 | 2.2 | Lower | 20 |
| 9 | М | 76 | 2.7 | Upper | 32 |
| 10 | М | 45 | 2.7 | Middle | 25 |
| 11 | М | 63 | 4.1 | Middle | 25 |
| 12 | М | 63 | 3.2 | Lower | 17 |
| 13 | М | 44 | 2.6 | Middle | 27 |
| Mean | | 52 | 2.6 | | 24 |

Table 5. Pathological characteristics of the renal tumor.

| Patient | Histology | Fuhrman Grade | Vascular invasion | Preoperative Cr (mg/ml) | Postoperative Cr (mg/ml) |
|---------|--------------|------------------|----------------------|----------------------------|-----------------------------|
| 1 | Papillary | Ι | No | 0.9 | 1.0 |
| 2 | Papillary | Ι | No | 0.9 | 1.1 |
| 3 | Complex cyst | - | No | 0.9 | 0.96 |
| 4 | Clear cells | III | No | 3.3 | 3.7 |
| 5 | Papillary | Ι | No | 1.0 | 1.01 |
| 6 | Clear cells | II | No | 1.1 | 1.3 |
| 7 | Papillary | Ι | No | 1.4 | 1.6 |
| 8 | Clear cells | III | No | 0.8 | 0.9 |
| 9 | Clear cells | II | No | 0.99 | 1.1 |
| 10 | Clear cells | II | No | 0.98 | 0.97 |

| Continued | | | | | |
|-----------|-------------|-----|----|-----|-----|
| 11 | Clear cells | III | No | 0.6 | 0.7 |
| 12 | Clear cells | III | No | 0.9 | 0.9 |
| 13 | Clear cells | II | No | 0.8 | 0.9 |
| Mean | | | | 0.9 | 1.0 |

None of the patients had significant intraoperative bleeding, required any blood transfusion or evolved to fistulae or urinary collections in the postoperative. None of the patients undergoing the surgery had any renal function unit loss.

All the patients were monitored under the same protocol during a mean 36-month (6 - 72) follow-up, and no local recurrence or systemic diseases were observed.

4. Discussion

Robotic nephrotomy in the handling of solid and completely endophytic tumors represents a definitive and reliable approach, preserving renal function in all cases, besides providing a better exposure and safety for tumor resection. The robotic surgery advantages and the growing experience in nephron-sparing minimally invasive surgeries enable experienced surgeons to perform RPN in challenging cases [11].

Rogers *et al.* [12] were the first to show the feasibility and safety of RAPN in twelve complex cases, including hilar, endophytic, and/or multiple tumors. The mean size of the tumor was 3.6 cm, with 192 min mean operative time and 31 min WIT. All patients had negative surgical margins. Later, Gong *et al.* [13] reported the results of 29 patients undergoing RAPN for renal mass, including hilar, endophytic, and multiple tumors. The mean size of the tumor was 3 cm, with 197 min mean operative time and 25 min WIT. All cases had negative surgical margins and no recurrence was found in the mean 15 months follow-up.

Compared to such historical series, our findings suggest excellent RAPN performance for completely endophytic masses. Our group reported the consecutive experience in 13 cases, with mean 2.6 cm tumor size, mean 150 min operative time, and 24 min WIT. A small rate of intraoperative complications was evidenced, all surgical margins were negative, and no recurrence was found after a 36-month follow-up.

Besides, the achievement of a "Trifecta" that stands for a parameter introduced to define the quality of the RAPN procedure [14], in 69% of the endophytic tumors, shows a favorable outcome compared to other minimally invasive PN series reported [15] [16].

Partial nephrectomy and/or enucleation account for 30% of the surgical procedures in the treatment of renal tumors, with survival similar to the one found in radical nephrectomy for the early stages, evidencing a cancer-specific and overall survival of 98% and 97%, respectively [1] [4]. For <4 cm tumors, no additional surgical margin needs to be removed for ideal cancer control. The study reaffirmed the relevance of the healthy parenchyma thickness excised along with the tumor for long-term renal function preservation. Simmons *et al.* [17] showed the percentage of renal volume preservation rather than WIT to be the main determinant of the final eGFR following PN, and that the technical changes designed to minimize healthy volume loss, while still reaching negative margins, may account for a better functional outcome.

There are many definitions of central tumors, the best accepted of which are those of Black *et al.* [18], when the lesion is fully surrounded by normal renal tissue, and that of Brown *et al.* [19], when the lesion is less than 5 mm distant from the excretory system or hilar vessels. A rather challenging scenario is represented by such completely intraparenchymal renal masses, considering that the surgeon has no visual clues of the tumor location as the kidney surface is reached. Thus, surgical removal of those lesions encompassed greater technical difficulties for location and resection, besides a greater probability of perioperative complications. If well-succeeded perioperative and oncological outcomes are to be achieved, we strongly suggest that intraoperative ultrasound be used for identification of tumor margins, as advocated by Assimos *et al.* [20]. It can be controlled robotically or laparoscopically by the bedside assistant.

The use of minimally invasive ablative therapies, such as radiofrequency and cryotherapy for small renal tumors, is currently on the rise, providing greater safety and broadening their indications [21] However, since the tumor is endophytic and close to the excretory path and hilar vessels, this approach may be a limiting factor [22]. A nephron sparing surgery for central tumors has shown to be safe and effective compared to peripheral tumors, evidencing that operative and ischemia time, the need to close the collector system and blood transfusion showed no statically significant differences. Autorino *et al.* [23] reported their experience in the robotic management of renal mass, comparing the results of endophytic masses with mesophytic and exophytic tumors and stated that they found no differences in terms of surgical complications, positive margins rate or postoperative changes in eGFR.

The limitations of this study involve its retrospective nature despite the prospective data collection, the small number of patients, 36-month median follow-up, and absence of studies of the renal function of the units treated, or of serum creatinine. Nevertheless, the lesions were safely enucleated, providing negative margins and an acceptable warm ischemia time.

As a positive point, it seeks to encourage that the robotic approach be performed, even by surgeons with small or no experience at all in laparoscopic surgery.

5. Conclusion

RAPN can be performed safely and effectively for endophytic renal tumors. The accurate use of laparoscopic US and the exclusive robotic surgery platform resources facilitate the procedure in this challenging scenario.

Data Availability Statement

The data are stored in the electronic medical record system of the Hospital.

Conflicts of Interest

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

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