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# Contribution of Laser Photovaporisation in the Management of Lower Urinary Tract Symptoms Related to Prostatic Tumours: Preliminary Study of 29 Cases at the Saint Camille Hospital of Ouagadougou (Burkina Faso)

Clotaire Alexis Marie Kiemdiba Donega Yaméogo<sup>1\*</sup>, Bienvenu Ky<sup>1</sup>, Fasnewendé Aristide Kaboré<sup>1</sup>, Adama Ouattara<sup>2</sup>, Brahima Kirakoya<sup>1</sup>

<sup>1</sup>Department of Urology, Yalgado Ouédraogo Teaching Hospital, Ouagadougou, Burkina Faso

<sup>2</sup>Department of Urology, Sanon Souro Teaching Hospital, Bobo Dioulasso, Burkina Faso

Email: \*yameogoclotaire@yahoo.fr

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## Abstract

The treatment of prostatic tumour-related lower urinary tract symptoms (LUTS) uses a varied therapeutic arsenal. In our country, the treatment is dominated by open surgery. Laser treatment is becoming an efficient alternative to trans-urethral prostatic resection or prostatic adenectomy. We report our experience with the results of Thulium laser photovaporization in the treatment of prostatic tumour-related LUTS. **Materials and Methods:** A prospective study was conducted between November 2018 and August 2019 at the Saint Camille hospital of Ouagadougou. The inclusion criteria were the presence of LUTS related to a prostatic tumour with an operative indication. **Results:** 29 patients were treated with Thulium laser prostatic photovaporization. The average age of patients was  $72.58 \pm 25.34$  years (54 - 84 years). The average vaporization duration was  $71.24 \pm 21.65$  minutes (15 - 210 minutes) for an average prostatic volume of 80.97 ml. The average duration of hospitalization for patients was 1.93 days (1 - 5 days). The average bladder sounding duration was 1.68 days (1 - 4 days). A capsular perforation, a sphincter lesion and urinary retention after removal of the catheter were the complications. **Conclusion:** Laser photovaporization is a newly used method at the Saint Camille Hospital. The benefit is the reduction of the risk of bleeding, the short duration of hospital stay and bladder sounding. Photovaporization deserves to be popularized in our daily practices.

## Keywords

LUTS, Laser Photovaporization, Prostate, Burkina Faso

## 1. Introduction

The symptoms of the lower urinary tract associated with a prostatic tumour mainly concern men over the age of 60 [1]. Surgical treatment of lower urinary tract symptoms (LUTS) related to prostate tumours uses a varied therapeutic arsenal. In our context of resource-limited countries, treatment remains predominantly dominated by open-surgery.

Nowadays, the mini-invasive techniques are the most used. Among the surgical techniques, transurethral resection of the prostate (TURP) is still considered as the gold standard for the treatment of benign prostatic hyperplasia, but its main disadvantage is represented by blood loss even if it significantly improves urinary symptoms and urinary flow [2]. Laser treatment is becoming an increasingly used, effective alternative to trans-urethral prostatic resection or prostatic adenomectomy. Several lasers (KTP, Ho: YAG, Thulium ...) and several techniques (enucleation, vaporisation) are currently available, with more and more studies validating reliability, reproducibility, and gain in terms of sounding time and hospitalization, per- and post-operative bleeding [1] [3]. Photoselective vaporization of the prostate is a minimal invasive endoscopic treatment of benign prostatic hyperplasia (BPH) obstruction. It uses the light energy produced by a laser source to destroy and remove urethral obstruction due to BPH. It is useful in patients with bleeding disorders [1].

Laser vaporization of the prostate utilizes the thulium laser section and vaporization capabilities. The material used is a resectoscope, a 1000  $\mu$  laser fiber and a 200 W thulium laser generator. The procedure begins with a section at 50 W from the bladder neck to veru montanum at 5 and 7 o'clock. First, the median lobe is vaporized at 150 W. The side lobes are then vaporized.

We report our experience with the results of Thulium laser photovaporization in the treatment of prostatic tumour-related LUTS.

## 2. Materials and Methods

A prospective study was conducted between November 2018 and August 2019 within the surgical department of the Saint Camille hospital of Ouagadougou. The inclusion criteria were the presence of a symptomatic prostatic tumour with evidence of surgical management. Our study on the use of laser photovaporization in the surgical management of prostate tumors is the first in west Africa. Were included in this study, patients with benign prostatic hypertrophy with failure of medical treatment based on  $\alpha$  blockers or those with a malignant prostate tumor advanced and obstructive who required continuous urinary catheterization. This is our first experience with laser in the surgical management of prostate tumors. It is a new technique and also an expensive one for most of the population.

The procedure was performed under spinal anaesthesia after checking the sterility of the urine. The administration of prophylactic antibiotherapy based on ceftriaxone 2 g and gentamycin 160 mg was systematic after the induction of

anesthesia.

The prostatic photovaporization was performed using a Thulium YAG 200 W laser supplied by a Thulium system. A 30° 26-F continuous flow cystoscope was used with the laser set at 80 W first, 150 W for vaporization, and 50 W for coagulation. The fibre is inserted into the continuous flow laser cystoscope with a separate irrigation channel. Isotonic saline serum at room temperature was used for irrigation. A configuration allowing a continuous flow provided sufficient visibility and cooling of the fibre.

The prostate vaporization was performed under vision using laser fibre with a contact scanning technique. The procedure is performed as an TURP, starting with the bladder neck and the lateral lobes, the anterior lobe, and finally the apical part of the prostate [4] [5].

The vesical sounding at the end of the operation was systematic, by the setting up of a double current catheter 22 Fr, balloon inflated at 30 cc with continuous irrigation with isotonic saline serum.

The data collected concerned patient characteristics (age, prostate volume), surgical and post-operative data (duration of intervention, complications, duration of sounding, duration of hospitalization).

The data were entered and analysed using the epi info 7 software.

All patients gave informed consent. Patients were assessed in post-operative at 1 month after the intervention.

### 3. Results

#### 3.1. Characteristics of the Study Population

A total of 29 patients secondary to benign prostatic hyperplasia (24) and malignant prostate tumor advanced with lymph node and bone metastases (5) were treated by Thulium laser prostatic photo-vaporization during 10 months between November 2018 and August 2019.

The average age of patients was  $72.58 \pm 25.34$  years (54 - 84 years). Dysuria, pollakiuria and urinary retention were the reasons for consultation found in all patients. The average prostatic volume was  $80.97 \pm 15.72$  ml (30 - 120 ml), of which 75.86% had a volume less than or equal to 80 ml.

#### 3.2. Post-Operative Management

The average duration of the interventions was  $71.24 \pm 21.65$  minutes with extremes of 15 to 210 minutes. The average prostatic volume was  $80.97 \pm 15.72$  ml. The average duration of hospitalization for patients was 1.93 days (1 - 5 days). Hospitalization was less than 48 hours in 86.2% of patients (**Table 1**).

The average bladder sounding duration was 1.68 days with extremes ranging from one day to 4 days (**Table 2**). The bladder catheter was removed at one day in 52% of cases, at two days in 45% of cases, at three days and four days after in 3% of cases.

The complications noticed were a capsular perforation; a urethral striated

sphincter lesion and a urinary retention after removal of the catheter. The post-operative course for the patients was uneventful. No dysuria presented by our patients.

#### 4. Discussion

The limits of our study are the small sample size, the patient follow-up time and the absence of uroflowmetry to better objectify the urinary obstruction.

Despite these limits, the following comments or discussions may be made.

The average age of patients in our series was  $72.58 \pm 25.34$  years (54 - 84 years). This result was similar to data in the literature showing benign prostatic hypertrophy as a common benign pathology in men over 50 years old and which is responsible for LUTS [6]. These LUTS can have a significant impact on the quality of life and may even be responsible for complications requiring medication or surgery [6]. Bachman [7], Kumar [8], Sandhu [9] found an average of 70.4 years (50 - 90), 72.6 years (67 - 95) and 70.1 years (44 - 92).

In our study, the average duration of the interventions was  $71.24 \pm 21.65$  minutes with extremes of 15 to 210 minutes. The average prostatic volume was  $80.97 \pm 15.72$  ml. The duration of the procedure depends on the prostatic volume, the laser's power and the operator's experience. Bachman [7], noted an average intervention time of 54.5 minutes for an average prostatic volume of 52.2 ml, Kumar [8] 33.5 minutes for a prostatic volume of 53.2 ml and Sandhu [9] 123 minutes for a prostatic volume of 101 ml.

The average operative times varied between 30 and 140 minutes depending on the series [10]. Although the technique was considered by some people to be slower and laborious than a trans-urethral resection of the classical prostate, it did not identify any significant difference between the operative duration of laser photovaporization and that of trans-urethral resection of the prostate [11].

**Table 1.** Duration of hospitalization.

Duration	Frequency (n)	Percentage (%)
24 H	10	34.4
48 H	15	51.8
72 H	2	6.9
120 H	2	6.9
Total	29	100

**Table 2.** Bladder sounding duration.

Duration	Frequency (n)	Percentage (%)
24 H	14	48.3
48 H	12	41.4
72 H	1	3.4
96 H	2	6.9
Total	29	100

Concerning the duration of hospitalization and vesical sounding, in the literature the tendency is rather towards vesical and short-term hospital stay [12].

Bouchier-Hayes, 2006 [13] noted an average duration of 12 hour-bladder sounding with a hospital stay of one day. Heinrich, 2007 [14] and Ruszat, 2007 [15] respectively found an average bladder sounding duration of 1.4 days and 1.8 days with a hospital stay of 3.6 days and 3.8 days.

The average duration of hospitalization for patients was 1.93 days (1 - 5 days).

In our series, the bladder catheter was removed at one day in 52% of the cases, at two days in 45% of the cases, and at three days and four days in 3% of cases after sounding.

Our results can be explained by the high prostatic volume, the surgical complications such as: capsular perforation, urinary retention and sphincter lesion; and our first year of experience. Kumar S.M. found a capsular perforation [8]. Other complications have been noted by other authors. Delayed hematuria, urgenturia, urethral stricture were reported by Maleck and colleagues [16].

The laser thulium allows in addition to the vaporization to perform a prostatic enucleation. This prostatic enucleation allows a gain in time. This makes possible the surgery of prostatic tumors with large volume [9] [17].

## 5. Conclusions

Laser photovaporization is a new method used in the surgical department of the Saint Camille hospital. This alternative has completely changed the management of symptomatic obstructive prostatic pathologies. The major benefit of photovaporization is the reduction of hemorrhagic risk, the short duration of hospital stay and bladder catheter use.

The achievement of good results and its low morbidity support its importance in the management of prostatic tumours. In our country, its popularization deserves to be encouraged.

## Consent

Consents of the patients were obtained before publication of this article.

## Conflicts of Interest

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

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# Congenital Urinary Tract Anomalies: About Cases 80 Cases at the University Hospital of Brazzaville

Anani Wencesl Séverin Odzébé<sup>1,2\*</sup>, Crayne Mboutol Mandavo<sup>1,3</sup>, Irene Patricia Lucie Ondima<sup>1,3</sup>, Prosper Alain Bouya<sup>1,2</sup>

<sup>1</sup>Faculty of Health Sciences, Marien Ngouabi University, Brazzaville, Congo

<sup>2</sup>Department of Urology-Andrology, University Hospital of Brazzaville, Brazzaville, Congo

<sup>3</sup>Department of Pediatric Surgery, University Hospital of Brazzaville, Brazzaville, Congo

Email: \*odzebe\_s@yahoo.fr

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## Abstract

**Objective:** To determine the diagnostic and therapeutic aspects of urinary tract anomalies in children in our environment. **Patients and methods:** This was a retrospective descriptive study conducted in the pediatric surgery and urology-andrology departments of the University Hospital of Brazzaville, from January 2012 to December 2017. Children aged 0 to 17 years old hospitalized for a malformation of the urinary tract were included. **Results:** The frequency of urinary tract anomalies was 1% of all patients admitted during the study period. The average age of the patients was 6.1 years (range, 0 - 17 years). The most common motive of consultation was ectopic urethral meatus (66.2%), vesical urine retention (18.7%) and lumbar spine pain (6.3%). Hypospadias was more common with 58.7%, followed by posterior urethral valves (20%), uretero-pelvic junction obstruction (7.5%). The most frequent preoperative complications were urinary tract infection (11.3%), urolithiasis (3.7%) and renal failure (2.5%). The treatment was surgical including urethroplasty (70.1%), or instrumental based on destruction of valves (16.9%). **Conclusion:** Urinary tract anomalies suffer late diagnosis and treatment in our practice. An antenatal screening strategy should be put in place to improve care to prevent the occurrence of complications.

## Keywords

Malformations, Urinary Tract, Children, Brazzaville

## 1. Introduction

Congenital malformations of the urinary system are abnormalities of anatomical

structures, external or internal, isolated or multiple, fixed or progressive, due to a disorder of embryogenesis [1], interesting both the kidneys and excretory ways. They occupy the 3rd rank of overall congenital anomalies with 10% of cases [2] and affect about 3% to 4% of the population [1]. The nature of anomalies is variable and their severity is different, ranging from complex anomaly to a simple anomaly of position or conformation [3]. While in Europe, malformative uropathies are diagnosed during antenatal examination [4] [5]; however in Africa, they are still diagnosed after birth, most often following a complication [6], the most feared being renal failure. In Congo, very few studies have been carried out on these pathologies [7] [8]; the objective of this study was the diagnostic and therapeutic aspects of UTA in children in our hospital practice environment.

## 2. Patients and Methods

This was a retrospective study that took place in the departments of Pediatric Surgery and Urology-Andrology of the University Hospital of Brazzaville from January 2012 to December 2017 (6 years). During the study period, we included all children from 0 to 17 years hospitalised for malformative uropathy operated or not, and having an exploitable medical data. The data collected on a survey form, from medical records and registers of admissions and operative procedure reporting. We studied the variables:

- epidemiological: frequency, sex, age;
- diagnostics:
  - Clinical: motive of consultation, physical examination, discharge diagnosis, as well as the associated congenital anomalies.
  - Paraclinical: renal and urinary tract ultrasonography, retrograde urethrocytography (RUC), intravenous urography (IVU) to determine the type of malformative uropathy and its repercussions; as well as serum creatinine and uroculture for complications.
- therapeutic: the radical treatment was either instrumental (bladder catheterization, destruction of valves with Béniqué's sound) or surgical (urethroplasty, nephrectomy, pyeloplasty, ureterovesical reimplantation, bladder reconstruction);
- evolutionary: length of hospitalization, inpatient post-operative follow-up, the notion of death.

Analysis of data was done using the Epi Info software. Quantitative variables were expressed in terms of means  $\pm$  standard deviation and qualitative variables as percentage form. For the statistical analysis, we used the Pearson correlation test (chi-square) with a significance threshold  $p < 0.005$ .

## 3. Results

### 3.1. Epidemiological Aspects

During the study period, 8113 patients were admitted to the pediatric surgery and urology-andrology departments, including 80 UTA cases (1%). The average

age was  $6.1 \pm 4.6$  years old (0 - 17 years old). There was a male predominance with 76 boys and 4 girls.

### 3.2. Diagnostic Aspects

Clinically, the circumstances of discovery were: ectopic urethral meatus in 53 cases (66.2%), vesical urine retention and dysuria in 15 cases (18.7%), lumbar spine pain in 5 cases (6.3%), urinary incontinence in 4 cases (5.0%), female external genitalia abnormality in 2 cases (2.5%) and abdominal bloating in 1 case (1.3%).

Ultrasound of the urinary tract (**Table 1**) was performed in 24 children (30%), RUC in 24 (30%) and IVU in 8 (10%). Ultrasonography revealed bilateral uretero-hydronephrosis and fight bladder in 13 cases (54.2%), hydronephrosis with cortical thinning in 3 cases (21.1%). In 4 cases (16.4%), ultrasound findings were normal.

#### Diagnoses

The discharge diagnoses are shown in **Table 2**.

Hypospadias was the most common disease with 47 cases (58.7%) and the average age at the time of diagnosis was 5.6 years old (0 - 17 years old).

#### Associated malformations

Five children (6.3%) had other congenital conditions associated with UTA. Symphyseal disjunction occurred in 2 children with bladder exstrophy, bifid clitoris in 2 children, and anorectal malformation with vaginal hypoplasia in one child.

#### Complications at the time of diagnosis

The main complications found were urinary tract infection in 9 children (4 *E. coli*, 3 *Klebsiella* and 2 *Candida albicans* infections), bladder stones in 3 children and renal failure in 2 children (serum creatinine 50 and 58 mg/L).

### 3.3. Therapeutic Aspects

Seventy-seven (96.2%) patients were treated including two patients with renal cystic dysplasia who were monitored and one patient died before surgery. Surgical treatment was performed in 62 cases (81.2%) depending on the disease; and 15 (17.5%) patients had instrumental treatment by destruction of the posterior urethral valves either by laminating or with Beniqué probe. The different types of surgeries performed are shown in **Table 3**.

**Table 1.** Ultrasound findings.

Ultrasound findings	Number	%
Bilateral uretero-hydronephrosis and fight bladder	13	54.2
Hydronephrosis with thinning of the cortex	5	21.1
Renal cyst	2	8.5
normal	4	16.4
Total	<b>24</b>	<b>100</b>

**Table 2.** Distribution of patients according to discharge diagnoses.

Discharge diagnoses	N	%
Hypospadias	47	58.7
Posterior urethral valves	16	20
Pyelo-ureteral junction syndrome	6	7.5
Bladder exstrophy	4	5.0
Epispadias	3	3.7
Cystic dysplasia	2	2.5
Ectopia of the ureteral meatus	1	1.3
Vesicoureteral reflux	1	1.3
Total	<b>80</b>	<b>100</b>

**Table 3.** Distribution of the workforce by type of surgery.

Type of surgery	Number	%
Urethroplasty*	50	64.9
<i>Resection of posterior urethral valves</i>	12	15.6
Pyeloplasty	6	7.8
Bladder plasty	4	5.2
Urethrostomy	2	2.6
Right nephrostomy	1	1.3
Right nephrectomy	1	1.3
Uretero-vesical reimplantation	1	1.3
<b>Total</b>	<b>77</b>	<b>100</b>

\*For hypospadias or epispadias repair.

### 3.4. Evolutionary Aspects

The mean length of hospitalization was 13.7 days  $\pm$  8.6 days (3 to 45 days).

The postoperative follow-up of patients was appreciated during hospitalization. Fifty-five (68.7%) patients had simple postoperative follow-up. Twenty patients (42.5%) who had surgery for hypospadias had fistula in the postoperative follow-up. Two (1.3%) patients had vesico-parietal fistula after bladder repair for bladder exstrophy, and we noted a case of severe sepsis (1.3%).

A 6-year-old patient with chronic renal failure with a bilateral mute kidney at the IVU complicating posterior urethral valves, died before the operation.

## 4. Discussion

As with any retrospective, descriptive and monocentric hospital study, we were limited in the collection of some data on the one hand and the results obtained cannot be extrapolated in general.

## 4.1. Epidemiological Aspects

In our study, UTA represent 1% of all admissions to the service. This frequency is lower than those observed in Conakry [9] with 4%. For Kahloul *et al.* [10], this rate is 3%, in a study conducted in a pediatric ward where admissions are higher than ours. Most authors agree that uropathies are frequent in boys like observed in our study [9] [10] [11]; it can be explained by the high frequency of malformations of the male urethra, especially hypospadias and epispadias.

The average age of children in our study is 6.1 years old (0 to 17 years old) at the time of diagnosis. This result is close to that reported by Asinobi *et al.* [6] in Nigeria while in western countries postnatal discovery is earlier, particularly with an average age of 11 months in Germany [12], 10.6 months in Poland [13]. This diagnostic delay in our hospital practice can be explained by the virtual absence of antenatal diagnosis on the one hand and by socio-cultural reasons on the other. While in developed countries, the antenatal screening rate for UTA is 60% to 70% [5] [14] from a routine obstetrical ultrasound; which allows early management of patients.

## 4.2. Diagnostics Aspects

### Circumstances of discovery

The majority of patients (66.2%) were admitted for external urologic malformation, including urethral meatus position abnormality, anterior abdominal wall defect, others for clinical manifestations such as dysuria or acute retention of urine, abdominal and/or lumbar pain, abdominal mass with lumbar contact. While others have been discovered by complications: urinary tract infection (11.2%), urolithiasis (3.7%), or even renal failure (2.5%). Urinary tract infection is the most commonly reported circumstance in the literature [2] [10]; indeed, the occurrence of urine infection which that is the age remains a mode of revelation very frequent. For Solomon [15], congenital abnormalities of the urinary tract are the leading cause of chronic renal failure in children.

### Hypospadias

Hypospadias is one of the most common congenital anomalies of the urethral spongiosum, the ventral prepuce and in more severe cases penile chordee. It is the most common urinary tract anomaly in our series with a mean age at the time of diagnosis of 67.2 months. While in developed countries, the average age at diagnosis varies from 16 to 24 months [16] [17] [18] [19]. This difference is related to several socio-cultural and economic factors in developing countries. Indeed, in developing countries, ignorance, poverty and traditional beliefs are diagnosis delay factors. The operative technique used was a function of the type of hypospadias and the habits of the surgeon. In clinical practice, many factors influence the choice of surgical technique, including “personal taste, upbringing, situational preference, training, experience and personal success” [20]. There are five sequential steps for the successful repair of hypospadias: penile straightening, urethroplasty, meatoplasty and glanuloplasty, scrotoplasty and skin cov-

erage. The major technical advances in hypospadias surgery that have improved surgical outcomes are preservation of the urethral plate, incision of the urethral plate, dorsal midline plication, epithelized urethroplasty dartos flap coverage, and two stage alternative techniques [21]. Fistula is the most common complication after urethroplasty [22]; in our study, we noted 42.5% of fistula after urethroplasty.

#### **Posterior urethral valves**

During our study, we found 16 cases in 10 years, with a hospital frequency of 1.6 cases/years. They constitute the second cause of UTA with 20% of cases. The incidence of posterior urethral valves is variously reported in the literature ranging from 1 to 4/1000 births [22] [23]. Urinary disorders such as dysuria or urine retention are constant [22] [23]. Ante-natal ultrasound allows the early management of this disease from birth [6]. Fogarty probe [24] is still the most commonly used technique in our hospital practice, although currently the standard treatment of the posterior urethral valves is endoscopic resection as soon as possible to avoid the occurrence complications [25] [26].

#### **Pyelo-ureteral junction syndrome**

In our series, it represents 7.6% of UTA; this rate is variable according to some authors, more important in developed countries especially in England with 38% [27] and lower in developing countries with 14% in Tunisia [10] and 3.2% in Mali [28]. This difference can be explained by the absence or insufficiency of antenatal diagnosis and by low health coverage in our countries where the diagnosis is generally suspected during abdominal mass or complications including urinary infections. [10] [28]. In our series, treatment consisted of conventional pyeloplasty using the Anderson-Hynes technique [29] in 2 patients and the 3rd had a total nephrectomy due to destruction of the renal parenchyma.

Bladder exstrophy accounts for 5% of UTA. This rate is identical to that found by N'diaye in Mali [30]. Initial treatment consisted of a plasty of the bladder, bladder neck, urethra and anterior abdominal wall associated with posterior iliac osteotomy; depending on the evolution, an enlargement can be proposed or a urinary derivation type Mitrofanoff [31].

Isolated epispadias with 3 cases remains a rare malformation; it was a penile continent epispadias in most cases and treated by urethroplasty [32].

Cystic dysplasia was diagnosed in 2 patients (2.5%) and their management consisted of clinical and ultrasound surveillance as recommended in the literature [33].

## **5. Conclusion**

Urinary tract anomalies are a group of relatively common diseases in children. In Congo, antenatal diagnosis is almost non-existent. This results in delay in management, the occurrence of complications, the most feared of which is renal failure. However, the majority of urinary tract anomalies consist of uncomplicated or less complicated forms with favorable prognosis and progression spontaneously or after surgical correction.

## Conflicts of Interest

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

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