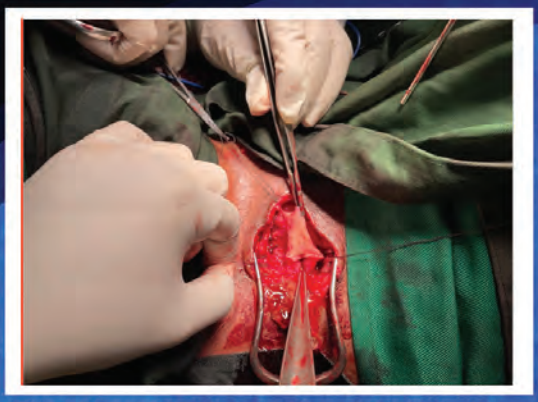
Volume 34 | Issue 2 | July-December, 2024

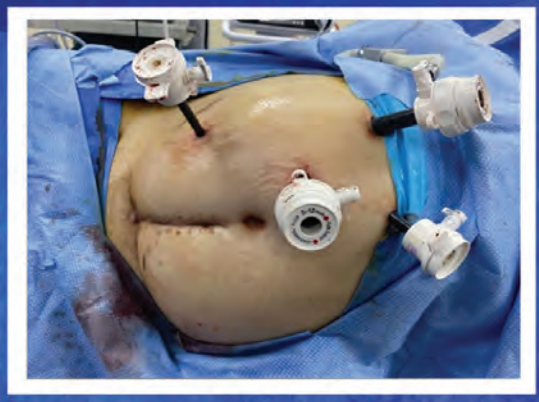
PJU Philippine Journal of UROLOGY

ISSN 0117-8962

www.pjuonline.com



Buccal graft laid dorsally and quilted to the corpora cavernosa



Trochar placement done for laparoscopic ureteral reimplantation

ISSUE HIGHLIGHTS

Official journal of the PUA Philippine Urological Association

Philippine Journal of Urology

VOLUME 34 NUMBER 2 JULY-DECEMBER, 2024

Contents

PJU

Philippine
Journal
of
Urology

The *Philippine Journal of Urology* is published semi-annually in two numbers per year in June and December, by the Philippine Urological Association, Inc. and printed by OVT-Graphic Line, 23A. Mabini St., Upper Plaza, West Rembo, Taguig City.

Editorial Board

EDITORIAL

The Evolution of Robotic Surgery in the Philippines: A Story of Resilience and Transformation

Jason L. Letran, MD, FPCS, FPUA

Robocare Surgery Center, Chinese General Hospital and Medical Center

Introduction

Robotic surgery has revolutionized modern surgical practice, providing enhanced three-dimensional vision, precision, and maneuverability that have redefined minimally invasive surgery (MIS) across multiple surgical disciplines.

This article recounts the evolution of robotic surgery in the Philippines, highlighting the barriers that needed to be overcome, including the initial skepticism and reluctance of both surgeons and patients alike, as well as the financial and institutional hurdles, leading the way to the groundbreaking inaugural procedure in 2010 and the current broader utilization across several surgical specialties. Today, the story of robotic surgery stands as a testament to its resilience in the face of challenges and a vision for forthcoming innovative medical procedures.

The future promises continued growth for robotic surgery in our country. The influx of newer platforms in the market will make this technology more accessible, affordable, and advanced, including the potential for telesurgery.

The Surgical Landscape Before 2010

Before 2010, minimally invasive surgery through laparoscopy had already transformed surgical practices in the Philippines, although traditional open procedures continued to play a significant role in the country's surgical community. Laparoscopy, however, came with its unique limitations: restricted maneuverability of the long non-articulated instruments, a two-dimensional operative view seen on flat screen monitors, and a counterintuitive instrument handling that demanded considerable dexterity and hand-eye coordination. Thus, it was met with resistance from surgeons who had difficulty adjusting to the technology.

In 1985, the first robot platform, the Programmable Universal Machine for Assembly 200 (PUMA), was used on a human patient to perform neurosurgical biopsies.[1] However, it was not until 1998, after several improvements in design, that Intuitive Surgical brought into human use the first system of what would be the most successful robotic surgery platform until today: the da Vinci Surgical Robotic System.[2]

The da Vinci Surgical Robotic System consists of three (3) components: an imaging system in the vision cart, a patient cart to which the robotic arms are attached, and a surgeon console that houses the central control of the surgical robot.

The imaging system offers a magnified three-dimensional view, with the camera movements under the surgeon's complete control. This eliminates the dependence on a surgical assistant to handle the camera, thus improving the stability and exposure of the surgical field. The fine instruments attached to the individual robotic arms of the side cart are articulated, with seven degrees of freedom that mimic the movements of the human wrist, to carry

out the surgical tasks. At the console, which can be a single or dual console system, two handles with finger slots controlled by the surgeon transmit the surgeon's movements scaled down to carry out the surgical tasks with unmatched precision. The dual console system allows for real-time simultaneous view, with either of the two surgeons taking control of the surgery at the discretion of the senior surgeon at the main console. The console had pedals to allow the use of energy sources, such as monopolar or bipolar cautery, for precision cutting and hemostasis. (Figure 1)

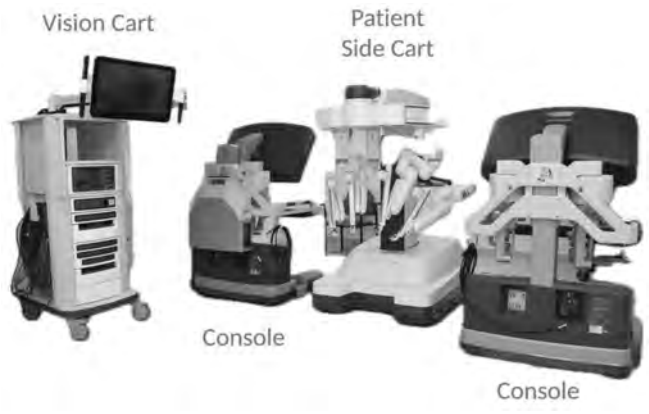


Figure 1. The da Vinci Xi Dual Console Robotic System.

Robotic-assisted surgery has been utilized widely in centers worldwide since the 2000s. Not wanting to be left behind, my personal journey to adapt the robotics technology for our country started around 2005. The vision was not only about harnessing new technology but about embracing what was best for the patients and pushing the boundaries of what was possible in surgery.

The Dream: Bringing Robotic Surgery to the Philippines

Driven by a commitment to excellence in surgery and a conviction that robotic surgery would eventually benefit Filipino patients, significant personal resources and time were invested in several training ventures. Each journey and training course was undertaken with the hope that one day, this technology would be available in our country.

As an expensive, locally untested technology promoted by a lone advocate, it's no surprise that hospitals initially responded with skepticism. However, persistence ultimately overcame this resistance.

The Breakthrough: The First Robotic Surgery in the Philippines

The Medical City eventually became the first local institution to embrace robotic technology by acquiring the da Vinci S robot. A fellow urologist completed robotic surgery training at that time, providing a like-minded ally's support.[a] On June 20, 2010, after years of advocacy and tireless pursuit, the first robotic-assisted laparoscopic radical prostatectomy in the Philippines was performed with him as the bedside assist.[3,4] It was the culmination of years of effort and perseverance, but more importantly, it signaled the beginning of a new surgical era in the Philippines.

Within months, St. Luke's Medical Center in Global City also acquired a newer robotic platform, the da Vinci Si, further solidifying the presence of this revolutionary technology in our country.

Initial Skepticism and Overcoming Resistance

The introduction of robotic surgery was initially met with skepticism. Barriers to acceptance among colleagues included legitimate concerns about the learning curve, the high cost of acquiring and maintaining the robotic system, and doubts about whether the benefits justified the investment. Similarly, patients who believed that a "robot" would perform or assist in the surgery also found robotic surgery unacceptable. However, the early adopters invested time in local and international training. Partnerships and collaborations with institutions of excellence abroad led to acquiring the necessary skills to perform robotic surgery and mentoring the next generation of robotic surgeons.

Early Successes in Robotic Surgery

The early successes in robotic-assisted surgeries among urologists helped build confidence in this technology among the other surgical specialties, particularly gynecology and general surgery. As awareness grew, so did governmental support. In 2019, the Philippine General Hospital (PGH) became

the first government institution to acquire a robotic system, significantly expanding access to lower-income patients and demonstrating the technology's viability in public healthcare.

Overcoming an Unexpected Challenge: The COVID-19 Pandemic

The COVID-19 pandemic in 2020 posed unprecedented healthcare challenges. Priorities shifted, and with resources redirected to urgent pandemic-related care, elective surgeries, especially robotic procedures, took a back seat, leading to a significant decline in robotic surgery volumes.

Resumption and Expansion of Robotic Surgery

As pandemic restrictions eased in 2021, robotic surgery programs saw a resurgence. That year, Intuitive Surgical lifted a brief moratorium on sales, enabling Chinese General Hospital and Medical Center to enter the field and launch its program in September 2022. This added competition to the market led to improved affordability due to price regulation among private institutions. Additionally, charitable programs and partnerships with non-governmental organizations provided financial assistance to needy patients, further broadening robotic surgery's reach.

Technological Upgrade and Continued Growth of Robotic Surgery

In May 2024, a significant upgrade in robotic technology occurred with the introduction of the da Vinci Xi system to the local market. With its introduction, several new hospitals ventured into robotic surgery, including Makati Medical Center, St. Luke's Medical Center in Quezon City, and soon, another government institution, the Southern Philippines Medical Center in Davao City. Chinese General Hospital and Medical Center even acquired the country's first dual-console robotic system, allowing collaboration between the two surgeons seated at the console in complex cases and enhancing training opportunities for the next generation of robotic surgeons. Furthermore, additional private and government hospitals are actively negotiating to obtain the new da Vinci Xi, potentially increasing competition.

Today, the Philippines is home to six (6) fully operational and one soon-to-start robotic surgery centers, all using the da Vinci platform, with eighty-eight (88) qualified robotic surgeons spanning the fields of urology, gynecology, general surgery, head and neck surgery, and thoracic-cardiovascular surgery. Since its inception, the field has grown substantially, with two thousand nine hundred ninety (2,990) successful robotic-assisted procedures performed from June 2010 to October 2024 (Figure 2). 5 Urology remains the dominant specialty, accounting for 55% of all cases, followed by gynecology at 33%, general surgery at 10%, and other specialties comprising the remaining 2% (Figure 3).[5]

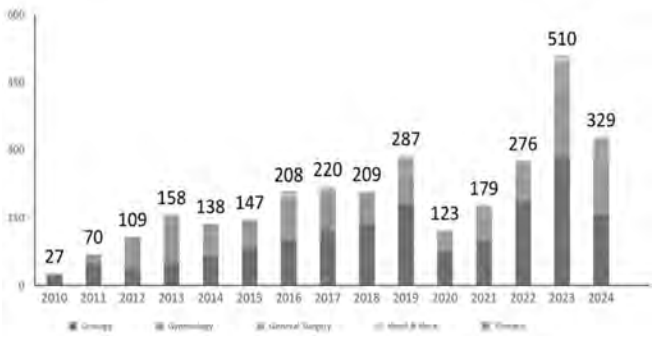


Figure 2. Philippine robotic procedure trend from June 2010 to October 2024 (n = 2,990).

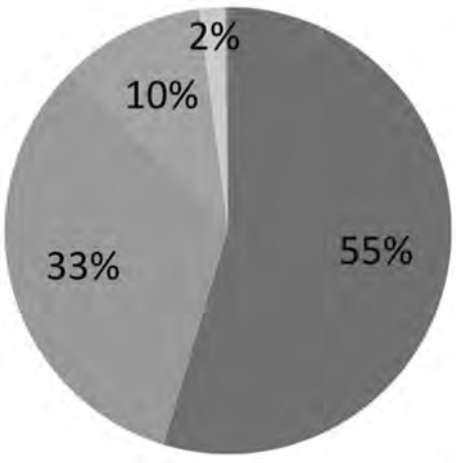


Figure 3. Philippine robotic procedure trend per specialty from June 2010 to February 2024 (n = 2,990).

With newer and more affordable robotic platforms entering the market, robotic surgery is here to stay. Ongoing training and education for Filipino surgeons will ensure a steady pool of skilled professionals, making robotic surgery a legitimate option in many surgical cases for years to come.

Conclusion: A Personal Reflection

The growth of robotic surgery in the Philippines is a testament to vision, resilience, and perseverance. Playing a role in introducing this technology and performing the country's first robotic surgery has been rewarding, especially with the realization that this progress has become a shared accomplishment. With seven (7) institutions offering robotic surgery, with more under negotiation, and eighty-eight (88) active robotic surgeons, with more still in training, a total of two thousand nine hundred ninety (2,990) robotic surgical cases completed by the robotic surgery community to date, and exponentially more to come, it is gratifying to reflect on the humble beginnings and progress achieved in the field. The ultimate goal remains clear as we look to the future: to make robotic surgery accessible to all patients, regardless of location or financial situation.

References

1. Kwoh YS, Hou J, Jonckheere EA, Hayati S. A robot with improved absolute positioning accuracy for CT guided stereotactic brain surgery. IEEE Trans Biomed Eng 1988;35(2):153-60.
2. Morrell ALG, Morrell-Junior AC, Morrell AG, Mendes JMF, Tustumi F, Gustavo L, Oliveira DE, Silva E, Morrell A. The history of robotic surgery and its evolution: when illusion becomes reality. Rev Col Bras Cir 2021 Jan 13:48:20202798.
3. The First Robotic-Assisted Surgery in the Philippines: An Oral History. Inquirer Health. June 22, 2010.
4. Intuitive Surgical. Data on File.
5. Device Technology: Data on File.

ORIGINAL RESEARCH

Exploring the Clinicopathological Characteristics of Testicular Cancer: A Study at the Southern Philippines Medical Center

Bryan B. Cagampang, MD and Jay-R R. Enojo, MD, FPUA, FPSUO

Department of Urology, Southern Philippines Medical Center, Davao City

Objective: To investigate the clinicopathologic profile of testicular cancer at the Southern Philippines Medical Center (SPMC) in Davao City from January 2017 to December 2022.
Methods: This is a retrospective study that analyzed data from a cohort of 33 patients using a combination of descriptive statistics and chi-square tests.
Results: The study revealed a mean patient age of 35 years, with the majority (82%) falling between 19 and 59 years. Cryptorchidism was associated with 9% of cases, and most tumors (55%) were located on the right side, with sizes between 3 and 10 cm (58%). The predominant symptom was a painless testicular mass (100%), underscoring the importance of self-examination. Pathologic stage distribution indicates a predominance of advanced stages, notably Stage IIIC at 24%. Germ cell tumors constitute 91% (52% seminoma, 39% non-seminoma), with no significant correlation between tumor stage at diagnosis and number of risk factors identified or body mass index (BMI). Symptom duration trends towards significance in association with advanced stages.
Conclusion: The study contributes to a comprehensive understanding of testicular cancer in the Philippines, aligning with global trends. It emphasizes the crucial role of early detection through self-examination and timely consultation. The prevalence of advanced stages highlights the imperative for heightened awareness and intervention.

Key words: testicular neoplasms, clinicopathologic profile, epidemiology, germ cell tumor

Introduction

Germ cell tumors, constituting 98% of testicular malignancies, exemplify a paradigm of treatable neoplasms.[1] Despite its rarity, the annual incidence of testicular cancer was found to have increased by a factor of 1.80 over a 25-year period, escalating from 37,231 cases in 1990 to 66,833 new cases in 2016.[2] In various cultures around the world, testicular cancer is currently the most common malignancy in young men, 15-34 years of age.[3] The regions with the highest incidence rates were Western and Northern Europe, while Asia and Africa exhibited the lowest rates. Paradoxically, despite the generally low incidence and the categorization of testicular cancer as a treatable neoplasm, Africa and Asia faced elevated death rates.[4] This observation points towards potential challenges linked to insufficient knowledge, inefficient detection methods, and restricted access to medical care and treatment. At present, there is a lack of research describing the clinicopathologic profile of testicular cancer in the Philippines.

In a comprehensive overview of testicular cancer in different geographical settings, Chalya et al. (2014) conducted a retrospective study in Tanzania spanning a decade, identifying 56 cases. With an average age of 28, patients predominantly presented with right-sided testicular swelling

(67.9%), and the majority had seminoma (62.2%). Inguinal orchidectomy emerged as the primary surgical intervention (77.4%), with adjuvant chemotherapy (11.1%) and radiation (7.4%) applied in select cases.[5] Similarly, Dusaud et al. (2015) investigated 341 cases of testicular cancer in a French military hospital from 1990 to 2011. The majority of patients sought medical attention following self-examination for testicular masses (47.1%). Non-seminomatous germ cell tumors prevailed, and no significant difference in 5-year survival rates was discerned between seminomas and non-seminomatous germ cell tumors.[6] Examining the scenario in Kashmir, India, Mustafa et al. (2017) conducted a review of 40 cases of testicular germ cell cancers over a 5-year period. The predominant histological type was also seminoma (65%), and testicular swelling was also the most common presenting symptom (65%). High inguinal orchiectomy was the prevailing surgical procedure, conducted in over 67% of cases.[7] These diverse studies collectively contribute to our understanding of the clinicopathological patterns and management strategies in different populations.

The main objective of the study was to determine the clinicopathologic profile of testicular cancer at Southern Philippines Medical Center (SPMC), Davao City, from January 2017 – December 2022. Understanding the clinicopathologic profile of patients in a specific region, is crucial for devising effective prevention, early detection, and treatment strategies. By comprehensively studying the cases at SPMC, this research can contribute to improving the overall health outcomes of individuals diagnosed with testicular cancer in the locality.

Methods

The study employed a descriptive retrospective document review to outline the clinicopathological profile of testicular cancer patients at the Southern Philippines Medical Center (SPMC), Davao City, Philippines, from January 2017 to December 2022. Conducted in the SPMC, a tertiary government hospital with a 1,500 bed-capacity, the focus was on all diagnosed testicular cancer patients. Data were extracted from the initial entry of qualified patients in the SPMC medical records section to avoid duplication.

Inclusion Criteria:

- Any age group
- Patients who underwent radical orchiectomy at SPMC
- Patients confirmed with a histopathological diagnosis of testicular cancer
- Patients who received medical/surgical care, including diagnosis, treatment, or follow-up at SPMC
- Patients for whom comprehensive clinicopathologic data, including tumor type, stage and histological details are available for analysis

Exclusion Criteria:

- Patients who did not undergo radical orchiectomy at SPMC
- Patients who have metastatic testicular involvement originating from other primary cancers
- Cases lacking essential clinicopathologic details necessary for comprehensive analysis

The independent variable in the study is the clinicodemographic profile of target patients, considering factors like age, congenital malformations, family history of testicular or other cancers, carcinoma in situ history, personal testicular cancer history, body mass index, tumor location and size, signs and symptoms, duration of symptoms, histologic type, and pathologic stage.

Main Outcome Measures

The following were the variables used in the study, described accordingly.

Age. This was presented as a mean age with the standard deviation of the chronological age of the patients at the time of diagnosis. Frequency and percentage were used to report data based on the following age groups: 0-18 years old, 19-59 years old, or 60 years old and above.

Associated congenital malformations. This referred to the presence or absence of congenital malformations diagnosed concurrent with testicular tumor,

specifically cryptorchidism and hypospadias (surgically treated or not). This was presented as frequency and percentage of the population.

Family history of testicular cancer. This referred to the presence or absence of any family history of testicular cancer up to the second degree relative. This was presented as frequency and percentage of the population.

Family history of other cancer(s). This referred to the presence or absence of any family history of cancer(s), other than testicular cancer up to the second degree relative. This was presented as frequency and percentage of the population.

History of carcinoma in situ of the testis. This referred to the presence or absence of a previous diagnosis of carcinoma in situ of the patient's testis (ipsilateral or contralateral). This was presented as frequency and percentage of the population.

Personal history of testicular cancer. This referred to the presence or absence of a previous patient's diagnosis of testicular cancer. This was presented as frequency and percentage of the population.

Body mass index. This described the general habitus of the patient, and in this study, it was described using frequency and percentage based on the following groups: underweight (<18.5), normal (18.5 – 24.9), overweight (25 – 29.9), Obese Class I (30.0 – 34.9), Class II (35 – 39.9), or Class III (≥40).

Location of tumor. This referred to the laterality of the testicular tumor whether right, left or bilateral. This was presented as frequency and percentage of the population.

Tumor size. This referred to the widest dimension of the tumor: ≤ 3cm, > 3cm to 10cm, or ≤ 10cm. This was presented as frequency and percentage of the population.

Signs and symptoms presented. This was presented as the frequency and percentage of the total population and included the following signs and symptoms: painless testicular mass either by self-examination or systematic examination by a physician, acute testicular pain, chronic/episodic testicular pain, gynecomastia, infertility, weight loss, and abdominal/flank pain.

Duration of symptoms prior to consultation. This pertained to the time duration from symptom onset up to the time of initial consultation: <1 month, 1 to 3 months, 3 to 6 months, 6 months to 1 year or more than 1 year. This was presented as frequency and percentage of the population.

Histologic type. This was presented as the frequency and percentage of the total population and included the following types of testicular cancer: 1) Germ Cell Tumor: Seminoma, 2) Germ Cell Tumor: Non-Seminoma, 3) Spermatocytic Seminoma and 4) Non-Germ Cell Tumor.

Pathologic stage. In the context of this study, denoted the specific staging level determined through comprehensive evaluation of the official histopathologic findings post-radical orchiectomy, coupled with a thorough metastatic work-up which included the following: Stage IA, IB, IS, IIA, IIB, IIC, IIIA, IIIB, and IIIC. This was presented as frequency and percentage of the population.

Sample Size Computation

A total enumeration of patients with testicular cancer who met the specified inclusion and exclusion criteria, from January 2017 to December 2022 at SPMC was included in the study. To determine the minimum sample size for this study, the investigator used the following assumptions and the sample size calculation for proportions found in Open Source Epidemiologic Statistics for Public Health (OpenEpi):

1. Based on the charts, there were approximately 40 records of patients with testicular cancer from January 2017 to December 2022 at SPMC
2. The confidence interval was set at 90%.
3. The prevalence of those who have tumor size greater than 3cm is at least 50%, the default value in our calculation.

The minimum sample size for this study was 30.

Data Handling and Analysis

Frequencies and percentages were used to describe categorical click demographic variables. Mean and standard deviation were used to summarize continuous clinicodemographic variables. The prevalence of the different types of testicular cancer as well as its pathologic stages at diagnosis were reported as frequencies and percentages. Correlation analysis using chi-square test was employed to investigate the relationship between pathologic stage at diagnosis and the following clinical factors: 1) number of risk factors identified; 2) body mass index (BMI); and 3) consultation delay or the duration of symptoms prior to first consultation. All statistical analyses used a 0.05 level of significance.

Ethics Review

The researchers obtained approval from both the Davao Center for Health Development Joint Research Ethics Committee (DCHD JREC) and the SPMC Department of Urology, including the consultant in charge.

Results

The study examined the clinicopathologic characteristics of 33 testicular cancer patients at the Southern Philippines Medical Center (SPMC) from January 2017 to December 2022. As presented in Table 1, the mean age of patients diagnosed with testicular cancer at SPMC was 35.39 years ± 13.83. The majority of cases (82%) fell within the age range of 19 to 59 years, with a noteworthy representation of older individuals at 15% for those aged 60 and above. Pediatric cases (0-18 years old) accounted for only 3% of the total.

The association between testicular cancer and cryptorchidism (not surgically treated) was noted in 9% of cases, underscoring the significance of considering congenital factors in the pathogenesis of testicular cancer. Surprisingly, there was an absence of a family history of testicular cancer or other cancers, as well as a history of carcinoma in situ of the testis in the studied cohort. Personal history of testicular cancer was observed in only 9% of cases (3 out of 33).

Table 1. Clinicodemographic profile of patients with testicular cancer.

Characteristics	Values
Age	35.39 ± 13.83
0 to 18 years old	1 (3%)
19 to 59 years old	27 (82%)
60 years old and above	5 (15%)
Associated Congenital Malformation	
Cryptorchidism (surgically treated)	0 (0%)
Cryptorchidism (not surgically treated)	3 (9%)
Hypospadias (surgically treated)	0 (0%)
Hypospadias (not surgically treated)	0 (0%)
None	30 (91%)
Family History of Testicular Cancer	
With History	0 (0%)
Without History	33 (100%)
Family History of Other Cancer(s)	
With History	0 (0%)
Without History	33 (100%)
History of Carcinoma in Situ of the Testicle	
With History	0 (0%)
Without History	33 (100%)
Personal History of Testicular Cancer	
With History	3 (9%)
Without History	30 (91%)
Body Mass Index	
Underweight (<18.5)	5 (15%)
Normal (18.5-24.9)	19 (58%)
Overweight (25.0-29.9)	6 (18%)
Obese I (30.0-34.9)	2 (6%)
Obese II (35.0-39.9)	1 (3%)
Obese III (≥40)	0 (0%)
Location of Tumor	
Right	18 (55%)
Left	14 (42%)
Bilateral	1 (3%)
Size of Tumor	
≤ 3cm	3 (9%)
> 3cm to 10cm	19 (58%)
> 10cm	11 (33%)
Duration of Symptoms Prior to First Consultation	
<1 month	2 (6%)
1 to 3 months	6 (18%)
3 to 6 months	2 (6%)
6 months to 1 year	12 (36%)
more than 1 year	11 (33%)

Examining the distribution of tumor location revealed a slightly higher incidence on the right side (55%) compared to the left (42%), with bilateral cases being minimal (3%). This corresponded with findings in existing literatures, which frequently report a higher prevalence of tumor occurrence in the right testicle. Tumor size analysis revealed that 58% of cases exhibited tumors ranging from three to 10 cm, 33% had tumors exceeding 10 cm, and only 9% presented with tumors smaller than 3cm. The analysis of the timeframe during which individuals experienced symptoms before seeking medical consultation indicated that 6% sought consultation within the first month of symptom onset, 18% had their initial consultation between one and three months, 36% of patients presented after six months, while 33% waited for over a year before seeking medical advice.

Table 2 shows a comprehensive overview of the diverse manifestations observed within the study population. The ubiquitous and primary symptom reported across all cases is a painless testicular mass with 100% prevalence. While a painless testicular mass stands out as the predominant presentation, a small percentage (3%) of cases manifested acute testicular pain. Moreover, a noteworthy proportion (21%) experienced chronic or episodic testicular pain. Remarkably, none of the patients in the study presented with gynecomastia nor infertility, suggesting that these specific manifestations might not be prevalent in this particular cohort. Weight loss, reported in 12% of cases, and abdominal/flank pain, observed in 21% of cases, have drawn attention to the systemic impact of testicular cancer.

Table 2. Signs and symptoms of testicular cancer.

Signs and Symptoms	Values
Painless testicular mass	33 (100%)
Acute testicular pain	1 (3%)
Chronic/episodic testicular pain	7 (21%)
Gynecomastia	0 (0%)
Infertility	0 (0%)
Weight loss	4 (12%)
Abdominal/flank pain	7 (21%)

Table 3 displayed a detailed breakdown of the pathologic stage and histologic type of testicular cancer at SPMC. The distribution across pathologic stages revealed a diverse landscape, with the majority falling within advanced stages. Stage III constituted the highest percentage at 39% followed by Stage I at 33% and Stage II at 27%.

Table 3. Pathologic stage and histologic type of testicular cancer.

Characteristics	Values
Pathologic Stage	
Stage IA	5 (15%)
Stage IB	6 (18%)
Stage IS	0 (0%)
Stage IIA	2 (6%)
Stage IIB	1 (3%)
Stage IIC	6 (18%)
Stage IIIA	3 (9%)
Stage IIIB	2 (6%)
Stage IIIC	8 (24%)
Histologic Type	
Germ Cell Tumor: Seminoma	17 (52%)
Germ Cell Tumor: Non-seminoma	13 (39%)
Embryonal	3 (9%)
Yolk Sac Tumor	5 (15%)
Teratoma	4 (12%)
Choriocarcinoma	1 (3%)
Spermatocytic Seminoma	2 (6%)
Non-Germ Cell Tumor	1 (3%)

The histologic analysis underscored the prevalence of germ cell tumors, constituting the majority (91%) of cases. Among these, seminoma (52%) and non-seminoma (39%) were the predominant subtypes. Among the non-seminomatous GCT, the most common subtype was yolk sac tumor (15%), followed by teratoma (12%), embryonal carcinoma (9%), and choriocarcinoma (3%). In 6% of cases, biopsy revealed a spermatocytic seminoma and only one of 33 (3% of the study population) had non-germ cell histology, specifically, lymphoma.

Table 4 shows a comprehensive overview of the correlation between clinical factors and tumor

stage at the time of diagnosis using chi square analysis, shedding light on the influence of several key clinical variables. The distribution of tumor stages did not reveal a significant correlation with the number of identified risk factors (p=0.753). Among individuals with no risk factors, 91% were diagnosed at Stage I, 89% at Stage II, and 77% at Stage III. Only one out of the 33 cases had two or more identifiable risk factors and was diagnosed with a Stage III tumor.

An examination of the relationship between BMI and tumor stage through chi-square analysis yielded no statistically significant association (p = 0.567). Various BMI categories exhibited diverse proportions across tumor stages, with no discernible trend of correlation.

The duration of symptoms before the initial consultation did not significantly correlate with tumor stage at the time of diagnosis (p=0.105). However, there was a noticeable trend towards significance. Patients seeking medical attention within the first month or within 1 to 3 months of symptom onset tend to receive an earlier-stage diagnosis, while individuals with symptoms lasting

Table 4. Correlation of clinical factors with tumor stage at diagnosis.

Clinical Factors	Stages			*p-value*
	I	**II**	**III**	
Number of Risk Factors Identified				
None	10 (91%)	8 (89%)	10 (77%)	
One	1 (9%)	1 (11%)	2 (15%)	0.753
Two or more	0 (0%)	0 (0%)	1 (8%)	
Body Mass Index				
Underweight (<18.5)	2 (18%)	2 (22%)	1 (8%)	
Normal (18.5-24.9)	5 (45%)	6 (67%)	8 (62%)	
Overweight (25-29.9)	3 (27%)	0 (0%)	3 (23%)	0.567
Obese Class I (30.0-34.9)	0 (0%)	1 (11%)	1 (8%)	
Obese Class II (35-39.9)	1 (9%)	0 (0%)	0 (0%)	
Obese Class III (≥40)	0 (0%)	0 (0%)	0 (0%)	
Duration of Symptoms Prior to First Consultation				
<1 month	1 (9%)	0 (0%)	1 (8%)	
1 to 3 months	5 (45%)	0 (0%)	1 (8%)	
3 to 6 months	0 (0%)	0 (0%)	2 (15%)	0.105
6 months to 1 year	2 (18%)	5 (56%)	5 (38%)	
more than 1 year	3 (27%)	4 (44%)	4 (31%)	

6 months to 1 year or more than 1 year were more likely to be diagnosed at advanced stages.

Discussion

The clinicopathologic profile of testicular cancer at SPMC was analyzed, revealing trends that aligned with global patterns. Testicular cancer predominantly affected the young and middle-aged population (19-59 years old), consistent with established epidemiological trends. Examination of tumor sizes indicated a notable percentage of cases with tumors ranging from three to 10 cm (58%), followed by tumors exceeding 10 cm (33%). This implied a potential delay in seeking medical attention, as larger tumors may have been associated with prolonged symptom duration.

Examining the time frame during which individuals experienced symptoms before seeking medical consultation yielded valuable insights into patient awareness and healthcare-seeking behavior. The data revealed that a significant number of patients delayed seeking consultation, with 36% presenting after six months, and 33% waiting for over a year before seeking medical advice. Only 6% of cases displayed a sense of urgency, seeking consultation within the first month of symptom onset.

The primary symptom reported across all cases was a painless testicular mass, emphasizing the critical role of self-examination and early detection. Patients displayed diverse symptoms, with some experiencing acute pain and others reporting chronic or episodic testicular pain. This variability in symptomatology underscored the importance of comprehending both acute and chronic pain patterns during clinical assessments in the context of testicular cancer. Systemic symptoms reported, including weight loss and abdominal/flank pain, may have served as indicators of advanced disease stages, emphasizing the necessity of addressing the holistic well-being of patients beyond localized manifestations. This broader perspective was crucial for comprehensive patient care, ensuring that the clinical focus extended to encompass the systemic implications of testicular cancer.

The distribution across pathologic stages revealed a diverse landscape of testicular cancer presentations. Notably, the majority of cases fell within the advanced stages, with Stage III constituting the highest percentage at 39%. This highlighted a potential trend of delayed diagnosis or presentation at more advanced disease stages. Understanding the pathologic stage distribution was essential for prognosis determination and treatment planning, emphasizing the need for increased awareness campaigns to promote early detection and intervention. Seminoma emerged as the predominant subtype, aligning with established epidemiologic trends. The coexistence of diverse subtypes underscored the imperative for customized treatment approaches, emphasizing the pivotal role of precise histologic classification in ensuring optimal patient management.

The distribution of tumor stages did not reveal a significant correlation with the number of identified risk factors ($p=0.753$). This finding implied that the presence of multiple risk factors may not have been a decisive factor in predicting the progression of testicular cancer at the time of diagnosis in this specific population. Similarly, there was no significant association between tumor stage and BMI. The absence of a substantial correlation between these factors in this dataset suggested that BMI alone may not have served as a robust predictor of advanced cancer at the time of diagnosis. This finding aligned with a 2015 study by Markt et al, which conducted a retrospective review of 960 germ cell tumors in patients treated at the Dana-Farber Cancer Institute (DFCI) between 1997 and 2012, revealing no association between BMI and tumor characteristics at baseline.[8] Another study by McGregor et al in 2019, analyzing 1161 electronic medical records from the same institution (DFCI) during the same period, found that lower BMI was linked to adverse prognostic variables at presentation according to the International Germ Cell Consensus Classification (IGCCC) risk groups for metastatic GCT. However, this association was not observed in terms of relapse. The study indicated that, in the metastatic disease setting, men with a BMI less than 25 kg/m^2 were less likely to present with good-risk disease, and overall, men with lower BMI were more likely to present with intermediate-risk or poor-risk GCT.[9] It was crucial to consider other potential confounding factors or interactions between BMI and unexplored variables in this analysis.

Duration of diagnosis delay was an issue that still retained its importance for testicular tumors. According to Gercek et al (2023), delayed diagnosis not only resulted in an increase in tumor size but also adversely impacted tumor stage and prognostic factors. The correlation analysis conducted by Gercek et al found a positive association between the duration of diagnostic delay and radiological and pathological tumor size, the rate of detecting retroperitoneal lymphadenopathies, and the N stage.[10] In contrast to this study, the duration of symptoms before the initial consultation did not exhibit a significant correlation with tumor stage at the time of diagnosis as presented in Table 4. However, there was a noticeable trend towards significance for the duration of symptoms before consultation (p=0.105). Patients who sought medical attention within the first month or within 1 to 3 months of symptom onset tended to receive an earlier-stage diagnosis. Conversely, individuals with symptoms lasting 6 months to 1 year or more than 1 year were more likely to be diagnosed at advanced stages. This underscored the critical role of timely medical consultation in the early detection and diagnosis of testicular cancer. A systematic review conducted by Clarke and Williams (2022), covering 15 articles between 1996 and 2020, identified various modifiable factors contributing to diagnostic delay, including lack of awareness, patient embarrassment, misdiagnosis, and delays in referrals for ultrasound scans.[11]

This study acknowledged limitations that may have affected its generalizability and reliability. These included potential selection bias due to the exclusive focus on SPMC patients, a small sample size, and a single-center design, limiting broader applicability and statistical power. The retrospective design may have introduced incomplete or inaccurate information and recall bias. Furthermore, the analysis incompletely addressed the impact of socioeconomic and cultural factors, and the study lacked exploration of genetic or molecular factors. Recognizing these limitations was crucial for accurate interpretation.

Recommendations for future research shall involve targeted awareness campaigns to promote early detection. To enhance generalizability, future studies should diversify the study population beyond SPMC, consider a larger sample size, and adopt a multicenter approach. Prospective study designs are encouraged to minimize retrospective limitations. Additionally, prioritizing comprehensive exploration of socioeconomic, cultural factors, and genetic/molecular aspects are essential to advance understanding and guide effective interventions in testicular cancer clinicopathology.

Conclusion

In summary, this retrospective chart review at SPMC yielded a comprehensive insight into the clinicopathologic features of testicular cancer patients in the locality. The results mirrored global patterns, underscoring the predominance of this cancer among individuals aged 35 years on average, with a notable correlation with cryptorchidism. The diverse distribution of tumor sizes, predominantly falling between three and 10 cm, and the right testicle as the primary location further characterized the cohort. The prevailing histologic type was seminomatous germ cell tumors.

This study emphasized the critical role of prompt medical consultation in early detection, especially given that a substantial proportion of patients—over 60%—deferred seeking medical advice for more than six months after symptom onset. Examining symptoms revealed a prevalent presentation of a painless testicular mass, accentuating the significance of self-examination for early identification.

The distribution of pathologic stages underscored a prevalence of advanced stages, particularly Stage III, implying potential patterns of delayed diagnosis. Although no statistically significant associations emerged for the number of identified risk factors and BMI, the trend approaching significance in the relationship between duration of consultation delay with tumor stage at diagnosis suggested that this aspect warranted further exploration in a larger-scale study.

Acknowledgements

The authors express their gratitude to Dr. Manuel Belisario and Prof. Roel Ceballos for their significant contributions to this research.

References

1. Partin AW, Dmorchowski RR, Kavoussi LR, Peters CA. Neoplasms of the testis. In: Campbell-Walsh-Wein Urology. 12th ed. Canada: Elsevier, Inc.; 2021. p. 2411–2447.
2. Wang SC, Chang NW, Chen WJ, et al. Trends of testicular cancer mortality-to-incidence ratios in relation to health expenditure: an ecological study of 54 countries. Int J Environ Res Public Health [Internet]. 2021 [cited 2023 Jan 18];18:1546. Available from: https://www.mdpi.com/journal/ijerph. DOI: https://doi.org/10.3390/ijerph18041546.
3. Manecksha RP, Fitzpatrick J. Epidemiology of testicular cancer. BJU Int [Internet]. 2009 [cited 2023 Jan 20];104:1329–33. Available from: https://pubmed.ncbi.nlm.nih.gov/19840008/. DOI:10.1111/j.1464-410X.2009.08854.x.
4. Park JS, Kim J, Elghiaty A, Ham WS. Recent global trends in testicular cancer incidence and mortality. Medicine (Baltimore) [Internet]. 2018 Sep [cited 2023 Jan 18]; 97(37):12390. DOI: 10.1097/MD.0000000000012390
5. Chalya PL, Samson S, Rambau PF. Ten-year experience with testicular cancer at a tertiary care hospital in a resource-limited setting: a single centre experience in Tanzania. World J Surg Oncol [Internet]. 2014 [cited 2023 Jan 18];12:356. Available from: http://www.wjso.com/content/12/1/356. DOI: doi:10.1186/1477-7819-12-356.
6. Dusaud M, Durand X, Desfemmes FR, et al. A 20-year epidemiological review of testis cancer at a French Military Hospital. Military Medicine [Internet]. 2015 Nov [cited 2023 Jan 18]; 180(11):1184. Available from: https://academic.oup.com/milmed/article/180/11/1184/4160602. DOI:10.7205/MILMED-D-14-00604.
7. Mustafa SA, Mitla V, Banday SZ, Kuchay S. Profile of testicular germ cell tumors in Kashmir: a retrospective analysis. Int J Sci Study [Internet]. 2017 Jul [cited 2023 Jan 18]; 5(4):183-6. Available from: http://www.ijss-sn.com/uploads/2/0/1/5/20153321/ijss_july_oa39_-_2017.pdf. DOI:10.17354/ijss/2017/361.
8. Markt SC, Miller R, O'Donnel E, et al. BMI at diagnosis and adverse outcomes among men with malignant testicular germ cell tumors. J Clin Oncol [Internet]. 2015 Mar 1 [cited 2023 Nov 30]; 33(7). Available from: https://ascopubs.org /doi/10.1200/jco.2015.33.7_suppl.400. DOI:10.1200/jco.2015.33.7_suppl.400.
9. McGregor BA, Miller RE, O'Donnel E, et al. Body mass index and outcomes in germ cell tumors. Clin Genitourin Cancer [Internet]. 2019 August [cited 2023 Nov 30];17(4):283-90. Available from: https://www.sciencedirect.com/science /article/abs/pii/S1558767319301387. DOI:10.1016/j.clgc.2019.04.012.
10. Gercek O, Topal K, Yildiz AK, Yazar VM. The effect of diagnosis delay in testis cancer on tumor size, tumor stage and tumor markers. Actas Urol Esp [Internet]. 2023 Nov 18 [cited 2023 Dec 5]; 47(10):132-4. Available from: https://pubmed.ncbi.nlm.nih.gov/37981168/. DOI:10.1016/j.acuro.2023.09.004.
11. Clarke R, Williams T. Factors impacting the delay in diagnosis and treatment of testicular cancer: a systematic review. J Health Des [Internet]. 2022 [cited 2023 Dec 5]; 7(2):465-85. Available from: https://www.journalofhealthdesign.com/JHD/article/view/164. DOI:10.21853/JHD.2022.164.

ORIGINAL RESEARCH

Efficacy of Single Dose Intravenous Antibiotic Prophylaxis for the Prevention of Postoperative Systemic Inflammatory Response Syndrome in Patients Undergoing Percutaneous Nephrolithotomy: A Randomized Controlled Study

Edward S. Uy Magadia, MD and Hermenegildo Jose B. Zialcita, MD, FPUA

Department of Urology, National Kidney and Transplant Institute

Introduction: Despite universal agreement on the application of antimicrobial prophylaxis, the optimum administration period of antibiotics for percutaneous nephrolithotomy (PCNL) remains controversial and the risk for antimicrobial resistance due to prolonged antibiotic use as well as financial burden that may prove to be challenging for both the patient and the physician. This study therefore aims to determine the safety and effectiveness of a single dose antibiotic prophylaxis in patients undergoing PCNL.

Methods: A randomized controlled trial was conducted in PCNL patients between 2021-2023. The patients were randomly assigned to three groups: single dose prophylaxis 30 minutes before surgery arm (Group A), 30 minutes before and 12 hours after surgery arm (Group B), and continued antibiotics until removal of nephrostomy tube arm (Group C), respectively.

Results: A total of 81 patients were included (Group A=27, Group B=28, and Group C=26). The rate of comorbidities did not differ significantly in the three groups: HTN (p=0.166), DM (p=0.121), and Others (p=0.405). The presence of hydronephrosis was seen in 70.4% of patients. About half had solitary stone type (54.3%) and had left area affected (51.8%). Also, 14.8% had history of UTI. The patient groups did not differ in clinical and operative characteristics (all p>0.05) except in history of previous stone surgeries. Significantly more patients had previous history of stone surgeries in Group A (37.0%) than in Group B (3.6%) and Group C (15.4%) (p=0.006). The following proportion of no growth in preoperative urine culture was observed: Group A (92.6%), Group B (89.3%), and Group C (80.8%) (p=0.174). The estimated blood loss was significantly lower in Group A (130.7ml) than in Group B (235.7ml) and Group C (261.5ml) (p=0.032). Significantly less patients in Group A were free from stone (74.1%) compared to Group B (92.9%) and Group C (96.2%) (p=0.030). After surgery, only two patients (2.5%) had criteria consistent with SIRS and both belonged in Group C. No significant difference in incidence of SIRS was observed among the three groups (p=0.067).

Conclusion: Single dose antibiotic prophylaxis for the prevention of post-operative bacterial infection in patients undergoing PCNL is as effective as multiple dose antibiotic prophylaxis. Consistent with existing guidelines on PCNL, single dose antibiotic prophylaxis is highly recommended as it is more cost-effective and may lower the risk for antibiotic resistance in the future. More RCTs with larger sample size which can determine the effectiveness of single dose antibiotic prophylaxis in patients at high-risk for post-operative PCNL infections are recommended.

Key words: Percutaneous nephrolithotomy prophylactic antibiotic regimen, Systemic Inflammatory Response Syndrome

Introduction

Percutaneous Nephrolithotomy (PCNL) is widely used in the surgical treatment of patients with kidney stones larger than 2 cm in diameter with success rates exceeding 90%.[1,2] Although PCNL is preferred because of its minimally invasive nature, minor and major complications are reported in up to 83% of cases. The postoperative complications of PCNL include bleeding, infection, urine leakage, and residual pain. Infectious complications are among the most common.[1] The signs of infections, including fever (21-74%), transient bacteremia (20-35%), systemic inflammatory response syndrome (SIRS; 23.4- 29.0%), and bacteriuria (10-37%), are reported more commonly, sepsis rates have been reported to vary from 0.25 to 1.5%. Because of high infectious complication rates, antibiotic prophylaxis is highly recommended.[2,3]

Percutaneous nephrolithotomy (PCNL) involves the opening or manipulating of the upper urinary tract and thus is categorized as a ''clean-contaminated'' complex endourologic surgical procedure.[4] Both European Association of Urology (EAU) and American Urological Association (AUA) guidelines recommend antibiotic prophylaxis for PCNL.[1] Despite universal agreement on the application of antimicrobial prophylaxis, the optimum administration period of antibiotics for PCNL remains controversial and the risk for antimicrobial resistance due to prolonged antibiotic use as well as financial burden that may prove to be challenging for both the patient and the physician.

The study aimed to determine the safety and effectiveness of a single dose antibiotic prophylaxis for the prevention of developing post-operative bacterial infection in patients undergoing PCNL.

Methods

Research Design

Double-Blind, Prospective, Three arm, Randomized Controlled Study

Patient Selection

A total of 81 patients underwent PCNL for renal calculi between 2021 to 2023 were included. The exclusion criteria are as follows: 1) significant preoperative bacteriuria or a positive urine culture, a significant bacteruria will be considered if count is $\geq 10^5$ cfu/ml, 2) indwelling catheter (Double J Stents, Nephrostomy Catheters, Urethral Catheters), 3) prior history of infectious stones, 4) allergy to preoperative antibiotics, 5) presence of purulent urine from the access needle, 6) significant comorbidities that would predispose to SIRS (chronic renal failure, uncontrolled diabetes mellitus, severe heart failure, recent onset myocardial infarction or stroke, hepatic or hematologic diseases, etc.), 7) patients aged less than 18 years old and 8) refusal to enroll in the study. This study was approved by the Institutional Review Board of the National Kidney and Transplant Institute (NKTIREC 2021-04) and informed consent was obtained from all patients on the day they were hospitalized for surgery.

Randomization

Patients who underwent PCNL received Ceftriaxone in three different regimens based on the mentioned arms and were selected using simple random sampling technique by computer-generated random numbers. A computer-generated random numbers 0-15 was used to assign the treatment, Group A was assigned to numbers multiple of 3, Group B was assigned to even numbers that is not a multiple of 3 (0 is regarded as even) and Group C was assigned to odd numbers not multiple of 3. Blocking design was used to ensure the equal allocation of treatment. Consecutive sampling was done until the minimum sample size in all groups is met.

Perioperative Assessment

The approximate stone surface area was calculated from the length, width and height of the stone in terms of centimeters (cm) using plain computed tomography (CT) of the kidneys, ureters, and bladder. Stones were classified as solitary (isolated pelvic or calyceal) or multiple (stone in more than one calyceal system, partial or complete staghorn stones). Stone complexity was computed using the Guy's Stone Complexity Scoring.

Preoperatively, all patients underwent laboratory tests including complete blood cell count, blood chemistry, serum creatinine measurement, bleeding and coagulation profile, and urine cultures were performed in all patients. Patients with positive urine cultures were treated accordingly until sterile urine was obtained. Perioperative urine samples were obtained for culturing. SIRS criteria is defined as, namely tachycardia (heart rate >90 beats/min), tachypnea (respiratory rate >20 breaths/min) or arterial carbon dioxide tension ($PaCO_2$) lower than 32 mm Hg, fever or hypothermia (temperature >38 or <36°C), and leukocytosis, leukopenia or bandemia (white blood cells >1,200/mm^3, <4,000/mm^3 or bandemia ≥10%).[5]

Intervention

The patients were randomly assigned to three groups according to the regimen of antibiotic used single dose prophylaxis 30 minutes before surgery (Group A), 30 minutes before and 12 hours after surgery (Group B), and continued antibiotics until removal of nephrostomy tube (Group C), respectively.

Surgical Procedure

The surgery started when patient was inducted under general anesthesia. A ureteral catheter under C-arm fluoroscopy was placed cystoscopically at the beginning of each procedure. Approach was either standard prone or supine position. After a percutaneous access was established, serial dilation of the nephrostomy tract carried up sizes up to 30 Fr under fluoroscopic guidance to insert a 24 Fr Nephroscope. Lithoclast (pneumatic, ultrasonic or laser) was used for stone fragmentation and some stones were retrieved with stone forceps. A double J stent and a nephrostomy catheter (size is upon surgeon's preference) was placed at the end of the operation. Number of access, operative time, and other auxiliary procedures were recorded.

Post-operative follow up

Vital signs were monitored postoperatively every 1 hour then every 4 hours once transferred back to the room from Post Anesthesia Care Unit (PACU). Transfusion performed, infection related events and hospitalization time were documented. Complete blood cell count and serum creatinine measurement were performed for all patients during the hospitalization period. The nephrostomy tube inserted intraoperatively was kept for up to 48 hours, then clamped and subsequently removed, unless a complication occurred necessitating an extended period of drainage. Presence of SIRS criteria was monitored for all patients. Blood and urine cultures were obtained for patients with fever >38.5°C. Patients with positive SIRS criteria and clinical suspicion of urosepsis were managed accordingly. Oral antibiotics were not prescribed upon discharge.

Statistical Analysis

All demographic and clinical characteristics were summarized using mean and standard deviation for continuous variables, frequency and percentage for categorical variables to describe patient profile. Chi-square analysis was used to compare urine culture positivity and SIRS incidence among the 3 groups. ANOVA and chi square were used to compare intra-operative and post-operative characteristics among the 3 groups.

Stata 14 was used for data analysis and p-value<0.05 was considered statistically significant

Ethical Considerations

The protocol of this study adheres to the ethical considerations and ethical principles set out in relevant guidelines, including the Declaration of Helsinki, WHO guidelines, International Conference on Harmonization-Good Clinical Practice, Data Privacy Act of 2012, and National Ethics Guidelines for Health Research 2017.

Conflicts of Interest

No potential conflicts of interest have been identified. The principal investigators and co-investigators had nothing to disclose.

Data Safety, Privacy and Confidentiality

Subject information was kept secured, with access available only to members of the research team. Computerized study information was stored

on a secured network with password access. All identifiable information and data were given a code number. A master list linking the code number and subject identity was kept separately from the research data. Only members of the research team will have access to the list. The research records shall be stored for at least 5 years following completion of the study. Individually identifiable research data shall not be shared with other individuals outside of the research and analysis team.

The investigator and all key personnel have completed the Good Clinical Practice (GCP) training on the responsible conduct of research with human data. Monitoring and reporting of adverse events were the responsibility of the primary investigator. Data monitoring included the proper attainment of informed consent and monitoring of adverse events. This information was reviewed on throughout the study.

Results

A total of 81 patients were included (Group A=27, Group B=28, and Group C=26). The mean age of the participants was 27.0 years old and majority were males (65.4%). The mean stone size was 3.0 cm^2. Significantly, more patients had previous history of stone surgeries in Group A (37.0%) than in Group B (3.6%) and Group C (15.4%) (p=0.006). The rate of comorbidities did not differ significantly in the three groups: HTN (p=0.166), DM (p=0.121), and Others (p=0.405). The presence of hydronephrosis was seen in 70.4% of patients. About half had solitary stone type (54.3%) and affected left area (51.8%). The mean stone opacity was 1040 and 14.8% had history of UTI. The mean preoperative white blood cell was 7.5. The mean creatinine was 1.07 and mean hemoglobin was 13.6. The patient groups did not differ in clinical and operative characteristics (all p>0.05) except in history of previous stone surgeries. (Table 1)

The following proportion of no growth in preoperative urine culture was observed: Group A (92.6%), Group B (89.3%), and Group C (80.8%) (p=0.174). The most common isolated microorganism was Diphtheroids (6.2%).

The mean operation time was 88.7 min. About half had level of access above the 12th rib (50.6%). Almost all only had one access (95.1%). The estimated blood loss was significantly lower in Group A (130.7ml) than in Group B (235.7ml) and Group C (261.5ml) (p=0.032). The mean stone clearance rate was 99.5. Significantly less patients in Group A were stone-free (74.1%) compared to Group B (92.9%) and Group C (96.2%) (p=0.030). Only two patients needed blood transfusion (2.5%) and 8.8% had auxiliary procedures done. None had pelvic perforation. Nephrostomy withdrawal day was significantly shorter in Group A (1.5) than in Group B (2.1) and Group C (2.3) (p<0.0003). Hospital length of stay did not differ significantly in the three groups (Group A=4.5, Group B=5.6, Group C=5.2, p=0.058).

Only two patients (2.5%) had criteria consistent with SIRS and both were from Group C. No significant difference in incidence of SIRS was observed among the three groups (p=0.067).

Discussion

Following PCNL, studies reported a 10.8% and 0.5% incidence rate of infection-related complications, such as fever and sepsis, respectively. The European Association of Urology (EAU) Guidelines on Urolithiasis recommend using a single-dose prophylactic antibiotic to lower the risk of these consequences. According to the American Urological Association (AUA) policy, PCNL patients should receive antibiotic prophylaxis and perioperative antibiotic therapy within 60 minutes following the surgery.[5] No current guideline stated if nephrostomy tube placement during the end of the PCNL procedure is routine, and is only upon discretion of the attending surgeon. The same holds true for when to remove the nephrostomy tube. The average time between removal of nephrostomy tube placement and removal was 2 days after the procedure.

In the current study, it was observed that a single dose of preventive antibiotics is sufficient to prevent infection-related complications in percutaneous nephrolithotomy (PCNL).[6] The overall incidence of SIRS was 2.5% with 0 incidence in patients given single dose prophylaxis 30 minutes before surgery.

Table 1. Clinical and operative characteristics of patients (n=81).

	Total (n=81)	**Group A (n=27)**	**Group B (n=28)**	**Group C (n=26)**	***p***
	Frequency (%); Mean ± SD; Median (Range)				
Patient age, years	53.7±3.5	56.0±1.5	54.2±2.6	50.9±2.0	0.231
Body mass index, kg/m^2	27.0±0.8	27.4±0.8	56.4±0.7	26.9±0.8	0.680
Sex					
Male	53 (65.4)	17 (63.0)	18 (64.3)	18 (69.2)	0.880
Female	28 (34.6)	10 (37.0)	10 (35.7)	8 (30.8)	
Stone size, cm^2	3.0±0.2	2.5±0.2	3.2±0.3	3.1±0.3	0.164
Comorbidities					
HTN	35 (43.2)	13 (48.2)	15 (53.6)	7 (26.9)	0.116
DM	21 (25.9)	11 (40.7)	5 (17.9)	5 (19.2)	0.121
Others	17 (21.0)	8 (29.6)	4 (14.3)	5 (19.2)	0.405
History of previous stone surgery	15 (18.5)	10 (37.0)	1 (3.6)	4 (15.4)	**0.006**
Presence of hydronephrosis	57 (70.4)	19 (70.4)	21 (75.0)	17 (65.4)	0.742
Stone type					
Solitary	44 (54.3)	12 (44.4)	19 (67.9)	13 (50.0)	0.190
Multiple	37 (45.7)	15 (55.6)	9 (32.1)	13 (50.0)	
Opacity of stone	1040±250.1	955.2±68.4	1137.9±191.7	1025±76.4	0.594
Laterality					
Left	42 (51.8)	17 (63.0)	13 (46.4)	12 (46.2)	0.367
Right	39 (48.2)	10 (37.0)	15 (53.6)	14 (53.8)	
History of UTI	12 (14.8)	6 (22.2)	4 (14.3)	2 (7.7)	0.329
Preoperative white blood cell, x10^3/uL	7.5±0.5	7.2±0.3	7.6±0.4	7.8±0.4	0.515
Mean creatinine, mg/dL	1.07±0.03	1.12±0.07	1.0±0.04	1.1±0.07	0.490
Mean hemoglobin	13.6±0.4	13.6±0.3	13.7±0.3	13.5±0.6	0.812

Table 2. Distribution of commonly isolated microorganisms in preoperative urine (n=81).

	Preoperative urine culture			
	Total (n=81)	**Group A (n=27)**	**Group B (n=28)**	**Group C (n=26)**
No growth	71 (87.6)	25 (92.6)	25 (89.3)	21 (80.8)
Diphtheroids	5 (6.2)	2 (7.4)	2 (7.1)	2 (7.6)
Staphylococcus spp	4 (4.9)	2 (7.4)	1 (3.6)	1 (3.8)
Enterobacter clocease	1 (1.2)	0 (0.0)	0 (0.0)	1 (3.8)
Proteus	1 (1.2)	0 (0.0)	0 (0.0)	1 (3.8)
Streptococcus spp	1 (1.2)	0 (0.0)	0 (0.0)	1 (3.8)

Table 3. Intraoperative and postoperative characteristics of patients (n=81).

	Total (n=81)	**Group A (n=27)**	**Group B (n=28)**	**Group C (n=26)**	***p***
	Frequency (%); Mean ± SD; Median (Range)				
Operation time, min	88.7±9.2	80.5±7.1	91.7±8.2	94.0±8.5	0.449
Level of access					
Below the 12th rib	40 (49.4)	15 (55.6)	13 (46.4)	12 (46.2)	0.734
Above the 12th rib	41 (50.6)	12 (44.4)	15 (53.6)	14 (53.8)	
Number of access					
1	77 (95.1)	27 (100.0)	26 (92.9)	24 (92.3)	0.348
≥2	4 (4.9)	0 (0.0)	2 (7.1)	2 (7.7)	
Estimated blood loss	209.0±152.0	130.7±95.7	235.7±141.2	261.5±189.1	**0.032**
Stone free rates	99.5±0.5	99.6±0.4	99.0±0.7	99.8±0.2	0.485
Stone composition					
None	71 (87.6)	20 (74.1)	26 (92.9)	25 (96.2)	**0.030**
Calcium oxalate	1 (1.2)	1 (3.7)	0 (0.0)	0 (0.0)	
Mixed	9 (11.1)	6 (22.2)	2 (7.1)	1 (3.8)	
Red blood cell transfusion	2 (2.5)	0 (0.0)	1 (3.6)	1 (3.9)	0.598
Auxiliary procedures	7 (8.8)	1 (3.7)	3 (10.7)	3 (12.0)	0.515
Pelvic perforation	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	n/a
Nephrostomy withdrawal day	2.0±0.8	1.5±0.1	2.1±0.1	2.3±0.1	**0.0003**
Hospital stay	5.1±0.5	4.5±0.3	5.6±0.4	5.2±0.2	0.058

Table 4. Incidence of SIRS in patients (n=81).

	Total (n=81)	Group A (n=27)	Group B (n=28)	Group C (n=26)	*p*
	Frequency (%)				
Temperature ≥38ºC or ≤36ºC	2 (2.5)	0 (0.0)	0 (0.0)	2 (7.7)	0.067
Heart rate >100 beats/min	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	n/a
Respiratory rate >20 breaths/min	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	n/a
White blood cell count >12,000/uL or <4,000/uL	2 (2.5)	0 (0.0)	0 (0.0)	2 (7.7)	0.067
Met SIRS criteria (2 or more)	2 (2.5)	0 (0.0)	0 (0.0)	2 (7.7)	0.067

Consistent with the findings of the current study, Chae et al. (2018) observed that when compared to a single-dose prophylactic antibiotic regimen, the three-day regimen did not show superior efficacy in preventing bacterial infections in PCNL. In their RCT, they randomly assigned patients in the single-dose group (n=20) who received single dose of 2 g ceftriaxone 30 minutes before PCNL, whereas those in the three-days regimen group (n=20) received preoperative single dose of 2 g ceftriaxone and an additional postoperative oral cefpodoxime proxetil (100 mg twice a day) for three days. Their results showed that fever did not develop in any of the patients in the single-dose group but developed in one patient (5.0%) in the three-day regimen group due to pneumonia (p=0.3). SIRS developed in four patients from each group but none developed sepsis after PCNL.[7]

Also related to the current study, a meta-analysis was conducted by Jung et al. (2022) to explore the efficacy of single dose antibiotic prophylaxis in perioperative period of PCNL. In ten included studies, the authors observed no significant differences between single dose and extended dose in the rate of fever [p = 0.93, OR = 0.96, 95% confidence interval (CI) 0.44–2.13, I^2 = 64%].[8] In contrast to the current study's findings, extended dose showed lower rate of SIRS compared to single dose (p = 0.0005, OR = 1.81, 95% CI 1.30–2.53, I^2 = 53%). The authors concluded that sepsis in post-operative PCNL can be effectively prevented with a single dosage of antibiotics, but in high-risk individuals, longer-term antibiotic treatment may be necessary to prevent PCNL infections.

Using as little antibiotics as feasible is crucial to reducing antibiotic resistance. There is a clear link between the misuse of antibiotics and the emergence of resistance.[9] Bacteria may become resistant to a particular antibiotic if it is used excessively. An empirical antibiotic's potential for failure surpasses its benefits when the global population becomes more resistant to specific antibiotics. An increased need for antibiotics may arise from such a failure due to postoperative infections.[10] As a result, administering antibiotics only once can save healthcare costs. However, further studies should be done if the same findings on the effectiveness of single dose antibiotic prophylaxis is applicable in high-risk individuals who are prone to post-PCNL infections.

Trials usually ensure comparability of baseline characteristics of the three study groups in terms of history of previous stone surgery, estimated blood loss, and stone clearance in treatment groups by doing randomized allocation. However, in the current study, significant differences were still observed despite randomization, and these can affect patient outcomes. The impact of these differences on the outcomes cannot be further explored since only two patients had SIRS in the

overall study sample. Nonetheless, other baseline clinical and intraoperative factors are comparable in the three groups. Nephrostomy withdrawal day was also significantly highest in patients who had continuous antibiotic prophylaxis compared to other groups. The decision of the clinician to remove nephrostomy tube later in the patients with continuous prophylaxis, could partially explain the increased SIRS incidence.

The current limitation of the study is the small sample size (only 88 of 126 were included) which could have lowered the power of the statistical test to observe significant differences among groups.

Conclusion

Single dose antibiotic prophylaxis for the prevention of post-operative bacterial infection in patients undergoing PCNL is as effective as multiple dose antibiotic prophylaxis. Consistent with existing guidelines on PCNL, single dose antibiotic prophylaxis is highly recommended as it is cheaper and may lower the risk for antibiotic resistance in the future. More RCTs with larger sample size which can determine the effectiveness of single dose antibiotic prophylaxis in patients at high-risk for post-operative PCNL infections are recommended.

References

1. Seyrek M, Binbay M, Yuruk E, et al. Perioperative prophylaxis for percutaneous nephrolithotomy: Randomized study concerning the drug and dosage. Department of Urology, Haseki Teaching and Research Hospital, Istanbul, Turkey. J Endourol 2012 26 (11); DOI: 10.1089/end.2012.0242
2. Han Kyu Chae, Myong Kim, Jung Hyun Shin, Hyung Keun Park; Comparison of the efficacy between the single-dose and three-day prophylactic antibiotic regimens for the prevention of bacterial infections in patients with percutaneous nephrolithotomy: A randomized controlled study; Department of Urology, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Korea; Urogenit Tract Infect 2018;13(3):66-71; https://doi.org/10.14777/uti.2018.13.3.66
3. Demirtas A, Yildirim YE, Sofikerim M, et al. Comparison of infection and urosepsis rates of ciprofloxacin and ceftriaxone prophylaxis before percutaneous nephrolithotomy: A prospective and randomised study. Sci World J 2012, Article ID 916381, 6 pages; doi:10.1100/2012/916381
4. Tuzel E, Aktepe OC, Akdogan B. Prospective comparative study of two protocols of antibiotic prophylaxis in percutaneous nephrolithotomy. J Endourol 2013; 27 (2). DOI: 10.1089/end.2012.0331
5. Turk C, Petrik A, Sarica K, et al. EAU Guidelines on Interventional Treatment for Urolithiasis. Eur Urol 2016;69(3):475–82. Epub 2015/09/08.
6. Assimos D, Krambeck A, Miller NL, et al. Surgical management of stones. American Urological Association/Endourological Society Guideline, PART I. J Urol 2016;196(4):1153–60. Epub 2016/05/31.
7. Chae HK, Kim M, Shin JH, Park HK. Comparison of the efficacy between the single-dose and three-day prophylactic antibiotic regimens for the prevention of bacterial infections in patients with percutaneous nephrolithotomy: A randomized controlled study. Urogenit Tract Inf 2018 Dec 31;13(3):66-71.
8. Jung HD, Cho KS, Moon YJ, Chung DY, Kang DH, Lee JY. Antibiotic prophylaxis for percutaneous nephrolithotomy: An updated systematic review and meta-analysis. Plos One 2022 Apr 15;17(4):e0267233.
9. Abushaheen MA, Fatani AJ, Alosaimi M, et al. Antimicrobial resistance, mechanisms and its clinical significance. Dis Mon 2020;66(6):100971. Epub 2020/03/24.
10. Tuzel E, Aktepe OC, Akdogan B. Prospective comparative study of two protocols of antibiotic prophylaxis in percutaneous nephrolithotomy. J Endourol 2013;27(2):172–6. Epub 2012/08/23.

ORIGINAL RESEARCH

Comparative Study of Supine Versus Prone Percutaneous Nephrolithotomy for Renal Calculi: A Retrospective 5-year Single Center Experience

Glenys Mae Doria, MD; Karl Marvin M. Tan, MD, FPUA; Eli Paulino F. Madrona, MD, FPUA and Michael Eufemio L. Macalalag, MD, FPUA

Department of Urology, Veterans Memorial Medical Center

Objectives: To describe the demographics of patients undergoing supine PCNL (s-PCNL) and prone PCNL (p-PCNL) at Veterans Memorial Medical Center (VMMC) and to compare different data collected between the two approaches.
Methods: Retrospective data collection was done through chart review of patients who underwent supine and prone PCNL at VMMC from 2018 to 2022. Information collected includes patient demographics, clinical profile, stone burden and laterality, surgical technique, hospital days, complications and management.
Results: A total of 176 cases, 132 s-PCNL and 44 p-PCNL, were included. Demographic data show no statistical difference as to age and sex. There is no statistical difference in the stone burden, stone density, and Guy's stone scores between the two groups. There was no statistical difference in the mean operative time and stone free rates between the two groups. Mean hospital stay was 6.11 days for s-PCNL and 6.76 for p-PCNL, with significant statistical difference in favor of s-PCNL. Complication rates were 15.2% for supine PCNL and 13.6% for prone PCNL. There was no statistical significant difference in Clavien-Dindo complications between the two groups. There was no mortality reported for both groups
Conclusion: There is an observed increasing trend in the number of supine PCNL versus prone PCNL from 2018 to 2022. Supine PCNL is as effective and safe as prone PCNL. Supine PCNL appears to be more beneficial in terms of hospital stay in days. However, one limitation of the study its being retrospective and collated data which is the cause of the discrepancy in sample population size between the two groups.

Key words: Supine percutaneous nephrolithotomy (PCNL), prone PCNL, renal calculi

Introduction

Stone surgery comprises 36% of the urologic surgical cases at VMMC. Percutaneous nephrolithotomy has been increasingly used in this institution to address renal calculi. The procedure involves percutaneous renal puncture, dilation of the tract, and fragmentation and clearance of calculi.[1] PCNL is now considered as the standard management for large and complex stones.[2,3] Its indications have continued to broaden, further stressing the importance of percutaneous nephrolithotomy in the skill set of urologists.

The goal of renal stone surgery is to ensure stone clearance while minimizing complications.[4] Hence, the determination of stone-free and complication rates and the factors and practices that affect them is essential to ascertain achievement of success in percutaneous nephrolithotomy. Use of stone scoring systems, development of new

technology, modification of surgical techniques, and accumulation of experience and training are some of the means used to ensure optimal outcomes.

This study describes the profile of patients undergoing PCNL in one tertiary level hospital. The investigators describe the stone-free rates, perioperative complications, and outcomes of percutaneous nephrolithotomy and compare these variables between supine and prone PCNL.

Methods

The investigators conducted a descriptive retrospective cohort study on patients who underwent percutaneous nephrolithotomy at VMMC from 2018 to 2022. Charts were secured from the medical records/medical library for data collection.

Inclusion Criteria

Included were patients of all ages, with nephrolithiasis and who underwent percutaneous nephrolithotomy, done by Urology residents and consultants at VMMC from years 2018 to 2022.

Exclusion Criteria

Excluded were pregnant patients and patients whose charts have incomplete history, physical examination findings, imaging results, and laboratory results.

The patient demographics and clinical profile were collected. They included patient's age, gender, body mass index, preoperative hemoglobin, preoperative creatinine, urine culture, and preoperative white blood cell count. Information on stone characteristics including laterality, Guy's stone score, stone location, attenuation or stone density, presence of structural malformation, and preoperative and postoperative imaging done were gathered. Sample size computation was done using the software StatCalc from EpiInfo 7.1.4.0. Estimation was based on the assumptions that: 1) the ratio of patients without the ipsilateral open renal stone surgery is 1; 2) 95% of patients with ipsilateral open renal stone surgery are stone free; 3) 5% of patients without ipsilateral open renal stone surgery is stone free. In a computation of odds ratio (OR)=2.80 (Atmoko, et al., 2016) having stone free rate carried out at 95% confidence level, a sample size of 180 patients will have 80% power of rejecting the null hypothesis if the alternative holds.

Upon securing medical risk assessment and informed consent for the procedure, the patient would then undergo percutaneous nephrolithotomy. Surgical technique was described through data on intraoperative imaging used, position, intraoperative antibiotic given, energy device used for stone fragmentation, number of PCNL access established, nephrostomy tube usage, and double J stent usage.

Perioperative data considered were the surgeon's experience, stone clearance/stone free status, operative time, presence of complications and management done, total number of hospital days, and intraoperative blood transfusion.

All categorical data were encoded by assigning alphanumeric codes for an efficient encoding process making sure that each code can easily be traced back to its original category. A master list was prepared to ensure easy referencing process. The numerical information such as age, hospital stay and other demographic and clinical characteristics were encoded as it is up to 2 decimal places to ensure accuracy.

To describe the demographic profile of the patients, stone characteristics, surgical techniques, residual stones and supine and prone PCNL complications made use of descriptive statistics. Mean and standard deviation were used for describing continuous data (at least interval scale) while frequency and percent were used for datasets with categorical characteristics (nominal data). Frequency distribution tables were used to present the summary of the data sets. For the comparison of the means between two groups, t-test for two independent means was used. T-test for two proportions was used for the comparison of the difference in the percentages. All data were coded and analyzed using R software.

Results

Table 1 shows the demographic profile of 176 patients who underwent percutaneous

Table 1. Patient demographics.

Total Subjects	Supine	Prone	
	n=132	n=44	P-value
Mean age (in years)	55.34±13.307	56.67±11.37	0.260
Sex			
Male	81 (61.4%)	21(47.7%)	0.056
Female	52 (39.4%)	23(52.3%)	0.067
Mean BMI	25.24±3.12	24.48±3.5	0.101
Mean WBC	8.17±3.23	8.53±2.66	<0.01
Mean Hemoglobin	135±16.106	147.73±134.32	0.265
Antibiotics			
Amikacin	1 (0.8%)	0(0%)	0.281
Cefoxitin	6 (4.5%)	3 (6.8%)	0.277
Ceftazidime	2 (1.5%)	0(0%)	0.206
Ceftriaxone	117(88.6%)	38 (86.4%)	0.344
Ertapenem	1 (0.8%)	0 (0%)	0.281
Levofloxacin	2 (1.5%)	0 (0%)	0.206
Meropenem	2 (1.5%)	0 (0%)	0.206
Piperacillin Tazobactam	1 (0.8%)	3 (6.8%)	<0.01

nephrolithotomy. The mean age of patients was 55.34 years for those who underwent s-PCNL and 56.67 years for those who underwent p-PCNL. More males underwent s-PCNL at 61.4% while more females underwent p-PCNL at 52.3%. The mean BMI of patients who underwent s-PCNL was 25.24, higher than mean BMI of patients who underwent p-PCNL at 24.48. The mean WBC count was 8.17 in those who underwent s-PCNL and 8.53 in the p-PCNL group. Mean preoperative hemoglobin was 135 in s-PCNL and 147.73 in p-PCNL.

Preoperative antibiotics were given to patients as routine practice. In both groups, Ceftriaxone was most commonly given to patients at 88.6% in s-PCNL and 86.4% in p-PCNL, followed by Cefoxitin at 4.5% and 6.8%, respectively. Other antibiotics given to the rest of the patients were Amikacin, Ceftazidime, Ertapenem, Levofloxacin, Meropenem, and Piperacillin Tazobactam.

Table 2 shows that all patients had a plain CT stonogram done preoperatively. In terms of laterality, in the s-PCNL group, 37.9% had stone on the right and the other 62.9% on the left. For p-PCNL, 61.4% had stone on the right and 38.6% on the left.

On grading using the Guy's stone score, for s-PCNL the most frequent was Grade I at 41.7% followed by grade IV at 27.3%, grade II at 20.5%, and grade 10.6%. In the p-PCNL group, the most frequent was grade II at 29.5%, followed by grade III and IV both with 22.7% and grade I at 25%.

The mean stone burden for s-PCNL was 3.18cm and for p-PCNL is 3.17cm at 3.2cm and the mean stone density found in s-PCNL was 1067.43 and 1069.06 in p-PCNL.

Table 2. Stone characteristics.

	Supine	Prone	p-value
Laterality			
Right	50 (37.9%)	27 (61.4%)	<0.01
Left	83 (62.9%)	17 (38.6%)	<0.01
Guy's stone score			
Grade I	55 (41.7%)	11 (25%)	0.024
Grade II	27 (20.5%)	13 (29.5%)	0.106
Grade III	14 (10.6%)	10 (22.7%)	0.021
Grade IV	36 (27.3%)	10 (22.7%)	0.276
Mean stone burden (in cm)	3.18±1.273	3.17±1.4	0.495
Mean stone density (in Hounsfield units)	1067.43±336.109	1069.06±356.47	0.489
Anatomic abnormality	5(3.8%)	1(2.3%)	0.468
Preoperative imaging			
CT scan	132(100%)	44(100%)	-

On review of imaging and intraoperative findings, the noted structural malformations among patients who underwent s-PCNL were bladder neck stenosis, bifid renal pelvis, narrow infundibulum at superior pole, ureteropelvic junction stenosis, and ureteral stenosis, and in p-PCNL was ureteral stenosis, all with an incidence of 1 each.

Table 3 shows the techniques used in the conduct of PCNL and outcomes. General endotracheal anesthesia (GETA) was used for all cases of p-PCNL. On the other hand, there was a variety of anesthesia utilized for s-PCNL: 92.4% (122 of 132) GETA, 5.3% (7 cases) under Spinal Anesthesia, 0.8% (1 case) under Epidural (continuous lumbar epidural block) and 1.5 (2 cases) utilizing combined technique of GETA with epidural anesthesia.

A majority in both groups utilized fluoroscopy (125 of 132 for s-PCNL and 39 of 44 for p-PCNL). The remaining minority were accessed with sonographic guidance. Majority of the cases were accessed with a single access point except for 2 cases of multiple access points for complete stone fragmentation in the supine PCNL group.

Intraoperative intravenous gentamicin was given in 92.4% of s-PCNL group and in 93.2% of the p-PCNL group. In the remaining cases, only a grasper was used to evacuate the stone without any fragmentation done. Some surgeons opted not to administer intraoperative antibiotics.

Pneumatic lithotripters were utilized in 97% for s-PCNL and in 88.6% of the cases for p-PCNL. The rest and minority of cases were fragmented with ultrasound lithotripsy. Majority of the cases were accessed with a single access point except for 2 cases of multiple access points for complete stone clearance in the supine PCNL group.

In the p-PCNL group, all were accessed through a superior calyx however, in s-PCNL, 92.4% were accessed through an inferior calyx, 4.5% in a middle calyx, and 3% in a superior calyx. All cases for supine PCNL and prone PCNL had intra-operative

Table 3. Surgical technique and outcomes.

	Supine	Prone	P-value
Anesthesia			
GETA	122 (92.4%)	44 (100%)	0.030
Spinal	7 (5.3%)	0 (0%)	0.060
Epidural	1 (0.8%)	0 (0%)	0.281
GETA-epidural	2 (1.5%)	0 (0%)	0.206
Intraoperative Image Guidance			
Fluoroscopy	125 (94.7%)	39 (88.6%)	0.084
Ultrasound	7 (5.3%)	4 (9.1%)	0.184
Combined	0 (0%)	1 (2.3%)	0.041
Intraoperative Gentamicin			
Yes	122 (92.4%)	41 (93.2%)	0.434
No	10 (7.6%)	3 (6.8%)	0.434
Energy			
Pneumatic Lithotripsy	128 (97%)	39 (88.6%)	0.015
Ultrasonic Lithotripsy	4 (3%)	5 (11.4%)	0.015
Access			
1	130 (98.48%)	44 (100%)	
>1	2 (1.52%)		
Calyx			
Superior	4 (3%)	44 (100%)	<0.01
Middle	6 (4.5%)	0 (0%)	0.075
Inferior	122 (92.4%)	0 (0%)	<0.01
NT usage	132 (100%)	44 (100%)	-
DJ stent usage	132 (100%)	44 (100%)	0.281
Surgeon's experience			
Competent (has done more than 60 cases)	6 (4.5%)	6 (13.6%)	0.019
Trainee (has done 60 cases or less)	126 (95.5%)	38 (86.4%)	0.019
Stone free			
Yes	122 (92.4%)	42 (95.5%)	0.245
No	10 (7.6%)	2 (4.5%)	0.245
Mean operative time	106.77±47.066	98.23±54.12	0.175
Complications			
None	112 (84.8%)	38 (86.4%)	0.403
Yes	20 (15.2%)	6 (13.6%)	0.403
Clavien-Dindo Complication Category			
Grade I	4 (3%)	2 (4.5%)	0.316
Grade II	11 (8.3%)	3 (6.8%)	0.374
Grade IIIa	1 (0.8%)	0 (0%)	0.281
Grade IIIb	2 (1.5%)	0 (0%)	0.206
Mean hospital days	6.11±1.603	6.76±2.26	0.040
Intraoperative blood transfusion			
Yes	41 (31.1%)	15 (34.1%)	0.354
No	91 (68.9%)	29 (65.9%)	0.354
Postoperative Imaging			
plain KUB film	132 (100%)	44 (100%)	0.030

double J stent insertion and nephrostomy tube placement.

Most cases were done by trainees at 95.5% in s-PCNL and 86.4% of p-PCNL while the rest were done by competent surgeons.

Stone clearance was achieved in 92.4% of s-PCNL cases and in 95.5% of p-PCNL cases, which shows no significant statistical disparity (p=0.245). Stone clearance was determined intraoperatively by the surgeon and through the postoperative plain KUB film that all patients underwent. Mean operative time was 106.37 mins + 47.06 for s-PCNL and 98.23 mins ±54.12 for p-PCNL with no statistical difference between the two.

Uneventful post-operative course was noted in 112 of 132 (84.8%) for s-PCNL and 38 of 44 (86.4%) for p-PCNL. The remaining had post-operative complications and were categorized as Clavien I (s-PCNL-4 cases and p-PCNL-2 cases), II (s-PCNL-11 cases and p-PCNL-3 cases), IIIa (s-PCNL-1 cases and p-PCNL-0 cases), IIIB (s-PCNL-2 cases and p-PCNL-0 cases) and IV (s-PCNL-2 cases and p-PCNL-1 cases). No Clavien Dindo V were noted. Intraoperatively, blood transfusion was done in 31.1% (41 of 132) of supine PCNL and 34.1% (15 of 44) prone PCNL case with no significant statistical difference with p-value 0.354. Mean hospital stay was 6.11 days + 1.6 for s-PCNL and 6.76 + 2.2 days for p-PCNL, significantly shorter for the s-PCNL group.

Table 4 shows the occurrence of residual stones according to the preoperative Guy's Stone Score. Of the 12 patients who had residual stones, 5 had grade IV GSS (s-PCNL-4, p-PCNL-1), 3 had grade III GSS (s-PCNL-2, p-PCNL-1), 3 had grade II GSS, while 1 had grade I GSS. This shows the usefulness of the Guy's Stone Score in predicting probability of stone clearance in patients who undergo PCNL.

There were a total of 18 cases of supine PCNL that had complications. Shock was addressed with norepinephrine and fluid challenge. Cases of anemia were treated with blood transfusion. 1 patient had cardiogenic shock which necessitated SICU admission and administration of norepinephrine and dobutamine. Cases of bleeding and hematuria were managed with IV tranexamic acid. Urosepsis was treated with culture-guided antibiotics and paracetamol. Colonic perforation that was recognised postoperatively was managed with emergency exploratory laparatomy and colostomy. DJ stent insertion was done in a case where leak per NT insertion site was noted.

Six of the 44 prone PCNL cases had complications. Hyperglycemia and increased creatinine were managed with hydration. Hematuria was managed with tranexamic acid. Cases with fever and sepsis were managed with antibiotics and antipyretics. A case of anemia required blood transfusion. 1 case had bradycardia for which atropine was given and blood transfusion done.

The data suggest that both procedures carry similar risks and the management strategies are consistent between the two. The outcomes of this study is comparable with those reported in

Table 4. Residual stone according to preoperative Guy's Stone Score (GSS)

Guy's Stone	Residual stones		
	SUPINE n=10	PRONE n=2	p-value
I	1(0.8%)	0(0%)	0.320
II	3(2.3%)	0(0%)	0.410
III	2(1.5%)	1(2.3%)	0.470
IV	4(3%)	1(2.3%)	0.430

literature, most notably in the, Clinical Research of the Endourological Society (CROES) with the most common complications being transient fever and bleeding.5 Other major complications encountered are sepsis and colonic perforation, which were managed with antibiotic administration and exploratory laparotomy with colostomy creation, respectively.

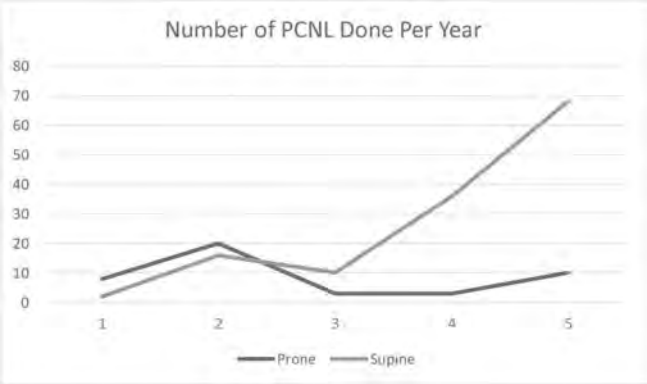


Figure 1. Number of PCNL done per year.

Figure 1 shows the number of PCNL done per year. Horizontal axis coincides with years covered by the study: 1 is 2018, 2 is 2019, 3 is 2020, 4 is 2021, and 5 is 2022. The graph demonstrates the increasing trend in the conduct of supine PCNL in the institution compared with prone PCNL.

Discussion

The worldwide prevalence rate of kidney stone disease ranges from 1 to 20%.[6] There has been a noted rise in prevalence over the past years globally, which possibly includes those incidentally found on imaging done for other indications. There are various approaches employed to treat nephrolithiasis including medical dissolution therapy, extracorporeal shockwave lithotripsy, open surgeries, and endourologic procedures such as retrograde intrarenal surgery and percutaneous nephrolithotomy.

Both the American Urological Association and the European Association of Urology recommend percutaneous nephrolithotomy as the first line management for nephrolithiasis 2cm and greater.[2,3] The technique of PCNL is continuously evolving in many aspects including diameter of instruments, patient positioning, tract creation techniques, lithotripters, and imaging modalities used, with the ultimate goal of stone clearance while minimizing complications.

This research study aimed to describe the experience of a high-volume tertiary level hospital with Percutaneous Nephrolithotomy for the treatment of nephrolithiasis in the supine and prone positions. This study found a high stone free rate with the use of PCNL, emphasizing the efficiency of the procedure with stone clearance. Most of those with residual stones are the patients who had staghorn or partial staghorn stones and this reflects what was already described in earlier studies on PCNL that stone burden is the most influential predictor of stone-free rate.[5]

Most of the procedures done in this institution were guided by fluoroscopy, in supine position, and using general endotracheal anesthesia. There is increasing interest in the use of ultrasound alone or in combination with fluoroscopy to reduce perioperative radiation exposure of the surgical team and the patient. In cases where spinal or epidural anesthesia was employed, the goal was to decrease blood loss because there was no expected systemic vasodilation, which was typically seen in general anesthesia.

The data here reflect a 31.8% rate of intraoperative blood transfusion and this was noted in larger stones, in longer operative times, and more commonly in procedures done by trainees. Infection is another commonly noted complication as seen in those who had transient fever, chills, and even septic shock. The data are in concordance with studies that have found bleeding, fever, and hematuria to be the most common complications of PCNL.[5]

Colonic perforation occurred in 2 of 176 patients (0.01%) and is one of the most significant complications of PCNL. In the literature, colon injury was noted to have a prevalence of 0.3% to 0.5%. Both occurrences were identified through passage of fecal material through the nephrostomy tract. The patients immediately underwent emergency exploratory laparotomy and creation of colostomy.

There is no statistical difference between supine and prone PCNL in terms of operative

time, stone free rates, and complication rates. However, this study shows that supine PCNL is more advantageous in terms of hospital days. This study shows that supine PCNL is comparable to prone PCNL and its adoption in practice may be beneficial especially to the surgical team comfort which removes the task of repositioning the patient intraoperatively and results to shorter hospital stay of patients.

The limitations of this study are its retrospective nature and the smaller sample size of the prone PCNL group. Further prospective studies to include larger cohorts may be done in order to be able to detect associations among variables.

The technologies and techniques in PCNL have far evolved since it was first described in the 1970s. It has been established as efficient and produces favorable outcomes. Continuous development and studies are needed in order to further improve safety and efficacy.

References

1. Shin TS, Cho HJ, Hong SH, Lee JY, Kim SW & Hwang TK. Complications of percutaneous nephrolithotomy classified by the modified Clavien grading system: A single center's experience over 16 years. Korean J Urol 2011; 52(11): 769–75. https://doi.org/10.4111/kju.2011.52.11.769
2. EAU Guidelines: Urolithiasis | Uroweb. (n.d.). Retrieved September 24, 2020, from https://uroweb.org/guideline/urolithiasis/#note_186
3. American Urological Association. Kidney Stones: Surgical Management Guideline (n.d.). Retrieved September 24, 2020, from https://www.auanet.org/guidelines/kidney-stones-surgical-management-guideline
4. Leavitt D A, de la Rosette JJ & Hoenig DM. Strategies for nonmedical management of upper urinary tract calculi. In A. W. Partin, C. A. Peters, L. R. Kavoussi, R. R. Dmochowski, & A. J. Wein (Editors): Campbell-Walsh-Wein Urology 2020; 12th edition (p. 2069). Elsevier.
5. de la Rosette J, Assimos D, Desai M, et al. The Clinical Research Office of the Endourological Society Percutaneous Nephrolithotomy Global Study: indications, complications, and outcomes in 5803 patients. J Endourol 2011; 25: 11-7.
6. Trinchieri A, Curhan G, Karlsen S, Jun WK. Epidemiology. In Stone Disease; Segura, J., Conort, P., Khoury, S., Eds.; ICUD: Paris, France, 2003; Distributed by Editions 21

ORIGINAL RESEARCH

Comparison Between Ultrasound Guided Transrectal versus Freehand Transperineal Ultrasound Guided Prostate Biopsy in a Tertiary Hospital (Philippines): A Randomized Prospective, Cross-Sectional Study

Jan Ernest Guy G. Yadao, MD; Michael Eufemio L. Macalalag, MD, FPUA and Rodney M. Del Rio, MD, FPUA

Section of Urology, Department of Surgery, Veterans Memorial Medical Center

Introduction: Prostate cancer, a significant male health concern (ASR: 29.3/100,000), demands accurate diagnosis. Prostate biopsy, pivotal for clinical decisions, relies on transrectal biopsy as the norm, despite limitations like infection risk and incomplete sampling. An alternative, transperineal biopsy, grants broader access but demands more time and anesthesia. Escalating complications due to antibiotic resistance heighten apprehensions.

Discrepancies in complications emerge from varied studies, while cancer detection rates stay consistent (45-49%). These conflicting outcomes raise vital safety issues. This study strives to bridge the information void by assessing complications within the local context, offering clarity for informed biopsy choices. With 150 words, the importance of evaluating biopsy methods in light of complications becomes evident, emphasizing the significance of this research in guiding clinical practice.

Objective: This research aims to compare ultrasound guided transrectal prostate biopsy and freehand ultrasound guided transperineal biopsy at a Quezon City government hospital. Specific objectives include describing patient profiles for each technique, assessing infection rates, evaluating pain tolerance, comparing hematuria levels, measuring dysuria immediately post-biopsy and 1 day after, analyzing hospitalization rates, evaluating the techniques' effectiveness in detecting prostate cancer, and reviewing histopathologic differences in prostatitis between the two methods.

Methods: The study was conducted at the Veterans Memorial Medical Center Urology Section from January to October 2023. Using a prospective, descriptive, cross-sectional design, male patients undergoing ultrasound guided transrectal or transperineal prostate biopsies were included. Inclusion criteria include males aged 45 and above with PSA above 4.0 ng/dl and abnormal prostate findings. Exclusion criteria cover repeat biopsy cases and prior prostate cancer diagnosis. With an assumed 50% detection and complication rate, a minimum of 109 patients for each biopsy type was required for a 95% confidence level and 5% margin of error, totaling 218 participants.

Results: The study compared transrectal and transperineal prostate biopsies in terms of patient characteristics, complications, diagnostic accuracy, and cancer detection rates. Patients undergoing transrectal biopsy had higher mean PSA levels (53.41 vs. 28.59, $p = 0.024$) and received more fosfomycin prophylactic antibiotics (27% vs. 18%, $p = 0.044$) compared to transperineal biopsy patients. Complication rates varied significantly between the two techniques, with chronic prostatitis seen in 5% of transperineal cases ($p < 0.01$). Transrectal biopsy patients experienced more pain, gross hematuria, urinary retention, fever, and hospitalization ($p < 0.01$). Diagnostic performance, assessed through the ROC curve's area under the curve, showed comparable sensitivity and specificity for transrectal (AUC = 0.559) and transperineal (AUC = 0.441) biopsies ($p = 0.108$). Cancer detection rates did

not significantly differ between transrectal (34.4%) and transperineal (45.9%) biopsies (p = 0.114). These results provide insights into the differences and similarities between the two biopsy techniques, impacting patient demographics, complications, and diagnostic outcomes.

Conclusion: This comparative investigation of transrectal and transperineal prostate biopsies in a tertiary hospital setting yields impactful insights. Participant ages were similar, but transrectal patients had higher PSA levels. Complication rates varied, with more chronic prostatitis in the transperineal group. Transperineal biopsies reduced pain, while transrectal group faced more complications. Cancer detection rates remained comparable. Transperineal biopsies demonstrated advantages in alleviating discomfort and potentially reducing complications. Tailoring biopsy approach based on patient profiles is crucial for diagnostic efficacy and patient well-being. These findings guide informed decision-making, prioritizing safety and experience in prostate biopsy practices.

Key words: Prostate biopsy, transrectal, transperineal, complications, cancer detection

Introduction

Prostate cancer was the second most prevalent cancer diagnosis in men and the fifth leading cause of death worldwide in 2018 (ASR: 29.3 per 100,000). The Philippines' ASR is 22.6 per 100,000, slightly lower than the global average. Early prostate cancer may be asymptomatic, but late stages may cause urine retention.[1] The best way to an informed decision making is a prostate biopsy.[3,4]

The gold standard for prostate cancer diagnosis is ultrasound-guided transrectal biopsy, which Cooner popularized in 1988 and Stamey and colleagues refined in 1989.[5] This approach inserts a core biopsy device into the rectum after a prophylactic antibiotic.[4] Due to its limited prostate access, this approach may not sample the apical and anterior areas enough, resulting in pathogenic problems.[6] Instead, transperineal biopsy involves core biopsy via the perineum's epidermis without antibiotics.[4,5] Unlike transrectal biopsy[5], this biopsy allows access to the prostate's anterior and apical areas. This operation takes longer than transrectal biopsies and requires nerve block or anesthetic.[3]

Infectious prostate biopsy consequences have increased due to multiresistant bacteria.[7] Transrectal biopsy patients have higher complications.[6] The prospective Webb, Shanmuganathan, and McLean investigation showed that transperineal biopsy can cause problems. The study found hematuria (62%), hemospermia (13%), discomfort (31%), dysuria (0.7%), septicemia (0.7%), and urine retention (7%). In contrast, the Australian Grummet research showed no infective problems or sepsis post-biopsy re-admission.

In response to conflicting findings in individual investigations, comparative studies, systematic reviews, and meta-analyses addressed information gaps. Huang, et al. found that transrectal biopsy patients were more likely than transperineal biopsy patients to have gross hematuria, urine retention, a perineal hematoma, urinary tract infection, fever over 38.5°C, sepsis, and hospitalization for complications.[5] Xiang, et al.'s systematic review and meta-analysis found that transperineal treatment reduced fever and rectal bleeding.[8] Unlike the previously stated research, Miller, Perumalla, and Heap found no statistically significant difference in complication rates between the two procedures. The investigation found sepsis, severe hematuria, rectal hemorrhage, urethral bleeding, hematospermia, and vasovagal events.[4] Young's study found no significant differences in sepsis, hemorrhage, and urinary tract infection between the two groups. Acute urine retention is considerably greater in transperineal biopsy patients.[7] Shen et al.'s systematic study found no significant difference in complications between transrectal and transperineal biopsies.[9]

Comparative studies showed transrectal and transperineal biopsies detect cancer similarly.[5,6] Huang, et al. found 49% cancer detection with transrectal biopsy and 45% with transperineal biopsy (p = 0.4920). Kawakami, et al.[10] found that transperineal biopsies detected malignancy 86% (243/783) and transrectal biopsies 82% (231/783) (p = 0.5100). Systematic reviews and meta-analyses[8,9] showed that both biopsy methods were accurate. Both biopsy methods detected cancer similarly, however the rate of complications

differed. Research shows conflicting outcomes, which could compromise patient safety. Overall, transrectal biopsy increases the likelihood of infective consequences.[6] This has not been recorded locally. Thus, the research notion was created.

This study describes and compares the infection rates, tolerability, hematuria, dysuria (immediate and 1 day post biopsy), hospitalization rate, capacity and histopathologic assessment of ultrasound guided transrectal prostate biopsy and freehand ultrasound guided transperineal biopsy among patients seen in a tertiary training government hospital in Quezon City, Philippines

Methods

Study Site

The study was conducted in the Urology Section of Veterans Memorial Medical Center (VMMC) in Quezon City, Philippines.

Study Duration

The study was carried out from January 2023 to October 2023.

Study Design

The study made use of a prospective cohort, analytical research design by recruiting patients subject for investigation and to gather comprehensive data related to the clinical outcomes of ultrasound guided transrectal prostate biopsy and freehand ultrasound guided transperineal biopsy at the Urology Section of Veterans Memorial Medical Center (VMMC). This data collection focused itself on determining the demographic and clinical profile of patients and other relevant background information of the patients as well as the critical outcomes as basis in determining the performance of the procedure.

Study Population

This study involved male patients as observation units. Specifically, male patients who underwent ultrasound guided transrectal prostate biopsy and transperineal prostate biopsy at the Section of Urology of VMMC were eligible study units. The following inclusion and exclusion criteria were applied.

The inclusion criteria for the study required participants to be 45 years old or older, have a prostate-specific antigen (PSA) level above 4.0 ng/dl, and present with an abnormal prostate on digital rectal examination. Exclusion criteria included individuals undergoing a repeat prostate biopsy, regardless of the indication, and those who had been previously diagnosed with prostate cancer.

Sample Size

Using a conservative approach, sample size estimation was done using StatCalc of Epi Info version 7.2.4. The latest census documented a total of 150 ultrasound guided transrectal prostate biopsy. For the purposes of maximizing the sample size, the anticipated cancer detection rate and complication rate per specific complication was set at 50%. Under a confidence level of 95% and a margin of error of 5%, the minimum number of patient charts included in the study was 109 in order to detect a 50% cancer detection rate and complication rate for transrectal prostate biopsy. Since the implementation of transperineal prostate biopsy was started in 2021, the assumptions used in the sample size estimation for transrectal biopsy was adapted for transperineal biopsy. In total, 218 participants were included in the study, where 109 patients underwent transrectal prostate biopsy and 109 patients underwent transperineal prostate biopsy.

Sample Size for Frequency in a Population

Population size(for finite population correction factor or fpc) (N):	150
Hypothesized % frequency of outcome factor in the population (p):	50%+/-5
Confidence limits as % of 100(absolute +/- %)(d):	5%
Design effect (for cluster surveys-DEFF):	1

Sample Size(n) for Various Confidence Levels

Confidence Level(%)	Sample Size
95%	109
80%	79
90%	97
97%	114
99%	123
99.9%	132

Equation

Sample size $n = [DEFF*Np(1-p)]/ [(d^2/Z^2_{1-\alpha/2}*(N-1)+p*(1-p)]$

Sampling Design

Purposive sampling was used in the recruitment of participants. All eligible participants were invited to participate in the study.

Operational Definition of Study Variables

Prostate-specific antigen (PSA) level refers to the concentration of PSA in the serum, measured in ng/dl. An abnormal digital rectal examination indicates the presence of clinical observations that may suggest or indicate prostate cancer, such as a nodular, non-movable, and hard prostate. Prostate volume refers to the size of the prostate as visualized in an ultrasound. The prophylactic use of antibiotics involves taking any antibiotic within the past seven days. Complications are any adverse events arising from the biopsy, including prostatitis, pain, gross hematuria, urinary retention, urinary tract infection, fever above 38.5°C, sepsis, or hospitalization due to complications. The complication rate is calculated by dividing the number of specific complications by the total number of participants, multiplied by a factor. Cancer detection refers to identifying cancer through biopsy, with the cancer detection rate calculated by dividing the total number of specimens positive for prostate cancer by the total number of participants, multiplied by a factor. Hematuria refers to the presence of blood in the urine, prostatitis is a disorder of the prostate gland associated with inflammation, and dysuria refers to pain upon urination.

Data Collection

Patients who were scheduled either for transrectal or transperineal prostate biopsy were invited to participate in the study. Upon obtaining written informed consent, the patient was enrolled in the study. The investigator interviewed the patient to obtain clinic-demographic details. Within seven days of observation post-biopsy procedure, the patients were observed. All possible complications within this period were evaluated by the investigator to ensure that the event was a complication of the prostate biopsy procedures. Once verified, the complications and cancer detection rates were documented.

Data Management

Gathered data were encoded in Microsoft Excel 2019. Only the investigator and the data manager/biostatistician had access to the data of this study. The data were kept in a password-protected spreadsheet

Data Analysis

STATA version 14 was used in data analysis. Descriptive statistics were employed to estimate the complication rates per event and the cancer detection rates. Frequency distributions were generated for all pertinent variables. The mean ± standard deviation (SD) was estimated for all continuous variables, while percentages were determined for all categorical variables. A test for two proportions (z-test) was applied to determine if there were significant differences between the complication rates per event and the cancer detection rates of the two biopsy procedures.

Ethical Consideration

The study protocol was submitted to the Technical and Ethical Review Board of the institution from whom an exemption for ethics review was sought. No considerable harm was imparted to the respondents. There was no direct human participation in the study, as secondary data were used. The study adhered to the provisions of the Data Privacy Act of 2012. Codes were used to represent each patient to ensure privacy and confidentiality of information. Only the principal investigator had access to the identity of all the participants. Personal identifiers were removed at data entry to ensure the anonymity of the participants to the data encoders. Information deemed confidential, such as that which might emotionally harm or degrade the integrity and dignity of a person, was not shared. The data set was kept for ten years after the conclusion of the study, after which it was deleted permanently

Declaration of Conflict of Interest

The principal investigator declares no conflict of interest.

Dissemination of Findings

Findings of this study were made available to the public and scientific communities through publication in duly recognized journals. Feedbacks were provided to the participants through a forum.

Results

The study compared various parameters between patients undergoing transrectal (n=122) and transperineal (n=133) prostate biopsies. (Table 1). The mean age was slightly higher in the transperineal group (68.73±15.5) compared to the transrectal group (66.27±16.11), though this difference was not statistically significant (p=0.107). PSA levels were significantly higher in the transrectal group (53.41±135.11) than in the transperineal group (28.59±30.68), with a p-value of 0.024. Findings from digital rectal examinations (DRE) showed a similar distribution of positive (7.4% vs. 6.8%) and negative results (92.6% vs. 93.2%) between the two groups, with p-values of 0.425 and 0.423, respectively. The mean prostate volume was comparable between the two groups (51±28.17 for transrectal and 53.37±31.65 for transperineal), with no significant difference (p=0.264). Prophylactic antibiotic use varied between the groups, with Fosfomycin more commonly used in the transrectal group (27% vs. 18%, p=0.044), while Ciprofloxacin was used at similar rates in both groups (73% vs. 74.4%, p=0.391). However, the results should be taken cautiously since this study is a single-center study, generalizing the results to other centers may have limited validity.

In Table 2, the study examined the sequelae following transrectal and transperineal prostate biopsy procedures. Chronic prostatitis was observed in 5% of patients who underwent the transperineal biopsy, while no cases were reported in the transrectal group, resulting in a significant difference (p<0.01). Chronic inflammation and urinary tract infections were not observed in both groups. Pain levels were significantly higher in the transrectal group, with a mean pain score of 3.87±1.45 compared to 3.14±1.16 in the transperineal group (p=0.005). Gross hematuria, urinary retention, fever >38.5°C, and hospitalization due to complications were all reported exclusively in the transrectal group, with each showing statistically significant differences (p<0.01). No such complications were observed in the transperineal group. These findings suggest that the transperineal approach may be associated with fewer complications and lower pain levels compared to the transrectal biopsy method.

Table 1. Clinico-demographic characteristic of patients (N=255)

Parameter	Transrectal (n=122)	Transperineal (n=133)	p-value
Mean (± SD) Age	66.27±16.11	68.73±15.5	0.107
Mean (± SD) PSA level	53.41±135.11	28.59±30.68	0.024
Findings in DRE (No. %)			
Positive	9 (7.4%)	9 (6.8%)	0.425
Negative	113 (92.6%)	124 (93.2%)	0.423
Prostate Volume (No. %)	51±28.17	53.37±31.65	0.264
Positive	45 (36.9%)	58 (43.6%)	0.138
Negative	66 (54.1%)	66 (49.6%)	0.237
Prophylactic antibiotic use (No. %)			
Fosfomycin	33 (27%)	24 (18%)	0.044
Ciprofloxacin	89 (73%)	99 (74.4%)	0.391

Table 2. Complication rate per sequelae of transrectal and transperineal biopsy.

Sequelae	Transrectal	Transperineal	Total	p-value
Chronic prostatitis	0 (0%)	6 (5%)	6 (2%)	<0.01
Chronic inflammation	0 (0%)	0 (0%)	0 (0%)	-
Pain scale	3.87±1.45	3.14±1.16	3.47±1.23	0.005
Gross hematuria	9 (7%)	0 (0%)	9 (4%)	<0.01
Urinary retention	6 (5%)	0 (0%)	6 (2%)	<0.01
Urinary tract infection	0 (0%)	0 (0%)	0 (0%)	-
Fever > 38.5ºC	6 (5%)	0 (0%)	6 (2%)	<0.01
Hospitalization due to complication	6 (5%)	0 (0%)	6 (2%)	<0.01

The study compared pain levels between patients undergoing transrectal and transperineal prostate biopsies. In Table 3, a slightly higher percentage of patients reported no pain in the transperineal group (14%) compared to the transrectal group (12%), though this difference was not statistically significant (p=0.425). Mild pain was significantly more common in the transperineal group (45%) than in the transrectal group (25%), with a p-value of 0.018. Moderate, severe, and very severe pain levels were reported more frequently in the transrectal group (31%, 15%, and 12%, respectively) than in the transperineal group (23%, 11%, and 7%), but these differences were not statistically significant (p=0.161, p=0.299, and p=0.167, respectively). The "worst" pain was only reported in the transrectal group (4%), with no cases in the transperineal group, approaching significance with a p-value of 0.066. These results suggest that while mild pain is more common in transperineal biopsies, higher pain intensities are more associated with transrectal biopsies.

Table 3. Severity of pain.

Pain	Transrectal Prostate Biopsy	Transperineal Prostate Biopsy	p-value
No pain	15 (12%)	18 (14%)	0.425
Mild	31 (25%)	60 (45%)	0.018
Moderate	38 (31%)	30 (23%)	0.161
Severe	18 (15%)	15 (11%)	0.299
Very severe	15 (12%)	9 (7%)	0.167
Worst	5 (4%)	(0%)	0.066

Table 4 analyzed the incidence of dysuria (pain upon urination) following transrectal and transperineal prostate biopsies. A significantly higher percentage of patients in the transperineal group (95%) reported no pain compared to the transrectal group (61%), with a p-value of 0.001. Conversely, mild dysuria was more common in the transrectal group (24%) compared to the transperineal group (5%), with a p-value of 0.002. Additionally, moderate dysuria was reported only in the transrectal group (15%), with no cases in the transperineal group, also showing a significant difference (p=0.002). These findings indicate that dysuria is significantly less common in patients undergoing transperineal prostate biopsies compared to those undergoing transrectal biopsies.

Table 4. Post procedural dysuria.

Dysuria	Transrectal Prostate Biopsy	Transperineal Prostate Biopsy	p-value
No pain	75 (61%)	116 (95%)	0.001
Mild	29 (24%)	6 (5%)	0.002
Moderate	18 (15%)	0 (0%)	0.002

In the first void post-biopsy, most patients in both groups experienced Grade 1 hematuria, with 81% in the transrectal group and 83% in the transperineal group, showing no significant difference (p=0.418). (Table 5) Grade 2 hematuria was reported by 11% of transrectal patients and 9% of transperineal patients (p=0.390). However, Grade 3 hematuria was significantly more frequent

in the transrectal group (6%) compared to the transperineal group, where no cases were observed (p=0.037). Grade 4 hematuria was rare, occurring in 2% of transrectal patients and none in the transperineal group, but the difference was not statistically significant (p=0.123).

At 24 hours post-biopsy, almost all patients in both groups experienced Grade 1 hematuria (98% in the transrectal group and 96% in the transperineal group), with no significant difference (p=0.352). Grade 2 hematuria was reported by 7% of transrectal patients and 6% of transperineal patients (p=0.455). Grade 3 hematuria, though infrequent, was only observed in the transrectal group (4%) and not in the transperineal group, approaching statistical significance (p=0.066).

Table 6 show the Area Under the Curve (AUC) for the two biopsy methods—transperineal and transrectal. For the transperineal biopsy method, the AUC was 0.441 with a standard error of 0.037 and a p-value of 0.108. The 95% confidence interval for this AUC ranged from 0.369 to 0.512, indicating moderate diagnostic performance but not reaching statistical significance. In contrast, the transrectal biopsy method had an AUC of 0.559 with a standard error of 0.037 and a p-value of 0.108. The 95% confidence interval for this AUC ranged from 0.488 to 0.631. This AUC value suggests slightly better diagnostic performance compared to the transperineal method, though it also does not achieve statistical significance. Overall, both methods show AUC values indicating moderate performance, with transrectal biopsy slightly outperforming the transperineal method in terms of diagnostic accuracy, but neither method achieved statistical significance in this analysis.

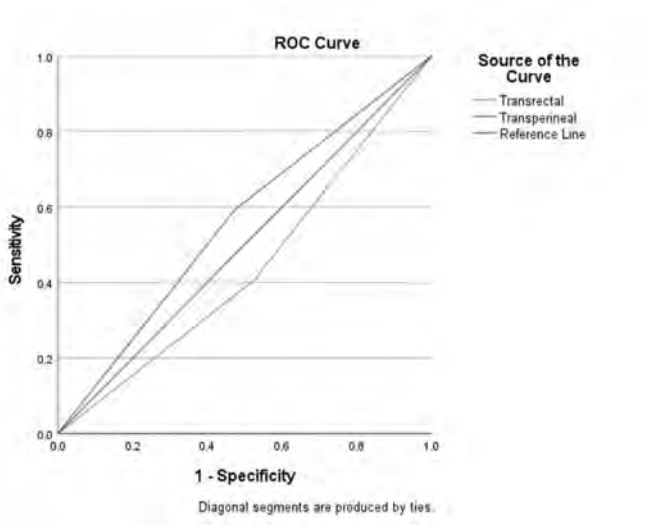


Table 5. Hematuria with first void post biopsy and 24 hours void post biopsy.

Time	Hematuria Grade	Transrectal Prostate Biopsy	Transperineal Prostate Biopsy	p-value
First Void Post Biopsy	1	99 (81%)	110 (83%)	0.418
	2	13 (11%)	12 (9%)	0.390
	3	7 (6%)	(0%)	0.037
	4	3 (2%)	(0%)	0.123
24 hours Void Post Biopsy	1	119 (98%)	128 (96%)	0.352
	2	8 (7%)	8 (6%)	0.455
	3	5 (4%)	(0%)	0.066

Table 6. Diagnostic performance.

Area Under the Curve					
Variables	Area	Std Error	p-value	95% Confidence Interval	
				Lower Bound	Upper Bound
Transperineal	0.441	0.037	0.108	0.369	0.512
Transrectal	0.559	0.037	0.108	0.488	0.631

Table 7. Cancer detection.

	Cancer Detected	%	p-value
Transrectal	42	34.4%	0.031
Transperineal	61	45.9%	

The study compared the rates of cancer detection between transrectal and transperineal prostate biopsy methods. The transrectal biopsy detected cancer in 42 cases, representing 34.4% of the total, with a p-value of 0.031, indicating a statistically significant result. In comparison, the transperineal biopsy detected cancer in 61 cases, or 45.9% of the total. This suggests that the transperineal biopsy method had a higher cancer detection rate than the transrectal method. The p-value for the transrectal biopsy indicates that this difference in detection rates is statistically significant.

In this investigation comparing transrectal and transperineal prostate biopsies within a tertiary hospital setting, several key findings emerged that hold crucial implications for clinical practice. Notably, while participant ages were comparable, the transrectal group exhibited higher PSA levels, hinting at potential differences in disease presentation. The analysis of complication rates unveiled a significant contrast, with chronic prostatitis being notably more prevalent in the transperineal cohort. Importantly, the transperineal approach demonstrated a significant reduction in pain scores, underlining its advantageous position in enhancing patient comfort during the procedure. Conversely, the transrectal group bore a higher burden of complications, including gross hematuria, urinary retention, fever, and hospitalization. Despite these differences, cancer detection rates between the two methods remained similar, reaffirming their diagnostic comparability. The evaluation of dysuria illuminated a clear advantage for the transperineal approach in terms of lower pain during urination, extending to a potential reduction in discomfort 24 hours post-biopsy. The nuances of hematuria outcomes indicated varied results, yet the transperineal technique displayed promise in minimizing higher-grade hematuria occurrences.

This study underscores the critical role of tailoring biopsy approach to individual patient profiles, considering not only diagnostic efficacy but also patient well-being. While both methods yielded similar cancer detection rates, the transperineal pathway emerged as a favorable option due to its ability to alleviate patient discomfort and reduce the risk of specific complications. As the medical landscape continues to evolve, these findings provide valuable insights for informed decision-making, ensuring that patient safety and experience remain at the forefront of clinical practices surrounding prostate biopsies.

Discussion

In terms of demographic and clinical profile, the result shows the mean age of patients was slightly higher in the transperineal group, but this difference was not statistically significant. PSA levels were significantly higher in the transrectal group, while the distribution of positive and negative findings in digital rectal examinations and mean prostate volume were comparable between the two groups.[11-13] Prophylactic antibiotic use varied, with Fosfomycin used more in the transrectal group. Studies in the literature had a slightly higher mean age in the TP group, with the difference being also statistically insignificant. The PSA levels were significantly higher in the TR group in both studies[11,12], highlighting a consistent finding. The distribution of positive and negative findings from digital rectal examinations and mean prostate volume were comparable between the two methods in the study. Both studies reported variability in prophylactic antibiotic use, with Fosfomycin being more common in the TR group.

For Sequelae, chronic prostatitis occurred only in the transperineal group, while no cases were reported in the transrectal group, showing a significant difference. Pain levels were notably higher in the transrectal group, and complications such as gross hematuria, urinary retention, fever >38.5°C, and hospitalization were exclusive to the transrectal group, indicating that the transperineal method was associated with fewer complications and lower pain levels. Comparing with the literature, the study observed chronic prostatitis solely in the TP group which reported similar incidences of chronic

prostatitis and inflammation between the methods. Pain levels were higher in the TR group in the study, aligning with the RRL's finding that TP biopsies were associated with lower overall discomfort. The study's observation of higher rates of gross hematuria, urinary retention, fever, and hospitalization in the TR group supports the RRL's conclusion that TP had fewer complications, including a 0% sepsis rate versus a 2.2% sepsis rate for TR.[11,14]

In terms of pain, pain levels were generally low for both techniques, with TP biopsies reported to have a lower overall discomfort score. The study found that mild pain was more prevalent in the TP group, while moderate, severe, and very severe pain were more common in the TR group. This is consistent with the RRL, which noted that TP biopsies had lower overall pain levels compared to TR, though the latter had higher pain intensity.[11,13] While, in terms of complications, the TP approach had significantly lower rates of urinary tract infections (UTIs), gross hematuria, and hospitalization due to complications compared to the TR method. Specifically, the TP method demonstrated a 0% sepsis rate, while the TR method had a 2.2% sepsis rate which corresponds with the RRL's finding of lower dysuria rates in the TP group and higher rates in the TR group. [12,13] The incidence of dysuria was lower in the TP group while for hematuria with lower rates reported in the TP group compared to the TR group. Compared with the results from the studies in the literature the incidence of dysuria was significantly lower in the TP group in the study. [11,12,13,14]

Both biopsy methods demonstrated moderate diagnostic performance. However, the TR approach had a higher overall cancer detection rate, particularly in patients with prostate volumes between 30–80 mL and T3–T4 stages. The TP method showed advantages in detecting anterior zone cancers and had a higher maximum cancer core length and core involvement percentage. The RR, however, highlighted TR's advantage in detecting cancers in patients with larger prostate volumes and advanced stages, while TP showed benefits in detecting anterior zone cancers and had a higher maximum cancer core length and core involvement percentage. [11,12,14]

The study found a higher cancer detection rate with the TP method (45.9%) compared to TR (34.4%), which was statistically significant. This finding contrasts with the RRL, which noted a higher overall cancer detection rate with TR but acknowledged TP's effectiveness in detecting clinically significant cancers, especially with MRI/TRUS fusion techniques. [11,12,14]

Conclusion

This comparative investigation of transrectal and transperineal prostate biopsies in a tertiary hospital setting yielded impactful insights. Participant ages were similar, but transrectal patients had higher PSA levels. Complication rates varied, with more chronic prostatitis in the transperineal group. Transperineal biopsies reduced pain, while transrectal group faced more complications. Cancer detection rates remained comparable. Transperineal biopsies demonstrated advantages in alleviating discomfort and potentially reducing complications. Tailoring biopsy approach based on patient profiles is crucial for diagnostic efficacy and patient well-being. These findings guide informed decision-making, prioritizing safety and experience in prostate biopsy practices.

References

1. Rawla P. Epidemiology of prostate cancer. World J Oncol 2019; 10(2): 63–89. https://doi.org/10.5312/wjo.v10.i2.63
2. International Agency for Research on Cancer. (2020). Global Cancer Observatory. Retrieved from https://gco.iarc.fr/
3. Grummet JP, Weerakoon M, Huang S, Lawrentschuk N, Frydenberg M, Moon DA & Haynes AM. Sepsis and 'superbugs': Should we favour the transperineal over the transrectal approach for prostate biopsy? BJU Int 2014; 114, 384–8. https://doi.org/10.1111/bju.12682
4. Miller JAM, Erumalla CHP & Eap GRH. Complications of transrectal versus transperineal prostate biopsy. ANZ J Surg 2005; 75(1): 48–50. https://doi.org/10.1111/j.1445-2197.2005.03463.x
5. Huang G, Kang C, Lee W & Chiang P. Comparisons of cancer detection rate and complications between transrectal and transperineal prostate biopsy approaches: A single center preliminary study. BMC Urology 2019; 19(101): 1–8. https://doi.org/10.1186/s12894-019-0531-7
6. Benjamin DX, Ristau TAMH & John DX. Free-hand transperineal prostate biopsy provides acceptable cancer detection and minimizes risk of infection: Evolving experience with a 10-sector template. Urol Oncol Sem Orig Invest 2018 https://doi.org/10.1016/j.urolonc.2018.09.013

7. Young R, Norris B, Reeves F & Peters JS. A retrospective comparison of transrectal and transperineal prostate biopsies: Experience of a single surgeon. J Endourol 2019; 33(6): 498–502. https://doi.org/10.1089/end.2018.0685
8. Xiang J, Yan H, Li J, Wang X, Chen H & Zheng X. Transperineal versus transrectal prostate biopsy in the diagnosis of prostate cancer: A systematic review and meta-analysis. Urol Oncol Sem Orig Invest 2019; 37(0): 1–11. https://doi.org/10.1016/j.urolonc.2019.03.002
9. Shen P, Zhu Y, Wei W, Li Y, Yang J, Li Y, & Zhang X. The results of transperineal versus transrectal prostate biopsy: A systematic review and meta-analysis. Asian J Androl 2012; 14(2): 310–5. http://dx.doi.org/10.1038/aja.2011.130
10. Kawakami S, Yamamoto S, Numao N, Ishikawa Y, Kihara K & Fukui I. Direct comparison between transrectal and transperineal extended prostate biopsy for the detection of cancer. Int J Urol 2007; 14(8): 719–24. https://doi.org/10.1111/j.1442-2042.2007.01821.x
11. Medscape. (n.d.). View article. Retrieved from https://www.medscape.com/viewarticle/976575?form=fpf
12. National Center for Biotechnology Information. (n.d.). PMC9883893. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9883893/
13. National Center for Biotechnology Information. (n.d.). PMC9045583. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9045583/
14. Nature. (n.d.). Scientific Reports. Retrieved from https://www.nature.com/articles/s41598-023-40371-7
15. SpringerOpen. (n.d.). Insights into Imaging. Retrieved from https://insightsimaging.springeropen.com/articles/10.1186/s13244-022-01210-x

CASE REPORT

Repair of Perineal Urethrostomy Stenosis Using Buccal Mucosal Graft in a Patient Diagnosed with Body Dysmorphia and Who Previously Underwent Total Penectomy, Bilateral Orchiectomy, and Scrotectomy: A Case Report

Patricia Anne Tagle, MD; Raul Carlo C. Andutan, MD, FPUA and
Mark Joseph J. Abalajon, MD, FPUA, FPhilGURS

Department of Urology, East Avenue Medical Center

Body dysmorphia is a debilitating disorder that centralizes on a preoccupation with one's physical appearance. Often, these individuals seek surgical correction in an effort to subdue this preoccupation. A majority of complications from feminizing gender reassignment surgery, consists of urethral stricture or stenosis, leading to voiding dysfunction. The patient is 39-year old male who underwent bilateral nipple removal, bilateral orchiectomy, scrotectomy and total penectomy with perineal urethrostomy, one year prior to consult. The patient eventually presented with acute urinary retention secondary to perineal urethrostomy stenosis. Urethroplasty with revision of perineal urethrostomy site using a buccal graft was done; and on follow up, he was noted to have good urine flow on uroflowmetry with mild lower urinary tract symptoms. Complex urethral strictures may be noted in patients with prior reconstructive history and lengthy areas of fibrosis. Although perineal urethrostomy is a valid surgical course of treatment for patients with complex strictures, improper technique, suboptimal patient factors, and, poor healing may lead to stenosis. The study aims to describe the use of a buccal graft as a viable alternative and easily reproducible technique to augment a revision perineal urethrostomy and lessen the recurrence of stenosis.

Key words: Buccal mucosal graft, reconstructive Urology, body dysmorphia, gender reassignment surgery

Introduction

The Diagnostic and Statistic Manual of Mental Disorders characterizes body dysmorphic disorder (BDD) as an impairing preoccupation with a perceived defect or flaw in the personal appearance. Patients often perceive this to look unattractive or deformed with increasing severity leading to poorer functioning and quality of life. These serve the foundation of its four criteria: A) Preoccupation with a perceived defect or flam, B) Repetitive behaviors or mental acts in response to the appearance concerns, C) Significant distress or impairment from this preoccupation, and D) Preoccupation not explained by body fat or weight.[1] In the United States, point prevalence was noted to be greater (2.4%) than other countries (1.7 - 1.8%).[1] Furthermore, studies done in Europe and North America have reported equivocal findings regarding gender differences.[2] A majority of patients have been noted to undergo surgery (dermatological, cosmetic surgery, and/or maxillofacial surgery) to remedy their preoccupation.[1-3] Prior to surgery, psychiatric evaluation and clearance is secured from two different psychiatrists explicitly defining this as the treatment of choice. Unfortunately,

surgical treatment was rarely found to improve overall symptoms with a majority expressing dissatisfaction on follow up.[2,3,4] As such, suicidal ideation and attempts are markedly elevated in this population.[1,2]

Feminizing gender reassignment surgery (GRS) as a whole includes psychotherapy, hormonal therapy, and a series of genital and non-genital surgical procedures more commonly indicated for patients affected by gender dysphoria[5] as opposed to body dysmorphia. The patient is also started on at least 12 months of hormonal therapy with estrogens and anti-androgens and required to undergo one year of social integration as the desired gender.[6] Although previous studies have noted urethral stricture and wound healing disorders to be the most frequent findings on follow-up[6], more recent studies have noted a dramatic decrease in these complications attributable to sufficient spatulation of the remaining bulbar and penile urethra.[5-7] A recent meta-analysis of complications for feminizing GRS noted a prevalence of 32.5% for overall surgical complications with urethral stenosis or stricture serving as the majority of these cases (14%). Despite this common complication, there was a noted disparity in its prevalence and correlation with surgical management. This may be attributable to a majority of reviewed cases attended to by non-urologists and thus lacking appropriate assessment and experience in managing lower urinary tract dysfunctions.[8]

Complex urethral strictures, as seen in failed reconstructions, often present with a challenging repair. In comparison to simple strictures, they often require extensive pelvic surgery due to: 1) a long area of fibrosis, 2) strictures associated with diverticulas, false passages and fistulas, or 3) extensive sphincter damage.[9] Apart from a history of surgery, cases often also include multiple urethral instrumentation which further complicates selection of the appropriate intervention.[10] Common interventions include skin flaps, buccal mucosal graft (BMG) and perineal urethrostomy.[11] Of the three, perineal urethrostomy creation is preferred for long strictures located in the proximal urethra and as an alternative to complex staged repairs.[12] Although the incidence of perineal urethrostomy stenosis post reconstruction has been equivocal, most studies concur that this outcome is often noted in patients with a history of multiple surgical procedures (i.e prior urethroplasty)[11-14] possibly attributable to the tissue's compromised blood supply.[14] We are presenting a case of a complex stricture with a history of surgical reconstruction and multiple urethral instrumentation and who underwent perineal urethrostomy repair with a buccal mucosal graft.

The Case

The patient in this case is a 39 year old male who sought consult due to acute urinary retention. One year prior, the patient underwent bilateral nipple removal, bilateral orchiectomy, scrotectomy and total penectomy with perineal urethrostomy. He had been diagnosed with body dysmorphia and maintained that he identifies as male with no desire to feminize his physical appearance or change this gender identity. The patient expressed feeling severely anxious and often perceived his genitals as tumors that did not belong in his anatomy. He then proceeded to undergo the aforementioned surgery with a non-urologist. No hormonal therapy was noted before or after this procedure. Additionally, although the patient's consent was taken, there were no noted clearances or evaluation from psychiatric services.

Post-operatively, the patient developed progressively worsening lower urinary tract symptoms. This prompted intermittent consult with multiple urologists for further management. He underwent at least two sessions of direct vision internal urethrotomy (DVIU) with minimal improvement. Due to the persistence of symptoms, he was then advised to start clean, intermittent, self-catheterization. Patient was initially compliant with this form of treatment; however, his symptoms exacerbated and ultimately led to acute urinary retention. On further urological assessment, the perineal urethrostomy site was noted to be completely stenotic (Figure 1). Prior to definitive surgery, emergency suprapubic cystostomy (STC) was performed to relieve the urinary retention.

Surgical Technique

The patient was placed in a lithotomy position under general anesthesia. The surgical site was

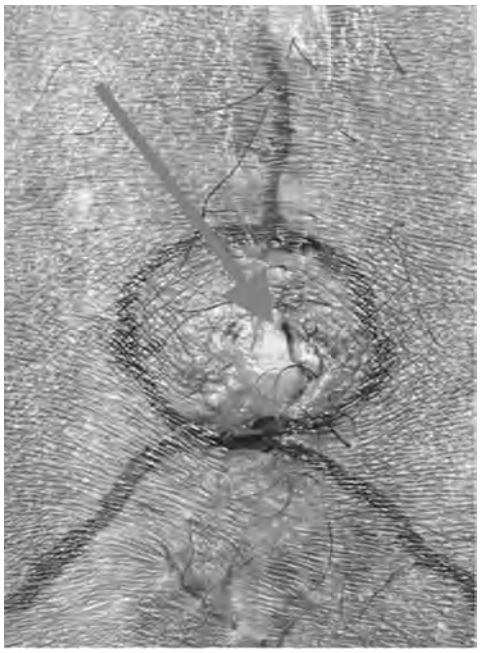


Figure 1. Stenosis of perineal urethrostomy

marked accordingly prior to being prepped with a betadinized solution (Figure 2a). A circumferential incision was done around the perineal urethrostomy site before being extended to an "inverted U" incision slightly inferior to the urethrostomy (Figure 2b). Upon further dissection, there were noted fibrotic portions of the bulbar urethra about 1.5cm from the urethrostomy site. These were carefully excised (Figure 3a) before the remaining bulbar urethra was mobilized proximally (Figure 3b) and pulled to the level of the skin incision.

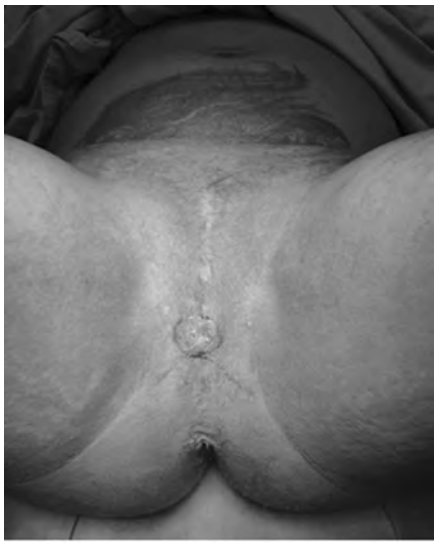


Figure 2a. Preoperative markings

Figure 2b. Skin incision

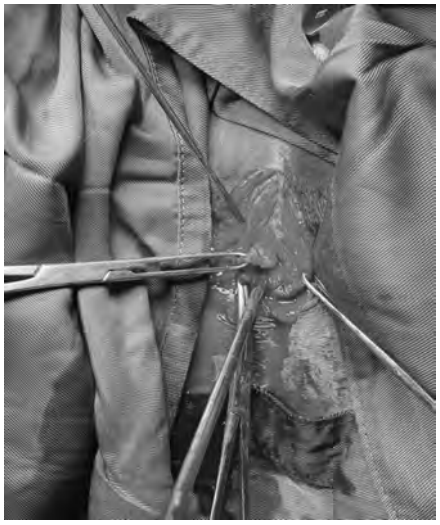


Figure 3a. Excision of fibrotic urethral segments

Figure 3b. Urethral mobilization

Intraoperative flexible cystoscopy (Figure 4) was done for complete assessment of the urethra. This revealed 95% obliteration of the urethrostomy lumen with a severely fibrotic bulbar urethra extending from the urethrostomy site to the membranous urethra approximately 1.0 cm from the sphincter. The distal urethra was then spatulated dorsally (Figure 5) while its ventral portion was carefully mobilized. The oral cavity was prepped and subsequently harvested for a buccal mucosal graft. The triangular shaped graft was approximately 1.5cm in width and 2.5cm in length and was quilted dorsally to the corpora cavernosa with vicryl 5-0 sutures (Figure 6). The apex of the perineal skin and "inverted U" incision were meticulously anastomosed to the ventral urethra (Figure 7) prior to closure. Finally, a siliconized Fr14 catheter was inserted with bolster dressing placed on the reconstructed area.

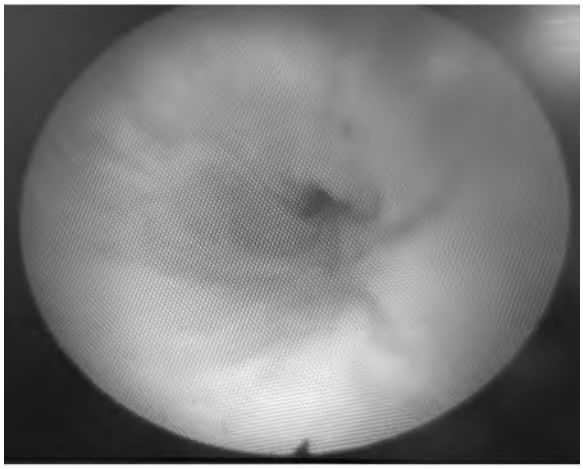


Figure 4. Intraoperative flexible cystoscopy of nembranous urethra

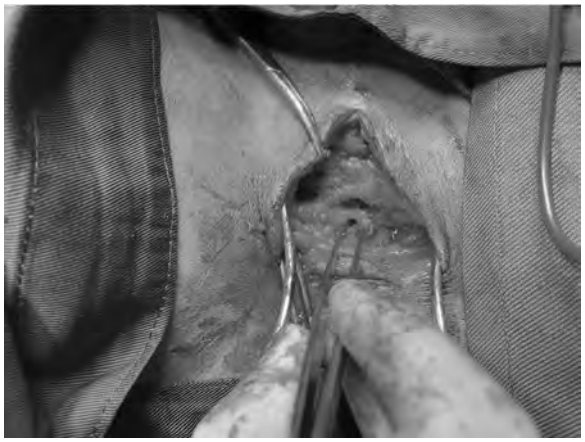


Figure 5. Supple urethra identified and spatulated dorsally

Figure 6. Buccal graft laid dorsally and quilted to the corpora cavernosa

Figure 7. Apex of perineal skin and inverted U incision anastomosed to ventral urethra

Results

Patient had an unremarkable postoperative course. Five days postoperatively (Figure 8), there was noted good wound healing at the reconstructed urethrostomy site and adequate output thru the indwelling catheter. After removing the catheter, patient was able to void freely with no straining or difficulty. Good graft take was also noted on his follow up 1 month post-surgery (Figure 9) with tolerable, mild lower urinary tract symptoms, based on IPSS, on follow-up one and three months post-surgery. Patient additionally underwent uroflometry, six months post-operatively with a Qmax of 18ml/sec.

Figure 8. Five days post revision

Figure 9. One month post revision

Discussion

BDD falls under the spectrum of obsessive-compulsive disorders and may manifest as repetitive behavior or mental acts in relation to the concerned physical appearance that ultimately causes clinically significant distress or impairment. Although studies have been mostly equivocal on gender distribution, larger reports done have found either an equal distribution between genders or a slight female predilection. BDD reported in men tend to have a preponderance for genital or muscular preoccupation.[1,3] An important distinction made in the most recent Diagnostic and Statistical Manual of Mental Disorders (2013) was its difference from gender dysphoria; unlike this, there is no conceived incongruence between the individual's expressed gender and their anatomical gender.[1] Patients often have a substantial impairment with daily functioning (social, occupation, etc.) and overall markedly low quality of life.[1,2] Thus, a majority of patients seek and receive surgical treatment for their apparent "flaws".[2] In a study done by Lai and colleagues (2010) examining the hospital records of cosmetic surgery patients over a three year period, 85.7% of patients with BDD were diagnosed during the preoperative workup for their planned cosmetic operations.[15] As in the present case, the patient has distressing preoccupation and severe aversion towards his nipples and genitalia; ultimately opting to undergo surgical management for specific removal of these parts only. The procedure done is essentially the penectomy component of feminizing GRS and as such, shares a similar complication profile due to two main issues: urethral angulation and stenosis secondary to devascularization.[16] This may manifest in deflected or slow voiding patterns, incomplete emptying, frequency, dysuria and spraying, which may contribute to the progression of dysphoria and be non-affirming.[16]

During this first surgical stage of GRS, the bulbar urethra is exposed and retracted prior to dissection of the vaginal space.[6] The urethra is then shortened by dividing the urethra in the proximal bulb and suturing the urothelium directly to the skin.[5] When the urethral meatus is positioned too distally or performed without spatulation, the urethra becomes angulated upwards towards the clitoris.[16] Although this method has a low rate of bleeding from the anastomosis, it may lead to antegrade micturition due to the inability to direct the urinary stream downwards.[5] Another common outcome is the high incidence of urethral meatal stenosis that is often due to the lack of spatulation,

poor mucosa to skin opposition or tissue ischemia from extensive mobilization.[8,16]

During the patient's first surgery performed by a non-urologist, the bulbar urethra was exposed and shortened, but was not spatulated, before being sutured directly to the skin during the creation of a perineal urethrostomy. Performing sufficient spatulation of the remaining bulbar and penile urethra to avoid stenosis has been considered the cause for the dramatic decrease in complications. From an incidence rate of up to 40% in previous literature, new series have reported a 2.9% incidence with only one person requiring revision.[5-7]

A number of techniques are available for the repair of perineal urethrostomy stenosis. Similar to other complex strictures, skin flaps or buccal mucosal grafts may additionally be utilized to increase the success of repair. An important key point to factor in repair for this case is the patient's history of surgery. Most use a scrotal skin flap due to its proximity to the involved area and because it may be used as either a vascularized flap or as a free skin graft.[5] However, the patient presented with no scrotum or excess skin available for an advancement flap. Furthermore, his history of previous repair may have caused a disruption in the blood supply and subsequently induced scarring, ultimately reducing the quality of the tissue involved.[11,12] Supplementation and/or repair with a flap alone may not be enough to ensure successful perineal urethrostomy because of its unreliable blood supply.[12] Sasam and Abalajon[14] described the use of two BMG's as dorsal and ventral inlays to augment the urethra in a female patient. Knowing the applicability of BMG in repairs of very proximal strictures, the decision was made to use a buccal graft to augment the revision of the perineal urethrostomy. The graft acts as a healthy substitution and upon onlay, provides a wide diameter neomeatus.[11] This allows an increased success when used in conjunction with perineal urethrostomy[11-13] with or without the additional use of skin flaps.[11,12]

Conclusion

Complex strictures are challenging because of their compromised blood supply, attributable to the history of surgical reconstruction. In the present case, the use of a buccal graft as well as sufficient spatulation of the remaining urethra allowed better post-operative outcomes. Thus in patients who have previously undergone a perineal urethrostomy, the use of a buccal graft to augment a revision perineal urethrostomy, is an easily reproducible technique, that can lessen the recurrence of stenosis. In the future, the authors recommend a larger case series with a longer follow-up period to fully evaluate outcomes for this particular technique.

References

1. American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders (5th ed.). https://doi.org/10.1176/appi.books.9780890425596
2. Sharma H, Sharma B & Patel N. Body dysmorphic disorder in adolescents. Adolescent Psychiatry 2019; 9(1): 44-57.
3. Bjornsson A, Didie E & Phillips K. Body dysmorphic disorder, Dialogues in Clinical Neuroscience 2010; 12(2): 221-32, DOI: 10.31887/DCNS.2010.12.2/abjornsson
4. Veale D, Boocock A, Gournay K, Dryden W, Shah F, Willson R & Walburn J. Body Dysmorphic Disorder. British Journal of Psychiatry 1996; 169(02): 196–201. doi:10.1192/bjp.169.2.196
5. Selvaggi G & Bellringer J. Gender reassignment surgery: an overview. Nature Reviews Urology 2011; 8(5): 274–82. doi:10.1038/nrurol.2011.46
6. Rossineto R, Hintz F, Krege S, Rübben H & vom Dorp F. Gender reassignment surgery - a 13 year review of surgical outcomes. Int Braz J Urol 2012; 38(1): 97–107. doi:10.1590/s1677-55382012000100014
7. Selvaggi G, Ceulemans P, De Cuypere G, VanLanduyt K, Blondeel P, Hamdi M, Monstrey S. Gender identity disorder: General overview and surgical treatment for vaginoplasty in male-to-female transsexuals. Plast Reconstr Surg 2005; 116(6): 135e–45e. doi:10.1097/01.prs.0000185999.
8. Dreher PC, Edwards D, Hager S, et al. Complications of the neovagina in male-to-female transgender surgery: a systematic review and meta-analysis with discussion of management. Clin Anat 2018; 31: 191–9.
9. Turner-Warwick R. Complex traumatic posterior urethral strictures. J Urol 1977; 118(4): 564–74. https://doi.org/10.1016/s0022-5347(17)58109-4
10. DeLong J, McCammon K, Capiel L, Rovegno A, Tonkin JB, Jordan G & Virasoro R. Augmented perineal urethrostomy using a dorsal buccal mucosal graft, bi-institutional study. World J Urol 2017 35(8): 1285–90. doi:10.1007/s00345-017-2002-z
11. Akagi N, Kanematsu A, Yamamoto S. Perineal urethrostomy with combined buccal mucosal graft and skin flap after complete loss of anterior urethra. IJU Case Rep 2021; 4: 92–4. doi: 10.1002/iju5.12251
12. Kamat N. Perineal Urethrostomy stenosis repair with buccal mucosa: description of technique and report of four cases. Urology 2008; 72(5): 1153–5. doi:10.1016/j.urology.2008.06.072

13. Myers JB, Porten SP & McAninch JW. The outcomes of perineal urethrostomy with preservation of the dorsal urethral plate and urethral blood supply. Urology 2011; 77(5): 1223–7. doi:10.1016/j.urology.2010.10.041
14. Sasam JC, Abalajon MJ, et al. Combined dorsal and ventral inlay buccal mucosal graf urethroplasty for female urethral strictures (Joshi Urethroplasty Technique): A first in the Philippines. Phil J Urol 2021; 31 (2): 89-92
15. Lai CS, Lee SS, Yeh YC & Chen CS. Body dysmorphic disorder in patients with cosmetic surgery. The Kaohsiung J Med Sci 2010; 26(9): 478–82. doi:10.1016/s1607-551x(10)70075-9
16. Mann RA, Kasabwala K, Kim N & Pariser JJ. The management of complications of feminizing gender affirming genital surgery. Urology 2021; 152: 67–73. https://doi.org/10.1016/j.urology.2021.01.031

CASE REPORT

TRES-ticles: A Rare Case of a Discontinous Type of Splenogonadal Fusion Presenting as Polyorchidism

Jiro A. Laxamana, MD and Cholson Banjo E. Garcia, MD, FPUA, FPhilGURS

Department of Urology, Jose R. Reyes Memorial Medical Center

Polyorchidism is a very rare congenital anomaly, which is defined as having more than 2 testicles in a human male. To date, there are only a number of cases reported worldwide and most of them are published as case reports. Most cases of polyorchidism are associated with other male genitourinary anomalies such as varicoceles, hydroceles, inguinal hernias, and testicular malignancies. Even much more rarer are accessory spleens located intrascrotally, with only a handful of case reports in the last 80 years. Reported here is a case of a 33-year old male presenting with symptoms of intermittent scrotal pain for 2 years and extratesticular mass on ultrasound. Surgical management for this patient was done, removing one of the accessory testicles. Histopathology showed as an accessory spleen. Since this is a rare occurrence, the authors aimed to present splenunculus as a differential for patients with polyorchidism.

Key words: Polyorchidism, splenunculi, splenogonadal fusion

Introduction

An splenunculus, or accessory spleen, refers to the normal splenic tissue ectopic to its normal location, separate from the rest of the organ. As an organ of both hematopoietic and immunologic function, it forms from multiple smaller components as a condensation of the mesodermal mesenchyme, which lands normally on the left side of the dorsal mesogastrium. Failure of this separation can lead to one or more nodules being ectopic. Having the same embryologic origin with the testis, a splenunculus can result from an abnormal connection of ectopic splenic tissue, with other mesodermal structures, particularly with the gonadal tissue, termed as splenogonadal fusion, and present as polyorchidism, or supernumerary testicles. Surgical excision to facilitate histopathologic diagnosis is usually done in most cases, with most, if not all patients, report minimal to no complications and issues regarding sexual function and fertility, with reports of aesthetic satisfaction. This report aimed to present a rare case of an adult male with an accessory spleen presenting as polyorchidism, its work up as well as its surgical management.

The Case

Patient is a 33-year old male with a chief complaint of 2 years history of intermittent left scrotal pain. There were no associated fever, dysuria, lower urinary tract symptoms, nor purulent penile discharge noted. Patient also denied any history of trauma. The patient ultrasound revealed a supernumerary testis, with consideration of testicular torsion. However, the

physician opted for conservative management with intravenous antibiotics and pain control, which offered improvement of the symptoms. Further workup was requested, however, he was lost to follow-up. Two weeks prior to consult, the patient noted recurrence of left scrotal pain and swelling. Patient was admitted with spontaneous resolution of the swelling and pain. Patient opted discharge against medical advice due to financial constraints, and was advised outpatient urology consult hence referral to this institution.

On physical examination, the genitalia was grossly male, with 2 palpable testes in the left hemiscrotum, and 1 palpable testis in the right hemiscrotum. All testes were approximately 3 cm in their widest individual diameter (Figure 1). There was no enlargement of the inguinoscrotal area on Valsalva. The bilateral inguinal areas were unremarkable.

Pertinent findings on the pre-operative ultrasound revealed an accessory testis measuring 2.9cm x 2.9cm x 2.4cm in the left hemiscrotum with increased vascularity, with bilateral reactive hydrocele (Figure 2.1).. Pre-operative MRI of the lower abdomen revealed a fat-containing hernia in the right inguinal region extending inferiorly to the scrotal sac, displacing the right testicle. Native testicles are normal in size and intensity, however, an accessory testis measuring 2.4cm x 2.6cm, was identified in the upper hemiscrotal sac on the left side such testis exhibited a comparatively more rounded and hypo-intense image, also exhibiting mild homogeneous enhancement, with few thin septa noted within, with a separate structure which may represent the epididymis. Bilateral hydrocele was also appreciated. The inguinal lymph nodes were unremarkable. (Figure 2.2). Blood work-ups, urinalysis, and seminalysis were all normal. During this time, the patient was assessed as a case of polyorchidism and was prepared for scrotal exploration.

Intraoperatively, an accessory left testis was noted. It had knotted blood supply, was viable, and normal-sized but no vas deferens. The main left testis was viable, normal-sized with normal-looking spermatic cord.The right testis was intact, normal-sized and viable (Figure 3). A bilateral hydrocele, and an indirect inguinal hernia on the right were noted. Orchiectomy of the left accessory testis with bilateral orchidopexy and right herniorrhaphy were performed. Patient's post-operative course was unremarkable as he was discharged 2 days post-op.

The histopathology report for the left accessory testis revealed the absence of a vas deferens and epididymis (Figure 4.1). On cut section, the specimen revealed areas of extensive hemorrhage (Figure 4.2). Microscopically, it revealed areas containing lymphoid follicles and littoral cells lining sinusoids with discontinuous walls in a background of hemorrhage, similar to a normal histology of a spleen (Figure 4.3). It was signed out as congestion and hemorrhage of accessory spleen.

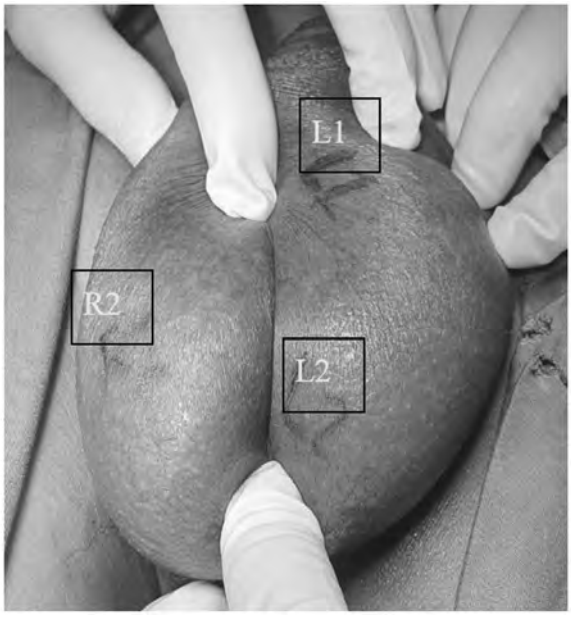


Figure 1. Patient's left testicles, labeled L1 and L2, and patient's right testicle, Labeled R1.

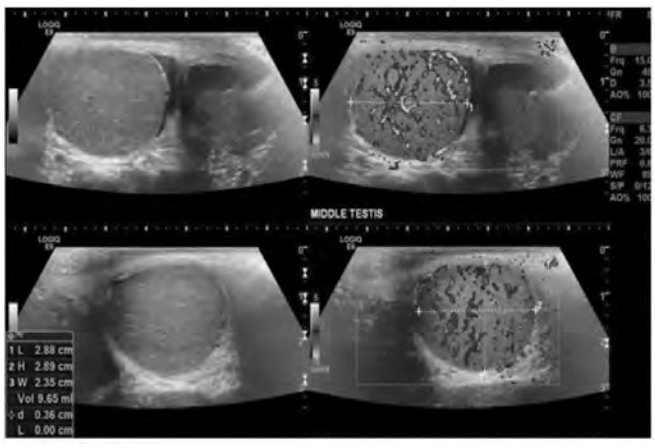


Figure 2.1. Pre-operative ultrasound showing left accessory testis .

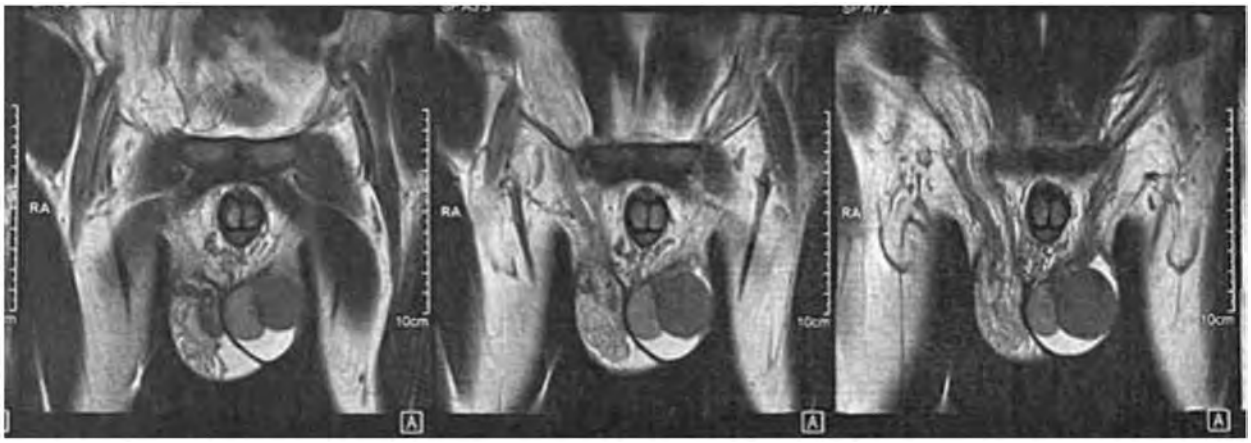


Figure 2.2. Pre-operative MRI showed the accessory testis in the upper hemiscrotal sac with mild homogenous enhancement.

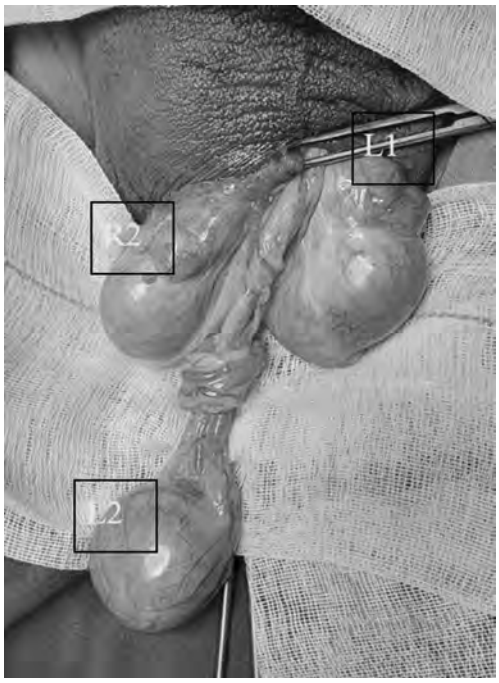


Figure 3. Left main testis (L1); Accessory testis (L2); Right main testis (R1)

Figure 4.1 Left Accessory testis with absent epididymis and vas deferens.

Figure 4.2. Left Accessory testis, left (cut section) showing areas of extensive hemorrhage

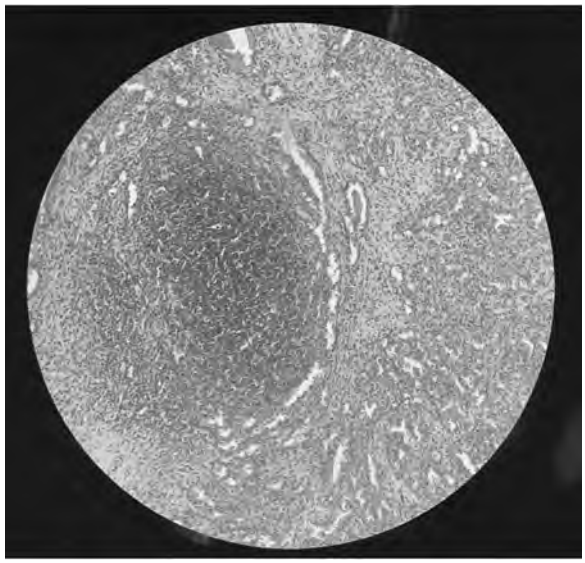


Figure 4.3. Histopathology findings showed areas with lymphoid follicles and littorial cell lining sinusoids.

Currently, the patient is doing well, asymptomatic, no limitations of activities of daily living, sexual function, and is back to work.

Discussion

Polyorchidism is a clinical entity where a person is assessed to have more than 2 testis, with triorchidism being the most common variant. It is a rare congenital anomaly of the genitourinary tract first described by Ahfeld, et al. in 1880. There are only less than 200 cases reported in the medical literature, with no age-specificity among the case reports, over the last 90 years. Normally, the testis begins to form around 6th week age of gestation from the genital ridge, which is a small protruberance on the dorsal coelemic wall. A number of theories have been postulated for the pathogenesis of polyorchidism, most of them are still poorly described due to lack of available data, but anomalous appropriation of cells differentiating into gonads, duplication or transverse versus longitudinal division of the urogenital ridge, or incomplete degeneration of a portion of the mesonephros and development of peritoneal bands to name a few.

As previously mentioned, triorchidism is the most common type, but cases of double polyorchidism have been reported (2 on each scrotum). The most common anatomical variant would be the left hemiscrotum having a supernumerary testicle, as seen in the present case.

The Leung classifications for supernumerary testicles are as follows: Type I lacks epididymis and vas deferens, thereby eliminating all reproductive potential; type II refers to a supernumerary testis which shares the epididymis and vas deferens of the other testis; type III, a testis that has its own epididymis but shares the vas deferens with the other testes and type IV, where there is a complete duplication of the testis, epididymis, and vas deferens. The patient was classified as type I, however, no appreciated spermatic cord was found, and intraoperatively, only supplying blood vessels were found, which raised the suspicion for another clinical entity. Differential diagnoses for polyorchidism include, but are not limited to, encysted hydrocele, spermatocele, a hematocele, or a varicocele, or a testicular or a paratesticular neoplasm. Even more rarely, a diagnosis of splenogonadal fusion or an accessory spleen in the gonad can be made, which was seen in the present case.[2]

Splenogonadal fusion (SGF) is another rare, benign, congenital anomaly where the spleen is abnormally attached to a gonad, which was first described by Bostroem, et al. in 1883. The pathophysiology of SGF begins during the 5th week of embryological development, where the splenic anlage develops in the left dorsal mesogastrium. This splenic progenitor comes into close contact with the left urogenital fold during the rotation of the embryonic gut. The urogenital fold contains the gonadal mesoderm, which matures into the human gonadal structures. The spleen-gonadal interaction continues until gonadal descent at 8th weeks age of gestation. Failure of separation of these primitive tissues result in SGF. There are two types: the continuous and the discontinuous type. The continuous type has a direct anatomical connection between the ectopic and normal spleen, connected by a cord which may be totally splenic in origin, beaded with splenic tissue nodules, or a totally fibrous band. The discontinuous type involves gonadal fusion with an accessory spleen or ectopic splenic tissue. The patient in the present

case has a discontinuous type of splenogonadal fusion. Knowing the embryologic physiology of splenogenesis and gonadal differentiation as far as anatomy is concerned, together with the histopathologic findings consistent with an accessory spleen, the patient can be diagnosed as having splenogonadal fusion.[1,3]

Conclusion

Polyorchidism is considered a rare clinical condition by itself, moreover, the accessory testis being a splenogonadal fusion makes it a rarer clinical entity. With over 200 published cases of polyorchidism noted, the possibility of it being a splenogonadal fusion makes it a differential in managing these types of patients. With this. appropriate awareness should be promoted not only for the urologist as well as the pediatricians who handles these cases initially.

References

1. Chen SL, Kao YL, Sun HS & Lin WL. Splenogonadal fusion. J Formosan Med Assoc 2008; 107(11): 892–5. https://doi.org/10.1016/s0929-6646(08)60206-5
2. Mazketly M, Aleter O, Brimo Alsaman MZ, Bazkke B, Jouda ME & Kayyali A. A rare case of polyorchidism in a 40-year-old man. A case report. Ann Med Surg 2012; 66: 102389. https://doi.org/10.1016/j.amsu.2021.102389
3. Prada Arias M, Vázquez Castelo JL, Montero Sánchez M, Muguerza Vellibre R & Rodríguez Costa A. [Supernumerary intrascrotal ectopic spleen: discontinuous splenogonadal fusion]. Anales de Pediatria (Barcelona, Spain: 2003) 2006; 64(3): 277–9. https://doi.org/10.1157/13085518

CASE REPORT

Laparoscopic Ureteral Reimplantation After Multiple Open and Endoscopic Abdominal Surgeries for a Ureteral Stricture Complicated by Endometriosis: A Case Report

Chester Lorenz C. Chacon, MD; Dinno Francis A. Mendiola, MD, FPUA; Jose Benito A. Abraham, MD, FPUA and Ernesto L. Gerial, Jr., MD, FPUA

Department of Urology, National Kidney and Transplant Institute

Previous abdominal surgeries have been viewed as a relative contraindication to laparoscopy. The authors report a case of a distal third ureteral stricture previously managed by multiple endoscopic and open procedures and successfully repaired with an exclusively laparoscopic approach.

A 37-year-old female, diagnosed case of chronic endometriosis had previously undergone an open excision of left ovarian cyst and an ipsilateral open psoas hitch reimplantation. Her right distal third ureteral stricture had been on chronic ureteral stent replacement for the past three years. After a comprehensive preoperative evaluation, the patient underwent a successful and uncomplicated laparoscopic ureteral reimplantation on the left. The authors describe their surgical technique and the challenges they encountered therein.

Recurrent distal third ureteral stricture previously managed by multiple open and endoscopic surgeries is a challenging disease to manage. An experienced minimally-invasive surgical team can successfully manage this problem laparoscopically without immediately resorting to open.

Key words: laparoscopy, renal descensus, ureteral reimplantation, distal third stricture

Introduction

It has been a long-held dictum that multiple previous abdominal surgeries are relatively contraindicated for laparoscopic surgery. This is mainly due to the anticipated post-operative adhesions in the field that increase the difficulty in conducting the surgery.

Though several studies have already shown that robotic and laparoscopic surgery can be safely performed in patients with multiple previous abdominal surgeries, it is still a focus of discussion among surgeons.

To add to this, the presence of urinary tract endometriosis further increases the surgical difficulty. Up to 47% of patients with ureteral endometriosis have undergone nephrectomy at the time of diagnosis.[1] Majority of these patients present with flank pain and hematuria. Post-operative histopathologic studies have demonstrated the presence of endometrial tissue involving the surrounding urinary tract, as well as the urothelial mucosa in some cases.

The Case

Presented here is a case of a recurrent right distal third ureteral stricture in a 37-year old female who is a diagnosed case of endometriosis who had been advised ureteral surgery due to bilateral distal third ureteral strictures. (Figure 1) The patient had undergone an open excision of ovarian cyst, left and

a open psoas hitch on the left. Her right distal third ureteral stricture had been on chronic ureteral stent replacement since three years prior the procedure. The patient had been hesitant on undergoing a third open procedure.

Figure 1. Pyelography films of the bilateral distal third ureteral stricture. The patient had undergone a previous open psoas hitch on the left.

Thus, the proposed surgical plan was to perform a cystoscopy, double J stent removal, right; laparoscopic ureteral reimplantation with intra-operative double J stent insertion. The possibility of converting to an open procedure was thoroughly discussed, along with potential intraoperative complications such as hemorrhage and bowel perforation. The patient consented for the procedure.

With consent secured, the patient was placed under general endotracheal anesthesia. A cystoscopy was done. The findings showed a normal anterior urethra, slit-like ureteral orifices bilateral, left ureteral reimplant orifice located in the left bladder dome, Double J Stent protruding at the right ureteral orifice, smooth bladder mucosa, no encrustations, stones or masses seen. The double J stent was removed, and a retrograde pyelography was done. With the distal third ureteral stricture was identified, the surgeons proceeded with laparoscopic ureteral reimplantation. (Figure 2)

The patient was placed on left lateral decubitus. The port placement are as follows: a 10mm port was inserted at the right para umbilical area for the camera and abdominal insufflation up to 15 mm Hg. A 10mm assist port was inserted at the right upper quadrant. A 5 mm working port was inserted at the right lower quadrant, and a 5mm port inserted in subxiphoid area. (Figure 3)

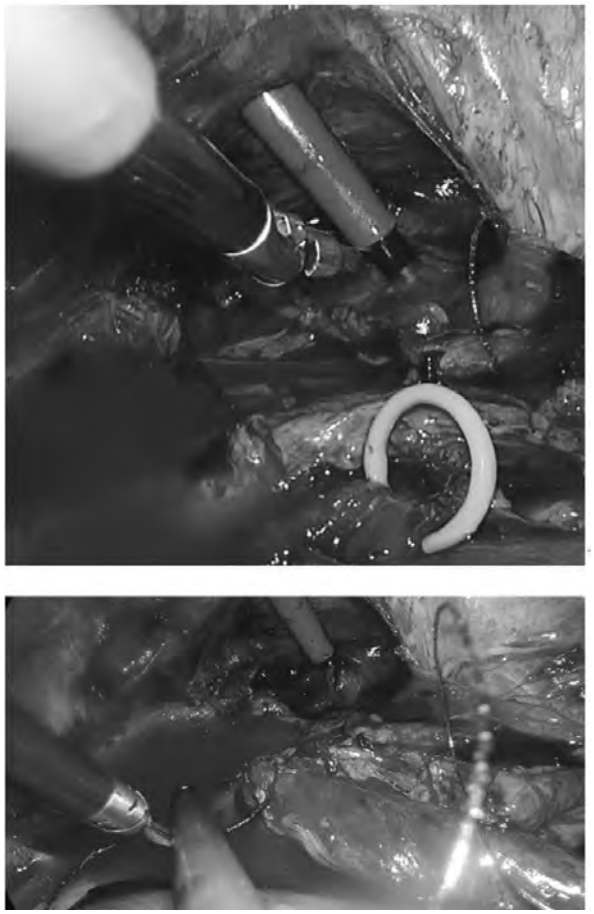


Figure 2. Ureteroneocystostomy done on the left ureter.

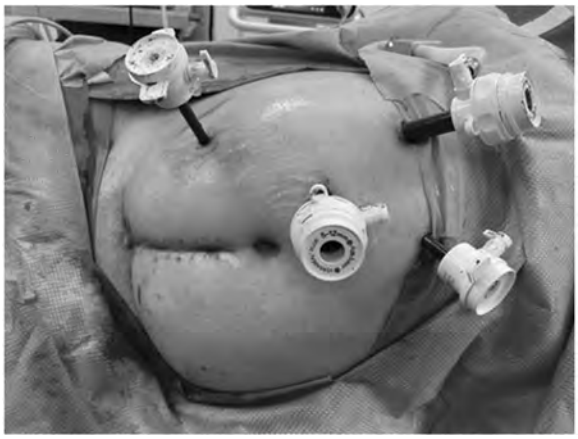


Figure 3. Trochar placement done for laparoscopic ureteral reimplantation.

The ascending colon was mobilized antero-medially by dissecting along the white line of Toldt exposing the gonadal vein and right ureter. The ureter was isolated and dissected distally toward the bladder and proximally toward the renal hilum. After adequate exposure, the right ureter was identified showing severe proximal dilatation with severe adhesions in the distal ureter. Multiple endometrial implants were seen surrounding the distal ureter and right and left ovary. The dilated ureter was transected proximally and spatulated. Periureteral tissues surrounding the distal portion of ureter was excised and sent for histopathology. The urinary bladder was then opened anteriorly approximately 1.5cm in length. An extravesical ureteroneocystostomy using an anterior Lich-Gregoir technique was done using 3-0 V-lock sutures. An indwelling ureteral stent was inserted retrogradely before completing the anterior repair. A Jackson-Pratt drain was placed and abdominal closure was done, concluding the procedure.

The postoperative course of the patient was unremarkable. The patient was able to ambulate on the postoperative day 1. The surgical drain was removed on the postoperativce day 3 and was discharged with catheter. The indwelling Foley catheter was subsequently removed after two weeks at the outpatient clinic.

The patient had her double J stent removed on an outpatient basis 4 months after the surgery. A repeat diuretic renal scan was performed. Findings showed that the right kidney had tracer retention, which had good response to diuresis, denoting resolution of ureteral obstruction.

Discussion

The most common etiology of ureteral strictures is iatrogrenic, owing to a previous surgery. But there have been several cases of endometriosis that caused concomitant ureteral strictures. These cases have been reported in literature before. Specifically, 0.3 to 6% of patients with endometriosis have been diagnosed with urinary tract endometriosis, more often due to an incidental finding during laparoscopy, as in these cases.[1] These cases and their management varied depending on the involved ureteral segments, with corresponding variations in the approach of repair, depending on the extent of the injury.[2] Several case reports have mentioned the use of hormonal therapy as an adjunct to surgical removal of endometrioma.[3] In this case, the cause of stricture formation was direct involvement of the ureter by endometriotic tissue. This has been performed in other cases, varying from laparoscopic uretero-ureterostomy to laparoscopic Psoas hitch. Nevertheless, the outcomes of laparoscopic approaches compared to open procedures is comparable.[4]

Complications of the laparoscopic ureteral reimplantation for endometriosis have been observed. These include, but are not limited to, vesicovaginal and ureteral fistulas, and bladder leakage.[2]

The most prominent difference noted in the cases was the history of recurrent ureteral reimplantation and multiple abdominal surgeries that proved a challenge in conducting the surgery. Nevertheless, the successful repair and reimplantation of this case demonstrates that, despite multiple previous surgeries, there are still good outcomes in doing the laparoscopic approach.

This case report demonstrated that despite multiple previous abdominal surgeries, multiple reimplantation and open surgical repair of the distal third ureteral stricture, laparoscopic ureteral reimplantation can still be safely performed.[3] Good surgical experience, careful adhesiolysis, and adequate exposure are essential in the success of the surgery.[5] The outcomes of the laparoscopic approach have been comparable with that of open procedures. With the benefit of earlier recovery time and relatively less post-operative pain

Conclusion

With the advent of laparoscopy, an increasing number of surgical procedures that have often necessitated an open procedure have been done through minimally invasive surgery. Urologic procedures that have been previously done through an exclusively open approach are now being done through laparoscopy. Studies have already demonstrated comparable outcomes with minimal post-operative complications.

The background of multiple previous abdominal surgeries must not hinder the surgeon in rendering a laparoscopic approach to patient management.

The overall benefit of earlier recovery contributes to overall good patient care. Despite this, surgical and patient safety during the conduct of the operation must always be top priority. Ample surgical experience is thus essential in approaching recurrent ureteral strictures.

Conflict of Interest

The authors declare no conflicts of interest in writing the study.

References

1. Azioni G, Bracale U, Scala A, Capobianco F, Barone, M, Rosati M. Laparoscopic ureteroneocystostomy and vesicopsoas hitch for infiltrative ureteral endometriosis. Min Inv Ther Allied Technol 2010; 19(5): 292-7.
2. Alves J, Puga M, Fernandes R, Pinton A. Laparoscopic management of ureteral endometriosis and hydronephrosis associated with endometriosis. J Min Inv Gynecol 2017; 24(3): 466-74.
3. Tchartchian G, Fabricious P, Bojahr B. Laparoscopic ureteral reimplantation in endometriosis: A severe case. Surg J 2017; 3(4): 167 -73.
5. Junior J, Buere R, Crispi C. New paradigms in endometriosis surgery of the distal ureter. Recent Advances in Laparoscopic Surgery. DOI: 10.5772/ intechopen.81788 Accessed 15 February 2021
4. Rassweiler J, Gozen A, Erdogru T, Sugiono M, Teber D. Ureteral reimplantation for management of ureteral strictures: A retrospective comparison of laparoscopic and open techniques. Eur Urol 2007; 51: 512-23.

CASE REPORT

Prostate Synovial Sarcoma in a 29-Year-Old Male: A Case Report

Ronald Andrew C. Mijares, MD and Marlo Vir C. Batucan, MD, FPUA

Department of Urology, Vicente Sotto Memorial Medical Center, Cebu City

Synovial sarcoma is an extremely rare soft tissue cancer that predominantly affects young adults, typically occurring at the para-articular region of the extremities. Primary synovial sarcoma of the prostate is exceptionally uncommon in clinical practice.

Presented here is a case of a 29-year-old male with prostatic synovial sarcoma. He experienced lower urinary tract symptoms and eventually had urine retention. Also discussed here are the imaging findings, treatment plan, and differential diagnosis.

The patient experienced urinary frequency, dysuria, and acute urinary retention, which led to the insertion of a Foley catheter. Subsequent ultrasound scans revealed a large lobulated solid prostate gland. A prostate biopsy confirmed the presence of a malignant spindle cell neoplasm, indicating a prostatic stromal sarcoma. Immunohistomorphologic findings (TLE-1+, STAT6-, S100-, CD34-, ER-, PR-) were consistent with a diagnosis of Monophasic Synovial Sarcoma. The patient underwent six cycles of neoadjuvant chemotherapy before a Radical Prostatectomy was performed. The postoperative course was uneventful, and the patient was discharged in a significantly improved condition.

Given the rarity of this condition, the authors are reporting a case of prostatic synovial sarcoma and how they managed it. They performed a radical prostatectomy with neoadjuvant chemotherapy, which had a positive effect. Subsequent postoperative monitoring and imaging showed no further symptoms.

Key words: Prostate synovial sarcoma, prostate cancer, prostatectomy

Introduction

Synovial sarcoma is an extremely rare soft tissue cancer that predominantly affects young adults, typically occurring at the para-articular region of the extremities.[1] Most synovial sarcomas in the genitourinary system have been reported in the kidney.[2] Synovial sarcoma of the prostate overwhelmingly affects young to middle-aged men, presenting as increased urinary frequency, hematuria, dysuria, nocturia, and eventual urinary retention due to bladder outlet obstruction.[3,4] Primary synovial sarcoma of the prostate is exceptionally uncommon in clinical practice and given its non-specific symptoms, synovial sarcoma of the prostate is commonly detected in its late stages.[5,6]

The purpose of this case study was to document and analyze the clinical presentation, diagnostic process, treatment approach, and outcomes of an extremely rare case of prostatic synovial sarcoma in a 29-year-old male. This study aimed to contribute to the limited body of knowledge regarding this rare malignancy, provide insights into effective diagnostic and therapeutic strategies, and discuss the implications for prognosis and

patient management. This case aimed to provide a comprehensive presentation of a 29-year-old male who experienced lower urinary tract symptoms and eventually had urine retention. Presented here is a compelling case of synovial sarcoma of the prostate with the authors' treatment plan and surgical intervention.

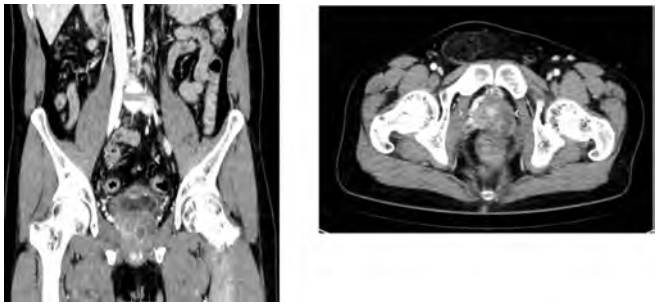
This case study is significant because prostatic synovial sarcoma is an exceedingly rare condition with only 10 previously reported cases. Due to its rarity, there is limited information available on its clinical behavior, optimal treatment strategies, and long-term outcomes. By documenting this case, the study aimed to enhance understanding of the disease, support the development of evidence-based treatment protocols, and potentially improve prognostic predictions. Additionally, this case can provide valuable data on the viability of surgical resection and contribute to ongoing discussions regarding the role of chemotherapy in managing this rare cancer.

The Case

A 29-year-old man complained of urinary obstructive symptoms that began seven months ago. This symptom progressed noting increased urinary frequency and straining, eventually leading to acute urinary retention. The patient sought consultation at a private hospital and was referred to a urologist, who inserted an indwelling catheter. Upon physical examination, an irregularly enlarged prostate was observed during the digital rectal examination. Ultrasound showed a large lobulated solid mass measuring 64mm x 67mm x 82mm. Computed Tomography scan of the whole abdomen revealed a large heterogenous mass (87mm x 73mm x 63mm) present in the prostate gland, centered in the left and posterior aspect of the prostate gland (PG: 184 grams) and the urethra was noted to be displaced to the right. The prostate capsule was intact. The mass abutted the rectum posteriorly but with intact fat plane. The absence of a specific family history of cancer or occupational hazards was noted.

The patient underwent Cystoscopy and Transurethral Resection of the Prostate. Pathologic examination revealed a malignant spindle cell neoplasm, indicating a potential prostatic stromal sarcoma. The immunohistomorphologic findings suggested a diagnosis of Monophasic Synovial Sarcoma, as it tested positive for TLE-1. However, STAT6, S100, CD34, ER, and PR tested negative on immunohistochemical examination.

The patient was discharged uneventful and was advised to consult with a Medical Oncologist. The patient received six cycles of (AIM: Adriamycin, Ifosfamide, Mesna) Chemotherapy, and a follow-up CT scan showed a decrease in the size of the previously enlarged prostate gland, which now measures 4.3cm x 4.6cm x 3.3cm with a computed volume of 33 ml (Figures 1 & 2).



Figures 1 and 2 show the coronal cut and axial cut of the CT scan showing the prostatic mass.

The patient was referred to the Urology service. A digital rectal examination revealed an approximately 30-40 gram prostate gland with a palpable firm nodule noted at the left prostatic lobe. Subsequently, the patient underwent Radical Prostatectomy (Figure 3). Postoperatively, the patient's recovery was uneventful. The patient was discharged in improved condition, with the surgical incision dry, intact, and healing well.

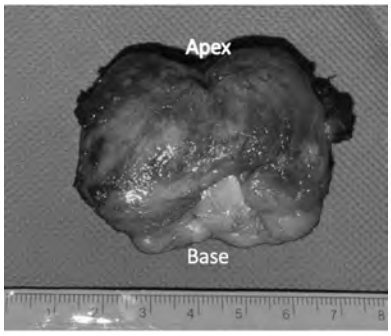


Figure 3. Prostatic mass

Discussion

Synovial sarcomas represent 8% of all soft tissue sarcomas and predominantly affect young adults between the ages of 15 and 40, although they can occur in individuals across a wide age range.[7] It is a type of malignant and aggressive tumor that originates from the soft tissues, such as the muscles, tendons, or the lining of joints. It typically carries a poor prognosis and may not respond well to treatment.[4,8] This type of tumor can spread through the bloodstream to other parts of the body (systemic spread) or by directly infiltrating surrounding tissues and structures (local invasion).[8,9] Early detection and prompt treatment are crucial for managing synovial sarcoma.[10] Primary prostatic sarcomas are exceptionally rare, comprising less than 0.1% of cases.[11]

A case report by Hou et al. described 10 cases of prostatic synovial sarcoma, including their own report. Patients ranging in age from 22 to 63 years and an average age of 42 years.[1] The primary clinical symptoms in 9 out of 10 patients were related to the urinary tract, such as dysuria, acute urinary retention, and hematuria.[1] In this case, the patient also exhibited symptoms of dysuria, urinary frequency, and eventually urinary retention.

In imaging studies, synovial sarcoma of the prostate is typically a large and heterogeneous lesion, easily distinguishable from the surrounding tissues[12,13], as in the present case before chemotherapy with Doxorubicin, Ifosfamide, and Mesna (AIM).[14,15] Since prostate sarcomas are rare, treatment protocols have not been clearly defined.[7,13] Sarcomas usually do not respond well to radiotherapy, and they too have a poor response to chemotherapy.[14,15] Aggressive surgical resection should be considered, taking into account the patient's age and the absence of distant metastases and lymphadenopathy.[16,17] In the present case, after six cycles of chemotherapy, the authors observed a positive response in the patient's sarcomatous mass, and they were able to successfully perform a prostate resection.[18]

In most reported cases, the preferred treatment method entails radical surgical resection, combined with radiotherapy and chemotherapy tailored to the tumor's specific characteristics.[1,3,5,6] In the present case, the patient successfully underwent surgical resection of the prostate with notable tolerance. Subsequent follow-up examinations revealed an absence of any patient-reported complaints, indicating a favorable postoperative course.

Conclusion

Diagnosing and treating synovial sarcoma of the prostate is challenging due to nonspecific clinical and radiological data, low incidence, and rarity. Treatment decisions are based on tumor extent, staging, and risk-benefit analysis. Prognosis is generally unfavorable with a relatively short survival time. Surgical resection is a viable option, while the benefits of chemotherapy are still undetermined. More cases are needed to establish a better diagnosis and treatment plan.

References

1. Hou D, Wang X, Xia Q & Zong Y. Primary prostate synovial sarcoma: A case report and review of literature. Int J Surg Case Rep 2022; 96: 107265. https://doi.org/10.1016/j.ijscr.2022.107265
2. Ehsanullah S, Rashid SZ, Haq A & Ehsanullah SA. A rare case of synovial sarcoma of the prostate causing urinary retention. Cureus. https://doi.org/10.7759/cureus.21057
3. Emadi Torghabe A, Ebrahimi R & Pishevar Feizabad Z. Primary synovial sarcoma of the prostate: A case report and literature review. Clin Case Rep 2022; 10(10). https://doi.org/10.1002/ccr3.6394
4. Jun L, Ke S, Zhaoming W, Linjie X & Xinru Y. Primary synovial sarcoma of the prostate: report of 2 cases and literature review. Int J Surg Pathol 2008;16(3): 329–34. https://doi.org/10.1177/1066896907309575
5. Olivetti L, Benecchi L, Corti S, Del Boca C, Ferrari M, Sergio P, Bercich L & Tanzi G. Monophasic synovial sarcoma of prostatic fascia: Case report and literature review. Case Rep Urol 2015; 1–5. https://doi.org/10.1155/2015/419180
6. Shirakawa T, Fujisawa M, Gotoh A, Okada H, Arakawa S & Kamidono S. Complete resection of synovial sarcoma of prostatic fascia. Urology 2003; 61(3): 644. https://doi.org/10.1016/s0090-4295(02)02373-7
7. Choong P. Soft tissue sarcoma: New paradigms in care. Sarcoma 2012; 1–1. https://doi.org/10.1155/2012/439208
8. Iwasaki H, Ishiguro M, Ohjimi Y, Ikegami H, Takeuchi T, Kikuchi M, Kaneko Y & Ariyoshi A. Synovial sarcoma of the prostate with t(X;18)(p11.2;q11.2). Am J Surg Pathol 1999; 23(2): 220–6. https://doi.org/10.1097/00000478-199902000-00012
9. Williams DH, Hua VN, Chowdhry AA, Laskin WB, Kalapurakal JA, Dumanian GA & Dalton DP. Synovial sarcoma of the prostate. J Urol 2004; 171(6 Pt 1), 2376. https://doi.org/10.1097/01.ju.0000125319.92634.9b

10. Partin AW, Dmochowski RR, Kavoussi LR & Craig AP. (2021). Campbell-Walsh-Wein Urology. Elsevier
11. Salih FM, Rasti Karim Mama, Sami Saleem Omar, Hawro Taha Hamza, Isaac RH, Salih J & Layth Mula-Hussain. Prostatic stromal sarcoma – Management course of a rare presentation: A case report. Curr Probl Cancer Case Rep 100221–100221. https://doi.org/10.1016/j.cpccr.2023.100221
12. Cheng YC, Wang JH, Shen SH, Chang YH, Chen PCH, Pan CC, Ko SC & Chang CY. MRI findings of prostatic synovial sarcoma. Br J Radiol 2007; 80(949): e15-18. https://doi.org/10.1259/bjr/23845930
13. Mankin HJ & Hornicek FJ. Diagnosis, classification, and management of soft tissue sarcomas. Cancer Control 2005; 12(1): 5–21. https://doi.org/10.1177/107327480501200102
14. Ratan R & Patel SR. Chemotherapy for soft tissue sarcoma. Cancer 2016; 122(19): 2952–60. https://doi.org/10.1002/cncr.30191
15. Gounder M. Soft tissue sarcoma treatment protocols: Treatment protocols. EMedicine 2024. https://emedicine.medscape.com/article/2007168-overview?form=fpf
16. Musser JE, Assel M, Mashni JW, Sjoberg DD & Russo P. Adult prostate sarcoma: The Memorial Sloan Kettering experience. Urology 2014; 84(3): 624–8. https://doi.org/10.1016/j.urology.2014.05.036
17. National Comprehensive Cancer Network. (n.d.). Prostate Cancer Advanced Stage. https://www.nccn.org/patients/guidelines/content/PDF/prostate-advanced-patient.pdf
18. Smith JA, Howards SS, Preminger GM, Dmochowski RR & Hinman F. (2019). Hinman's Atlas of Urologic Surgery. Elsevier.