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EDITORIAL

Urinary tract infections and other healthcare-associated infections: a medical-administrative perspective

Infecciones del tracto urinario y otras infecciones asociadas a la atención médica: una perspectiva médico-administrativa

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Over the past three decades, advances in medicine have increased the opportunity to offer cutting-edge treatments for previously fatal conditions. At present, the use of immunosuppressant drugs, prostheses, and highly complex surgery has also brought consequences that, to some extent, have spiraled out of control. Healthcare-associated infections (HAIs) are one of the major problems. Several microorganisms are involved and can primarily affect the respiratory tract, the urinary tract, the bloodstream, and surgical wounds. Among the most relevant microorganisms of the last decade is *Acinetobacter baumannii*[1], for which outbreaks have been reported worldwide[1]. This pathogen is found on surfaces such as examination tables, medical instruments, and even handwashing areas[1]. The transmission mechanism from patient to patient is through contact, that is, when a healthcare worker handles an infected patient and subsequently handles another patient without proper hand hygiene[1]. This microorganism is specifically mentioned because it is considered by several researchers in the field of public health to be a real threat. This is due to its high virulence and its ability to develop resistance to broad-spectrum antibiotics such as fourth-generation cephalosporins, carbapenems, and glycopeptides[2,3]. This is only the beginning of the problem, since once a multidrug-resistant infection is present, the only option is the use of colistin. This drug is currently scarce and expensive[2]. Therefore, in many cases, healthcare systems do not have access to the drug due to shortages or a lack of economic resources, which increases the specific mortality rate. The scenario can worsen even further when *A. baumannii* and other HAI-related agents such as *Escherichia coli* become resistant to colistin[2,5].

HAIs are a global public health problem. In developed countries, the frequency of HAIs is reported at < 10%[6]. The difference lies in timely notification, forecasting, and measuring outcomes. In some hospitals, HAIs can represent a significant percentage of the annual budget, due to prolonged stays (days/patient), associated morbidity, and a high probability of outbreaks. Therefore, it is necessary to improve measurement and monitoring mechanisms to prevent HAIs.

The main difficulty lies in three key areas: the lack of timely notification, antibiotic resistance, and the costs generated for the healthcare sector. When HAIs are reported late, patients tend to experience complications, increasing length of stay, morbidity, and mortality. The cascade of problems intensifies when HAI-related microorganisms become multidrug-resistant, increasing hospital stays and multiplying mortality by up to 50%[4].

A work plan could efficiently measure the data generated from epidemiological research and improve the system to guarantee the protection of patients and

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institutional staff. To establish health plans and strategies, a thorough diagnosis is necessary to objectively understand the current situation. Having hard data makes it easier to establish robust plans and strategies for disease prevention, protecting healthcare personnel, and optimizing resources. The proposal includes the formation of working networks -that is, critical masses of thought- for developing projects related to epidemiological research. By integrating multidisciplinary teams and internal and external advisory boards, it is more feasible to achieve high-quality projects and, consequently, better plans with enormous potential for solving problems. This is all based on the Official Standards of the Federation[6,7], institutional regulations, and, as a highly relevant complement, the recommendations issued by international bodies such as the United Nations and the World Health Organization, among others.

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ORIGINAL ARTICLE

Predictive factors for success of ultrasound-guided percutaneous nephrolithotomy

Factores predictivos de éxito de la nefrolitotomía percutánea guiada por ultrasonido

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Abstract

Background: *Given the cumulative harmful effects of radiation over time, the use of alternative imaging modalities to safely guide percutaneous nephrolithotomy (PCNL) has become increasingly relevant.* **Objective:** *The objective of this study was to identify clinical and radiographic factors that predict the success of ultrasound-guided PCNL (USG-PCNL), defined as a stone-free state.* **Materials and methods:** *This retrospective study included 115 patients treated with USG-PCNL between January 2021 and November 2022. Clinical and nephrolithometric variables obtained from computed tomography were analyzed. The association between these variables and residual stone burden was evaluated using multiple linear regression and receiver operating characteristic (ROC) curve analysis.* **Results:** *Stone-free status was achieved in 73% of patients. Residual stones were significantly associated with a stone burden > 3290 mm^3 (OR: 6.0) and involvement of ≥3 renal calyces (OR: 4.9). Multivariate analysis and ROC curves showed good predictive power (area under the curve: 0.765 and 0.791, respectively). The Guy's grading system and STONE score were correlated with higher residual stone burden, especially in Guy's Grade IV cases.* **Conclusions:** *Stone burden and the number of affected calyces were the main predictors of success in USG-PCNL. Pre-operative evaluation tools can enhance patient selection and surgical planning, potentially optimizing clinical outcomes and reducing complications.*

Keywords: *Percutaneous nephrolithotomy. Ultrasound-guided. Residual stones. Complications.*

Resumen

Antecedentes: *Dado el efecto acumulativo y perjudicial de la radiación a lo largo del tiempo, el uso de modalidades de imagen alternativas para guiar de forma segura la nefrolitotomía percutánea (PCNL) se ha vuelto cada vez más relevante.* **Objetivo:** *Identificar los factores clínicos y radiográficos que predicen el éxito de la nefrolitotomía percutánea guiada por ultrasonido (USG-PCNL), definido como ausencia de cálculos residuales.* **Materiales y métodos:** *Este estudio retrospectivo incluyó a 115 pacientes tratados con USG-PCNL entre enero de 2021 y noviembre de 2022. Se analizaron variables clínicas y nefrolitométricas obtenidas mediante tomografía computarizada. La asociación entre estas variables y la carga litiásica residual se evaluó mediante regresión lineal múltiple y análisis de curvas ROC.* **Resultados:** *Se logró estado libre de cálculos en el 73% de los pacientes. La presencia de cálculos residuales se asoció significativamente*

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con una carga litiásica superior a 3,290 mm³ (OR: 6.0) y la afectación de tres o más cálices renales (OR: 4.9). El análisis multivariado y las curvas ROC mostraron un buen poder predictivo (AUC: 0.765 y 0.791, respectivamente). El sistema de clasificación de Guy y el puntaje STONE se correlacionaron con una mayor carga de cálculos residuales, especialmente en los casos de grado 4 de Guy. **Conclusiones:** *La carga litiásica y el número de cálices afectados fueron los principales predictores de éxito en la USG-PCNL. Las herramientas de evaluación preoperatoria pueden mejorar la selección de pacientes y la planificación quirúrgica, optimizando potencialmente los resultados clínicos y reduciendo las complicaciones.*

Palabras clave: *Nefrolitotomía percutánea. Guiada por ultrasonido. Cálculos residuales. Complicaciones*

Introduction

Percutaneous nephrolithotomy (PCNL) is the treatment of choice for large and complex renal stones[1]. Predictive factors for PCNL success have been previously described, identifying stone characteristics and a history of prior surgeries as the main predictors; however, those studies were conducted using fluoroscopic guidance[2]. The harmful effects of radiation exposure on both the surgeon and surgical team, as well as on the patient, are well known[3], making the use of alternative techniques that significantly reduce or eliminate radiation exposure increasingly important.

Ultrasound-guided (USG) renal access reduces radiation exposure without compromising clinical outcomes[4] and offers several advantages over fluoroscopic guidance[5]. As our experience increased, we transitioned in 2021 to performing fully USG-PCNL.

A thorough analysis of each case is essential to provide patients with the best surgical option. Therefore, identifying patient-related and stone-related factors that influence treatment outcomes, including complication risk and treatment success, is essential[6-8].

The objective of this study was to evaluate the clinical and radiographic factors that predict the success of USG-PCNL.

Materials and methods

This was a retrospective study that reviewed the medical records of patients with renal stones treated with USG-PCNL from January 2021 to November 2022, with approval by the Research and Ethics Committee No. 1001, under institutional registry number R-2022-1001-060. Inclusion criteria: age > 18 years and complete post-operative follow-up records. Exclusion criteria included coagulopathies, untreated urinary tract infections at the time of surgery, and pregnancy.

Surgical technique

Most patients underwent surgery in the supine position, allowing both antegrade and retrograde access to the urinary tract. A 5 Fr occlusion catheter was initially placed for irrigation and to generate artificial hydronephrosis. In prone procedures, the catheter was placed before repositioning. A 3.5 MHz convex transducer (BK Medical Flex Focus 400, Denmark) was used in all cases, with appropriate machine settings (depth, focus, gain, and dynamic range) to ensure optimal image quality. Renal access was obtained using an 18 Fr echogenic needle (EchoTip, Cook). Tract dilation was performed using a two-step technique, totally USG, as previously described[9].

Patients were divided into two groups: Group 1 – residual lithiasis, and Group 2 – stone-free. A low-dose non-contrast computed tomography (CT) scan was performed 1 month postoperatively to assess stone-free status. Stones ≤ 4 mm were considered clinically insignificant and classified as stone-free. Complications were recorded using the modified Clavien-Dindo classification[10].

Statistical analysis

Quantitative variables are expressed as means ± standard deviation and were analyzed using Student's t-test. Qualitative variables are expressed as frequencies and percentages, analyzed with Chi-square tests.

Correlation analysis

Pearson correlation was used to assess the association between pre-operative clinical and nephrolithometric variables and residual stone burden after PCNL.

Multivariate analysis

To adjust for potential confounders, a multiple linear regression model was used with residual stone burden

in mm^3 as the dependent variable and clinical and radiographic variables as covariates. Odds ratios and 95% confidence intervals were calculated for stone-free status, and receiver operating characteristic (ROC) curve analysis was performed to determine the area under the curve (AUC). Statistical significance was set at $p < 0.05$. All analyses were performed using SPSS version 25.0.

Results

We included 115 patients, 56% were women, with a mean age of 48 ± 14 years. Approximately 60% had at least one comorbidity. A history of nephrectomy due to lithiasis was present in 3%, and 1.7% had a history of hyperparathyroidism. About half of the patients had undergone previous surgical treatment for renal stones (double J stent placement, endoscopic or open surgery). Prior PCNL and open surgery were recorded in 13% and 6% of cases, respectively. Radiographically, 49% had right stones, and 11% had bilateral stones. Stone locations included lower calyx (23%), multiple calyces (23%), incomplete staghorn (18%), and complete staghorn (19%). The mean stone burden was 9,034 ± 12,039 mm^3, with a mean stone density of 1,014 ± 344 HU. According to nephrolithometric scoring systems, 48.7% had complex stones, with a mean STONE score of 9.6 ± 1.4 (Table 1).

The kinds of PCNL included standard (24-30 Fr) in 87%, MiniPerc (16-18 Fr) in 7%, and Super MiniPerc (14 Fr) in 6%. Most surgeries (85%) were performed in the supine position. Pre-operative ultrasound without hydronephrosis in 57% of cases; 22% had Grade I, 18% Grade II, and 3% Grade III.

A stone-free rate of 73% was achieved. Post-operative complications were observed in 22% of patients. The most frequent were fever or bleeding that did not require transfusion (Clavien-Dindo I, 12%). One patient developed peroneal nerve injury requiring rehabilitation, and two underwent secondary ureteral stone surgery (Clavien-Dindo III). No Clavien-Dindo Grade IV or V occurred. No statistically significant differences were found in BMI, comorbidity rate, or surgical history between groups ($p = 0.46$, 0.62, and 0.6, respectively). Between CT-based lithometric variables, only stone burden differed significantly (6392 ± 8859 mm^3 in stone-free vs. 16,195 ± 16,158 mm^3 with residual stones; $p = 0.003$).

More residual stones are associated with higher Guy and Stone scores. 45% of patients with residual lithiasis were classified as Guy 4, compared to 8% in the stone-free group (Table 2). Patients with residual stones had longer operative times (172 ± 56 vs. 110 ± 44 min; $p < 0.001$).

Table 1. Clinical characteristics of patients

Characteristic	n = 115
Age, mean ± SD	48.4 ± 13.7
Female sex, n (%)	64 (55.7)
BMI (kg/m^2), mean ± SD	29.8 ± 6.5
Comorbidities, n (%)	68 (59.1)
Previous renal surgery, n (%)	51 (44.3)
Stone Location	
Lower calyx, n (%)	26 (22.6)
Multiple calyces, n (%)	26 (22.6)
Complete staghorn, n (%)	22 (19.1)
Incomplete staghorn, n (%)	21 (18.3)
Renal pelvis, n (%)	14 (12.2)
Upper calyx, n (%)	5 (4.3)
Middle calyx, n (%)	1 (0.9)
Stone burden (mm^3), mean ± SD	9,034 ± 12,039
Skin-to-stone distance (cm), mean ± SD	9.91 ± 2.16
Stone density (HU), mean ± SD	1,014 ± 433
Guy's Score	
Guy 1	37 (32.2)
Guy 2	22 (19.1)
Guy 3	35 (30.4)
Guy 4	21 (18.3)

BMI: body mass index; SD: standard deviation.

Correlation analysis showed statistically significant associations between residual stone burden and the number of calyces involved ($r = 0.21$, $p = 0.02$), total stone burden ($r = 0.20$, $p = 0.03$), and Guy score ($r = 0.22$, $p = 0.02$) (Table 3).

ROC curve analysis revealed AUC values of 0.765 for stone burden and 0.791 for the number of calyces involved. The optimal cutoff for stone burden was 3290 mm^3 (90% sensitivity, 57% specificity); for calyces involved, the cutoff was ≥ 3 (74% sensitivity, 70% specificity) (Fig. 1).

Multivariate analysis revealed that a stone burden exceeding 3290 mm^3 increased the risk of residual stones by up to 6 times. Involvement of three or more calyces increased the risk by nearly 4 times (Table 4).

Discussion

Stone burden and the number of affected calyces are the main predictors of stone-free status after PCNL.

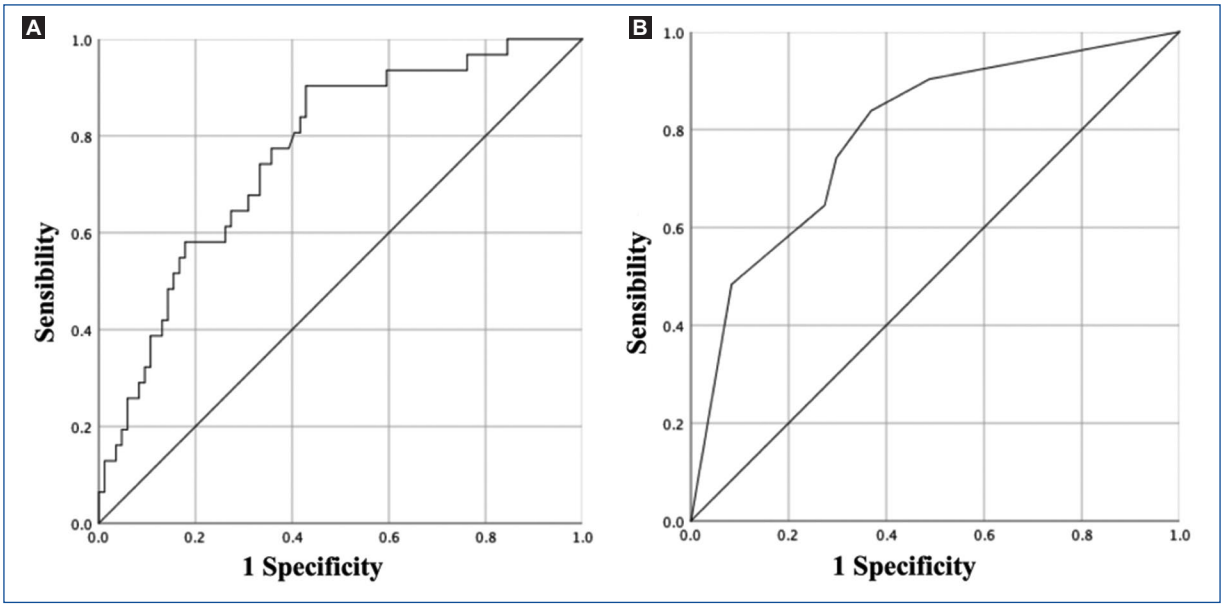

Figure 1. A: receiver operating characteristic (ROC) curve for stone burden > 3290 mm^3. **B:** ROC curve for ≥ calyces involved by stones. The area under the curve for stone burden and number of calyces was 0.765 and 0.791, respectively. Higher values may increase the risk of residual stones.

Table 2. Comparison of CT variables

Characteristic	Residual stones (n = 31)	Stone-free (n = 84)	p
Stone burden (mm^3), mean ± SD	16,195 ± 16,158	6,392 ± 8,859	0.003
Stone density (HU), mean ± SD	1,104 ± 346	981 ± 340	0.09
Skin-to-stone distance (CT), mean ± SD	10.3 ± 2.3	9.8 ± 2.1	0.28
Renal dilation present, n (%)	16 (51.6)	33 (39.3)	0.24
Guy's Score Guy 1 Guy 2 Guy 3 Guy 4	 2 (6.5) 3 (9.7) 12 (38.7) 14 (45.2)	 35 (41.7) 19 (22.6) 23 (27.4) 7 (8.3)	< 0.001
STONE Score, mean ± SD Score 8 Scores 9-10 Scores 11-12	10.4 ± 1.1 2 (6.5) 12 (38.7) 17 (54.8)	9.3 ± 1.3 21 (25) 50 (59.5) 13 (15.5)	< 0.001 < 0.001

BMI: body mass index; SD: standard deviation; CT: computed tomography.

Table 3. Correlation of residual stone burden with clinical and tomographic variables

Characteristic	r	p
BMI	–0.04	0.65
Number of involved calyces	0.21	0.02
Skin-to-stone distance	–0.03	0.72
Stone burden (mm ≥)	0.20	0.03
Stone density (HU)	0.08	0.42
Renal dilation	–0.06	0.65
Guy's Score	0.22	0.02
STONE Score	0.17	0.07

BMI: body mass index.

Several predictors of post-PCNL success have been identified, including stone burden, number and location of stones, Hounsfield units, skin-to-stone distance, BMI, and renal anatomical variants[11,12]. No single predictor has proven independently conclusive; thus, composite scoring systems are frequently used.

Thomas et al. introduced the Guy's Stone Score to predict surgical outcomes based on stone number, location, and calyceal anatomy[13]. Unlike their findings, renal dilation and calyceal anatomical variants were not statistically significant predictors in our cohort, possibly due to the low proportion of patients with moderate-to-severe hydronephrosis. However, consistent with Thomas et al., 67% of patients with residual stones

Table 4. Factors associated with residual stones in patients undergoing USG-PCNL (logistic regression analysis)

Variable	OR	95% CI	p	OR (stepwise)	95% CI (stepwise)	p (stepwise)
Stone burden > 3,290 mm	6.06	1.46-25.18	0.013	6.75	1.77-25.78	0.005
≥ 3 involved calyces	5.58	1.10-28.26	0.038	4.56	1.46-14.20	0.009
Stone density (HU)	1.0	0.99-1.003	0.20	Not included		
Skin-to-stone distance	1.10	0.87-1.39	0.42	Not included		
Renal dilation	2.02	0.72-5.65	0.18	Not included		

USG-PCNL: ultrasound-guided percutaneous nephrolithotomy; OR: odds ratio, CI: confidence interval

were classified as Guy 4, compared to 33% in the stone-free group. The highest stone-free rates occurred in Guy 1-2 cases, and Guy scores correlated directly with residual stone burden.

Rashid et al. also supported the predictive value of the Guy's score, finding stone-free rates of 100% and 96% for Grades I and II, and 80% and 67% for Grades III and IV, respectively[14].

The STONE nephrolithometry score incorporates imaging parameters with good predictive performance[11]. In our study, unlike Okhunov's, all patients underwent pre-operative non-contrast CT for detailed stone evaluation. While the STONE score showed only a trend toward correlation with residual burden, the most reliable predictors were stone burden and the number of involved calyces – consistent with the validation study of the STONE score.

Renal stone burden is a well-established predictor of PCNL success, as confirmed in multiple prior studies[15-17]. The use of simplified pre-operative evaluation tools is valuable for guiding clinical and therapeutic decisions in patients undergoing USG-PCNL. Our findings support the direct association between higher stone burden and residual lithiasis.

Study limitations include its retrospective, single-center design with procedures performed by a single surgeon. Future multicenter studies will help validate and strengthen our findings.

Conclusion

Stone burden and the number of involved calyces were the primary predictors of stone-free status following PCNL. These findings may help inform patients undergoing this procedure more effectively and aid in identifying those who may require additional interventions to achieve complete stone clearance.

Funding

None.

Conflicts of interest

The authors declare that they have no conflicts of interest.

Ethical considerations

Protection of humans and animals. The authors declare that no experiments involving humans or animals were conducted for this research.

Confidentiality, informed consent, and ethical approval. The authors have followed their institution's confidentiality protocols, obtained informed consent from patients, and received approval from the Ethics Committee. The SAGER guidelines were followed according to the nature of the study.

Declaration on the use of artificial intelligence. The authors declare that no generative artificial intelligence was used in the writing of this manuscript.

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ORIGINAL ARTICLE

Somatic-type malignancy transformation in testicular germ cell tumors

Transformación somática maligna de los tumores de células germinales de testículo

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Abstract

Background: *Germ cell tumors (GCTs) are the most common testicular neoplasms. Although they have a good prognosis, malignant somatic transformation (MST) is an infrequent but aggressive complication.* **Materials and methods:** *An observational, longitudinal, analytical study was conducted, reviewing the medical records of male patients over 15 years old with GCT who were treated between 2024 and 2025.* **Results:** *MST was identified in a small group of cases, with localization in the testicle and retroperitoneum. The most common histologic type was embryonal neuroectodermal.* **Discussion:** *MST is resistant to targeted schemes such as BEP. The need for complete surgical resection and subtype-specific chemotherapy was highlighted.* **Conclusions:** *MST requires an aggressive multimodal treatment approach to achieve better outcomes. Strategies for detection and treatment should be improved.*

Keywords: *Somatic transformation. Testicle. Cancer.*

Resumen

Antecedentes: *Los tumores de células germinales (TCG) son las neoplasias testiculares más comunes. Aunque tienen buen pronóstico, la transformación somática maligna (TSM) es una complicación infrecuente pero agresiva.* **Materiales y métodos:** *Estudio observacional, longitudinal, analítico basado en la revisión de expedientes de pacientes masculinos mayores de 15 años con TCG tratados entre 2024 y 2025.* **Resultados:** *Identificación de TSM en un pequeño grupo de casos, con localización en testículo y retroperitoneo. El tipo más común fue neuroectodérmico embrionario.* **Discusión:** *La TSM es refractaria a esquemas dirigidos como BEP. Se destacó la necesidad de resección quirúrgica completa y quimioterapia específica según el subtipo.* **Conclusiones:** *La TSM requiere un manejo agresivo multimodal para lograr mejores desenlaces. Se deben mejorar las estrategias de detección y tratamiento.*

Palabras clave: *Transformación somática. Testículo. Cáncer.*

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Introduction

Germ cell tumors (GCTs) are the most common testicular neoplasm in young men, accounting for approximately 95% of all testicular tumors. Although most of these tumors have a favorable prognosis with established chemotherapeutic and surgical treatments, a rare but clinically significant complication is somatic malignant transformation (SMT) within GCTs[1]. This transformation involves the development of a malignant non-germ cell component, such as sarcomas, carcinomas, or neuroectodermal neoplasms. It has been associated with more aggressive clinical behavior, resistance to conventional treatment, and a worse prognosis.

Somatic transformation (SDT) occurs in a small percentage of patients with testicular GCTs, estimated at between 2% and 6% of cases. However, variability in diagnostic methodology, follow-up, and the lack of standardized registries make it difficult to establish a precise and generalizable prevalence. Furthermore, current medical literature contains discrepancies regarding its histopathological definition, predisposing factors, and clinical characteristics, which limit its early identification and appropriate therapeutic approach[2].

Given the clinical importance of recognizing this transformation, it is essential to understand its true frequency and histopathological spectrum within GCTs in different hospital or population settings. The absence of local or regional studies evaluating the prevalence and spectrum of SDT in testicular GCTs prevents us from fully understanding the scope of the problem and developing more specific detection, follow-up, and treatment strategies. Conducting this study to determine the spectrum and prevalence of SMT in testicular GCTs will generate fundamental epidemiological information to understand the magnitude of this phenomenon in our setting, identify potential associated risk factors, and contribute to the development of more appropriate diagnostic and therapeutic protocols. Furthermore, it will provide evidence that could support the inclusion of more rigorous surveillance strategies in patients with mixed GCTs or those with teratomatous elements, who are considered at higher risk for this transformation. In this sense, our research will not only fill an important gap in national knowledge about testicular tumors but will also have a potential impact on improving clinical outcomes and the quality of oncological follow-up in young patients.

Materials and methods

Objectives

General

This study aims to determine the prevalence and histopathological spectrum of SMT in patients with testicular GCTs at a high-volume specialized hospital.

Specific

- To identify the most frequent histological type of SMT in testicular GCTs
- To describe the clinical and demographic characteristics of patients with somatic cell tumors (SCTs), including age, clinical stage, and oncological history
- To evaluate the association between the type of primary SCT and the presence of SDT
- To analyze the oncological treatments received by patients with SCTs and their relationship to clinical outcomes.

Study description

A retrospective review of electronic medical records of patients admitted between January 2024 and June 2025 was conducted. Patient records were identified in the institution's databases. Subsequently, the medical histories of these patients were reviewed, each was then assigned a code, and data were collected using a virtual data collection form prepared in Excel 2021.

Study type

Observational, longitudinal, and analytical study.

Selection criteria

Inclusion

The following records will be included:

- Male patients with a histopathologically confirmed diagnosis of testicular germ cell tumor
- Cases treated and/or registered in the Urology Oncology Service between 2024 and 2025
- Patients with complete clinical and histopathological information available in physical or electronic records
- Patients older than 15 years at the time of diagnosis.

Exclusion

- Patients with testicular tumors of non-germ cell origin
- Cases whose histopathology does not allow for a definitive determination of the presence or absence of malignant somatic transformation (MST)
- Patients with extragonadal GCTs without evidence of primary testicular involvement
- Patients with incomplete information on treatments or without the minimum clinical follow-up required to evaluate outcomes.

Statistical analysis

Descriptive statistics were used to summarize quantitative variables such as age, time to treatment, and survival, expressed as mean and standard deviation or median and interquartile range, depending on their distribution. Qualitative variables such as tumor type, presence of MST, and histological type will be presented as absolute frequencies and percentages. The prevalence of MST will be calculated as a proportion of all testicular GCTs, with its corresponding 95% confidence interval. To explore associations, Chi-square tests were applied using Statistical Package for the Social Sciences version 20.1.

Ethical statement

The Institutional Internal Ethics Committee II, the Institutional Review Board, of the Centro Medico Nacional, Siglo XXI Hospital, states that all procedures performed in this study involving human participants were in accordance with the ethical standards of the Institutional Ethics Committee and with the 1964 Declaration of Helsinki and its subsequent amendments or comparable ethical standards.

Results

Based on the data obtained in this investigation, a total of six patients presented with MST of testicular GCTs at the Hospital of the Centro Medico Nacional Siglo XXI, yielding a true prevalence in the population between 0.416% and 3.58%, with a 95% confidence level. Patients with SMT had a mean age at diagnosis of 21.8 years (19.1-24.5 years, 95%) ± 2.5 years.

Regarding the type of tumor in the retroperitoneum, the most frequent type was mature teratoma, representing 33.3% of all cases. The remaining tumors each represented 16.7%, with one case per tumor. Histopathological analysis was performed using immunohistochemistry, yielding the following representative histological sections (Fig. 1).

The clinical stage at diagnosis was PT2 N3 M0 S0 in 33.3% of patients, equivalent to two cases. The other clinical stages each represented 16.7%, equivalent to one patient (Fig. 2).

Regarding the initial treatment received, we observed that the majority of patients underwent right radical orchiectomy, with four patients representing 66.7% of the total cases, whereas left radical orchiectomy was performed in the remaining 33.3%.

On the other hand, when observing the site of metastasis at the time of diagnosis, we found that the most frequent location was the retroperitoneum, with 50% of patients. Retroperitoneum and duodenum, retroperitoneum and lung, as well as absence of metastasis, each represented 16.7%, equivalent to one case each (Fig. 3).

Figure 4 shows the types of MST, with embryonal neuroectodermal being the predominant type, accounting for 50% of the total. Moderately differentiated adenocarcinoma, chondrosarcoma, and biphasic synovial sarcoma each represented 16.7% of the total malignant transformations.

Following treatment, an evaluation of the response to cancer therapy was performed. A total of 83.3% of patients showed a partial response, whereas only 1 patient (16.7%) achieved a complete response. The main sites of somatic tumors were equally distributed, with 50% in the retroperitoneum and 50% in the right testicle.

The most common chemotherapy regimen was BEP, composed of bleomycin, etoposide, and cisplatin, which was administered to 33.3% of the patients. The other regimens, such as BEP + capecitabine + oxaliplatin, BEP + doxorubicin + ifosfamide, and platinum, were used in 16.7% of cases each (Fig. 5). Finally, regarding the clinical stage of TSM at diagnosis, we observed in Figure 6 that clinical stage IIC was the most frequent, representing 33.3% of all patients. The remaining stages (IB, IIB, IIIA, and IIIC) each represented 16.7% (Fig. 6).

Discussion

MST in testicular GCTs is a rare phenomenon, with international literature estimating that it occurs in approximately 3-6% of metastatic GCTs, a similar proportion to that reported in Mexican series[1]. It generally originates from a teratomatous component, which is

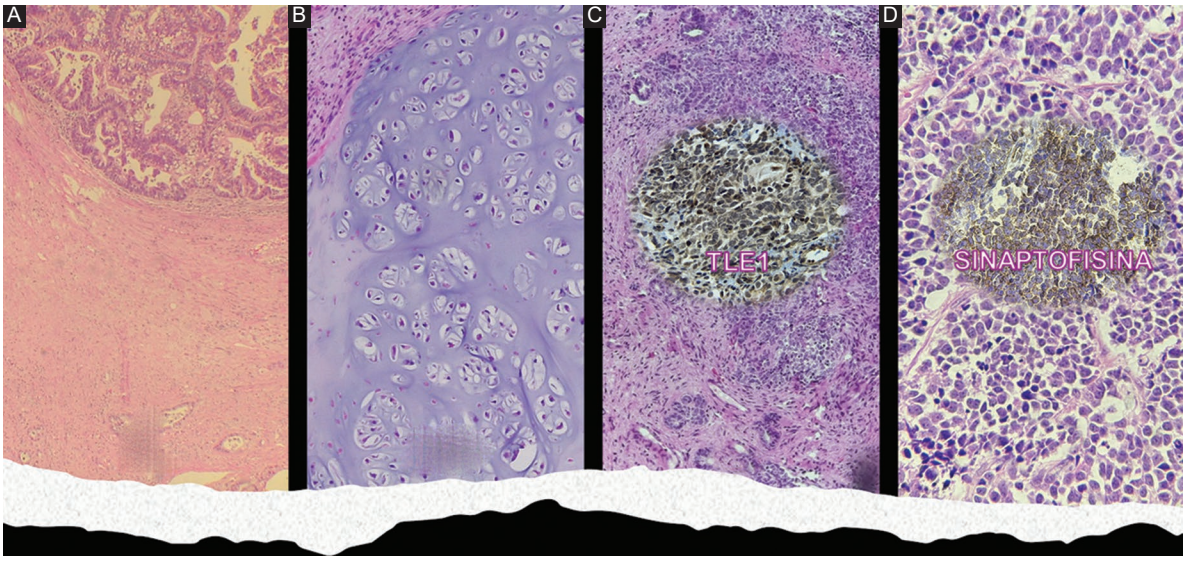

Figure 1. Histopathological spectrum of TSM. **A:** adenocarcinoma: malignant epithelial neoplasm with an intestinal appearance, characterized by glands with architectural atypia. **B:** chondrosarcoma: malignant chondroid neoplasm originating from a mature teratoma. **C:** synovial sarcoma: malignant spindle cell mesenchymal neoplasm. TLE1 +. **D:** embryonic-type neuroectodermal: neoplasm with a sheet-like arrangement and nest formation, with the presence of pseudorosettes. Synaptophysin +.

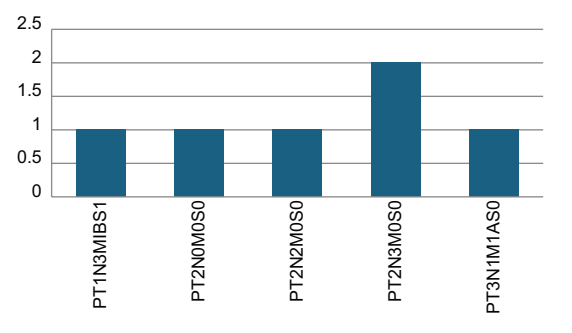

Figure 2. Clinical stage.

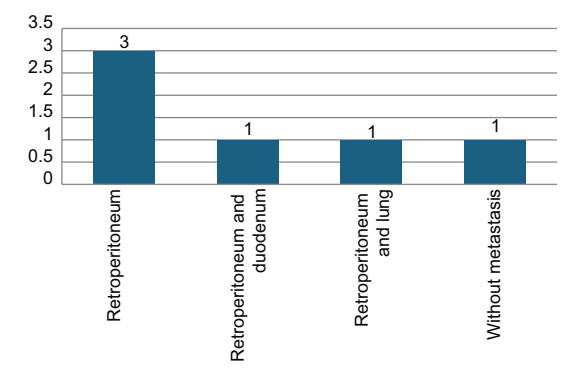

Figure 3. Sites of metastasis at diagnosis.

why some authors refer to it as a teratoma with malignant transformation[2]. However, the histological subtypes described are highly varied, with sarcomas predominating in international reports, especially rhabdomyosarcoma and chondrosarcoma, followed by adenocarcinomas and other carcinomas, as well as primitive neuroectodermal tumors (PNETs)[1,3]. For example, Hwang et al. analyzed 63 cases and found 21 carcinomas, predominantly adenocarcinomas, 21 sarcomas, and 15 PNETs. Of these, sarcomas were the most frequent in the testicular site, while carcinomas predominated in metastases. In the national literature, García-Labastida et al. described nine cases with TSM and observed that the most common malignant component was chondrosarcoma[1,3].

In our study, an uncommon histological component also predominated, since 50% of the cases presented with primitive neuroectodermal tumor, and the remaining cases corresponded to a biphasic synovial sarcoma, a chondrosarcoma, and an adenocarcinoma. This distribution differs somewhat from the usual pattern, given that in other Mexican and international series, the occurrence of PNETs is generally lower compared to classic sarcomas and secondary adenocarcinomas[1,3].

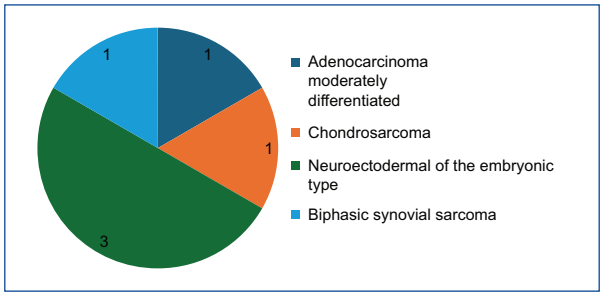

Figure 4. Type of malignant somatic transformation.

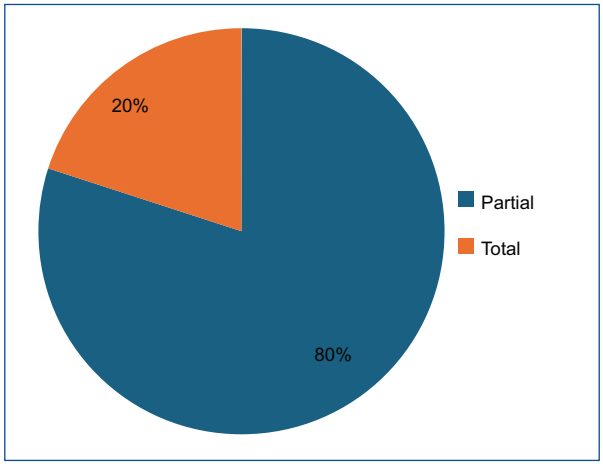

Figure 5. Evaluation of treatment response.

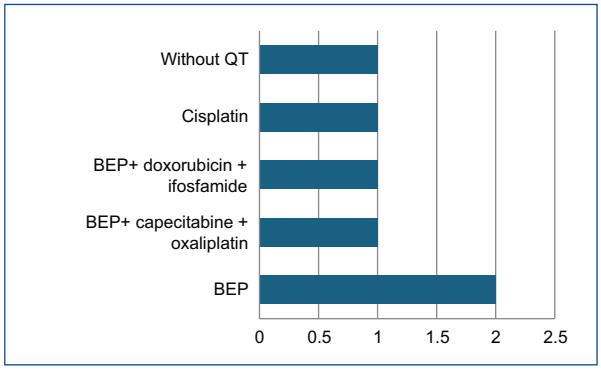

Figure 6. Chemotherapeutic regimen used.

However, our finding highlights the heterogeneity of testicular tumors (TTS), which can originate from any of the three germ cell lines[4]. TTS can manifest in both the primary testicular tumor and metastatic lesions. In our case, the most frequent location was the retroperitoneum and the testicle, with the right side always being affected testicularly. This is consistent with the metastatic nature of many teratomas, since in other series, the most common metastatic location was the retroperitoneum, followed to a lesser extent by the pelvis, lung, peritoneum, pleura, vertebrae, etc. In the study by Hwang et al., for example, the retroperitoneum hosted 25 of 41 metastatic cases with TTS, whereas other sites were much less frequent[3]. Similarly, clinical series describe that the disease usually presents initially as a testicular mass, given that most GCTs originate in the testicle, and that symptoms secondary to metastasis appear mainly in post-pubertal patients with disease progression[1].

Regarding the initial management of testicular GCTs, radical orchiectomy is the recommended approach, and in our series, all patients received this treatment, consistent with international guidelines, which indicate that complete surgical resection of the primary tumor is essential. However, unlike teratomas without transformation, GCTs are often refractory to standard chemotherapy for GCTs. Cárdenas-Perilla et al. emphasize that complete surgical resection with negative margins is the gold standard in these cases, associated with a significant improvement in survival[5]. In addition, authors recommend supplementing treatment with chemotherapy regimens targeted to the identified somatic subtype, since cisplatin/etoposide (BEP)-based regimens have limited efficacy in monomorphic somatic tumors[5]. For example, Donadio et al. treated 10 patients with monomorphic somatic tumors using specific chemotherapy and observed partial responses in seven of 10 patients[5], consistent with our report, where most patients responded only partially to the administered cancer treatments, reflecting the difficulty of achieving complete tumor responses. These local data are comparable to international series where complete responses are exceptional; therefore, current evidence suggests that, in addition to adjuvant chemotherapy, resection of residual metastatic disease is crucial for achieving durable control, since previous studies have shown that patients undergoing extensive surgery for metastases had higher disease-free rates, whereas the absence of resection is associated with a worse prognosis[1-5]. Metastatic testicular tumors (MTCTs) confer a worse prognosis than conventional GCTs, since, in general, 5-year survival rates in patients with MTCTs range from 35 to 60%, much lower than the > 80% of GCTs sensitive to standard treatment. For example, the study by Sharma et al. reported an overall 5-year survival rate of 47% in 30 patients with MTCTs, a figure that fell to 37% in those with a primary testicular tumor diagnosed at advanced stages[6]. Similarly, Hwang et al. found that when testicular tumors were confined to the testis, the 5-year survival rate was 87%, but only 35%

when metastatic disease was present[3]. Even the histological subtype of the testicular tumor influences survival, as in the same study, patients with a malignant carcinomatous component had a 5-year survival rate of only 17%, compared to 77% for sarcomas and 73% for PNET. These results are consistent with previous findings that approximately 50% of metastatic cases with testicular tumors result in death, compared to 5% when the transformation remains limited to the testis[2].

In our study, although follow-up is limited, the high rate of partial responses and the prevalence of metastatic disease suggest a high risk of progression. In particular, the single complete response indicates that most patients require additional treatment, which is consistent with the concept that MST is resistant to conventional therapies and has a poor prognosis. Therefore, aggressive surgical management of residual disease is associated with better long-term outcomes.

Conclusion

MST in testicular GCTs is an infrequent but clinically relevant entity, associated with worse prognoses and a lower response to conventional chemotherapy. In our center, we identified a predominance of the embryonic neuroectodermal subtype, with equal distribution between the testis and retroperitoneum, and a high rate of partial response to treatment. These findings are consistent with national and international literature, which emphasizes that MST occurs primarily in teratomas, with a predominance of sarcomatous and carcinomatous histologies, and the retroperitoneum being the most frequent metastatic site.

Comparison with previous studies reinforces the need for a multimodal approach, where radical orchiectomy is complemented by surgical resection of residual disease and, in selected cases, chemotherapy targeted to the histological subtype. However, survival rates remain lower than those observed in conventional GCTs.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

Funding

No specific funding was received for this work.

Ethical considerations

Protection of humans and animals. The authors declare that no experiments involving humans or animals were conducted for this research.

Confidentiality, informed consent, and ethical approval. The study does not involve patient personal data nor requires ethical approval. The SAGER guidelines do not apply.

Declaration on the use of artificial intelligence. The authors declare that no generative artificial intelligence was used in the writing of this manuscript.

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PERMANYER

ORIGINAL ARTICLE

Frequency of bladder emptying dysfunction in normal-weight women without pelvic organ prolapse who have urinary incontinence

Frecuencia de disfunción del vaciamiento vesical en mujeres de peso normal sin prolapso de órganos pélvicos que tienen incontinencia urinaria

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Abstract

Objective: *The objective of the study was to determine the frequency of bladder emptying dysfunction (BED) in women of normal weight without pelvic organ prolapse (POP) who have diagnosis of urinary incontinence (UI).* **Material and methods:** *A cross-sectional study was conducted in patients with UI. Patients who underwent urodynamic testing for any medical indication were included in the study.* **Results:** *Seventy-six patients with a clinical diagnosis of UI who underwent urodynamic testing were identified. In 68.4% of the patients, the diagnosis of UI was confirmed by urodynamic testing, and 67.1% presented with voiding dysfunction. Etiologies observed as causes of UI included detrusor overactivity in 18.4% of patients, overflow in 17.1%, hypocontractility in 23.7%, and obstruction in 8.1%.* **Conclusion:** *More than two-thirds of patients with UI, of normal weight, without POP, presented with BED.*

Keywords: *Urinary incontinence. Women. Voiding dysfunction. Overactive bladder. Urodynamic.*

Resumen

Objetivo: *Determinar la frecuencia de disfunción del vaciamiento vesical en mujeres de peso normal sin prolapso de órganos pélvicos que tienen diagnóstico de incontinencia urinaria.* **Material y métodos:** *Se realizó un estudio transversal en pacientes con incontinencia urinaria. Se incluyeron pacientes a los que se les realizó prueba urodinámica por cualquier indicación médica.* **Resultados:** *Se identificaron setenta y seis pacientes con diagnóstico clínico de incontinencia urinaria a quienes se les realizó pruebas urodinámicas. En el 68.4% de los pacientes el diagnóstico de incontinencia urinaria se confirmó mediante pruebas urodinámicas y el 67.1% presentó disfunción miccional. Las etiologías observadas como causas de incontinencia urinaria incluyeron hiperactividad del detrusor en el 18.4% de los pacientes, desbordamiento en el 17.1%, hipocontractilidad en el 23.7% y obstrucción en el 8.1%.* **Conclusiones:** *Más de dos tercios de los pacientes con incontinencia urinaria, de peso normal, sin prolapso de órganos pélvicos, presentaron disfunción del vaciamiento vesical.*

Palabras clave: *Incontinencia urinaria. Mujeres. Disfunción miccional. Vejiga hiperactiva. Urodinámica.*

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Introduction

Bladder emptying dysfunction (BED)

The International Continence Society (ICS) and the International Urogynecological Association (IUGA) define BED as "abnormally slow and/or incomplete urination, based on both symptoms and urodynamic findings"[1].

BED is a common health problem in women and may be related to an abnormality in detrusor muscle activity. This makes BED a challenge in clinical practice, both in obtaining an accurate diagnosis and choosing the appropriate and best treatment[2].

The prevalence of BED, based on symptoms, ranges from 6% to 61%; however, 8-9% of women who present with lower urinary tract symptoms (LUTS) also report voiding and filling symptoms[1].

BED is associated with detrusor muscle abnormalities or outlet obstruction, resulting in myogenic or neurogenic damage. The main risk factors are age, obesity, hypertension, multiparity, hormonal status, alcohol consumption, medication use, abdominopelvic surgeries, constipation, gynecological history, and diabetes[3].

Pelvic organ prolapse (POP) is a common cause of bladder outlet dysfunction (BOD) due to bladder obstruction, and its prevalence increases with obesity, hysterectomy, previous pelvic surgery, diabetes, and advanced age[2,4,5].

Obesity increases intra-abdominal pressure and weakens the pelvic floor, promoting urinary incontinence (UI)[6]. POP also contributes to UI by decreasing support of the bladder neck and urethra; in severe cases, it can mask UI, so preoperative urodynamic evaluation is recommended[7,8].

The diagnosis of BOD requires a comprehensive and progressive approach, identifying risk factors and thoroughly evaluating symptoms. Since voiding and storage symptoms often coexist, diagnosis based solely on clinical presentation and physical examination is limited. Therefore, urodynamic and imaging studies are recommended for accurate assessment[9].

Urodynamics is the most accurate test for diagnosing the type of incontinence and voiding dysfunctions, such as urethral obstruction or detrusor hypotonia. It evaluates pressure, flow, and volume in the lower urinary tract, aiming to reproduce symptoms and correlate them with pathophysiological findings[10]. Urodynamics assesses the bladder storage and emptying phases using physiological parameters. The AUA and SUFU recommend it for women with suspected UI, candidates for surgery, or those with advanced POP without symptoms of UI[11]. Given that urodynamics involves certain risks, its necessity should be carefully evaluated. In uncomplicated cases, conservative treatment may be the first option before resorting to invasive studies[12].

The IPSS is a simple, reproducible, and inexpensive questionnaire for assessing LUTSs. Although designed for men, it has shown clinical validity in women for evaluating symptoms, treatment response, and BOD associated with urinary tract obstruction[13].

Management begins with patient education, explaining normal urinary function, treatment options, and common goals. Some patients may choose not to undergo treatment; the primary goal is to relieve symptoms and improve quality of life[14,15].

Treatment can be behavioral, pharmacological, catheter-based, or surgical. Behavioral management includes lifestyle changes and bladder training. The most commonly used medications are anticholinergics, α-blockers, and mirabegron, which relax the detrusor muscle and increases bladder capacity[2,16].

Catheterization can be used short-term, long-term, or through self-catheterization, promoting self-care. However, it should not be the first option due to its association with urinary tract infections, trauma and urethral stricture, stones, and chronic inflammation[17].

Finally, patients can always opt for surgery. The two most common procedures are intravesical electrostimulation and sacral neuromodulation[18].

Based on the above, the objective of this research is to determine the frequency of BED in women of normal weight without POP who have UI.

Methods

A cross-sectional study was performed after authorization from the local Health Research and Ethics authorities (R-2022-3606-035/COFEPRIS 17 CI 09-010-024). The electronic records of the patients selected from the study universe were reviewed (ECE IMSS® version 4.2.5-HOTFIX-1).

Statistical analysis included the description of the population using measures of central tendency, frequencies, and proportions. For regression, a crude analysis was used taking into account a significant value if $p < 0.05$. Statistical analysis was performed with EpiInfo version 7.2 (Centers for Disease Control and Prevention, Atlanta, GA, USA), Excel® (Microsoft, Redmond, WA, USA), and Open Epi (Open-Source Epidemiologic Statistics for Public Health, Bill and

Melinda Gates Foundation, Emory University, Atlanta, GA, USA).

Variables included for the study were: BED, UI, age, Q-max, voided volume, residual volume, voiding efficiency, detrusor pressure, detrusor pressure at q-max, maximum pressure

Results

A total of 76 patients with diagnosis of UI were included. A 100% of them underwent urodynamic testing with a clinical diagnosis of UI underwent urodynamic testing in a tertiary medical facility. The mean age of the patients studied was 56 ± 15 years. A proportion of 68.4% had a diagnosis confirmed by urodynamic testing. Of all the patients studied, 67.1% presented with voiding dysfunction. In Table 1, details are depicted.

The mean Qmax of the patients studied was 23.55 ± 11.81, the mean residual volume was 16.20 ± 17.51, and the mean voiding efficiency was 83.93 ± 17.48. The mean detrusor pressure was 23.76 ± 15.51, the mean detrusor pressure Qmax was 29.79 ± 17.88, and the mean maximum pressure was 30 ± 17.65. Table 2 shows voiding characteristics from the studied patients.

Among patients diagnosed with UI by urodynamics, 76.5% also had BED. In addition, 23.5% of patients had BED but did not present with UI as measured by urodynamics. Similarly, the mean Qmax in patients diagnosed with UI by urodynamics was 20.81 ± 9.8, the mean residual volume was 17.25 ± 17.81, and the mean emptying efficiency was 82.94 ± 17.76. The mean detrusor pressure was 22.63 ± 15.40, the mean detrusor pressure Qmax was 29.54 ± 18.83, and the mean maximum pressure was 29.85 ± 18.50. Details can be seen in Table 3.

Among patients with UI and voiding dysfunction, we observed etiologies such as detrusor overactivity in 18.4% of patients, overflow in 17.1%, hypocontractility in 23.7%, and obstruction in 8.1% as causes of UI, as is shown in Figure 1.

Finally, Table 4 shows the mean Qmax in patients with UI with and without BED.

Table 1. Patients with clinical urinary incontinence and voiding dysfunction

Patients with urodynamic UI	Urinary incontinence		
	(+)	(–)	Total
Voiding dysfunction			
(+)	39	12	51
(–)	13	12	25
Total	52	24	76

OR = 3.0%, 95% IC: 1.805-8.294.

Table 2. Voiding characteristics and diagnosis of urinary incontinence

Variable	n = 76 (%)	Min	Max
Age	56 ± 15	33	81
Urinary incontinence			
Yes	52 (68.4)		
No	24 (31.6)		
Voiding dysfunction			
Yes	51 (67.1)		
No	25 (32.9)		
Type of incontinence			
Detrusor overactivity	18 (18.4)		
Associated with retention	12 (17.1)		
Hypocontractility	13 (23.7) 8 (8.1)		
Qmax	23.55 ± 11.81	2	59
Residual volume	16.20 ± 17.51	0	85
Voiding efficiency	83.93 ± 17.48	15	100
Detrusor pressure	23.76 ± 15.51	2	85
Detrusor pressure Qmax	29.79 ± 17.88	2	94
Maximum pressure	30 ± 17.65	2	94

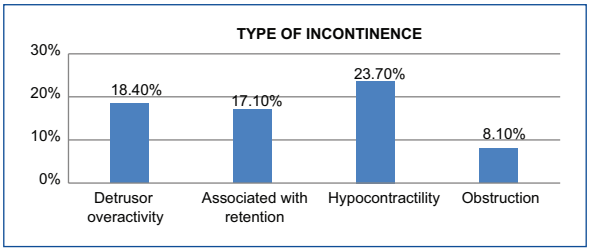

Figure 1. Etiologies observed in patients with urinary incontinence.

Discussion

Voiding dysfunction, according to the ICS and IUGA, is defined as abnormally slow and/or incomplete urination, based on both clinical symptoms and urodynamic findings[19]. At present, its association with UI has been identified, making it relevant for diagnosis, monitoring, and treatment[20,21]. Urodynamic testing (cystometry) evaluates bladder storage to determine the cause of UI and bladder emptying using a pressure-flow curve to rule out causes of dysfunctional voiding[22].

In 2012, Nager et al.[19] conducted a multicenter randomized trial in the United States in patients

Table 3. Voiding characteristics and voiding dysfunction in patients with urinary incontinence by urodynamics

Variable	n = 76 (%)	Urinary incontinence by urodynamics	
		Yes (%)	No (%)
Age	56 ± 15	55 ± 10	59 ± 22
Voiding dysfunction			
With dysfunction	51 (67.1)	38 (75)	13 (25)
Without dysfunction	25 (32.9)	13 (52)	12 (48)
Qmax	23.55 ± 11.81	20.81 ± 9.82	29.50 ± 13.67
Residual volume	16.20 ± 17.51	17.25 ± 17.81	13.92 ± 17
Voiding efficiency	83.93 ± 17.48	82.94 ± 17.76	86.08 ± 17
Detrusor pressure	23.76 ± 15.51	22.63 ± 15.40	26.17 ± 15.79
Detrusor pressure Qmax	29.79 ± 17.88	29.54 ± 18.83	30.33 ± 16.01
Maximum pressure	30 ± 17.65	29.85 ± 18.50	30.33 ± 16.01

Table 4. Mean Qmax in all patient groups studied

Patients with urodynamics	Urinary incontinence	
	(+)	(–)
Voiding dysfunction		
(+)	20.49 ± 9.4	20.81 ± 9.8
(–)	29.80 ± 13.7	29.50 ± 13.6

undergoing surgical procedures for UI. They compared symptoms at 12 months in two groups of patients: those who only had a preoperative clinical evaluation in the office versus those who had a preoperative urodynamic study.

Urodynamic testing is also relevant. Researchers used a 70% or greater reduction in the urogenital distress inventory-6 score and a "better" or "much better" response on the patient global impression of improvement survey to measure treatment success.

A total of 630 women were studied, randomly assigned to undergo either clinical evaluation in the office and urodynamic testing or clinical evaluation only (315 per group).

They found that the group of patients who underwent clinical evaluation and urodynamic testing had a 76.9% success rate in treatment compared to 77.2% in the group of patients who only underwent clinical evaluation. There were no significant differences between the groups in the variables of incontinence severity, quality of life, patient satisfaction, voiding dysfunction, or adverse events. Finally, their study concluded that in patients with uncomplicated stress UI, preoperative office-based evaluation alone was non-inferior to urodynamic testing for results 1 year after treatment.

The ICS and IUGA consider that in patients with UI who also have pathology such as POP or diabetes mellitus, urodynamic testing modifies the therapeutic approach in up to 25% of cases. However, in patients without these comorbidities, urodynamic testing has not been shown to modify the therapeutic or surgical approach[20].

Furthermore, a very important factor is economic variability, since the costs for institutions, given that these are invasive procedures; do not justify performing them routinely. Therefore, before performing or requesting a urodynamic study, a complete analysis, follow-up, and thorough clinical review are recommended.

Currently, simple and inexpensive tools are available that can be performed in the office, such as voiding diaries, IPSS, and bladder ultrasound with post-void residual urine measurement, for these patients[22,23].

It is important to highlight, as a strength of our study, that we identified that detrusor overactivity with urinary leakage secondary to exertion is clinically indistinguishable from stress UI demonstrable by clinical maneuvers.

Of the 51 patients with urodynamic UI, it was found that in 18 patients (18.4%) it was secondary to detrusor overactivity, in 12 patients (17.1%) it was associated with chronic urinary retention, and in 8 patients (8.1%) it was due to bladder outlet obstruction.

The ICS and IUGA report an incidence of uncomplicated UI of 5-9% in the United States and Europe; however, this figure has not been established in our country[24]. In our study, the incidence was 6.6% (76 patients) out of 1136 urodynamic studies, which were the focus of this analysis.

In our study, we determined that the frequency of voiding dysfunction in uncomplicated UI is 67.1% (odds ratio = 3%, 95% confidence interval: 1.805-8.294).

Similarly, we found normal findings in the urodynamic study in 15.7% of the patients studied, with no evidence of UI or voiding dysfunction. This can be attributed to the lack of standardized diagnostic processes in the clinic, which would allow for a comprehensive, timely, and optimal approach and management for patients with UI symptoms[21].

This assessment includes evaluating different areas such as voiding diaries, validated questionnaires, the IPSS, and bladder ultrasound for quantification of residual urine[25].

Although the study population was not large, the frequency of voiding dysfunction is notable.

Two-thirds of the patients studied were diagnosed with voiding dysfunction, and eight patients (10.5%) underwent.

Conclusion

Based on the results presented, it can be assumed that more than two-thirds of patients with uncomplicated UI had BED. The most frequent cause of BED was detrusor hypocontractility, and 18.4% of UI was due to detrusor overactivity. Fewer than one-third of the patients studied (15.7%) showed neither UI nor BED. In 89.5% of the patients, the urodynamic study resulted in a change in treatment management.

Conflicts of interest

The authors declare that there are no conflicts of interest in this project.

Funding

The authors declare that there was no funding for this work.

Ethical considerations

Protection of humans and animals. The authors declare that no experiments involving humans or animals were conducted for this research.

Confidentiality, informed consent, and ethical approval. The authors have obtained approval from the Ethics Committee for the analysis of routinely obtained and anonymized clinical data, so informed consent was not necessary. Relevant guidelines were followed.

Declaration on the use of artificial intelligence. The authors declare that no generative artificial intelligence was used in the writing of this manuscript.

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ORIGINAL ARTICLE

Assessment of lower urinary tract symptoms in patients with Parkinson's disease

Evaluación de los síntomas del tracto urinario inferior en pacientes con enfermedad de Parkinson

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Abstract

Objective: *The objective of the study was to evaluate lower urinary tract symptoms (LUTS) in patients with Parkinson's disease (PD) using the International Prostate Symptom Score (IPSS) and Neurogenic Bladder Symptom Score (NBSS) questionnaires and assess their correlation between them.* **Materials and methods:** *An observational, cross-sectional, descriptive study was conducted, in patients over 18 years of age with a PD diagnosis were selected and evaluated to the urology service, where they were completed the IPSS and NBSS questionnaires.* **Results:** *Seventy-five patients with PD were evaluated. The NBSS questionnaire revealed a higher prevalence in the storage/emptying symptom domain. In the IPSS questionnaire, the most common symptoms were storage symptoms, especially urgency and nocturia, with a predominance of moderate symptom severity in both men and women. The NBSS questionnaire is consistent with the information obtained by the IPSS. No significant differences were observed when analyzing between sex or the time of evolution of the disease.* **Conclusion:** *LUTS are very common in patients with PD. Storage symptoms are the most frequently reported by patients. Symptoms occur in similar proportions between men and women, and these can occur from the onset of the disease, so early assessment by an urologist should be recommended in all these patients.*

Keywords: *Parkinson's disease. Lower urinary tract symptoms. Bladder. Urinary incontinence. Urinary sphincter. Pelvic floor.*

Resumen

Objetivo: *Evaluar los síntomas del tracto urinario inferior (STUI) en los pacientes con diagnóstico de Enfermedad de Parkinson (EP) mediante los cuestionarios IPSS y NBSS y valorar su correlación.* **Materiales y métodos:** *Se realizó un estudio observacional, transversal, descriptivo, en el cual se seleccionaron a todos los pacientes mayores de 18 años, con diagnóstico de EP que fueron enviados al servicio de Urología donde se les realizó los cuestionarios IPSS y NBSS.* **Resultados:** *Se evaluaron 75 pacientes con EP, el cuestionario NBSS reveló mayor prevalencia en el dominio de síntomas de almacenamiento/vaciamiento. En el cuestionario IPSS los síntomas más comunes fueron de almacenamiento, especialmente urgencia y nocturia, con predominio de severidad de síntomas moderados tanto en hombres como mujeres. El cuestionario NBSS es consistente con la información obtenida por el IPSS. No se observaron diferencias significativas en la sintomatología al analizar el género y tiempo de evolución de la enfermedad.* **Conclusión:** *Los STUI son muy frecuentes en pacientes con EP.*

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Los síntomas de almacenamiento son los que con mayor frecuencia son reportados por los pacientes. Los síntomas se presentan en proporciones similares entre hombres como mujeres y estos pueden presentarse desde el inicio de la enfermedad por lo que la valoración temprana por un urólogo debe recomendarse en estos pacientes.

Palabras clave: *Enfermedad de Parkinson. Síntomas del tracto urinario inferior. Vejiga. Incontinencia urinaria. Esfínter urinario. Suelo pélvico.*

Introduction

The lower urinary tract is responsible for the storage and emptying of urine, and it is coordinated by a complex innervation between the brain, spinal cord and peripheral ganglia down to the last nerve fibers, so any alteration at any of these levels implies the development of symptoms of neurogenic lower urinary tract dysfunction[1].

Parkinson's disease (PD) is a neurological disorder characterized by the loss of dopaminergic neurons in the substantia nigra, leading to the development of multiple signs and symptoms, the most common being motor symptoms[2]. Non-motor symptoms also occur during the course of this disease. Lower urinary tract symptoms (LUTS) are the most common non-motor symptoms reported in PD[3,4], and are associated with poor survival, increased risk of falls, early institutionalization, and high healthcare costs[5]. Based on the dopamine depletion model, it has been shown that D1 receptor activity inhibits the micturition reflex, while D2 receptor activity facilitates the micturition reflex in animal models of PD. However, the non-motor involvement in PD remains a subject of ongoing research[6].

Urinary symptoms are common among patients with PD; these include urinary urgency, nocturia, increased frequency, urinary incontinence, and incomplete bladder emptying, progressing to urinary retention[7]. The incidence of these symptoms has been reported beetwen 27% to 63.9%[8]. Nocturia is the most common symptom, reported by up to 60% of patients[9]. Regarding urodynamic abnormalities, 67% of patients presented with detrusor overactivity, while only 3% presented with dyssynergia detrusor sphincter[10]. The risk factors most closely related to LUTS in patients with PD are disease duration, age, Hoehn-Yahr score > 2, sleep disorders, constipation, PD rating using the unified PD rating scale III and mental status (MMSE)[11].

The evaluation of LUTS in PD begins with a medical history focused on establishing whether storage and/or voiding symptoms are present. The use of questionnaires and surveys makes this task simpler and more standardized. LUTS were traditionally assessed using the International Prostate Symptom Score (IPSS), which consists of seven questions divided between voiding symptoms (sensation of incomplete emptying, intermittency, weak stream, straining) and storage symptoms (frequency, urgency, and nocturia), in addition to a question regarding overall quality of life with these symptoms. There is also an additional outcome to this measurement, which is the ratio between voiding and storage symptoms (V/S ratio), which is useful for determining the predominant component in the symptomatology[12].

Despite the IPSS being a widely accepted and easily replicable questionnaire, it has several limitations. Therefore, in 2013, an instrument was developed to assess the burden of urinary symptoms in patients with neurogenic bladder: the neurogenic bladder symptom score (NBSS). Although originally designed for the evaluation of patients with multiple sclerosis and spinal cord injury, this questionnaire is used to assess the symptoms of neurogenic dysfunction of the lower urinary tract, it includes 24 questions. The first question classifies patients according to the method used to empty their bladder (indwelling catheter, condom-type urinary collector, intermittent catheterization, or regular toileting). The remaining questions assess three groups: incontinence, storage/voiding, and consequences, with a final question evaluating overall quality of life[13].

The treatment of LUTS in PD should focus on improving quality of life by improving urinary symptoms while minimizing morbidity and maximizing the outcomes of treatment options.

Morbidity from bradykinesia, immobility, depression, and cognitive impairment in these patients makes it extremely difficult to design an effective treatment, even with dedicated caregivers[14].

As a first-line treatment, similar to non-neurogenic cases, conservative therapies are recommended, such as lifestyle changes, scheduled voiding, fluid restriction, and bladder training. In one study, seventeen patients underwent pelvic floor training using EMG-assisted biofeedback; 71% achieved at least a 50% reduction in urinary incontinence, and seven patients achieved a 100% reduction.

The use of antimuscarinics is widely used in patients with overactive bladder; however, their study in patients with PD was not evaluated, and these patients were even excluded from most studies. Therefore, a

double-blind, placebo-controlled trial was conducted examining the efficacy of solifenacin in 23 patients with PD, with favorable results[15]. Among the available medications with favorable effects are β- 3 adrenergic agonists such as mirabegron, which effectively reduce urgency symptoms with mild adverse effects[16]. An alternative to pharmacological treatments is intravesical botulinum toxin type A. Studies demonstrate a significant reduction in the number of incontinence episodes per day. Urinary symptom scores improved significantly; however, the number of voids per day and nocturia episodes were not significantly altered, and a significant increase in post-void residual urine was observed[17,18].

Stimulation of the tibial nerve for 20 min daily for 6 weeks improves the symptoms of an overactive bladder. This is achieved by depolarizing the sacral and lumbar somatic afferent fibers through shared nerve roots and ganglia of the bladder and tibial nerve. It has encouraging results, but patients must be willing to make frequent visits to the office, which can be a challenge for patients with PD.

The use of sacral neurostimulation in patients with PD is still under investigation[19]. Deep stimulation of the subthalamic nuclei is a therapy used as an alternative treatment for motor symptoms. In some patients, improvement in urinary tract symptoms has also been demonstrated; some may experience subjective and objective changes in their urinary habits, which may depend primarily on the target of the stimulator. However, the pathway by which these changes occur has not been demonstrated, and there is insufficient evidence to recommend it as the sole treatment for these symptoms[20]. Well-designed, placebo-controlled future studies are needed to obtain definitive data on the benefit of neuromodulation in PD.

Proper identification of LUTS in patients with PD is fundamental since it is a predictor of progression, is directly related to quality of life and subsequent complications and allows for appropriate treatment; therefore, early assessment by a urologist is recommended in patients with PD.

Materials and methods

With authorization from the Local Research Committee, an observational, cross-sectional, descriptive study was conducted, in which all patients over 18 years of age, diagnosed with PD, who were referred to the Urology service, were included in the study.

Table 1. Demographic characteristics

Variable	Women (n = 27)	Men (n = 48)	p
Age (SD)	63±7.8	63.2±11.3	0.9
Parkinson's disease duration, months (min-max)	96 (6-540)	130.5 (12-480)	0.7
Comorbidities, n (%)			
DM2	5 (18)	4 (8)	0.2
HTN hypertension	11 (40)	16 (33)	0.6
Alcoholism	3 (11)	10 (20)	0.3
NBSS (min-max)/74	15 (1-57)	21 (4-66)	0.17
Consequences (min-max)/23	1 (0-12)	4 (0-21)	0.4
Incontinence (min-max)/29	5 (0-24)	8 (0-24)	0.2
Storage/emptying (min-max)/22	9 (1-21)	10.5 (1-21)	0.1
Quality of life	1 (0-4)	2 (0-4)	0.2
IPSS (min- max), n (%)	9 (2-33)	9 (0-19)	
Mild	13 (48)	17 (35)	0.3
Moderate	13 (48)	29 (60)	
Severe	1 (4)	2 (5)	

IPSS: international prostate symptom score; NBSS: neurogenic bladder symptom score; SD: standard deviation; T2DM: type 2 diabetes mellitus.

Patients were assessed using the IPSS and NBSS questionnaires. Results were compared according to gender and duration of PD (< and > 10 years).

Categorical variables were evaluated using the Chi-square test and numerical variables using the Mann-Whitney U test. A $p < 0.05$ was considered statistically significant. The Statistical Package for the Social Sciences program version 24.

Results

Seventy-five patients diagnosed with PD were evaluated; 64% were male. The most frequent comorbidity reported in both groups was arterial hypertension (40% in women and 33% in men). Demographic characteristics are shown in Table 1.

Regarding the NBSS questionnaire, the average score was 15 points in women and 21 points in men; the most affected domain was the presence of storage/emptying symptoms with an average of 10.5 in men and 9 points in women.

According to the IPSS questionnaire, moderate symptoms were more predominant in both sexes, occurring in 13 (48%) women and 29 (60%) men; in the case of mild symptoms, they were reported in 13 (48%) women and 17 (35%) men. Among men, only 1 (4%) case of severe symptoms was reported among women and 2 (5%) among men. No significant differences were found when comparing the population between men and women.

Table 2. Comparison beetwen patients with more than 10 years

Variable	Women < 10 years (n = 14)	Women>10 years (n = 13)	p	Men < 10 years (n = 24)	Men>10 years (n = 24)	p
NBSS (min-max)						
Consequences (min-max)	13.5 (1-35)	22 (7-57)	0.4	18 (4-64)	24.5 (6-66)	0.2
Incontinence (min-max)	0.5 (0-9)	2 (0-12)	0.1	2 (0-21)	5 (0-21)	0.3
Storage/emptying	4 (0-20)	5 (0-24)	0.8	8 (0-22)	8 (0-24)	0.5
(min-max)	9 (1-13)	10 (6-21)	0.08	10.5 (1-21)	10.5 (6-21)	0.2
Quality of life	1 (0-4)	1 (0-4)	0.2	1.5 (0-4)	2 (0-4)	0.9
IPSS (min-max)	9.5 (2-33)	7 (2-17)	0.4	8 (0-19)	9.5 (0-19)	0.5

NBSS: neurogenic bladder symptom score; IPSS: international prostate symptom score.

The NBSS and IPSS questionnaires were compared in men and women with < 10 years and more than 10 years of disease progression, and no significant differences were found between the groups and the value reported in the surveys (Table 2).

Discussion

According to the results obtained, all patients reported LUTSs, higher than that reported by Ogawa et al., who estimate a prevalence between 27% and 63%. This could be due to a superselection of patients who are treated in a third-level hospital like ours[8].

The most predominant symptoms according to both questionnaires were storage symptoms, with urgency and nocturia being the most frequent in this category, which agrees with what was reported by authors such as Yeo et al. where he demonstrated that nocturia occurs in 60% of patients and is the most common in patients with EP, regardless of sex or time since the disease[9].

The IPSS analysis shows that there is a higher number of male patients with moderate symptoms; however, this is not statistically significant. This could be explained by the presence of other comorbidities in older men, independent of PD, such as obstructive prostatic enlargement.

Regarding the NBSS analysis, we can observe that it correlates well with what was found in the IPSS questionnaire, with a predominance of storage symptoms, with frequency, urgency and nocturia being the most present in patients, as reported in other studies.

It is important to mention that there are no studies comparing the usefulness of the NBSS questionnaire in patients with PD. With the results obtained, we observed agreement between both methods. This could help us use different assessment tools in this population. This is the first report in our country evaluating PD patients with the NBSS questionnaire.

The present study has several limitations, beginning with a small patient sample that limits the scope of our conclusions. Another problem is the use of questionnaires, which can introduce perception and recall biases, and without objective information, such as a urodynamic study, these biases may be even greater. Furthermore, the retrospective nature of the study limits the possibility of drawing substantial conclusions.

Conclusion

The findings of this study confirm the high prevalence of lower urinary tract dysfunction in patients with PD. Symptoms occur in similar proportions in men and women and can be present from the onset of the disease; therefore, evaluation by a urologist should be recommended for all PD patients presenting with LUTSs.

Conflicts of interest

The authors declare no conflicts of interest.

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REVIEW ARTICLE

Comparison of transperineal and transrectal biopsy approaches for prostate cancer diagnosis

Comparación entre el abordaje de biopsia transperineal y transrectal para le diagnostico de cáncer de próstata

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Abstract

Introduction: *Prostate cancer (PCa) is one of the most common cancers worldwide. Diagnosis is usually established by biopsy, performed either via the perineum (transperineal [TP]) or the rectal wall (transrectal [TR]).* **Material and methods:** *A PubMed search was conducted for English-language, high-impact journals published between 2019 and 2024.* **Results:** *A total of 17 articles met the inclusion criteria, covering PCa epidemiology, biopsy indications, and definitions of both approaches. Data addressed advantages, disadvantages, complication rates, costs, and comparative outcomes of TP and TR biopsies.* **Discussion:** *TP biopsies were consistently associated with lower sepsis risk compared to TR, as well as shorter hospital stays due to reduced infection and urinary retention. No significant differences were found between TP and TR approaches in the detection of clinically significant PCa, particularly in magnetic resonance imaging-targeted biopsies.* **Conclusion:** *TP biopsy appears to be a safer alternative to TR, with fewer complications, notably post-operative infections, urinary retention, and hospitalizations. While both methods achieve similar cancer detection rates, TP biopsy is preferable for anterior and apical lesions. Final selection should be tailored to patient-specific factors.*

Keywords: *Prostate cancer. Diagnosis. Transperineal. Transrectal. Biopsy. Ultrasound.*

Resumen

Introducción: *El cáncer de próstata es uno de los cánceres más comunes a nivel mundial. El diagnóstico se establece mediante la biopsia de próstata, que puede realizarse por vía perineal (transperineal [TP]) o por vía rectal (transrectal [TR]).* **Material y métodos:** *Se realizó una búsqueda en PubMEd en inglés, en revistas de alto impacto publicadas entre 2019 y 2024.* **Resultados:** *Un total de 17 artículos cumplieron los criterios de inclusión, abordando la epidemiología, las indicaciones de biopsia y las definiciones de ambos abordajes. Ventajas, desventajas, tasas de complicaciones, costos y resultados comparativos entre las biopsias TP y TR. Discusión: Las biopsias TP fueron consistentemente asociadas con un menor riesgo de sepsis que la TR, así como una estancia hospitalaria más corta debido a menor riesgo de infección y retención urinaria. No se encontraron diferencias significativas entre los abordajes TP y TR en la detección de cáncer de próstata clínicamente significativo, particularmente en las biopsias dirigidas con resonancia magnética.* **Conclusión:** *La biopsia TP parece ser una alternativa segura a la TR, con menos complicaciones: infecciones postoperatorias, retención urinaria y hospitalización. Mientras que ambos métodos logran una tasa de detección de cáncer muy similar, la biopsia TR es preferible para lesiones apicales y anteriores. La selección final debe ser individualizada según los factores específicos del paciente.*

Palabras clave: *Cáncer de próstata. Diagnostico. Transperineal. Transrectal. Biopsia. Ultrasonido.*

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Introduction

Prostate cancer (PCa) is among the most common cancers worldwide, the most common cancer in men in more than half of all countries in the world, with an estimated 1.4 million new cases reported in 2020. It is also among the leading causes of cancer deaths in men in a quarter of the world's countries, with an estimated 375,000 deaths in 2020[1].

In Mexico in 2020, PCa was among the 10 leading causes of death in the general population, according to Basulto-Martínez et al.[2] In 2020, a mortality rate of 11.5/100,000 men diagnosed was estimated. In the country, 80% of patients diagnosed with PCa are in advanced stages of the disease; this makes it impossible for them to receive treatment with curative intent[2].

PCa mainly affects men between 45 and 60 years old. Diagnosis is initially made with prostate-specific antigen (PSA) testing, digital rectal examination, magnetic resonance imaging (MRI), or health screening[3]. Definitive diagnosis requires a prostate biopsy. Diagnosis in advanced stages and treatment failure are the main factors that increase the mortality rate associated with this disease[3].

PSA is a prostate-specific but not cancer-specific marker; therefore, PSA elevated levels may indicate other benign pathologies, such as benign prostatic hyperplasia or prostatitis. Because of this, men without PCa may have elevated PSA levels[3]. Several secondary tests are available to determine whether a man with an elevated PSA should be biopsied. These include: percent free PSA, prostate health index, 4Kscore, and ExoDx Prostate (IntelliScore), as well as multiparametric MRI. These tests help to avoid unnecessary biopsies and overdiagnosis of indolent disease[4]. These secondary tests should be incorporated and only biopsied in men who are at high risk for high-grade PCa[4].

Biopsy can be performed through the skin between the anus and the scrotum (transperineal [TP]) or through the rectal wall (transrectal [TR]). During a biopsy, the prostate is commonly localized with TR ultrasound (TRUS)[3]. Positive MRI findings can be used to identify abnormal areas of the prostate during biopsy specifically[3].

In 2015, 99% of biopsies performed in the United States were performed by the TR approach. This process consistently introduces bacteria into the prostate, urinary tract, and blood; therefore, the use of antibiotic prophylaxis is universal[5]. Historically, TP biopsy had to be performed under general anesthesia, which limits its widespread use; however, new techniques allow its performance under local anesthesia, which increases the possibility of its routine implementation[5].

The objective of this review is to comprehend the advantages of each technique to elucidate which one allows a better, more opportune diagnostic approach to this disease.

Material and methods

Systematic searches were carried out in the PubMed database, with a focus on high-impact journals and articles in English. The initial search included the terms: "Prostate Cancer," "Epidemiology," "Early Detection," and "Diagnosis," combined using Boolean operators. Subsequently, a second search was performed with the combinations of terms: ("Transperineal" AND "Transrectal") AND "Biopsy," using the Boolean operator "AND." The search period covered articles published from 2019 to 2024. To ensure accuracy, articles in languages other than English, as well as conference proceedings and editorials, were systematically excluded to homogenize the available evidence. In addition, relevant articles cited in the reference lists of the included texts were processed to assess their eligibility and inclusion.

Results

A total of 17 articles of systematic reviews, randomized, cohort, comparative, retrospective, and randomized studies were found, about the epidemiology of PCa nationally and worldwide, indications for biopsy, and definitions of both approaches. In addition, information was found about the benefits and limitations of each approach, where risk factors, complication rates, advantages, costs, and comparisons between TR and TP biopsy are discussed.

Discussion

The traditional method of prostate biopsy in recent decades has been through the TR approach; this procedure involves passing the biopsy needle through the rectal wall to access the prostate. There is concern regarding infectious complications and sepsis from such a procedure. The TP approach represents an option in which it is not necessary to pass the biopsy needle through the rectal mucosa, which could reduce the complications above; however, this technique historically requires general anesthesia for its performance[6].

The European Urology Association recommends TP biopsy as the technique of choice, due to the lower risk of severe urinary tract infection, which reduces antibiotic

resistance and associated costs[7]. However, the impact of this change on the detection of clinically significant PCa remains a matter of debate, and the most recent meta-analyses have produced conflicting results.

Studies show that the TP approach has a lower risk of sepsis compared to the TR approach. Still, the most recent systematic reviews have reported only seven small studies comparing the safety of both routes directly. Patients undergoing the TP approach are less likely to be readmitted to the hospital for sepsis. Still, they are more likely to be readmitted for urinary retention than patients undergoing TR biopsy[8].

It is important to note that the duration of hospitalization for sepsis or urinary retention was shorter in patients undergoing the TP approach than in those undergoing the TR approach[8]. Another factor that could change the risks of infectious complications after prostate biopsy and thus influence the decision to use one or the other approach is the continued decrease in the effectiveness of antibiotic prophylaxis.

Bacteriuria has been reported in 44% of patients, and bacteremia in 16% of patients after TR biopsy. Several studies have shown incidence ranges of infectious complications between 0.5 and 9.3%. Body mass index, diabetes, and pre-operative catheterization are independent risk factors for infection. A history of urinary retention was associated with infection-related hospitalization after TR biopsy[9].

The factors that make the TP approach a safer method are attributed to the relative cleanliness of the perineum after adequate asepsis before the procedure, compared to the rectum, which is rich in microorganisms and therefore, is a risk of introducing them into the systemic circulation each time the needle passes[10]. One study concluded that patients submitted to prostate biopsies by the TP approach contained a lower pathogenic bacterial load than those submitted to the TR biopsy[11].

Regarding the TP approach, an incidence of infectious complications of around 1.86% has been seen. The independent risk factors for infection are diabetes, due to possible mechanisms such as poor physical condition and lower systemic resistance, which lengthen the healing time. The other risk factor is the history of urinary retention, as the urinary medium is more conducive to bacterial reproduction[9].

No significant association has been found between the two different approaches and the detection rate of clinically significant PCa in MRI-directed biopsies. However, it has been found that patients may benefit more from the TP approach for anterior, apical, and PI-RADS 4 lesions[12]. This is supported by a comparative study in which both approaches were found to have similar cancer detection rates[13].

According to a retrospective study, the TR approach had a higher overall cancer detection rate and positive biopsy core rate than the TP approach group[13]. It also showed that in patients with prostate volumes of 30-80 mL, there was a higher cancer detection rate[14]. While the TP approach group had higher positive biopsy core rates among patients with stages T1-T2[14].

In relation to the TP approach, there is the alternative of peri-prostatic nerve block combined with perineal subcutaneous anesthesia and intrarectal lidocaine gel for the TRUS guidance process[14]. In a prospective randomized controlled trial, the efficacy and safety of this technique were evaluated, where it was found that this anesthesia technique is a safer and more efficient approach than local anesthesia in TP biopsy, and it can almost replace intravenous anesthesia and would be worth applying in clinical practice[15].

One study compared pain and discomfort between TR and TP prostate biopsy, finding that the latter was associated with higher pain scores[16]. In particular, patients undergoing TP prostate biopsy with tumescent local anesthesia experienced significantly higher pain scores compared to those receiving TR biopsy with standard local anesthesia, with a score of 3.9 versus 1.6 on a Visual Analog Scale[16].

One cohort study reported average costs of $2,140.51 USD (TR) versus $2,706.84 USD (TP) per patient, excluding complications, biopsies, and other additional costs[17]. In terms of total costs with complications, the TR group had an average cost per patient of approximately $260,711.64 USD for complications, whereas the TP group had a total cost of approximately $94,501.00 USD for the same item[17]. This suggests that, although biopsies in the TP group may have higher upfront costs, they offer long-term savings by reducing infection-related complications and hospital readmissions[17].

Conclusion

The TP approach is a safer alternative to the TR approach, with a lower rate of complications, especially post-operative infections, urinary retention, and hospital stays. Although both approaches show comparable rates of detection of clinically significant cancer, TP offers key anatomical advantages for anterior and apical lesions, making it a preferred option in selected cases.

Despite higher perioperative discomfort, TP's long-term cost savings from reduced complications support its adoption. Although the choice between TP and TR should be individualized based on the anatomical characteristics of the patient's lesions, prioritizing safety and diagnostic efficacy.

Conflicts of interest

The authors declare that they have no conflicts of interest.

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Ethical considerations

Protection of humans and animals. The authors declare that no experiments involving humans or animals were conducted for this research.

Confidentiality, informed consent, and ethical approval. The study does not involve patient personal data nor requires ethical approval. The SAGER guidelines do not apply.

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REVIEW ARTICLE

Efficacy of steroid use in the prevention of urethral stricture following transurethral resection of prostate: a review of the literature

Eficacia del uso de esteroides en la prevención de estenosis uretral posterior a una resección transuretral de próstata: una revisión de la literature

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Abstract

Background: *Urethral stricture is a frequent complication following transurethral resection of the prostate (TURP), primarily due to excessive collagen synthesis and fibrosis. Initial management includes minimally invasive procedures such as urethrotomy and urethral dilation, which, however, have high recurrence rates. Adjunctive therapies involving local injection or topical drug administration have been explored to reduce these recurrences.* **Objective:** *The objective of this study was to systematically review the efficacy of topical and injectable steroids in preventing urethral stricture after TURP.* **Methods:** *A comprehensive literature search was conducted in the National Library of Medicine for studies published between 2017 and 2025. Twenty-four studies investigating agents such as triamcinolone, 5-fluorouracil combinations, and Mitomycin C (MMC) were included.* **Results:** *Treatment with these agents was associated with a significant reduction in urethral stricture recurrence compared to controls receiving no additional therapy. MMC demonstrated the highest efficacy. In addition, paclitaxel-coated balloons, delivering an antiproliferative agent through combined mechanical dilation and localized administration, showed promising short-term safety and efficacy profiles.* **Conclusion:** *Topical and injectable therapies effectively reduce urethral stricture recurrence after TURP, with MMC and paclitaxel being the most notable agents. Further long-term studies are warranted to confirm these findings.*

Keywords: *Urethral stricture. Prostatic hyperplasia. Transurethral resection of prostate. Steroids. Mitomycin. Paclitaxel.*

Resumen

Antecedentes: *La estenosis uretral es una complicación frecuente tras la resección transuretral de la próstata (RTUP), principalmente debido a la síntesis excesiva de colágeno y la fibrosis. El tratamiento inicial incluye procedimientos mínimamente invasivos como la uretrotomía y la dilatación uretral, los cuales, sin embargo, presentan altas tasas de recurrencia. Se han explorado terapias adyuvantes, como la inyección local o la administración tópica de fármacos, para reducir estas recurrencias.* **Objetivo:** *Revisar sistemáticamente la eficacia de los esteroides tópicos e inyectables en la prevención de la estenosis uretral tras la RTUP.* **Métodos:** *Se realizó una búsqueda bibliográfica exhaustiva en la Biblioteca Nacional de*

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Medicina de los Estados Unidos para estudios publicados entre 2017 y 2025. Se incluyeron veinticuatro estudios que investigaban agentes como la triamcinolona, combinaciones con 5-fluorouracilo y la mitomicina C. **Resultados:** *El tratamiento con estos agentes se asoció con una reducción significativa de la recurrencia de la estenosis uretral en comparación con los controles que no recibieron terapia adicional. La mitomicina C demostró la mayor eficacia. Además, los balones recubiertos de paclitaxel, que liberan un agente antiproliferativo mediante dilatación mecánica combinada con administración localizada, mostraron perfiles de seguridad y eficacia a corto plazo prometedores.* **Conclusiones:** *Las terapias tópicas e inyectables reducen eficazmente la recurrencia de la estenosis uretral tras la RTUP, siendo la mitomicina C y el paclitaxel los agentes más destacados. Se requieren estudios a largo plazo para confirmar estos hallazgos.*

Palabras clave: *Estenosis uretral. Hiperplasia prostática. Resección transuretral de la próstata. Esteroides. Mitomicina. Paclitaxel.*

Introduction

Transurethral resection of the prostate (TURP) is a procedure in which prostatic tissue is resected using an endoscopic approach. It is commonly used to treat bladder outlet obstruction caused by benign prostatic hyperplasia as well as in the management of prostatic abscesses. Urethral stricture is a complication that can occur in up to 9% of patients after TURP, with a global prevalence ranging from 0.2% to 0.9%[1-3].

Injury to the urethral epithelium or underlying spongiosal tissue may lead to scar formation resulting in urethral strictures, negatively affecting urinary flow. Although strictures can occur in any urethral segment, approximately half of the cases involve the bulbar urethra[4-6].

The most common causes of urethral stricture include idiopathic, iatrogenic (e.g., catheterization or transurethral surgeries), inflammatory, and traumatic etiologies. Conventionally, treatment has involved urethral dilation or internal urethrotomy; however, long-term success rates are low, and repeated instrumentation can induce fibrosis, complicating subsequent reconstructive procedures[7-9].

Clinical studies have demonstrated that Mitomycin C (MMC) can prevent urethral strictures. Both triamcinolone and MMC possess antiproliferative and antifibrotic properties, positioning them as potential therapeutic agents for this condition. The aim of this study is to identify current evidence regarding the efficacy of triamcinolone and MMC in the prevention and reduction of urethral strictures[10,11].

Objectives

The objective of this study was to review studies on the use of steroids (triamcinolone) and MMC, evaluating their efficacy in preventing fibrosis and urethral stricture, as well as understanding factors contributing to their development.

Methods

A search for original articles was conducted through PubMed and the Cochrane Library. Search terms included: urethral stricture, TURP, urethrotomy, balloon or laser dilation, steroids, mitomycin, oral therapy, and intralesional injection.

Studies including male patients with urethral stricture undergoing TURP through cold-knife or laser were considered, regardless of etiology, location, duration, or prior interventions. Studies evaluating local steroid application at the stricture site – through injection or lubricated catheter – were included. In addition, an experimental animal study (rabbits) with urethral injury induced by a pediatric resectoscope was considered.

Results

One study compared 149 cases (mean age: 59.5 years) with 67 controls (mean age: 64.3 years). Patients with urethral stricture had significantly lower total testosterone levels than controls (394 ng/dL vs. 488 ng/dL). The prevalence of hypogonadism was higher in the stricture group (26% vs. 7.5%), suggesting an association between low testosterone and increased stricture risk[4].

In another study of 352 TURP patients (mean age: 67 ± 8.6 years), urethral stricture was diagnosed in 15 patients (4.3%), distributed as submeatal stricture (1.4%), penile urethra (1.1%), and bulbar urethra (1.7%)[12].

Further analysis indicated that each 100-unit increase in total testosterone was associated with a 34% reduction in stricture risk. Increases in free and bioavailable testosterone correlated with 18% and 10% risk reductions, respectively, demonstrating a strong link between hypogonadism and urethral stricture[13].

In the animal model, the resection area was irrigated with saline followed by MMC (0.5 mg/mL) and triamcinolone (40 mg). At 28 days, urethrography and

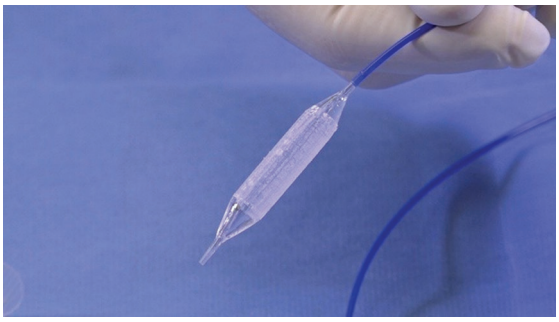

Figure 1. Optilume® balloon coated with Paclitaxel.

histopathology revealed significant differences in urethral diameter and reduced fibrosis, with decreased fibroblast proliferation and collagen deposition. These findings suggest that MMC and triamcinolone could potentially replace stents or long-term catheters.

Clinical studies indicate that the positive effect of MMC and steroids decreases over time[9]. In a study with topical triamcinolone through catheter, recurrence was 22.2% in the treated group versus 46.4% in controls. Urethral stabilization was achieved in 83.3% of the triamcinolone group and 61.5% of controls after a second urethrotomy, with 12-month follow-up[14].

Paclitaxel: from oncology to urology

Paclitaxel, a chemotherapeutic agent derived from the pacific yew tree, has shown efficacy in treating ureteral and urethral strictures due to its antiproliferative properties. Its use through ballon-released coated (BRC) combines mechanical dilation with localized drug delivery, reducing smooth muscle and fibroblast hyperplasia[15,16].

Low paclitaxel concentrations significantly reduce collagen production without causing smooth muscle toxicity[17]. BRC represents a minimally invasive option with dual therapeutic action, aiming to mitigate stricture recurrence after conventional dilation (Fig. 1) [18,19].

The ROBUST I study, with 5-year follow-up, reported functional success in 58% of patients, with improved urinary flow, symptoms, and quality of life, though the population was highly selected[17]. The randomized controlled ROBUST III trial validated Optilume® efficacy, showing reduced need for reintervention compared with standard endoscopic therapy; however, complex strictures were excluded, limiting generalizability[20].

A multicenter retrospective study by Ballesteros Ruiz et al. including 156 patients across 12 Spanish hospitals (2021-2024) reported a 6-month success rate of 73.8%, similar to ROBUST III (74.6%), with maximum flow increases of 8.9 mL/s at 6 months and 7.3 mL/s at 1 year[21].

Discussion

Results highlight a significant association between low testosterone levels and urethral stricture after TURP. Patients with strictures had lower total testosterone and higher hypogonadism prevalence, suggesting hormonal influence on stricture pathogenesis[4,13]. Testosterone may modulate scar formation and inflammation, key processes in urethral fibrosis, though further research is needed.

Local treatments with MMC and steroids, such as triamcinolone, have shown promising results in animal models and clinical trials. Reduced fibroblast proliferation and collagen deposition indicate an antifibrotic effect that may minimize stricture recurrence.[9,14]

Paclitaxel-coated balloons offer an innovative therapeutic approach, combining mechanical dilation and localized antiproliferative action. ROBUST I and III studies provide evidence of short- and medium-term efficacy and safety, improving urinary flow and reducing reintervention rates[15-20]. Limitations in patient selection restrict generalizability, highlighting the need for larger, more representative studies.

The multicenter retrospective study reinforces favorable outcomes, supporting paclitaxel-coated balloons as a promising option in post-TURP urethral stricture management[21]. Overall, consideration of hormonal factors and the development of combined pharmacological and device-based strategies may improve long-term outcomes. Multidisciplinary and personalized approaches remain essential.

Conclusion

Intralesional triamcinolone is associated with reduced stricture recurrence, particularly for strictures longer than 2 cm, reflecting the growing efficacy of instillation methods. Administration through coated catheter or submucosal injection decreases both recurrence probability and time to recurrence, with statistically and clinically significant results, minimal risk, and low cost. Topical application through catheter also reduces recurrence after internal urethrotomy, enhancing practicality.

MMC and triamcinolone may replace stents, intermittent catheterization, or long-term catheters post-urethrotomy. MMC intralesional therapy appears most effective, though both agents show significant

evidence in preventing urethral fibrosis, warranting further confirmation of safety and low complication rates.

Emerging strategies include tissue-engineered urethral substitutes, although clinical evidence remains limited. Paclitaxel-coated balloons offer an advantage over conventional dilation, reducing recurrence rates from 40% to 60% at 12 months to approximately 74.4% in treated cohorts, providing both mechanical and pharmacological prevention of recurrence.

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Conflicts of interest

The authors declare no conflicts of interest.

Ethical considerations

Protection of humans and animals. The authors declare that the procedures followed complied with the ethical standards of the responsible human experimentation committee and adhered to the World Medical Association and the Declaration of Helsinki. The procedures were approved by the institutional Ethics Committee.

Confidentiality, informed consent, and ethical approval. The study does not involve patient personal data nor requires ethical approval. The SAGER guidelines do not apply.

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