

LAPAROSCOPIC UROLOGIC SURGERY: INITIAL EXPERIENCES IN PADANG

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ABSTRACT

Introduction: Laparoscopic surgery is increasingly prevalent in urology due to improved surgical expertise. This minimally invasive procedure, popularized in the nineteenth century, offers advantages including reduced pain, less bleeding, shorter hospital stays, and improved cosmetic results compared to open surgery. Laparoscopy has expanded to various applications, including nephrectomies, pyeloplasty, ureteral stone removal, nonpalpable testes, and adrenal surgeries. Today, most urological procedures can be performed using laparoscopy, with oncological outcomes comparable to open surgery. **Objective:** In this retrospective study, we assess urological laparoscopic surgery results and complications in Padang, Indonesia. **Material & Methods:** A retrospective evaluation was conducted on patients who underwent laparoscopic surgery in Padang, Indonesia, between September 2017 and July 2023. The assessment encompassed preoperative diagnoses, laparoscopic procedure types, operation duration, hospital stays, blood loss, conversion to open surgery, and complications. **Results:** Of the 155 patients, 105 (67.7%) were male, with a median age of 37 years (range: 1-78). The common laparoscopic surgeries included simple nephrectomy (29%), laparoscopy undescended testis (UDT) (19.3%), renal cyst unroofing (13.5%), and radical nephrectomy (13.5%). Hospital stays ranged from 1 to 7 days, depending on the laparoscopic procedure type. Approximately 12.9% of patients required conversion to open surgery, and no major complications or fatalities were observed. **Conclusion:** The success and complication rates of laparoscopic surgeries in our city align with those reported in the literature. We firmly believe that technological advancements, increasing experience, and improved patient tolerance make laparoscopic surgery a secure and minimally invasive alternative to open procedures.

Keywords: Laparoscopic surgery, minimally invasive surgery, urological surgery.

ABSTRAK

Pendahuluan: Seiring berkembangnya keahlian di bidang bedah, teknik laparoskopi semakin sering digunakan dalam tindakan urologi karena bersifat minimal invasif dan menawarkan berbagai keuntungan dibandingkan bedah terbuka, seperti nyeri yang lebih ringan, perdarahan lebih sedikit, rawat inap lebih singkat, serta hasil kosmetik yang lebih baik. Saat ini, laparoskopi telah digunakan dalam berbagai prosedur urologi seperti nefrektomi, pyeloplasti, pengambilan batu ureter, penanganan testis yang tidak turun, hingga operasi adrenal. Sebagian besar prosedur urologi kini dapat dilakukan secara laparoskopik, dengan hasil onkologis yang setara dengan bedah terbuka. **Tujuan:** Studi ini bertujuan untuk mengevaluasi hasil dan komplikasi dari bedah laparoskopik urologi di Padang, Indonesia. **Bahan & Cara:** Studi retrospektif dilakukan terhadap pasien yang menjalani operasi laparoskopik di Padang dari September 2017 hingga Juli 2023. Data yang ditinjau meliputi diagnosis praoperatif, jenis prosedur, durasi operasi, lama rawat inap, kehilangan darah, konversi ke bedah terbuka, serta komplikasi yang muncul. **Hasil:** Dari 155 pasien, 105 (67,7%) adalah laki-laki, dengan usia median 37 tahun (rentang: 1–78 tahun). Prosedur terbanyak adalah nefrektomi sederhana (29%), laparoskopi untuk testis tidak turun (19,3%), unroofing kista ginjal (13,5%), dan nefrektomi radikal (13,5%). Lama rawat inap bervariasi antara 1 hingga 7 hari tergantung pada jenis prosedur laparoskopik yang dilakukan. Sekitar 12,9% pasien memerlukan konversi ke bedah terbuka. Tidak ditemukan komplikasi besar maupun kematian selama periode studi. **Simpulan:** Hasil dan angka komplikasi dari bedah laparoskopik urologi di Padang sejalan dengan laporan dari berbagai studi lain. Laparoskopi merupakan pilihan aman dan efektif sebagai alternatif bedah terbuka, didukung oleh teknologi, pengalaman operator, dan toleransi pasien yang baik.

Kata kunci: Bedah laparoskopik, bedah minimal invasif, bedah urologi.

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INTRODUCTION

Laparoscopic surgery, stemming from the inception of diagnostic laparoscopy in the Sixties, evolved into a surgical method in the early eighties. By the 1990s, it had gained widespread adoption across a diverse range of medical indications.¹ Recent clinical trials have consistently revealed comparable patient-centric and oncological outcomes between laparoscopic and open surgery approaches in the realm of cancer treatment. Additionally, laparoscopic surgery has been validated as a means to reduce hospitalization durations, hasten recovery, diminish abdominal wall injuries, and shorten operative durations.^{2,3}

Laparoscopy has since broadened its applications considerably. It now encompasses various procedures, including fundoplication for gastroesophageal reflux disease, bariatric surgery for morbid obesity, and colorectal surgery. Furthermore, advanced laparoscopic techniques have found their way into complex surgeries like hepatectomy, pancreatectomy, as well as urological and gynecological interventions.²

In the field of urology, laparoscopic surgery initially found its primary application in pelvic lymphadenectomy. Over the ensuing decades, its indications have expanded significantly to encompass a diverse array of procedures, including nephrectomies, pyeloplasty, ureteral stone removal, nonpalpable testes, and adrenal surgeries.^{2,3} The evolution of laparoscopic urological surgery has been marked by several transformative advancements, such as robot-assisted surgery, ultrahigh-definition video technology, innovative sealing devices, instruments featuring six degrees of freedom, ergonomic platforms furnished with armrests and chest support, and camera holders, all of which have revolutionized this surgical technique.⁴

The rapidly evolving landscape of laparoscopic surgery and its profound impact on urology.^{2,5} With recent advances in laparoscopic techniques, multiple benefits have been reported. However, the introduction and adoption of these techniques in our specific region, Padang, have been relatively recent, and there is a pressing need to assess their initial experiences and outcomes.

OBJECTIVE

Therefore, our retrospective study aims to provide a comprehensive evaluation of the status of laparoscopic urologic surgery in Padang, Indonesia.

MATERIAL& METHODS

A retrospective study was conducted at Padang, Indonesia, spanning the period from September 2017 to July 2023. Patients included in the analysis met the following criteria: having undergone laparoscopic surgery within the stipulated time frame in Padang, Indonesia. Conversely, patients with incomplete or missing medical records or those who underwent surgery for indications unrelated to urology were excluded from the study. The study population consisted of patients who had undergone laparoscopic surgery during the specified timeframe at the chosen location. Data was collected retrospectively from medical records, surgical logs, and relevant clinical documents, ensuring comprehensive coverage of the patient cohort.

The primary outcomes of interest included preoperative diagnoses, specific laparoscopic procedure types, operation duration, duration of hospitalization, estimated blood loss, occurrences of conversion from laparoscopic to open surgery, and the presence of postoperative complications. These variables were meticulously extracted from the patient records and clinical notes. Operation duration was defined as the time elapsed from the initiation of anesthesia to the completion of the surgical procedure. Hospitalization duration was the length of stay in the hospital post-surgery, ranging from admission to discharge. Conversions to open surgery were any instances where a planned laparoscopic procedure was converted to an open surgery due to unforeseen complications or technical challenges. Postoperative complications encompassed a wide spectrum of adverse events, including but not limited to infections, bleeding, organ injury, or any other untoward events related to the surgical procedure.

Descriptive statistics, such as mean, median, standard deviation, and percentage, were employed to summarize patient demographics and surgical outcomes. The data were then visualized using appropriate pie and bar charts. The study was conducted following the ethical principles outlined in the Declaration of Helsinki. It obtained approval from the ethics. Patient data were anonymized and treated with utmost confidentiality, complying with all applicable data protection regulations. Informed consent, where necessary, was obtained.

RESULTS

A total of 155 patients were included in this study based on the eligibility criteria (Table 1). The

105 (67.7%) patients were male, with a median age of 37 years (range: 1-78). The most common laparoscopic surgeries included simple nephrectomy (29%), laparoscopy UDT (19.3%), renal cyst unroofing (13.5%), and radical nephrectomy (13.5%) (Figure 1). Most surgeries such as partial nephrectomy, radical cystectomy, bladder diverticulectomy, varicocelectomy, laparoscopy continuous ambulatory peritoneal dialysis (CAPD), and radical nephroureterectomy, were conducted twice. Approximately 12.9% of patients required conversion to open surgery.

Seven (15.5%) simple nephrectomies were converted to open surgery (Figure 2). Despite having

the highest number of conversions, both radical cystectomy and adrenalectomy all (100%) had their laparoscopic surgeries converted. The median operation duration was highest at 360 minutes in radical prostatectomy, while the shortest was 60 minutes; reported in cyst unroofing, varicocelectomy, and urachal excision + partial cystectomy. Ten operations had none to negligible blood loss. Similar to operation duration, blood loss was highest in radical prostatectomy.

Hospital stays ranged from 1 to 7 days, depending on the laparoscopic procedure type. No notable complications were reported (Table 2)

Table 1. Demographic Characteristics.

Variables	Frequency (%), N=155
Age	37 (1,78) a
Gender	
Male	105 (67.7)
Female	50 (32.3)
Operation Type	
Laparoscopy UDTb	30 (19.3)
Simple Nephrectomy	45 (29)
Radical Nephrectomy	21 (13.5)
Partial Nephrectomy	2 (1.3)
Radical cystectomy	2 (1.3)
Pyeloplasty	5 (3.2)
Cyst Unroofing	21 (13.5)
Radical Prostatectomy	3 (1.9)
Bladder Diverticulectomy	2 (1.3)
Varicocelectomy	2 (1.3)
Laparoscopy CAPD	2 (1.3)
Diagnostic Laparoscopy for DSD	3 (1.9)
Ureterolithotomy	9 (5.8)
Radical Nephroureterectomy	2(1.3)
Urachal excision + Partial	1 (0.6)
Cystectomy Heminephrectomy	1 (0.6)
Adrenalectomy	3 (1.9)
Ureteroureterostomy	1 (0.6)
Conversion to Open Surgery	20 (12.9)

^a Median (Min,Max)

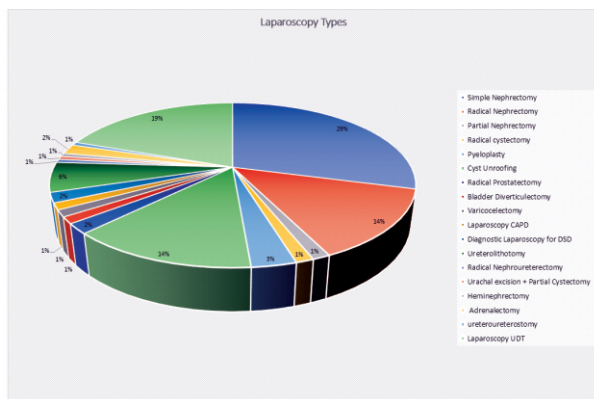
CAPD, continuous ambulatory peritoneal dialysis

DSD, Disorder of Sex Development; UDT, undescended testis

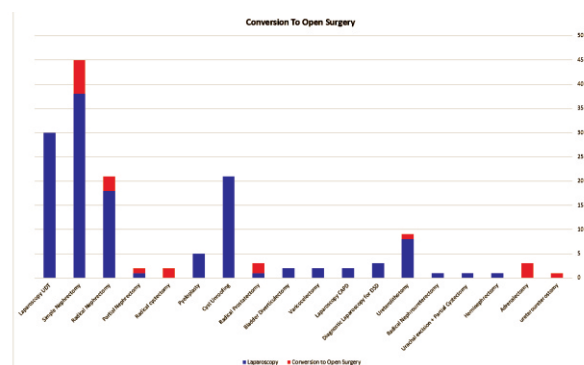
Table 2. Laparoscopic Surgery Characteristics

Operation Type	Frequency (%), N=155	Conversion to open surgery (%)	Operation Duration (Min.)	Bleeding Volume (mL)	Hospitalization Duration (Days)
Laparoscopy UDT	30 (19.3)	0	75 (60, 90)	a	1 (1, 2)
Simple Nephrectomy	45 (29)	7 (15.5)	135 (60,180)	50 (20,150)	3 (2.5)
Radical Nephrectomy	21 (13.5)	3 (14.20)	120 (80,180)	40 (20,120)	4 (3.6)
Partial Nephrectomy	2 (1.3)	1 (50)	160	80	4
Radical cystectomy	2 (1.3)	2 (100)	-	-	-
Pyeloplasty	5 (3.2)	0	150 (120,150)	a	5 (4.5)
Cyst Unroofing	21 (13.5)	0	60 (30,90)	*	1 (1.2)
Radical Prostatectomy	3 (1.9)	2 (66.7)	360	300	7
Bladder Diverticulectomy	2 (1.3)	0	135 (120,150)	50 (50,50)	5 (5.5)
Varicocelectomy	2 (1.3)	0	60 (60,60)	a	1 (1.1)
Laparoscopy CAPD	2 (1.3)	0	70 (60,80)	a	3 (3.3)
Diagnostic Laparoscopy for DSDd	3 (1.9)	0	80 (60,80)	a	1 (1,1)
Ureterolithotomy	9 (5.8)	1 (11.1)	120 (90,150)	a	5 (5.5)
Radical	2(1.3)	0	135(120,150)	65(50,80)	5
Nephroureterectomy					
Urachal excision + Partial	1 (0.6)	0	60	20	5
Cystectomy	1 (0.6)	0	150	50	3
Heminephrectomy					
Adrenalectomy	3 (1.9)	3 (100)	-	-	-
Ureteroureterostomy	1 (0.6)	1 (100)	-	-	-

^a Insignificant haemorrhage CAPD, continuous ambulatory peritoneal dialysis
DSD, Disorder of Sex Development UDT, undescended testis

**Figure 1.** Laparoscopy types.

There are 13 laparoscopy types that were included in this study. The most common laparoscopy types include simple nephrectomy shown by blue pie bar, laparoscopy UDT, Cyst unroofing, and radical nephrectomy. CAPD: continuous ambulatory peritoneal dialysis; DSD: Disorder of Sex Development; UDT: undescended testis.

**Figure 2.** Conversion to Open according to laparoscopy types.

Among all the procedures that were included in this study, some of the patients were converted to open surgery (shown in red bar) such as simple nephrectomy, radical nephrectomy, partial nephrectomy, radical cystectomy, radical prostatectomy, ureterolithotomy, adrenalectomy, and ureteroureterostomy. CAPD: continuous ambulatory peritoneal dialysis; DSD: Disorder of Sex

DISCUSSION

Among the 155 patients considered in this study, the majority underwent nephrectomy, totaling 68 patients (43.8%). The use of laparoscopic nephrectomy dates back to the early 1990s, and since then, it has evolved into the standard approach for managing renal pathologies. Laparoscopic nephrectomy offers distinct advantages, including smaller incisions, reduced pain, quicker recovery, and shorter hospitalization durations.⁶ Nevertheless, the primary concern associated with laparoscopic nephrectomy is not the procedure itself but rather the apprehension of potential long-term relapse.⁷

In a case report authored by Clayman et al., several benefits of laparoscopic nephrectomy were noted, including shorter hospital stays, decreased morbidity, and expedited recuperation. Nonetheless, the procedure revealed certain shortcomings, such as the necessity for extensive tissue dissection, the importance of precise organ isolation, and the requirement for specialized instruments to facilitate safe and swift tissue removal.⁸ Specifically focusing on partial nephrectomy, research has demonstrated its feasibility, with comparable oncological effectiveness and superior renal functional outcomes compared to laparoscopic radical nephrectomy for tumor cases. Primary advantages of laparoscopic partial nephrectomy encompass significant reductions in estimated blood loss, decreased postoperative pain at the surgical site, shorter postoperative recovery periods, improved cosmetic results, and preservation of nephrons.⁹ Interestingly, this trend is not explicitly shown in this study, as radical nephrectomy seems to be more beneficial than partial nephrectomy. This may have been influenced by the small number of partial nephrectomies done in this hospital.

Laparoscopic undescended testis (UDT) surgery was among the most successful, reporting zero conversion to open surgery, medium length operating time, and short hospitalization. Cryptorchidism, also known as undescended testes, represents the most prevalent endocrine gland disorder among male children. The physical examination of testes can be challenging, and when unequivocal identification of a normal testis proves elusive, further evaluation becomes imperative.¹⁰ Diagnostic laparoscopy serves as the primary approach for non-palpable testes, offering the dual advantage of identifying atrophic or absent testicles and facilitating concurrent orchiopexy if a viable testis is discovered.¹⁰⁻¹³

Nonpalpable UDT has emerged as the primary indication for laparoscopy. In Jamalalail et al.'s study, radiologic studies aimed at localizing the testis demonstrated limited utility, with sensitivity and specificity hovering around 45% and 78%, respectively.¹¹ In contrast, Dar et al. reported significantly improved outcomes, achieving a localization rate of 100% and a therapeutic yield of 96.9%, effectively managing 32 nonpalpable testes, with a solitary case diagnosed as vanishing testes through laparoscopy.¹⁰ Minimal complications were documented, including instances of bleeding, vascular injury, and testicular atrophy.¹² A comprehensive review spanning two decades underscored the efficacy of single-stage laparoscopic orchiopexy for low-level undescended testes, yielding highly favorable results.¹³

Procedures with a 100% open-surgery conversion rate in this study, such as radical cystectomy, adrenalectomy, and uretero-ureterostomy, warrant in-depth evaluation to determine their suitability for laparoscopy. Open adrenalectomy stands out as a particularly intricate and labor-intensive surgical procedure, with most operative morbidities attributable to the chosen surgical approach. It is important to emphasize that open surgery will always have its place, and the specific indications for both approaches must be unequivocally defined.⁷

It is crucial to acknowledge that several factors influence the likelihood of conversion, including the surgical indication, specimen size, and the surgical technique employed. In a study conducted by Liu et al., notable factors impacting the conversion of laparoscopic nephrectomy encompassed perirenal adhesions, organ invasion, and adhesions to the inferior vena cava.^{14,15} Notably, higher conversion rates ranging from 14% to 36% have been reported in obese women compared to their non-obese counterparts. As part of informed consent, it is imperative to counsel all women undergoing laparoscopy about the potential for unintended laparotomy, as it carries known risks and entails added morbidity compared to laparoscopy alone.¹⁶

Limitations in this study were the study's retrospective design which inherently carries the risk of selection bias and limited control over data quality. Furthermore, the use of descriptive statistics and data visualization techniques, while suitable for summarizing and presenting the data, may not capture more complex relationships or confounding factors that could influence the observed outcomes.

CONCLUSION

The success and complication rates of laparoscopic surgeries in our city align with those reported in the literature. We firmly believe that technological advancements, increasing experience, and improved patient tolerance make laparoscopic surgery a secure and minimally invasive alternative to open procedures.

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