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Role of Minimally Invasive Techniques in Combined Urological and General Surgical Procedures..

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ABSTRACT

Background Minimally invasive techniques (MIT) in combined urological and general surgical procedures have gained widespread acceptance due to their benefits in reducing patient trauma, enhancing precision, and minimizing recovery time. These techniques, particularly laparoscopic and robotic-assisted surgeries, offer significant advantages in managing complex cases involving multiple organ systems, ensuring faster recovery and improved outcomes.

Objectives This study aims to assess the effectiveness of minimally invasive techniques in combined urological and general surgical procedures, focusing on recovery time, complication rates, and patient satisfaction compared to traditional open surgeries.

Methodology A prospective cohort study was conducted at department of urology Pak international medical college Peshawar from June 2024 to June 2025. patients undergoing combined urological and general surgical procedures using minimally invasive techniques. Participants were assessed for postoperative recovery, complication rates, and hospital stay duration. Statistical analysis was performed using t-tests, chi-square tests, and regression models to compare outcomes between minimally invasive and traditional open surgical groups. Data was collected preoperatively and postoperatively, with a focus on patient recovery metrics and surgical success.

Results The mean age of patients was 58 years, with a standard deviation of 12.5 years. A total of 150 patients were included, with 75 undergoing minimally invasive procedures and 75 receiving traditional open surgery. The postoperative complication rate was significantly lower in the minimally invasive group ($p < 0.05$). Recovery times were also notably shorter in the minimally invasive group, with a mean recovery time of 6.5 days compared to 12 days in the open surgery group. The p-value for the difference in recovery time was 0.02, indicating a statistically significant advantage for minimally invasive surgery.

Conclusion Minimally invasive techniques in combined urological and general surgical procedures significantly improve patient outcomes by reducing recovery time and complication rates. This study supports the growing adoption of MIT for complex surgeries, demonstrating their advantages over traditional open techniques. The results underline the need for further exploration of these approaches in multi-disciplinary surgical settings to refine techniques and optimize patient care...

Keywords: *Minimally invasive surgery, combined surgery, urology, general surgery.*

INTRODUCTION

Over the past several decades, minimally invasive techniques (MIT), including laparoscopic and robotic-assisted surgeries, have revolutionized the field of surgery. These procedures, which utilize small incisions, advanced cameras, and specialized tools, offer a more precise approach to surgical intervention. As surgical technology has evolved, the role of MIT has expanded beyond single-specialty surgeries into more complex multi-disciplinary procedures. One area where MIT has shown significant promise is in combined urological and general surgical procedures, where both urological and abdominal or colorectal surgeries need to be performed together[1].Urological and general surgical procedures are often required for patients with coexisting conditions involving both the urinary tract and abdominal or colorectal organs. For example, patients with urinary tract obstruction, kidney stones, or bladder cancer may also require colorectal resections or hernia repairs[2]. Traditionally, such combined procedures were performed using open surgery, which involved large incisions and long recovery times. The need for more efficient, patient-centered approaches has led to the growing adoption of minimally invasive techniques for these combined procedures[3].The key benefits of MIT include smaller incisions, reduced postoperative pain, faster recovery times, and decreased hospital stay duration[4]. These techniques allow surgeons to perform complex surgeries with greater precision, utilizing high-definition cameras and robotic systems that offer magnified and detailed views of the surgical area[5]. Additionally, these technologies enable the surgical team to navigate the organs involved with minimal disruption to surrounding tissues, resulting in less blood loss, fewer infections, and a quicker return to normal activities[6].Several studies have already demonstrated the feasibility of performing urological and general surgeries with minimally invasive methods, but there is still limited data on the comprehensive outcomes of combining these specialties in a single surgical procedure[7]. With technological advancements in robotic surgery, such as the da Vinci Surgical System, and the growing experience of surgeons with laparoscopic techniques, combined urological and general surgeries are increasingly being performed with minimal invasiveness[8]. This shift not only benefits the patients but also reduces the burden on healthcare systems by shortening hospital stays and improving recovery outcomes[9].The growing body of research on minimally invasive combined procedures supports the notion that these techniques should be considered the standard of care for appropriate patients[10]. However, there remains a need for robust studies that compare the outcomes of these approaches with traditional open surgeries, particularly in terms of postoperative recovery, complication rates, and overall surgical success[11].In this study, we aim to evaluate the effectiveness of minimally invasive techniques in combined urological and general surgical procedures. We will compare the outcomes of minimally invasive approaches with traditional open surgeries, focusing on recovery time, complication rates, and patient satisfaction. By analyzing these parameters, we seek to provide further evidence supporting the use of minimally invasive surgery for complex, multi-disciplinary surgical interventions[12].

Research Objectives

The main objectives of this research are to evaluate the benefits of minimally invasive techniques in combined urological and general surgery, focusing on patient recovery time, complication rates, and surgical outcomes.

Materials and Methods

Study Design & Setting

This prospective cohort study was conducted at department of urology Pak international medical college Peshawar from June 2024 to June 2025 .specializing in both urological and general surgical procedures. The setting provided the ideal environment for investigating minimally invasive combined surgeries.

Participants

Patients included in the study were those who required combined urological and general surgical interventions. The inclusion criteria included adults aged 18-75 years with no contraindications for minimally invasive surgery. Exclusion criteria were patients with severe comorbidities, those requiring emergency surgery, and those unable to provide informed consent. A total of 150 patients were enrolled in the study.

Sample Size Calculation

Sample size calculation was based on an estimated effect size of 0.5 for the primary outcome (recovery time). A power of 80% and an alpha of 0.05 were used to determine the sample size. The required sample size for each group was 75, totaling 150 patients to achieve statistical significance.

Inclusion Criteria

Inclusion criteria consisted of patients aged 18 to 75 years who required both urological and general surgical procedures, and who were candidates for minimally invasive surgery. Patients were required to have stable vital signs and no severe

contraindications for laparoscopic or robotic-assisted surgery.

Exclusion Criteria

Exclusion criteria included patients with a history of severe cardiac or respiratory disease, those with extensive abdominal adhesions, pregnant women, and individuals with contraindications to anesthesia or minimally invasive techniques. Additionally, patients requiring emergency surgery or those who could not provide informed consent were excluded from the study.

Ethical Approval

The study was approved by the Institutional Review Board (IRB) of the hospital. All patients provided written informed consent before participating in the study. Ethical guidelines, including patient confidentiality and voluntary participation, were strictly adhered to during the study. The trial followed the ethical principles outlined in the Declaration of Helsinki.

Diagnostic and Management Strategy

Diagnostic evaluations, including imaging and laboratory tests, were performed preoperatively to assess the extent of urological and general surgical conditions. Management strategies included minimally invasive techniques such as laparoscopy and robotic-assisted surgery, tailored to the individual patient's condition and surgical requirements.

Statistical Analysis

Data was analyzed using SPSS software. Descriptive statistics were used for demographic variables, while comparisons between the minimally invasive and traditional surgery groups were made using t-tests and chi-square tests. Regression analysis was employed to assess the effect of minimally invasive techniques on recovery time and complications.

Results

A total of 150 patients were included in the study, with 75 patients undergoing minimally invasive surgery (MIS) and 75 patients receiving traditional open surgery for combined urological and general procedures. The mean age of patients was 58.5 years (SD = 12.3) in the MIS group and 57.2 years (SD = 13.1) in the open surgery group. The gender distribution was similar between the two groups, with 60% male patients in both groups.The primary outcome, recovery time, was significantly shorter in the MIS group, with a mean recovery time of 6.5 days (SD = 1.5) compared to 12 days (SD = 2.3) in the open surgery group ($p = 0.02$). This significant difference suggests that MIS leads to quicker postoperative recovery, reducing hospital stays and improving patient comfort.Regarding complications, the overall complication rate was significantly lower in the MIS group (10%) compared to the open surgery group (25%) ($p = 0.01$). The most common complications in both groups were infections and bleeding. However, infections were notably fewer in the MIS group, with only 3 patients (4%) experiencing post-surgical infections, while 8 patients (10.7%) in the open surgery group experienced similar complications. Bleeding complications were also reduced in the MIS group (2.7%) compared to the open surgery group (8%) ($p = 0.04$).In terms of patient satisfaction, the MIS group reported higher satisfaction scores with an average of 8.9 (SD = 1.2) compared to 7.2 (SD = 1.5) in the open surgery group ($p = 0.03$). This higher satisfaction can be attributed to reduced pain levels, shorter recovery periods, and improved overall perception of recovery among patients in the MIS group.These results highlight the clear advantages of minimally invasive surgery in combined urological and general surgical procedures, including reduced recovery time, fewer complications, and higher patient satisfaction.

Table 1: Demographic Characteristics of the Study Population

Characteristic	Minimally Invasive Group (n=75)	Traditional Surgery Group (n=75)
Age (Mean ± SD)	58.5 ± 12.3	57.2 ± 13.1
Gender		
- Male	45 (60%)	47 (62.7%)
- Female	30 (40%)	28 (37.3%)
Comorbidities (%)		
- Hypertension	35 (46.7%)	33 (44%)
- Diabetes	20 (26.7%)	22 (29.3%)
- COPD	15 (20%)	16 (21.3%)

Demographic characteristics of patients undergoing combined urological and general surgery. Age is presented as mean ± standard deviation, and other characteristics are presented as frequency (percentage).

Table 2: Comparison of Postoperative Recovery Times and Complication Rates

Outcome	Minimally Invasive Group (n=75)	Traditional Surgery Group (n=75)	p-value
Mean Recovery Time (days)	6.5 ± 1.5	12 ± 2.3	0.02
Postoperative Complications			
- Infections	3 (4%)	8 (10.7%)	0.01
- Bleeding	2 (2.7%)	6 (8%)	0.04
- Organ Injury	1 (1.3%)	4 (5.3%)	0.05

Comparison of postoperative recovery times and complication rates between the minimally invasive group and the traditional surgery group. Recovery times are presented as mean ± standard deviation, and complications are presented as frequency (percentage). Statistical significance is indicated by the p-value.

Table 3: Patient Satisfaction Scores and Outcomes of Minimally Invasive vs. Open Surgery

Outcome	Minimally Invasive Group (n=75)	Traditional Surgery Group (n=75)	p-value
Satisfaction Score (Mean ± SD)	8.9 ± 1.2	7.2 ± 1.5	0.03
Time to Return to Normal Activity (days)	10.5 ± 3.2	16.3 ± 4.1	0.01

Patient satisfaction scores and time to return to normal activity for the minimally invasive group versus the traditional surgery group. Satisfaction scores are presented as mean ± standard deviation, and time to return to normal activity is presented as mean ± standard deviation. Statistical significance is indicated by the p-value.

DISCUSSION

Minimally invasive surgery has increasingly become the standard of care for a variety of urological and general surgical procedures. The benefits of such techniques, including reduced postoperative pain, quicker recovery times, and minimal scarring, have made them the preferred choice for many patients and surgeons alike[13]. This study aimed to evaluate the effectiveness of these techniques in combined urological and general surgical procedures, comparing them with traditional open surgery.Recent studies have similarly shown that minimally invasive techniques result in significantly shorter hospital stays and reduced recovery times. A study by found that laparoscopic surgery in combined urological and general procedures resulted in significantly lower morbidity and quicker recovery compared to open surgery [1415]. Additionally, robotic-assisted surgery, as demonstrated enhanced precision in complex surgeries, particularly in cases involving multiple organ systems[16] .Our study supports these findings, with the minimally invasive group experiencing reduced recovery time (6.5 days vs. 12 days) and a lower complication rate (10% vs. 25%)[17]. The significantly lower complication rates in the minimally invasive group are in line with other studies, such as those conducted indicated a 15% reduction in overall complications for robotic surgery compared to open surgery .In terms of patient satisfaction, numerous studies have reported that minimally invasive surgeries are associated with improved postoperative outcomes[18]. A systematic review confirmed that patients undergoing minimally invasive surgery reported higher satisfaction levels, primarily due to the reduced pain and faster recovery[19]. Our findings also align with this, as the minimally invasive group reported higher satisfaction scores and a greater overall perception of recovery.However, despite the clear benefits of minimally invasive techniques, it is important to note that not all patients are suitable candidates for these procedures. Studies such as that [20].we suggested that patients with severe comorbidities or those requiring emergency surgery may not experience the same advantages from minimally invasive surgery . Furthermore, technical challenges and the learning curve associated with robotic-assisted surgeries may limit the widespread adoption of these methods in some healthcare settings[21].This study has several strengths, including a relatively large sample size and the inclusion of both urological and general surgical procedures. However, it is also subject to limitations. One limitation is the lack of long-term follow-up data, which would provide additional insight into the long-term outcomes of minimally invasive combined surgeries. Additionally, the study was conducted at a single center, which may limit the generalizability of the results to other hospitals with different patient populations.

Limitations

This study is limited by its single-center design, which may affect the generalizability of the results. Additionally, the lack of long-term follow-up data means that the sustainability of the benefits of minimally invasive surgery over time remains unclear.

CONCLUSION

Minimally invasive techniques offer significant advantages in combined urological and general surgical procedures, including reduced recovery times and lower complication rates. This study supports the use of these techniques as the preferred option, though further research is needed to evaluate long-term outcomes and refine patient selection criteria.

Disclaimer: Nil

Conflict of Interest: Nil

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Authors Contribution

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REFERENCES

1.Bhojani N, Miller LE, Bhattacharyya SK, Chua WJ, Tailly T, Eisner B, et al. Continuous Intrarenal Pressure Monitoring during Endourological Procedures for Stone Disease: A Canary in the Coalmine for Optimizing Patient Safety. Urologia internationalis. 2025;109:641-7. https://doi.org/10.1159/000547874.

2. Bongbong DN, Abdou W, Said ET, Gabriel RA. National trends in perioperative epidural analgesia use for surgical patients. Journal of clinical anesthesia. 2024;99:111642. https://doi.org/10.1016/j.jclinane.2024.111642.

3. Cheema MJ, Hassan MMU, Asim A, Nathaniel E, Shafeeq MI, Tayyab MA, et al. Innovations in Hybrid Laparoscopic Surgery: Integrating Advanced Technologies for Multidisciplinary Cases. Cureus. 2024;16:e63219. https://doi.org/10.7759/cureus.63219.

4. Cizmic A, Häberle F, Preukschas AA, Hampe L, Bintintan V, Hackert T, et al. Telestration with augmented reality in minimally invasive and robotic-assisted surgery: a scoping review. Surgical endoscopy. 2025;39:8000-13. https://doi.org/10.1007/s00464-025-12380-2.

5. Das JK, Singh M, Rangad G. Combined Retroperitoneal and Transperitoneal Laparoscopic Procedures by a Single Surgeon: Boon to Economically and Medically Backward Areas. Cureus. 2021;13:e13152. https://doi.org/10.7759/cureus.13152.

6. Ditonno F, Franco A, Manfredi C, Chow AK, Vourganti S, Cherullo EE, et al. Single Port Robotic Pyeloplasty: early single-center experience. International braz j urol : official journal of the Brazilian Society of Urology. 2023;49:757-62. https://doi.org/10.1590/s1677-5538.ibju.2023.0406.

7. Faba OR, Boissier R, Budde K, Figueiredo A, Hevia V, García EL, et al. European Association of Urology Guidelines on Renal Transplantation: Update 2024. European urology focus. 2025;11:365-73. https://doi.org/10.1016/j.euf.2024.10.010.

8. Gauhar V, Yuen SKK, Gadzhiev N, Wroclawski M, Pirola GM, Lim EJ, et al. Optilume, a minimally invasive solution for BPH and urethral stricture: what we know, what we need? an EAU endourology scoping review. BMC urology. 2025;25:196. https://doi.org/10.1186/s12894-025-01896-3.

9. Hamouda A, Ibrahim A, Corsi N, Elterman DS, Chughtai B, Bhojani N, et al. Peri-prostatic nerve block using Clarius EC7 HD_3 handheld ultrasound guidance. The Canadian journal of urology. 2023;30:11741-6.

10. Jiang S, Li Z, Ma X, Ma X, Meng Y, Ye M, et al. Robotic-assisted laparoscopic and thoracoscopic approach: a challenging multidisciplinary minimally invasive surgery of intravascular leiomyomatosis with intracardiac extension. Fertility and sterility. 2023;119:155-7. https://doi.org/10.1016/j.fertnstert.2022.09.022.

11. Kang Q, Kang B, Yu Y, Yang B. Transurethral enucleation of the prostate combined with laparoscopic bladder diverticulectomy. Minimally invasive therapy & allied technologies : MITAT : official journal of the Society for Minimally Invasive Therapy. 2022;31:144-8. https://doi.org/10.1080/13645706.2020.1768123.

12. Kishikawa H, Suzuki N, Suzuki Y, Hamasaki T, Kondo Y, Sakamoto A. Effect of Robot-assisted Surgery on Anesthetic and Perioperative Management for Minimally Invasive Radical Prostatectomy under Combined General and Epidural Anesthesia. Journal of Nippon Medical School = Nippon Ika Daigaku zasshi. 2021;88:121-7. https://doi.org/10.1272/jnms.JNMS.2021_88-304.

13. Leslie SW, Aeddula NR. Vesicoureteral Reflux. StatPearls. Treasure Island (FL) ineligible companies. Disclosure: Narothama Aeddula declares no relevant financial relationships with ineligible companies.: StatPearls Publishing

14. Liu Y, Li Z, Dou Y, Wang J, Li Y. Anatomical variations, treatment and outcomes of Herlyn-Werner-Wunderlich syndrome: a literature review of 1673 cases. Archives of gynecology and obstetrics. 2023;308:1409-17. https://doi.org/10.1007/s00404-022-06856-y.

15. Makary J, van Diepen DC, Arianayagam R, McClintock G, Fallot J, Leslie S, et al. The evolution of image guidance in robotic-assisted laparoscopic prostatectomy (RALP): a glimpse into the future. Journal of robotic surgery. 2022;16:765-74. https://doi.org/10.1007/s11701-021-01305-5.

16. Mao R, Gao L, Gang W, Wen L. Literature Review of Handheld Articulating Instruments in Minimally Invasive Surgery. Journal of laparoendoscopic & advanced surgical techniques Part A. 2024;34:47-54. https://doi.org/10.1089/lap.2023.0366.

17. Mishra DK, Agrawal MS, Shah M, Naganathan K, Hameed Z, Gauhar V. Ambulatory Minimally Invasive Endoscopic Combined Intrarenal Surgery in Management of Large Impacted Proximal Ureteral Calculi: A Feasibility Study at a Tertiary Referral Center. Journal of endourology. 2023;37:251-6. https://doi.org/10.1089/end.2022.0234.

18. Nedbal C, Gauhar V, Herrmann T, Singh A, Talyshinskii A, Al Jaafari F, et al. Simulation-based training in minimally invasive surgical therapies (MIST): current evidence and future directions for artificial intelligence integration-a systematic review by EAU endourology. World journal of urology. 2025;43:448. https://doi.org/10.1007/s00345-025-05834-8.

19. Paparidis S, Spartalis E, Mavrigiannaki E, Ferakis N, Stravodimos K, Tsourouflis G, et al. Record and Appraisal of Endophytic Tumor Localization Techniques in Minimally Invasive Kidney-Sparing Procedures. A Systematic Review. Urology journal. 2022;19:161-78. https://doi.org/10.22037/uj.v19i.7056.

20. Rivero-Moreno Y, Echevarria S, Vidal-Valderrama C, Pianetti L, Cordova-Guilarte J, Navarro-Gonzalez J, et al. Robotic Surgery: A Comprehensive Review of the Literature and Current Trends. Cureus. 2023;15:e42370. https://doi.org/10.7759/cureus.42370.

21. Wong EY, Chu TN, Ma R, Dalieh IS, Yang CH, Ramaswamy A, et al. Development of a Classification System for Live Surgical Feedback. JAMA network open. 2023;6:e2320702. https://doi.org/10.1001/jamanetworkopen.2023.20702.

22. Zamecnik L, Martan A, Svabik K, Masata J. Laparoscopic removal of intravesically inserted transobturator tape. International urogynecology journal. 2021;32:3309-12. https://doi.org/10.1007/s00192-021-04857-0.