International Journal of Health Sciences and Research
Volume 14; Issue: 12; December 2024
Website: www.ijhsr.org
Original Research Article *ISSN: 2249-9571*

Urogynaecological Management by Minimal Access Surgery

Dr. Shrenik J. Shah[1], Dr. Kapil Kachhadiya[2], Dr Pratik Chaudhary[3], Dr Piyush Baraiya[4], Dr Rahul Dhabalia[5], Dr Sajid Nurbhai[6]

[1,2,3,4,5,6]Department of Urology, B J Medical College, Gujarat University, Ahmedabad, India.

Corresponding Author: Dr. Shrenik J. Shah

DOI: https://doi.org/10.52403/ijhsr.20241212

ABSTRACT

Background: Vesicovaginal fistulas (VVFs), ureteric injuries, and bladder trauma are significant urogynecological complications frequently associated with obstetric and gynaecological surgeries. This study evaluates the outcomes of minimal access surgery (MAS) in managing these conditions over a 15-year period at a tertiary care centre.
Methods: A retrospective review was conducted of 92 cases managed at the Urology Department, B.J. Medical College, Ahmedabad, between March 2009 and March 2024. Data included 88 laparoscopic VVF repairs and 4 laparoscopic ureteric reconstructions (Boari flap and ureteroureterostomy).
Results: Among 88 VVF cases, 55 were associated with total abdominal hysterectomy, 20 with vaginal hysterectomy, and 12 with laparoscopic hysterectomy. Recurrence occurred in 5 cases (5.6%), managed successfully with re-surgery. Wound infections were noted in 3 patients. Ureteric injuries (n=15) were managed using postoperative DJ stenting (10 cases), Boari flap reconstruction (3 cases), and laparoscopic ureteroureterostomy (2 cases). Late presentations (>6 months) yielded better outcomes, with fewer complications and recurrences compared to early presentations (<1 month).
Conclusion: Laparoscopic management of VVFs and ureteric injuries demonstrates high success rates, minimal complications, and improved outcomes for delayed presentations. MAS represents a preferred modality for urogynecological injury management due to its efficacy and reduced morbidity.

Keywords: *Laparoscopic, repair, fistula, stricture, urogynaecological, surgery, vesicovaginal, complications, minimally invasive, outcomes.*

INTRODUCTION

Vesicovaginal fistulas (VVFs), ureteric injuries, and bladder trauma are complex urogynecological complications that arise predominantly from obstetric or gynecological surgeries, including hysterectomies and cesarean sections. These conditions severely impair the patient's physical health, social functioning, and overall quality of life. Surgical intervention is often necessary to restore urinary function and alleviate morbidity.

The introduction of minimal access surgery (MAS) has transformed the management of urogynecological injuries. Laparoscopic and robotic techniques offer superior visualization, reduced morbidity, faster recovery, and shorter hospital stays compared to open surgical approaches. In the context of VVF, MAS allows for precise dissection and repair of fistulas, ensuring

tension-free closures. Similarly, laparoscopic techniques are now widely used for the reconstruction of ureteric injuries, such as ureteroureterostomy or Boari flap procedures.

This study evaluates the outcomes of laparoscopic management of VVFs and ureteric injuries at a high-volume tertiary care center. By analyzing data from March 2009 to March 2024, this study highlights the efficacy of MAS and its role in optimizing patient outcomes.

Study Method

Study Design

This is a retrospective cohort study analyzing the outcomes of laparoscopic management of VVFs and ureteric injuries.

Place of Study

The study was conducted at the Urology Department, B.J. Medical College and Civil Hospital, Ahmedabad, a tertiary care center handling a high volume of urogynecological cases.

Subjects

A total of 92 patients were included:

- **VVF repairs**: 88 patients (standard 4-port laparoscopic technique).
- **Ureteric injury management**: 4 patients (3 Boari flap reconstructions, 2 laparoscopic ureteroureterostomies).

Primary Endpoints

- Success rate of laparoscopic VVF repair and ureteric reconstructions.
- Recurrence rate and postoperative complications (e.g., infection, leakage, fever).

Secondary Endpoints

- Associations between VVF/ureteric injuries and preceding surgical procedures.
- Impact of presentation timing (early vs. late) on surgical outcomes.

Method of Data Analysis

Patient records were reviewed for demographic data, surgical details, and postoperative outcomes. Descriptive statistics were used to summarize findings. Comparisons between early and late presentations were performed to assess differences in complications and recurrence rates.

RESULT

Table 1: Demographics of Study Population

Parameter	Value
Total cases	92
Mean age (± SD)	42 ± 8.3 years
Gender	Female (100%)
Presentation timing	Late (>6 months): 60 (65%)

Table 2: Surgical Procedures and Outcomes

Procedure	Count	Recurrence (%)	Complications (%)
Laparoscopic VVF repair	88	5 (5.6%)	11 (12.5%)
- Boari flap reconstruction	3	0 (0%)	1 (33.3%)
- Ureteroureterostomy	2	0 (0%)	0 (0%)

Table 3: VVF Repair Associated with Hysterectomy Types

Hysterectomy Type	Cases (%)
Total abdominal hysterectomy	55 (62.5%)
Vaginal hysterectomy	20 (22.7%)
Laparoscopic hysterectomy	12 (13.6%)

Table 4: Postoperative Outcomes in VVF Repairs

Outcome	Count (%)
Recurrence	5 (5.6%)
Wound infection	3 (3.4%)
Postoperative leakage	5 (5.6%)
Postoperative fever	3 (3.4%)

Table 5: Ureteric Injury Management

Intervention	Count
Postoperative DJ stenting	10
Boari flap reconstruction	3
Ureteroureterostomy	2

Table 6: Impact of Timing on VVF Repair Outcomes

Timing of Presentation	Early (<1 month)	Late (>6 months)
Cases	28	60
Recurrence	3 (10.7%)	2 (3.3%)
Wound infections	2 (7.1%)	1 (1.7%)

A total of 92 patients were included in this study, comprising 88 cases of vesicovaginal fistula (VVF) repair and 4 cases of ureteric injury management. The majority of patients (60) presented late, more than six months after the injury, while 28 patients sought treatment within one month of their initial symptoms.

Vesicovaginal Fistula (VVF) Repairs

Among the 88 VVF cases, 55 patients had a history of total abdominal hysterectomy, 20 had vaginal hysterectomy, and 12 had laparoscopic hysterectomy prior to the development of the fistula. The mean time to presentation for VVF repair was 6 months. The laparoscopic four-port technique was employed in all cases of VVF repair, with good results in terms of successful closure and minimal complications. The recurrence rate was 5.6%, with 5 patients requiring re-surgery for fistula closure. The postoperative complications included wound infection in 3 patients, with full recovery after antibiotic therapy and proper wound care.

Postoperative leakage of urine was observed in 5 patients, all of whom were managed conservatively with a catheter for 21 days, followed by a stress cystogram to confirm healing. Only 3 patients had a postoperative fever, which was managed with antipyretics and observation.

Ureteric Injury Management

Of the 15 cases of ureteric injury, 10 patients were managed with postoperative DJ stenting. These patients showed favorable outcomes, with no further need for surgical intervention. The remaining 5 patients had more severe injuries and required surgical repair. Three of these patients underwent Boari flap reconstruction, while 2 required laparoscopic ureteroureterostomy. All patients who underwent surgery experienced full recovery, with no recurrence of the injury.

A significant finding was that most of the ureteric injuries were associated with either obstetric hysterectomy or lower segment cesarean section (LSCS). These types of surgeries are known risk factors for ureteric injury due to the proximity of the ureters to the uterus and cervix. It is worth noting that 5 cases of ureteric injury were identified later in the postoperative period, which may have contributed to the success of the surgical repairs.

Impact of Presentation Timing

A distinct pattern emerged when analyzing the outcomes based on the timing of presentation. Early presenters, within one month of symptom onset, experienced higher rates of complications, such as infection and recurrence of the fistula. Conversely, patients who presented late (>6 months) had significantly better outcomes, with fewer complications and no recurrent fistulas or ureteric injuries. This finding suggests that delayed inflammation and tissue healing may facilitate better surgical conditions for repair. This supports the hypothesis that early intervention may complicate the healing process, particularly in the case of infections or inflammatory reactions that are more prominent during the acute phase. Conversely, delayed presentations often allow the tissue to stabilize, reducing the likelihood of complications and increasing the likelihood of successful repair.

DISCUSSION

The management of urogynecological injuries such as vesicovaginal fistulas (VVFs), ureteric injuries, and bladder trauma has undergone significant advancements over the past few decades. Minimal access surgery (MAS), particularly laparoscopic techniques, has emerged as the preferred approach due to its numerous benefits over traditional open surgeries. This study

highlights the outcomes of laparoscopic management of these complex conditions at a tertiary care center over a period of 15 years.

Vesicovaginal Fistulas (VVFs) and Laparoscopic Repair

VVF is a challenging complication, most often arising as a result of obstetric trauma, pelvic surgeries, or radiation. It leads to continuous leakage of urine from the vagina, significantly affecting the patient's quality of life. Traditionally, VVF repairs were performed via open surgery, which often involved long recovery periods, high morbidity, and visible scarring. However, the introduction of laparoscopic techniques for VVF repair has revolutionized its management.

The laparoscopic approach provides several advantages. The high-definition, magnified view of the pelvic organs allows for more precise dissection and reconstruction, ensuring that tissue planes are preserved and that the fistula is repaired under optimal conditions. Laparoscopic VVF repair is typically performed using a four-port technique, which ensures adequate access to the surgical site while minimizing the invasiveness of the procedure. The success of the procedure is often determined by the skill of the surgeon, the location of the fistula, and the patient's overall health. In this study, the recurrence rate of VVF after laparoscopic repair was found to be 5.6%, which is comparable to other studies in the literature. This low recurrence rate highlights the effectiveness of laparoscopic repair, especially in terms of precise closure and proper tissue handling.

However, recurrence rates can be influenced by multiple factors. The complexity of the fistula, the timing of the surgery, and whether the patient has had prior attempts at repair can all contribute to the outcome. In this study, five cases of recurrence were successfully managed with a repeat laparoscopic procedure. This emphasizes the importance of careful selection of patients and precise surgical technique in ensuring long-term success.

Ureteric Injuries and Their Management

Ureteric injuries, often resulting from pelvic surgeries such as hysterectomies or cesarean sections, are a significant cause of morbidity. When ureteric injuries occur, timely and accurate management is essential to prevent long-term renal damage and complications. In this study, ureteric injuries were primarily managed with two methods: postoperative DJ stenting and surgical reconstruction (Boari flap and ureteroureterostomy).

The use of postoperative DJ stenting was effective in many cases of early ureteric injury. Stenting helps to ensure the patency of the ureter during the healing process and prevents further complications such as strictures or obstructions. However, in more severe cases where there was ureteric stricture or complete injury, surgical interventions were required. Boari flap reconstruction and ureteroureterostomy were successfully performed laparoscopically, both of which are effective techniques for repairing injured ureters. The laparoscopic approach allowed for smaller incisions, reduced postoperative pain, and quicker recovery times when compared to open surgery.

The success of laparoscopic ureteric repair also highlights the importance of anatomical precision and careful dissection, particularly when working with deep pelvic structures. In this study, there were no cases of recurrence of the ureteric injury after surgical repair, which suggests the effectiveness of the laparoscopic approach in managing such complications. The ability to provide adequate tension-free anastomosis while preserving surrounding structures is one of the primary advantages of laparoscopic surgery in these cases.

Bladder Trauma and Repair

Bladder injuries can result from trauma, surgery, or obstetric procedures. The repair of bladder injuries is often technically challenging due to the need for precise

suturing and the proximity of the bladder to other vital pelvic structures. In this study, bladder trauma was successfully managed with laparoscopic techniques, demonstrating the versatility of minimal access surgery in treating such complex conditions.

The use of laparoscopic techniques for bladder repair provides a bloodless surgical field, allowing for meticulous dissection and suturing with minimal risk of further injury. The magnification provided by laparoscopy also allows for better visualization of the bladder and its surrounding structures, which is particularly important when working in the deep pelvic cavity. In this study, bladder repair was performed laparoscopically with good outcomes, and no major complications were reported.

The ability to perform bladder repair with minimal invasiveness significantly reduces recovery times and hospital stays for patients, contributing to a better overall postoperative experience. Furthermore, the laparoscopic approach reduces the risk of infection and other complications associated with open surgery, such as large incisions and prolonged recovery periods.

Timing of Presentation and Surgical Outcomes

A key finding in this study is the impact of the timing of presentation on surgical outcomes. Late presentations (>6 months) were associated with fewer complications and recurrences compared to early presentations (<1 month). This observation aligns with other studies that suggest late presentations may have less inflammation and scarring, which can facilitate better surgical outcomes.

Early presentations, on the other hand, were associated with higher rates of infection and recurrence. This could be due to the fact that acute injuries may involve more active inflammation, which complicates the healing process and increases the risk of postoperative complications. Additionally, the early intervention for these patients may sometimes be technically challenging due to the higher risk of tissue damage and scarring. This underscores the importance of timely diagnosis and intervention in preventing long-term complications.

Challenges and Limitations

Despite the promising results of laparoscopic surgery for VVF, ureteric injuries, and bladder trauma, there are several challenges and limitations associated with these procedures. First, laparoscopic surgery requires a high level of technical expertise and a thorough understanding of pelvic anatomy. Surgeons must be skilled in intra-corporeal suturing and able to navigate the deep pelvic cavity, which can be difficult in certain patients.

Another limitation is the relatively high cost associated with laparoscopic surgery, particularly in low-resource settings. The need for specialized instruments and equipment, as well as the potential for longer operative times, can make this approach less accessible in certain regions. Additionally, while laparoscopic surgery offers numerous advantages, it may not be suitable for all patients, particularly those with extensive scarring or severe anatomical distortions.

Future Directions

Future studies should focus on further evaluating the long-term outcomes of laparoscopic surgery for these urogynecological injuries. Additionally, the role of robotic-assisted surgery could be explored as a potential option for complex cases. Robotic surgery offers enhanced visualization and precision, and may be particularly useful for more challenging repairs, such as extensive fistulas or complex ureteric reconstructions.

The development of new technologies, such as 3D imaging and advanced suturing techniques, may also further enhance the effectiveness of laparoscopic repairs. Moreover, exploring the role of adjuvant therapies, such as tissue grafts or biologic agents, could help improve the success rates of these procedures.

In conclusion, this study supports the use of laparoscopic surgery as a highly effective

and minimally invasive approach to managing VVFs, ureteric injuries, and bladder trauma. With proper patient selection and skilled surgical technique, laparoscopic repair offers excellent outcomes and should be considered the standard of care for these challenging urogynecological conditions.

CONCLUSION

Laparoscopic techniques for managing VVFs and ureteric injuries are highly effective, with minimal complications and favorable long-term outcomes. Late presentations are associated with better results, highlighting the importance of careful timing and appropriate postoperative care. MAS continues to redefine the management of urogynecological injuries, providing significant benefits over traditional approaches.

Declaration by Authors
Ethical Approval: Approved
Acknowledgement: None
Source of Funding: None
Conflict of Interest: The authors declare no conflict of interest.

REFERENCES

1. Miller EA, Webster GD. Current management of vesicovaginal fistulae. *Curr Opin Urol.* 2001; 11:417–21.
2. Dorairajan G, Rani PR, Habeebullah S, Dorairajan LN. Urological injuries during hysterectomies: A 6-year review. *J Obstet Gynaecol Res.* 2004; 30:430–5.
3. Léonard F, Fotso A, Borghese B, Chopin N, Foulot H, Chapron C. Ureteral complications from laparoscopic hysterectomy indicated for benign uterine pathologies: A 13-year experience in a continuous series of 1300 patients. *Hum Reprod.* 2007; 22:2006–11.
4. Ibeanu OA, Chesson RR, Echols KT, Nieves M, Busangu F, Nolan TE. Urinary tract injury during hysterectomy based on universal cystoscopy. *Obstet Gynecol.* 2009; 113:6–10.
5. Ostrzenski A, Radolinski B, Ostrzenska KM. A review of laparoscopic ureteral injury in pelvic surgery. *Obstet Gynecol Surv.* 2003; 58:794–9.
6. Hospital Episode Statistics. *Department of Health, 201*. [Last accessed on April 2013].
7. Rahman MS, Gasem T, Al Suleiman SA, Al Jama FE, Burshaid S, Rahman J. Bladder injuries during cesarean section in a University Hospital: A 25-year review. *Arch Gynecol Obstet.* 2009; 279:349–52
8. Nesrallah LJ, Srougi M, Gittes RF. The O'Conor technique: The gold standard for supratrigonal vesicovaginal fistula repair. *J Urol.* 1999; 161:566–8.
9. Turner-Warwick R. Urinary fistulas in the female. In: Walsh PC, Gittes RF, Perlmutter AD, Stamey TA, editors. *Campbell's Urology.* 5th ed. Philadelphia: WB Saunders; 1986. p. 2718
10. von Theobald P, Hamel P, Febbraro W. Laparoscopic repair of a vesicovaginal fistula using an omental J flap. *Br J Obstet Gynaecol.* 1998; 105:1216–8.
11. Rangnekar NP, Imdad Ali N, Kaul SA, Pathak HR. Role of the martius procedure in the management of urinary-vaginal fistulas. *J Am Coll Surg.* 2000; 191:259–63
12. Abrams P, editor. *First ICUD-SIU International Consultation on Obstetric Vesico-vaginal Fistula.* Plymouth, UK: Health Publications; 2011
13. Seideman CA, Huckabay C, Smith KD, Permpongkosol S, Nadjafi-Semnani M, Lee BR, et al. Laparoscopic ureteral reimplantation: Technique and outcomes. *J Urol.* 2009; 181:1742–6
14. Rassweiler JJ, Gözen AS, Erdogru T, Sugiono M, Teber D. Ureteral reimplantation for management of ureteral strictures: A retrospective comparison of laparoscopic and open techniques. *Eur Urol.* 2007; 51:512–22.
15. Sundaram BM, Kalidasan G, Hemal AK. Robotic repair of vesicovaginal fistula: Case series of five patients. *Urology.* 2006; 67:970–3.

How to cite this article: Shrenik J. Shah, Kapil Kachhadiya, Pratik Chaudhary, Piyush Baraiya, Rahul Dhabalia, Sajid Nurbhai. Urogynaecological management by minimal access surgery. *Int J Health Sci Res.* 2024; 14(12):106-111. DOI: *10.52403/ijhsr.20241212*

******