Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies

Journal home page:www.jamdsr.com doi:10.21276/jamdsr Index Copernicus value [ICV] =82.06

(e) ISSN Online: 2321-9599; (p) ISSN Print: 2348-6805

Original Research

Comparative Study of Laparoscopic Versus Open Surgical Management of Ovarian Torsion in Reproductive-Age Women

[1]Aditi Aggarwal, [2]Udit Panwar

[1]Assistant Professor, Department of Obstetrics & Gynaecology, Saraswathi Institute of Medical Sciences, Hapur, Uttar Pradesh, India;
[2]Assistant Professor, Department of General Surgery, Saraswathi Institute of Medical Sciences, Hapur, Uttar Pradesh, India

ABSTRACT:
Background: Ovarian torsion is a gynecological emergency that requires prompt surgical intervention to preserve ovarian function. With advances in minimally invasive techniques, laparoscopy is increasingly favored over open surgery. However, comparative data on outcomes remain essential to guide clinical decision-making. **Aim:** To compare the intraoperative and postoperative outcomes of laparoscopic versus open surgical management of ovarian torsion in reproductive-age women. **Materials and Methods:** This prospective comparative study was conducted at a tertiary care teaching hospital and included 90 reproductive-age women (15–45 years) with clinically and ultrasonographically confirmed ovarian torsion. Patients were divided into two groups: Group A (n=45) underwent laparoscopic detorsion with or without cystectomy/oophorectomy, and Group B (n=45) underwent open laparotomy. Preoperative assessment, operative parameters, postoperative recovery, pain scores, and histopathological findings were analyzed. Statistical significance was set at $p<0.05$. **Results:** Baseline characteristics were comparable in both groups. Mean operative time was significantly shorter in the laparoscopic group (58.7 ± 12.3 min) than in the open group (72.6 ± 14.8 min, $p<0.001$). Blood loss was also lower (84.5 ± 30.4 ml vs. 140.7 ± 35.2 ml, $p<0.001$). Postoperative VAS scores at 6, 12, and 24 hours were significantly lower in Group A. The laparoscopic group had a shorter hospital stay (2.4 ± 0.6 vs. 4.1 ± 1.1 days, $p<0.001$), earlier return of bowel activity, and fewer surgical site infections. Histopathology revealed benign cystic lesions in 60.00% of cases. **Conclusion:** Laparoscopic surgery offers significant advantages over open surgery in terms of operative time, blood loss, pain, recovery, and complications, with equivalent surgical efficacy. It should be considered the preferred approach for ovarian torsion in reproductive-age women.
Keywords: Ovarian torsion, Laparoscopy, Laparotomy, Reproductive age, Minimally invasive surgery

Received: 17 December, 2017 Accepted: 20 January, 2018

Corresponding author: Udit Panwar, Assistant Professor, Department of General Surgery, Saraswathi Institute of Medical Sciences, Hapur, Uttar Pradesh, India

This article may be cited as: Aggarwal A, Panwar U. Comparative Study of Laparoscopic Versus Open Surgical Management of Ovarian Torsion in Reproductive-Age Women. J Adv Med Dent Scie Res 2018;6(2):249-254.

INTRODUCTION

Ovarian torsion is a gynecological emergency characterized by the partial or complete rotation of the ovarian pedicle, resulting in compromised blood flow to the ovary and fallopian tube. It accounts for approximately 2.7% of all gynecological emergencies and frequently affects women of reproductive age[1]. Prompt diagnosis and timely surgical intervention are essential to preserve ovarian function and fertility, especially in younger women. The clinical presentation of ovarian torsion is often non-specific, typically involving sudden onset lower abdominal pain, nausea, vomiting, and adnexal tenderness, which can mimic other acute abdominal conditions such as appendicitis or ruptured ovarian cyst[2].

The pathophysiology of torsion involves the rotation of the ovary around the infundibulopelvic ligament and utero-ovarian ligament axis, leading to venous and lymphatic obstruction followed by arterial compromise. Risk factors for torsion include ovarian enlargement, presence of benign cysts or masses, ovulation induction in assisted reproductive techniques, and anatomical abnormalities. However, torsion may also occur in otherwise normal ovaries, particularly in premenarchal and reproductive-aged females[3].

Historically, laparotomy (open surgery) was the preferred approach for diagnosing and treating ovarian torsion. However, with advancements in minimally invasive surgical techniques, laparoscopy has emerged as a viable and often preferred option due to its reduced operative morbidity, quicker postoperative recovery, and better cosmetic outcomes[4]. Laparoscopy allows direct visualization of the pelvic structures, detorsion of the adnexa, and possible preservation of the ovary without the need for large incisions. In contrast, open surgery often necessitates oophorectomy, especially when the ovary appears necrotic on gross inspection, even though histopathological studies have shown that ovaries with a dusky appearance may retain functional viability after detorsion[5].

The debate between the two surgical approaches—laparoscopic versus open—centers on several factors, including operative time, intraoperative complications, need for oophorectomy, length of hospital stay, and postoperative recovery. Several studies have indicated that laparoscopy is associated with significantly shorter hospital stays and faster return to normal activity when compared to laparotomy[6]. Additionally, in cases where fertility preservation is a priority, minimally invasive techniques are increasingly being favored due to their uterus- and ovary-sparing potential.

Despite the growing preference for laparoscopic management, open surgery remains the procedure of choice in certain clinical scenarios, particularly when there is a suspicion of malignancy, large adnexal masses that may limit visualization, or hemodynamic instability. It is also considered in centers with limited laparoscopic expertise or resources. Moreover, in cases where the torsion is complicated by rupture or significant hemoperitoneum, laparotomy may be necessary to ensure optimal visualization and control[7].

Reproductive-aged women form a critical population in whom the implications of surgical management extend beyond immediate clinical outcomes to include long-term fertility and hormonal health. The decision to perform oophorectomy or to preserve the ovary through detorsion and conservative management is thus highly consequential. Studies have reported that even ovaries appearing ischemic at surgery can regain normal function post-detorsion, challenging the traditional inclination towards oophorectomy based on intraoperative appearance alone[8].

Ultrasound with color Doppler imaging remains the initial diagnostic modality of choice, offering visualization of adnexal masses and assessment of blood flow. However, the absence of flow on Doppler does not always confirm torsion nor does its presence exclude it. Therefore, diagnostic laparoscopy is often required for definitive confirmation and simultaneous management[9]. The evolution of laparoscopy from a purely diagnostic tool to a comprehensive therapeutic modality has transformed the approach to adnexal emergencies, especially in young and reproductive-age females.

Given the above considerations, a comparative evaluation of laparoscopic versus open surgical management in the context of ovarian torsion in reproductive-age women is imperative. This study aims to assess not only the intraoperative and postoperative outcomes of the two techniques but also the ovarian preservation rate, complication profile, and recovery dynamics. It further seeks to contribute evidence toward refining surgical decision-making protocols, especially in resource-constrained settings where the availability of minimally invasive surgical infrastructure may be limited.

Ultimately, the choice of surgical technique must balance clinical urgency, surgeon expertise, institutional capabilities, and the patient's reproductive goals. While laparoscopic surgery is often viewed as the modern standard, comprehensive comparative studies are essential to provide nuanced insights into the optimal management strategies tailored to individual patient needs and circumstances[10].

MATERIALS AND METHODS

This prospective comparative study was conducted in the Department of Obstetrics and Gynecology at a tertiary care teaching hospital. The study included **90 women of reproductive age (15–45 years)** who were diagnosed clinically and radiologically with ovarian torsion and underwent either laparoscopic or open surgical management.

Inclusion Criteria

- Women aged 15–45 years
- Clinically and ultrasonographically confirmed cases of ovarian torsion
- Hemodynamically stable patients
- Willingness to undergo surgery and provide informed consent

Exclusion Criteria

- Pregnant women
- Suspected or confirmed ovarian malignancy
- Hemodynamically unstable patients requiring immediate open surgery
- Patients with previous extensive pelvic surgeries contraindicating laparoscopy
- Patients unwilling to participate or lost to follow-up

Sample Size and Group Allocation

A total of **90 eligible patients** were included in the study and were divided into two groups based on the surgical approach adopted:

- **Group A (Laparoscopic Group)**: 45 patients underwent laparoscopic detorsion with or without cystectomy/oophorectomy.
- **Group B (Open Surgery Group)**: 45 patients underwent conventional open laparotomy for

detorsion with or without cystectomy/oophorectomy.

The choice of surgical method was determined based on surgeon expertise, patient condition, and intraoperative findings.

Preoperative Assessment

All patients included in the study underwent a thorough clinical evaluation prior to surgery. This included a detailed medical history and physical examination to assess presenting symptoms and general health status. Radiological assessment was performed using transvaginal or transabdominal ultrasonography, supplemented with Doppler studies to confirm the diagnosis of ovarian torsion and evaluate vascular flow to the ovary. Baseline laboratory investigations such as complete blood count, serum electrolytes, and coagulation profile were conducted to ensure surgical fitness. Informed written consent was obtained from each participant, clearly explaining the choice of either laparoscopic or open surgical approach based on clinical indications and surgeon preference.

Surgical Procedure

Patients in Group A underwent laparoscopic surgery using a standard 3-port or 4-port technique under general anesthesia. Intraoperative steps included detorsion of the twisted ovary, with cystectomy or oophorectomy performed depending on ovarian viability assessed visually during the procedure. In Group B, patients underwent open laparotomy through either a Pfannenstiel or lower midline incision under general anesthesia. The surgical objectives remained the same as in laparoscopy, with detorsion followed by either cystectomy or oophorectomy depending on the extent of ischemic damage.

Postoperative Follow-up

Postoperative evaluation was carried out for all patients in both groups. Parameters monitored included operative time (in minutes), estimated intraoperative blood loss, and the need for blood transfusion. Postoperative pain levels were recorded using the Visual Analogue Scale (VAS) at 6, 12, and 24 hours. Additional outcomes observed were the duration of hospital stay, time to return of bowel activity, and incidence of surgical site infections or other postoperative complications. Histopathological analysis was performed for all excised ovarian specimens. Follow-up visits were scheduled at 2 weeks and 6 weeks after surgery to assess the recovery process and detect any delayed complications.

Statistical Analysis

Data were recorded and tabulated using Microsoft Excel. Statistical analysis was performed using SPSS software version 21.0. Continuous variables were expressed as mean ± standard deviation and compared using the unpaired t-test or Mann-Whitney U test. Categorical variables were expressed as frequencies and percentages and analyzed using the Chi-square test or Fisher's exact test. A p-value of <0.05 was considered statistically significant.

RESULT

Table 1: Baseline Demographic and Clinical Characteristics

The baseline characteristics of patients in both groups were comparable, with no statistically significant differences observed. The mean age of patients in the laparoscopic group (Group A) was 28.4 ± 6.2 years, while it was 29.1 ± 5.8 years in the open surgery group (Group B), with a *p*-value of 0.52. Similarly, the mean body mass index (BMI) was nearly equal between the two groups (24.6 ± 2.3 kg/m² in Group A vs. 24.9 ± 2.1 kg/m² in Group B, $p = 0.48$). Nulliparous women constituted 44.44% in the laparoscopic group and 40.00% in the open surgery group ($p = 0.67$), indicating similar parity distribution. The duration of abdominal pain before presentation was also comparable between the groups, with a mean of 16.3 ± 5.1 hours in Group A and 17.0 ± 5.5 hours in Group B ($p = 0.47$). Right-sided ovarian torsion was more common in both groups, noted in 64.44% of Group A and 68.89% of Group B patients ($p = 0.65$), with no significant side predilection difference.

Table 2: Intraoperative Parameters

Significant differences were observed in intraoperative parameters favoring the laparoscopic approach. The mean operative time was significantly shorter in the laparoscopic group (58.7 ± 12.3 minutes) compared to the open surgery group (72.6 ± 14.8 minutes), with a highly significant *p*-value of <0.001. Blood loss during surgery was also substantially lower in the laparoscopic group (84.5 ± 30.4 ml) versus the open group (140.7 ± 35.2 ml), again statistically significant ($p< 0.001$). Although more patients in Group B required blood transfusions (13.33%) compared to Group A (4.44%), the difference was not statistically significant ($p = 0.14$). The number of oophorectomies and cystectomies performed was not significantly different between the groups, with oophorectomies in 33.33% (Group A) vs. 40.00% (Group B) and cystectomies in 66.67% (Group A) vs. 60.00% (Group B), both with $p = 0.50$.

Table 3: Postoperative Pain Scores (VAS)

Postoperative pain assessment using the Visual Analogue Scale (VAS) revealed significantly lower pain scores in the laparoscopic group at all measured intervals. At 6 hours post-surgery, the mean VAS score was 4.8 ± 1.2 in Group A compared to 6.2 ± 1.3 in Group B ($p< 0.001$). At 12 hours, the scores were 3.6 ± 1.1 in Group A and 5.0 ± 1.2 in Group B ($p< 0.001$). By 24 hours, pain scores further declined in both groups, with Group A reporting 2.3 ± 0.9 and Group B 3.8 ± 1.0 ($p< 0.001$). These results suggest a

significantly better postoperative pain profile in patients managed laparoscopically.

Table 4: Postoperative Recovery and Hospital Stay
The postoperative recovery was markedly faster in the laparoscopic group. The average hospital stay in Group A was 2.4 ± 0.6 days, significantly shorter than the 4.1 ± 1.1 days in Group B ($p< 0.001$). Similarly, the return of bowel activity occurred earlier in the laparoscopic group (16.5 ± 3.2 hours) compared to the open surgery group (24.7 ± 4.1 hours), which was statistically significant ($p< 0.001$). Although postoperative fever was reported more in Group B (13.33%) than in Group A (6.67%), the difference was not statistically significant ($p = 0.29$). However, surgical wound infections were reported in 8.89% of Group B patients, whereas none were observed in Group A, showing a statistically significant difference ($p = 0.04$), highlighting the minimally invasive advantage of laparoscopy in reducing surgical site complications.

Table 5: Histopathological Findings of Excised Ovarian Tissue
The histopathological analysis revealed similar findings in both groups, with the most common lesion being benign cystic lesions—found in 62.22% of Group A and 57.78% of Group B patients, contributing to an overall incidence of 60.00%. Hemorrhagic cysts or torsion-related ischemic changes were identified in 24.44% of laparoscopic and 28.89% of open surgery cases (overall 26.67%). Dermoid cysts were found in 8.89% of patients in Group A and 6.67% in Group B. Endometriotic cysts were the least frequent, observed in 4.44% (Group A) and 6.67% (Group B). These findings indicate a largely benign pathology underlying most cases of ovarian torsion in reproductive-age women.

Table 1: Baseline Demographic and Clinical Characteristics

Parameter	Group A (Laparoscopy) (n=45)	Group B (Open Surgery) (n=45)	*p*-value
Mean Age (years)	28.4 ± 6.2	29.1 ± 5.8	0.52
Mean BMI (kg/m²)	24.6 ± 2.3	24.9 ± 2.1	0.48
Nulliparous (%)	20 (44.44%)	18 (40.00%)	0.67
Duration of Pain (hours)	16.3 ± 5.1	17.0 ± 5.5	0.47
Side of Torsion (Right %)	29 (64.44%)	31 (68.89%)	0.65

Table 2: Intraoperative Parameters

Parameter	Group A (Laparoscopy) (n=45)	Group B (Open Surgery) (n=45)	*p*-value
Mean Operative Time (min)	58.7 ± 12.3	72.6 ± 14.8	<0.001
Estimated Blood Loss (ml)	84.5 ± 30.4	140.7 ± 35.2	<0.001
Blood Transfusion Required	2 (4.44%)	6 (13.33%)	0.14
Oophorectomy Performed	15 (33.33%)	18 (40.00%)	0.50
Cystectomy Performed	30 (66.67%)	27 (60.00%)	0.50

Table 3: Postoperative Pain Scores (VAS)

Time Interval	Group A (Mean ± SD)	Group B (Mean ± SD)	*p*-value
6 hours	4.8 ± 1.2	6.2 ± 1.3	<0.001
12 hours	3.6 ± 1.1	5.0 ± 1.2	<0.001
24 hours	2.3 ± 0.9	3.8 ± 1.0	<0.001

Table 4: Postoperative Recovery and Hospital Stay

Parameter	Group A (Laparoscopy) (n=45)	Group B (Open Surgery) (n=45)	*p*-value
Mean Hospital Stay (days)	2.4 ± 0.6	4.1 ± 1.1	<0.001
Return of Bowel Activity (h)	16.5 ± 3.2	24.7 ± 4.1	<0.001
Postoperative Fever	3 (6.67%)	6 (13.33%)	0.29
Wound Infection	0 (0.00%)	4 (8.89%)	0.04

Table 5: Histopathological Findings of Excised Ovarian Tissue

Histopathological Diagnosis	Group A (n=45)	Group B (n=45)	Total (n=90)
Benign Cystic Lesion	28 (62.22%)	26 (57.78%)	54 (60.00%)
Hemorrhagic Cyst/Torsion Change	11 (24.44%)	13 (28.89%)	24 (26.67%)
Dermoid Cyst	4 (8.89%)	3 (6.67%)	7 (7.78%)
Endometriotic Cyst	2 (4.44%)	3 (6.67%)	5 (5.56%)

DISCUSSION

In the present study, the baseline demographic and clinical parameters such as age, BMI, parity, duration of pain, and laterality of torsion were comparable between the laparoscopic and open surgery groups, with no statistically significant differences observed. This aligns with the findings reported by Oelsner et al. (2003), who studied 102 patients with ovarian torsion and noted that right-sided torsion was more common (61.5%), and the majority of patients were in the reproductive age group. Their study emphasized that demographic variables did not significantly influence the choice of surgical approach or outcomes, supporting the reliability of comparing laparoscopic and open techniques on equitable grounds[11].

The intraoperative parameters in this study clearly favored laparoscopy, with significantly shorter operative time (58.7 ± 12.3 min vs. 72.6 ± 14.8 min) and reduced blood loss (84.5 ± 30.4 ml vs. 140.7 ± 35.2 ml) compared to open surgery. These observations are consistent with the results of Huchon et al. (2010), who compared laparoscopic and open detorsion in 95 women and found significantly lower operative times and blood loss in the laparoscopic group.12 Additionally, while the requirement for blood transfusion was higher in the open group (13.33% vs. 4.44%), it was not statistically significant, reflecting similar patterns noted by Huchon et al., who reported transfusion needs in 11.5% of open cases versus 2.4% in laparoscopic cases[12].

Pain assessment using the VAS scale in our study demonstrated that patients undergoing laparoscopy experienced significantly less pain at all time intervals—6, 12, and 24 hours postoperatively—with $p< 0.001$. These findings are corroborated by Canis et al. (1997), who reported that minimally invasive gynecologic procedures, including for adnexal torsion, resulted in lower pain scores, faster recovery, and reduced need for analgesics compared to laparotomy. In our study, mean VAS scores in Group A declined from 4.8 to 2.3 over 24 hours, whereas in Group B, they decreased from 6.2 to 3.8, reinforcing the analgesic benefits of the laparoscopic approach[13].

Postoperative recovery indicators were also significantly better in the laparoscopic group. The average hospital stay was 2.4 ± 0.6 days in Group A versus 4.1 ± 1.1 days in Group B ($p< 0.001$), and bowel activity resumed earlier in laparoscopic cases (16.5 ± 3.2 hours vs. 24.7 ± 4.1 hours). A notably lower rate of wound infection (0.00% in Group A vs. 8.89% in Group B) further highlights the advantages of minimal access surgery. These findings mirror those of Hsueh et al. (2001), who, in a series of 38 patients, concluded that laparoscopy offered faster convalescence, fewer wound complications, and shorter hospital stays in cases of adnexal torsion compared to open surgery[14].

Histopathological evaluation in our study revealed benign cystic lesions in 60.00% of cases overall, with hemorrhagic and torsion-related changes seen in 26.67%. Dermoid and endometriotic cysts were relatively rare. These findings are consistent with the study by Houry and Abbott (2001), who reviewed 100 cases of ovarian torsion and reported that 66% of the excised adnexal masses were benign cystic tumors or functional cysts, while torsion-related ischemic changes were observed in approximately 25% of cases. Their data support the concept that ovarian torsion in reproductive-age women is typically associated with benign pathology, justifying conservative or cyst-preserving approaches when feasible[15].

Finally, the surgical outcomes in our study underscore the broader clinical shift toward minimally invasive management of adnexal emergencies. The comparable rates of oophorectomy (33.33% vs. 40.00%) and cystectomy (66.67% vs. 60.00%) in both groups affirm that laparoscopic surgery does not compromise the efficacy or thoroughness of surgical intervention. Mage et al. (1993) had similarly concluded that laparoscopy offers adequate visualization and control in torsion cases, allowing preservation of ovarian tissue in most instances, especially when performed promptly[16].

CONCLUSION

This study demonstrates that laparoscopic management of ovarian torsion in reproductive-age women is associated with significantly shorter operative time, reduced blood loss, lower postoperative pain, faster recovery, and fewer complications compared to open surgery. Both approaches were equally effective in terms of surgical outcomes such as cystectomy and oophorectomy rates. The predominance of benign pathology supports a conservative, ovary-sparing approach whenever feasible. Therefore, laparoscopy should be considered the preferred method for managing ovarian torsion in suitable candidates.

REFERENCES

1. Sasaki KJ, Miller CE. Adnexal torsion: review of the literature. J Minim Invasive Gynecol. 2014;21(2):196–202.
2. Djavadian D, Braendle W, Jaenicke F. Laparoscopic oophoropexy for the treatment of recurrent torsion of the adnexa in pregnancy: case report and review. Fertil Steril. 2004;82(4):933–6.
3. Machado NO, Grant CS. Laparoscopic appendicectomy in all trimesters of pregnancy. JSLS. 2009;13(3):384–90.
4. Chohan L, Ramirez MM, Wray CJ, Kilpatrick CC. Laparoscopic management of fallopian tube torsion at 35 weeks of gestation: case report. J Minim Invasive Gynecol. 2011;18(3):390–2.
5. Wilasrusmee C, Sukrat B, McEvoy M, Attia J, Thakkinstian A. Systematic review and meta-analysis of safety of laparoscopic versus open appendicectomy for suspected appendicitis in pregnancy. Br J Surg. 2012;99(11):1470–8.

6. Koo YJ, Kim HJ, Lim KT, Lee IH, Lee KH, Shim JU, et al. Laparotomy versus laparoscopy for the treatment of adnexal masses during pregnancy. Aust N Z J Obstet Gynaecol. 2012;52(1):34–8.
7. Sun B, Fu A, Wang R, Zhang Y. Influence of carbon dioxide pneumoperitoneum on the growth hormone-insulin-like growth factor I axis in mid- and late-pregnancy rats. J Obstet Gynaecol Res. 2015;41(9):1394–8.
8. Cavaco-Gomes J, Moreira CJ, Rocha A, Mota R, Paiva V, Costa A. Investigation and management of adnexal masses in pregnancy. Scientifica (Cairo). 2016;2016:3012802.
9. Asfour V, Varma R, Menon P. Clinical risk factors for ovarian torsion. J Obstet Gynaecol. 2015;35(7):721–5.
10. Pulcinelli FM, Schimberni M, Marci R, Bellati F, Caserta D. Laparoscopic versus laparotomic surgery for adnexal masses: role in elderly. World J Surg Oncol. 2016;14(1):1–5.
11. Oelsner G, Shashar D. Adnexal torsion. Clinical characteristics and treatment of 102 cases. *Obstet Gynecol*. 2003;102(3):595–9.
12. Huchon C, Fauconnier A, Fritel X, Vienne G, Bader G, Dumont A, et al. Laparoscopy for management of adnexal torsion: A retrospective study of 95 cases. *J Minim Invasive Gynecol*. 2010;17(4):567–72.
13. Canis M, Pouly JL, Wattiez A, Mage G, Manhes H, Bruhat MA. Laparoscopic management of adnexal torsion. A review of 35 cases. *J Reprod Med*. 1997;42(5):313–6.
14. Hsueh YM, Hsu MI, Chen CY, Chou CY. Laparoscopic surgery in adnexal torsion. *J Am Assoc GynecolLaparosc*. 2001;8(4):591–5.
15. Houry D, Abbott JT. Ovarian torsion: A fifteen-year review. *Ann Emerg Med*. 2001;38(2):156–9.
16. Mage G, Canis M, Manhes H, Pouly JL, Bruhat MA. Laparoscopic management of adnexal torsion. *J Gynecol Surg*. 1993;9(1):33–8.