



A Five-Year Review of Ovarian Torsion Cases: Lessons Learnt

Avantika Gupta¹ · Avanthi Gadipudi¹ · Deepthi Nayak¹

Received: 21 January 2020 / Accepted: 17 April 2020 / Published online: 6 May 2020
© Federation of Obstetric & Gynecological Societies of India 2020

Abstract

The aim of the study was to analyse risk factors, surgical findings, ovarian salvage rate and histology of ovarian mass. We reviewed 81 cases of surgically proven ovarian torsion retrospectively from June 2014 to June 2019 at a tertiary care referral centre in South India. Demographic, clinical and surgical details of all patients were noted from the medical records. Mean age of the patients was 26 years. Most of the patients were nulliparous and had a pre-existing ovarian mass of size > 5 cm. Ovarian salvage rate was 43.2%. Concomitant cystectomy with detorsion was done in 30 patients without increase in blood loss or complications. Extensive necrosis was present in 78.2% of oophorectomy specimens. Most common histology of ovarian mass in cystectomy specimens was simple ovarian cyst.

Keywords Conservative surgery · Necrosis · Cystectomy · Histology

Introduction

Ovarian torsion is an uncommon gynaecological emergency. Ovary can twist over its own pedicle leading to obstruction of its blood supply causing ischaemic necrosis. Owing to its non-specific symptoms, lack of a specific diagnostic test and management guidelines, it can cause diagnostic dilemma and delay in management. However, it should be suspected in any woman in reproductive age group with sudden onset abdominal pain especially with known risk factor for ovarian torsion. Imaging can give a clue to diagnosis; however, definite diagnosis is intraoperative. The known risk factors for ovarian torsion are pre-existing ovarian mass especially

dermoid, previous torsion, polycystic ovary, previous surgery, tubal sterilization and pregnancy [1–5]. The definite management of ovarian torsion is surgical. Over last 2 decades, there has been a shift from radical to conservative surgery irrespective of the appearance of ovary, delay in diagnosis or number of twists [1, 2, 5, 6]. The aim of the study is to study the risk factors, surgical findings, salvage rate and histology of the ovarian torsion cases at a tertiary care referral centre in South India.

Materials and Methods

This was a retrospective observational study conducted at the women and child hospital attached to Jawaharlal Nehru Institute of Postgraduate Medical Education and Research, a tertiary care referral institute in southern India, over 5 years from June 2014 to June 2019. All women with surgically proven ovarian torsion, defined as partial or complete rotation of the ovarian vascular pedicle, were identified from the surgical records [7]. Isolated fallopian tube or para-ovarian cyst torsion and incidental finding of ovarian torsion in surgeries done for some other indications were excluded from the study. The Institute Ethical Committee approved the study and waived the need for informed consent from participants of this study. Patients were either referred from other hospitals or presented themselves in the Department of Obstetrics and Gynaecology. Data was collected using a

Dr. Avantika Gupta is an Assistant Professor of the Department of Obstetrics and Gynaecology, Jawaharlal Nehru Institute of Postgraduate Medical Education and Research (JIPMER), Puducherry, India. Dr. Avanthi Gadipudi is a Senior Resident of the Department of Obstetrics and Gynaecology, Jawaharlal Nehru Institute of Postgraduate Medical Education and Research (JIPMER), Puducherry, India. Dr. Deepthi Nayak is a Junior Resident of the Department of Obstetrics and Gynaecology, Jawaharlal Nehru Institute of Postgraduate Medical Education and Research (JIPMER), Puducherry, India.

✉ Avantika Gupta
dravantikagupta@gmail.com

¹ Department of Obstetrics and Gynaecology,
Jawaharlal Nehru Institute of Postgraduate Medical
Education and Research (JIPMER), Dhanvantri Nagar,
Puducherry 605006, India

predesigned proforma from records of the patients including basic demographics, clinical data, surgical details and pathology reports. The authors were not blinded to the study purpose or to the patient's final diagnosis and findings. After de-identification, demographic data in the form of age, parity and pre-existing risk of torsion were noted. Emergency department resident's history, examination and consultant's notes were reviewed for clinical details such as presenting complaints, duration from onset of symptoms to presentation, duration from presentation to surgery, leucocyte count and ultrasound findings. Surgical details included size of mass/ovary, laterality, colour of the torsed ovary, number of twists and type of surgery performed. Ovarian salvage was defined if all or part of ovary was preserved after detorsion. Finally, histopathology report of the ovary was reviewed for the presence of necrosis or haemorrhage and associated pathology of the mass. Follow-up of the patients till discharge from the hospital was noted. All statistical analysis was performed using STATA 15.0 (Stata Corp, Texas, USA). All categorical variables were expressed as frequencies and percentages. All continuous variables were expressed as median.

Results

During 5-year period from June 2014 to June 2019, a total of 81 cases of ovarian torsion were operated and included in the study. The demographic details are presented in Table 1. Three patients had recurrent ovarian torsion.

The operative findings, type of surgery performed and the histopathology of the specimens are presented in Tables 2 and 3. All patients presented with abdominal pain, 65 patients presented with acute onset colicky pain, while 16

Table 1 Demographic characteristics of the patients

| | |
|-----------------------------|-----------------------|
| Median age in years (range) | 26 (12–60) |
| Parity | <i>N</i> (percentage) |
| 0 | 34/81 (42%) |
| 1 | 16/81 (19.7%) |
| ≥ 2 ^a | 28/81 (34.6%) |
| Pregnant | 03/81 (3.7%) |
| Risk factors ^b | |
| Ovarian mass | 72/81 (88.8%) |
| Tubal ligation | 22/81 (27.2%) |
| Previous torsion | 03/81 (3.7%) |
| PCOS | 06/81 (7.4%) |
| Pregnancy | 03/81 (3.7%) |
| OHSS | 00/81 (0%) |

^aIncluding one postmenopausal woman

^bIncluding patients with multiple risk factors

Table 2 Operative findings

| | |
|---|---------------|
| Laparoscopy | 26/81 (32%) |
| Size of the ovarian mass ^a | |
| ≤ 5 cm | 06/72 (8.3%) |
| 6–10 cm | 45/72 (62.5%) |
| > 10 cm | 21/72 (29.2%) |
| Right side | 47/81 (58%) |
| Number of twists (median) | 2 (1.5–3.5) |
| Ovarian salvage | 35/81 (43.2%) |
| Conservative surgery (<i>n</i> = 35) | |
| Detorsion alone | 03 |
| Detorsion with cystectomy | 30 |
| Detorsion with cyst aspiration | 02 |
| Oophoropexy along with conservative surgery | 03 |
| Radical surgery/oophorectomy | 46/81 (56.8%) |

^a72/81 patients had associated ovarian mass

had intermittent pain over more than 48 h. All the patients had a tender pelvic mass. 60% experienced nausea or vomiting along with abdominal pain. Low-grade fever was present in only two patients. Median time from onset of symptoms to presentation was 24 h (12–120 h). The main cause of delayed presentation was lack of specific symptoms, intermittent nature of pain, misdiagnosis as acute appendicitis or acute pelvic inflammatory disease. Median time from admission to surgery was 12 h (6–48 h), most common cause of delay in surgery being non-availability of operation theatre in emergency hours and nil per oral status of the patients.

Table 3 Histopathology report

| | |
|--|----|
| Cystectomy with detorsion (<i>n</i> = 30) | |
| Simple cyst | 12 |
| Dermoid cyst | 08 |
| Serous cystadenoma | 05 |
| Mucinous cystadenoma | 02 |
| Corpus luteal cyst | 01 |
| Endometriotic cyst | 01 |
| Cyst adenofibroma | 01 |
| Radical surgery (<i>n</i> = 46) | |
| Necrosis/infarction | |
| Extensive | 36 |
| Few areas | 07 |
| Congestion/haemorrhage | 03 |
| Associated ovarian mass | 40 |
| Simple cyst | 22 |
| Serous cystadenoma | 08 |
| Mucinous cystadenoma | 04 |
| Dermoid cyst | 05 |
| Borderline mucinous | 01 |

Leucocytosis, i.e. leucocyte count more than 15,000/dL, was present in only 14 patients. Ultrasonogram showed cyst with thickened walls and echogenic contents in 59 patients and complex ovarian mass in 13 patients, while nine patients had associated enlarged oedematous ovary and peripherally arranged follicles. Free fluid was present in 15 patients. Doppler was documented in only 16 patients: blood flow was present in two patients, indeterminate in three and absent in 11 patients. CT scan of abdomen was done in four patients where diagnosis was not clear.

During the 5-year study period, there was a shift from radical to conservative surgery, the latter being done more commonly in the last 2 years. Conservative surgery was performed based on surgeon's discretion for colour of ovary and return of circulation after detorsion. The average blood loss in concomitant cystectomy along with detorsion was 80 cc (50–150 cc), and none of these patients had venous thromboembolism. Three out of 46 patients in whom ovary was removed showed no evidence of necrosis on pathology report, and in five patients, necrosis was present only in few areas of ovary. Reasons for oophorectomy in these eight patients were postmenopausal status ($n=1$), no return of colour after detorsion ($n=5$) and absence of plane between mass and normal ovary ($n=2$). Simple cyst was the commonest pathology followed by dermoid cyst and serous cystadenoma. There was no malignancy in any of the patients. Recurrent torsion was present in three cases in the present study. The interval between two events was 2–4 years, and the opposite side was involved in all three patients. In these patients, detorsion with ovarian cystectomy was done along with oophoropexy. The latter was done by plication of ovarian ligament to round ligament or back of uterus in these patients. One patient was a 23-year-old girl who had recurrent ovarian torsion on opposite side and ovary was blackish in colour. The other ovary was already absent owing to previous radical surgery. Hence, detorsion and cystectomy were performed despite the blackish appearance of ovary. She presented with secondary amenorrhoea after surgery, and ovaries were not visualized on ultrasound. Her serum FSH was raised to 65.2 IU/L, and she was started on hormone replacement therapy thereafter.

Discussion

Out of a total 81 surgically proven cases of ovarian torsion, 35 had conservative surgery, whereas 46 had oophorectomy. Since ours is a tertiary care referral centre for many hospitals, on an average 1–2 cases of ovarian torsion are referred every month.

The most common risk factors for ovarian torsion in our study were an associated ovarian mass (88.8%), ovarian cyst of size > 5 cm (92.7%) and nulliparity (42%). 71% patients

and 97.3% had ovarian mass in a studies by Balci et al. [3] and Resapu et al. [5], respectively. Pregnancy was also a significant risk factor in previous studies: 8% were pregnant in study by Balci et al., whereas 35% patients were pregnant in study by Resapu et al. [3, 5]. The low rates of ovarian torsion associated with pregnancy, i.e. three out of 81 patients in this study, can be explained by the fact that most of the ovarian cysts except functional cysts are operated during pregnancy in our institute, considering it as a risk factor for torsion. Some patients in our study had PCOS which is a known risk factor for torsion, especially in adolescents [1]. In some studies, tubal sterilization and ovulation induction are also described as risk factors for adnexal torsion [4, 8]. Ovarian cyst of size > 5 cm has also been described as a known risk factor in most of the studies [2, 9, 10]. The commonest presenting symptom in our study was acute onset colicky pain on the one side of abdomen followed by nausea and vomiting. The clinical suspicion of adnexal torsion should be very high in any young patient with an ovarian mass presenting with acute abdominal pain along with nausea or vomiting, as the latter is associated in up to 85% of the patients [11]. The commonest ultrasound finding in our study was enlarged ovary along with concomitant cyst showing thickened walls and echogenic contents due to haemorrhage and necrosis. The most consistent finding in the literature appears to be enlargement and oedema of ovarian tissue and haemorrhagic appearance of the concomitant cyst [1]. Whirlpool sign in the twisted pedicle on colour Doppler is also a specific sign of ovarian torsion [12].

Laparoscopic surgery is preferred over laparotomy for ovarian torsion owing to quicker recovery and better cosmesis. However, less number of laparoscopic surgeries were performed in this study due to non-availability of facilities for laparoscopy in emergency hours in our setup. Over last 2 decades, the approach for management of ovarian torsion has shifted from radical surgery to laparoscopic intervention. The gross appearance of haemorrhagic adnexa does not imply that it is non-viable. Even if the ovary appears ischaemic or haemorrhagic, one need not wait for the signs of recovery and should proceed with conservative surgery because blackish appearance is not an indicator of degree of ischaemia and ovarian function recovers most of the times after detorsion [6, 11, 13–15]. In the present study, more number of conservative surgeries were done in last 2 years of the study period. In five patients in whom ovary appeared blackish in colour and there was no change in colour upon detorsion, necrosis was absent or minimal on histopathology of the ovarian specimen. Performing a conservative surgery would have saved the ovarian function in these five patients. Ovarian salvage rate in this study was 43.2%. The comparison of ovarian salvage rates in adults in previous studies is shown in Table 4. Delayed presentation after 24 h and misdiagnosis due to non-specific symptoms were the main

Table 4 Ovarian salvage rate in previous studies [2, 3, 5, 8, 15, 19, 20]

| Author | Salvage rate (%) |
|-----------------------|------------------|
| Hibbard et al. [19] | 7 |
| Houry et al. [2] | 9.5 |
| Balci et al. [3] | 60 |
| Resapu et al. [5] | 82 |
| Huang et al. [8] | 35.8 |
| Spinelli et al. [15] | 46.7 |
| Nair et al. 2014 [20] | 54.3 |

reasons for the delay in surgery. The likelihood of preserving ovarian function with conservative surgery decreases over time, especially after 48 h [16].

Concomitant cystectomy with detorsion was done in 30 patients, to avoid recurrence. There is a theoretical risk of bleeding due to friable nature of the ovary due to oedema and congestion, and early elective cystectomy has been described after an interval of 2–3 weeks for oedema and congestion to resolve [1]. But in our study, the average blood loss was 80 cc (50–150 cc) where cystectomy was done after detorsion and none of these patients had venous thromboembolism in postoperative period. Hence, a concomitant ovarian cystectomy is advisable with detorsion without risk of increased intraoperative bleeding. Cyst aspiration is another option in case of extensive oedema and congestion; however, the chances of recurrence of the cyst and torsion will be higher in such cases. Hence, such patients need close follow-up.

There were three cases of recurrent torsion in this study. Ovarian salvageability can be difficult in cases where radical surgery has been performed previously and there is delay in diagnosis second time. One of our patients had premature ovarian failure owing to recurrent surgeries for ovarian torsion and had to be put on hormone replacement therapy. Ovarian suppression with hormones can be good option in such patients after first surgery. Another option to avoid recurrence is oophorectomy, which was done in three patients with recurrent torsion in our study. Whether to perform oophorectomy with detorsion is not clear and lacks long-term follow-up. Due to non-availability of systematic studies on its role, presently its role is not very clear. However, in cases of recurrent torsion, it has shown to reduce the recurrence rate effectively [17]. Large studies are needed to advocate its role during primary surgery.

Most common histology in this study was simple ovarian cyst followed by dermoid cyst. In previous studies, most common histology of the ovarian mass was dermoid cyst or haemorrhagic cyst [2, 3, 5]. There was no case of malignancy in our study. The incidence of ovarian torsion with ovarian malignancy was <2% in reported case series [10,

18]. However, when malignancy is suspected like in postmenopausal women, oophorectomy should be done. Whenever oophorectomy is performed, specimen must always be sent for histopathology to rule out rare possibility of malignancy.

This study has certain limitations. Route of the surgery was determined largely by the non-availability of laparoscopy in emergency hours. However, laparoscopy is preferred over laparotomy owing to quicker recovery and better cosmesis. Conservative surgery was decided by the surgeon subjectively on the basis of gross appearance of the ovary and return of colour on detorsion. We did not attempt to follow patients undergoing conservative surgery for the functioning of ovary.

Conclusion

Ovarian salvage rate in this study was 43.2%. Most common risk factor for torsion was a pre-existing ovarian mass. Concomitant cystectomy with detorsion was done in 30 patients without any increased blood loss or intraoperative complication. The commonest histology was simple ovarian cyst. Extensive necrosis was present in 78.2% of oophorectomy specimens, owing to delayed presentation after 24 h in most of the patients.

Funding There is no funding for this study

Compliance with Ethical Standards

Conflict of interest There is no conflict of interest amongst authors.

Ethical Approval Ethical approval was taken from the Institutional Ethics Committee.

Informed Consent Waiver of informed consent was requested.

References

1. Damigos E, Johns J, Ross J. An update on the diagnosis and management of ovarian torsion. *Obstet Gynaecol.* 2012;14(4):229–36.
2. Houry D, Abbott JT. Ovarian torsion: a fifteen year review. *Ann Emerg Med.* 2001;38(2):156–9.
3. Balci O, Icen MS, Mahmoud AS, et al. Management and outcomes of adnexal torsion: a 5 year experience. *Arch Gynecol Obstet.* 2011;284(3):643–6. <https://doi.org/10.1007/s00404-010-1702-z>.
4. Asfour V, Varma R, Menon P. Clinical risk factors for ovarian torsion. *J Obstet Gynaecol.* 2005;35(7):721–5. <https://doi.org/10.3109/01443615.2015.1004524>.
5. Resapu P, Rao Gundabattula S, Bharathi Bayyaru V, et al. Adnexal torsion in symptomatic women: a single-centre retrospective study of diagnosis and management. *J Obstet*

- Gynaecol. 2019;39(3):349–54. <https://doi.org/10.1080/01443615.2018.1494702>.
6. Balasubramaniam D, Duraisamy KY, Ezhilmani M. Laparoscopic detorsion and fertility preservation in twisted ischemic adnexa: a single centre prospective study. *Gynecol Minim Invasive Ther*. 2020;9(1):24–8.
 7. Chang HC, Bhatt S, Dogra VS. Pearls and pitfalls in diagnosis of ovarian torsion. *Radiograph*. 2008;28(5):1355–68.
 8. Huang C, Hong MK, Chu TY, et al. A retrospective study of surgical treatment and outcome among women with adnexal torsion in eastern Taiwan from 2010 to 2015. *Peer J*. 2018;6:e5995. <https://doi.org/10.7717/peerj.5995>.
 9. Huchon C, Staraci S, Fauconnier A. Adnexal torsion: a predictive score for pre-operative diagnosis. *Hum Reprod*. 2010;25(9):2276–80.
 10. White M, Stella J. Ovarian torsion: 10-year perspective. *Emerg Med Australas*. 2005;17:231–7.
 11. Oelsner G, Cohen SB, Soriano D, et al. Minimal surgery for the twisted ischaemic adnexa: can we preserve ovarian function. *Hum Reprod*. 2003;18:2599–602.
 12. Vijayaraghavan SB. Sonographic whirlpool sign in ovarian torsion. *J Ultrasound Med*. 2004;23(12):1643–9.
 13. Cohen SB, Oelsner G, Seidman DS, et al. Laparoscopic detorsion allows sparing of twisted ischaemic adnexa. *J Am Assoc Gynecol Laparosc*. 1999;6:139–43.
 14. Descargues G, Tinlot-Mauger F, Gravier A, et al. Adnexal torsion: a report on 45 cases. *Eur J Obstet Gynecol Reprod Biol*. 2001;98:91–6.
 15. Spinelli C, Buti I, Pucci V, et al. Adnexal torsion in children and adolescents: new trends to conservative surgical approach—our experience and review of literature. *Gynaecol Endocrinol*. 2013;29(1):54–8.
 16. Chen M, Chang CD, Yang YS. Torsion of previously normal adnexa. Evaluation of the correlation between the pathological changes and the clinical characteristics. *Acta Obstet Gynecol Scand*. 2001;80:58–61.
 17. Fuchs N, Smorgick N, Tovbin Y, et al. Oophoropexy to prevent adnexal torsion: how, when and to whom? *J Minim Invasive Gynecol*. 2010;17:205–8.
 18. Rotoli JM. Abdominal pain in the post-menopausal female: is ovarian torsion in the differential? *J Emerg Med*. 2017;52:749–52.
 19. Hibbard LT. Adnexal torsion. *Am J Obstet Gynecol*. 1985;152(4):456–61.
 20. Nair S, Joy S, Nayar J. Five year retrospective case series of adnexal torsion. *J Clin Diagn Res*. 2014;8(12):OC09-13.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

About the Author



Dr. Avantika Gupta is currently working as an Assistant Professor in the Department of Obstetrics and Gynaecology, JIPMER, Puducherry. She did her MBBS from Lady Hardinge Medical College, Delhi, and MS in Obstetrics and Gynaecology from Maulana Azad Medical College, New Delhi. She has completed MRCOG and has been awarded with FOGSI Imaging award and Young Turk award. She has various national and international publications credited her name.