Original Research Article

Laparoscopic detorsion of twisted ovarian adnexa and fertility preservation– A prospective Study

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Abstract

Background: Presentre search was aimed to analyze our experience about the preservation of ovary in cases of adnexal torsion by laparoscopy, irrespective of the extent of necrosis and number of twists, and to assess the subsequent ovarian viability. **Methods**: This was a prospective study conducted at a tertiary care government medical college and cancer hospital. All the cohorts of intraoperative diagnosis of adnexal torsion were included irrespective of the age group from January 2018 to January 2020, after due permission from institutional ethics committee. Demographic details and clinical and operative findings were recorded from willing participants. All patients underwent laparoscopy, except those withsuspected malignancy. Postoperatively, ovarian viability was assessed by ultrasound doppler in terms of vascularity and follicular development at the end of 1, 6, and 12 months. **Results**: A total of 24 patients completed this research. Acute abdominal pain 17 (70.83%) was the main presenting symptom in all age groups. The total number of cases of adnexal torsion was 23. Adnexal torsion was mainly diagnosed in young and adolescent girls. Out of 24 attempted detorsion, 23 ovaries were preserved (97.8%). Most of the pathologies were benign. All the preserved ovaries were showing follicles and vascularity during ultrasound follow-up. **Conclusion**: Laparoscopic detorsion of the ovary is the best treatment modality irrespective of the grade of ischemia. Ovarian structure and follicles were preserved following detorsion in all the cases, even in highly ischemic ovaries.

Keywords: Adnexal torsion, detorsion, laparoscopy, ovarian preservation.

Introduction

Adnexal torsion is the most common surgical emergency in young and reproductive age. The exact incidence is unknown; various studies have reported incidence between 0.3- 3.5 cases per year. [1] Conventionally, the management of choice is excision of the torsed adnexa. The advantage of detorsion of adnexa is clear as it helps to preserve the ovarian function and fertility and reduces the risk of premature ovarian failure. Laparoscopy adds the advantages of improved diagnosis, enhanced patient recovery, and short hospital stay. The main objective of this study was to analyze our experience in preserving the adnexa following laparoscopic detorsion despite apparent severe ischemia.

Methods

This prospective research was carried out at ourtertiary care laparoscopy center, in the department of gynecology over a period of 2 years (January 2018–January 2020) after obtaining approval from the institutional ethics committee. All the eligible patients were approached with a request to participate in the research. After through discussion with the patients and relatives, written informed consent was obtained from all the voluntarily willing patients. A total of 28 voluntarily willing patients of various age groups with adnexal torsion were included in the research. However we lost follow up of two patients at six months and two more patients at 12month. Patients with clinical and ultrasound features of torsion, which were not confirmed by surgery, were excluded from the study.

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The primary outcome measurement of this research was the rate of preservation of the ovary following detorsion of the twisted adnexa, irrespective of the grading of ischemia. The two secondary outcome measures included were:

- Intraoperative or postoperative complications
- Viability of ovary with by ultrasound.

Data regarding patients' demographic details, previous history of pelvic surgery, previous adnexal torsion, triggering factors, duration of symptoms, ultrasonographic (USG) findings, tumor markers, time from the onset of symptoms to surgery, and admission to surgery interval were recorded in case record form. Intraoperative findings such as site, side of torsion, grading of ischemia or necrosis, and number of twists were noted. Most of the twisted adnexa were carefully untwisted using nontraumatic instruments. The ovary was punctured to relieve congestion; if there was any associated pathology, it was surgically removed. Perspective of the grade of ischemia and viability after detorsion was assessed. Grading of ischemia was done based on Parelkar grading, as follows: [2]

Grade 1: Slightly discolored, normal-sized ovary which promptly reverted to normal color after detorsion

Grade 2: Dark red to brown, mildly enlarged ovary, which became hyperemic with multiple pinpoint petechiae after detorsion

Grade 3: Brown to black, grossly enlarged ovary with hematoma with slight improvement in color, with small pinpoint oozing after detorsion and hematoma evacuation

Grade 4:Completely black, grossly enlarged ovary with hematoma and no improvement in color after detorsion and hematoma evacuation.

In selective cases who were liable for recurrent torsion, unilateral or bilateral oophoropexy was done. To reduce the subjective

operator bias, surgeries were performed by two senior laparoscopic gynecologists. All the perimenopausal women (≥ 40 years) and patients with preoperative suspicion of malignancy underwent removal of the torsed adnexa irrespective of the grade of ischemia.
All the patients underwent laparoscopy except for patients with preoperative suspicion of malignancy and with huge ovarian cyst not fitting into the endobag who were taken up for laparotomy.
After the surgical procedure, all the patients were clinically assessed for pain, need for analgesics within first 24–48hr, and any postoperative complications such as sepsis and thromboembolism. The ovarian viability and structure were assessed by USG with color doppler in terms of restoration of normal blood flow, normal ovarian volume, and follicular development at 1, 6, and 12-month follow-up. If any patient underwent subsequent surgery for unrelated cause, evidence of viability of ovary was assessed by intraoperative documentation of normal appearance of the ovary.

Results

A total of 24 cohorts with intraoperative diagnosis of torsion were included [Figure 1]. Of these,23 were adnexal torsion and 1 were isolated fallopian tube torsion. Preoperatively, torsion was not diagnosed in 17 patients. In all age groups, clinical diagnosis was superior to ultrasound in detecting torsion.
Detorsion was not attempted in all the 1 patient aged ≥40 years irrespective of the grade of ischemia and cyst size. [Table 2]. Detorsion was attempted in 23 patients irrespective of the grade of ischemia which succeeded in 24 patients (95.83.8%) except in one patient for whom intraoperatively the adnexa were completely necrotic with gelatinous appearance and loss of normal architecture..'Cystectomy was done along with detorsion in 23 patients, out of which 5 patients had Grade 4 ischemia with cyst size of 5–10 cm and 10 patients had low-grade ischemia.
Oophoropexy was done in 20 patients. Bilateral oophoropexy was done in 24 patients which included children, adolescents, and patients with polycystic ovary syndrome. There was no recurrent ovarian torsion in our study. Out of 1 patients with isolated fallopian tube torsion, six underwent salpingectomy even with low-grade ischemia as they have completed their family.. There were no intraoperative or postoperative complications, and none had conversion to laparotomy [Figure 2].
Out of 2 salvaged ovaries, ovarian viability was assessed in terms of normal ovarian blood flow, normal ovarian volume, and follicular development with ultrasound Doppler for 23patients at 1 week, 1month, 6 month, All were having normal follicular development and vascularity. 15 patients conceived during the follow-up.

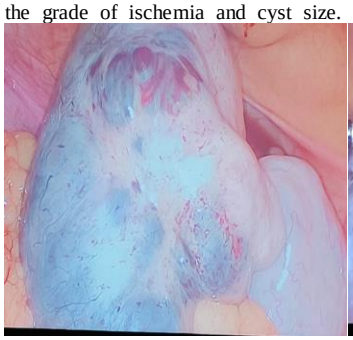

Fig 1: intraoperative diagnosis of torsion

Fig 2: no intraoperative or postoperative complications

Table1: Data and their numbers

Data	Number
Age (years), mean±SD	26
Married (n	14
Unmarried (n)	10
Nullipara (n)	15
Associated risk factors	
PCOS	8
Obesity	10
pregnancy	2
Previous history of torsion	1
Previous history of pelvic surgery	1
LSCS	4
Sterilization	4
Posthysterectomy	0
Symptoms	
Acute abdomen±vomiting	24
Chronic abdominal pain >7days	4
Fever	2
Clinical diagnosis of torsion (n)	20
USG diagnosis of torsion (n)	14
USG findings	
Normal vascularity	8
Low peripheral vascularity	10
Absent blood flow	**5**

CT/MRI done (n)	
Associated pathology	
(intraoperative), n (%)	22
Normal adnexa, n (%)	2
Time from the onset of symptoms to surgery (days), mean±SD	5
Time from hospital admission to surgery (h), mean±SD	6.99
Intraoperative findings (n)	
Side of torsion	
Right side	13
Left side	10
bilateral	1
Number of twists range	0-6
Site of torsion	
Ovary	10
Ovary with tube	14
Isolated fallopian tube	0
Grading of ischemia	
Grade 1, 2	18
Grade 3, 4	5
Gangrenous and friable mass	1

Table 2: Detorsion attempted

Salvageability (n)	Detorsion attempted (n)	Preserved (%)
Adnexa	23	95.83
Fallopian tube	1	4.1

Table 3:Histopathology and number of patients

histopathology	Number of patients
Benign cyst	2
Mucinous cyst	2
Serous cyst	2
Endometriosis	4
Corpus luteal cyst	2
Borderline mucinous	0
Dermoid teratoma	4
Paratubal cyst	1
Hydrosalphinx	2
Granulosa cell tumo	1
Hemorrhagic cyst	4

Discussion

Many recent studies are endorsing detorsion with or without oophoropexy as the treatment of choice for adnexal torsion.[3,4] In present research, among the 24 cohorts, we have preserved 97.8% of the ovaries following laparoscopic detorsion. Fady and Shawky in their study showed 100% preservation of twisted ovaries irrespective of ischemia and number of twists, even with apparently necrotic adnexa.[5] In the present research, normal vascularity in doppler was noted in 60% of the cases in concordance with study reported by Sasaki and Miller.[4] A grossly black hemorrhagic adnexa of grade 4 ischemia were seen in one patient; we managed to preserve all the ovaries. Even though the ovarian surface appears necrotic and friable in those cases, we could do detorsion meticulously with extreme care with evacuation of hematoma. There were no postoperative complications in any case. Parelkar et al. also preserved all the necrotic ovaries.They stated in their research that almost all patients had functioning ovary during follow-up ultrasound.[2] Hence, adnexectomy should not be tried immediately as the ovary revives from centre to periphery.Blood supply can still be obtained from the ovarian or uterine artery and complete arterial occlusion does not occur usually.

In present research, there is a lack of correlation between the onset of symptoms and ovarian infarction, and the range varies from one day to 120 days. We could preserve an ovary in a 16-year-old girl who presented with chronic abdominal pain of 4 months with intraoperative grade 4 ischemia of the right adnexa with four twists. Similar to the study of Fady et al.Present study also proves that duration of pain cannot predict the ovarian salvageability. Recall of pain is highly subjective and unreliable, especially in children and adolescents. Many authors advocate early intervention, anticipating better surgical outcomes.[6,7] These data imply that prolonged duration of symptoms should not interfere prompt imaging and urgent surgical intervention. Associated pathology was seen in majority of our cases (77 i.e. 91.6%), and cystectomy was done in all patients with grade 1 and 2 ischemia. Even though some authors suggest that cystectomy has to be done at later date along with repeat imaging [8], we have done concurrent cystectomy (complete or partial) along with detorsion. During follow-up imaging, there was no persistent cyst; hence, interval cystectomy was not required in any of our patients, similar to the study by Adeyemi-Fowode et al.[1]In the present research, severe ischemia of grade 4 was seen in six patients; in these patients, getting a plane between the cyst wall was difficult due to the friability and edema and also excision of this cyst may cause removal of undue amount of ovarian tissue. Hence, we have done cyst aspiration and partial peeling of cystwall in those cases for histopathological diagnosis. All huge cysts that underwent torsion had low-grade ischemia; hence, cystectomy was done successfully without difficulty. Ahigh incidence of a normal ovary undergoing torsion is seen in young adolescents in our study, may be due to various obvious anatomical reasons.[9] We have observed adnexal torsion in two young girls with Turner's syndrome and two patients with a supernumerary ovary. Because of the rarity of malignancy in younger women with adnexal torsion (1–4%), there should not be any delay in the surgical intervention. [10-12] In present research, three patients had borderline mucinous ovarian tumors, two patients had adult granulosa cell tumor, and all were more than 35 years of age. We could not confirm any additional benefit of adding computed tomography/magnetic resonance

imaging for preoperative diagnosis of adnexal torsion, similar to other studies.[13] Our data showed follicles in all ischemic ovaries during follow-up ultrasound. Unfortunately, there is no reliable way to predict ovarian salvage, and it is necessary to have long-term follow-up with serial ultrasound to confirm ovulation, ovarian size, and follow-up of oocytes, and subsequent pregnancies will indicate the fully preserved ovarian function.[14] Present research also confirms that leaving the necrotic ovary will not cause any deleterious effect to the patient. The role of oophoropexy, after detorsion to reduce the recurrence, is not clear.[15,16] Following detorsion, bilateral oophoropexy can be offered to children, adolescents, normal looking ovaries with anatomical abnormality, bilateral adnexal torsion, polycystic ovaries and during pregnancy due to high risk of recurrent torsion in these groups. We have followed the same principle and have not come across any recurrence. Several methods of oophoropexy have been described such as fixing the ovarian and round ligaments, fixing the ovary to the pelvic wall or uterosacral ligament or to the posterior surface of the uterus, and shortening the ovarian ligament.

We have done a combined method of fixing the ovary to the posterior uterine surface and plicating the ovarian ligament with No. 2-0 PDS or prolene. We usually prefer this, as there is anatomical conservation and surgical feasibility. The impact of oophoropexy on subsequent fertility merits further study. In present resaech, we did not come across any recurrence or any postoperative complications except one patient who required readmission after 5 months of surgery in view of recurrent ovarian cyst with abdominal pain on the operated side. Laparoscopic cystectomy was done intraoperatively with no evidence of torsion. Histopathology came out to be a benign mucinous cyst.

Limitation

We could include only surgically proven cases of adnexal torsion, and we may have missed few patients with atypical presentation who did not undergo surgery. Nevertheless, this is one of the very few prospective studies with a large number of patients in adolescent and reproductive age group with successful preservation of 97.8% of torsed ovaries.

Conclusion

Ovarian salvage can be done irrespective of the delayed presentation, number of twists, and the grade of ischemia, and we found that ovarian structure and follicles were preserved following detorsion in all the cases. Laparoscopic management of adnexal torsion is safe and feasible and facilitates enhanced patient recovery.

Ethical issues: This research was started only after permission from institutional ethics committee. A strict confidentiality of participating patients was maintained. We adhered to all the prevalent ethical guidelines including declaration of Helsinki, revised &updated time to time.

Conflict of Interest: Nil
Source of support: Nil

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