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# Clinico Pathological Profile of Adnexal Torsion Cases- A Retrospective Analysis from A Tertiary Care Teaching Hospital in Southern India

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***Abstract***

***Introduction:*** *Adnexal torsion is a significant source of morbidity, and nonspecific signs can make diagnosis difficult. Early identification is crucial to avoid ovarian infarction and the likelihood of related infertility. Our study aims to assess the clinicopathological profile of adnexal torsion cases through retrospective analysis from a tertiary care teaching hospital in southern India.* ***Methods:*** *This retrospective study was carried out in the Department of Obstetrics and Gynaecology at a tertiary care teaching hospital in Tamil Nadu, India. Data was collected on women with surgically proven adnexal torsion from January 2019 to December 2022. Proper ethics permission was obtained, and informed consent was taken from all the patients prior to the commencement of the study. The subjects' confidentiality was maintained. The data was represented using detailed descriptive analyses, medians, and percentages. Statistical analysis was carried out using Microsoft Excel 2007 and IBM SPSS version 21.* ***Conclusion:*** *Adnexal torsion is an uncommon condition. Acute stomach discomfort, nausea, and vomiting are the most common symptoms. Adnexal torsion's clinical and radiographic diagnosis is challenging for both doctors and radiologists. As a result, extensive clinical experience and radiological abilities are necessary. Early identification and surgical treatment save the ovary while maintaining its function.*

**Keywords:** *Adnexal torsion, ovarian tumors, Detorsion*

## 1. Introduction

Torsion is the twisting of an organ or a portion of an organ along its axis [1]. Torsion of the adnexa is a gynecologic emergency that occurs in about 2%-3% of females experiencing acute pelvic discomfort [2-4]. Because both the ovary and the fallopian tube are frequently implicated, the preferable term is adnexal torsion rather than ovarian torsion [5]. In clinical practice, however, both phrases are frequently used interchangeably. The ovary and fallopian tube twist on their vascular and ligament supports, resulting in intermittent perfusion caused initially by venous and lymphatic congestion and later by a compromise in arterial flow. Torsion of extra ovarian (para tubal or para ovarian) cysts can also happen, however, it happens less frequently. Despite its rarity, adnexal torsion is a significant source of morbidity, and nonspecific signs can make diagnosis difficult. Early identification is crucial to avoid ovarian infarction and the likelihood of related infertility.

Pregnancy, ovulation inducement, polycystic ovarian syndrome (PCOS), past tubal ligation, and adnexal hypermobility are all risk factors for adnexal torsion [6-8]. Clinically, patients present with a rapid onset of pelvic or abdominal pain that may fluctuate or spread to the loin, followed by nausea and vomiting. Pyrexia, tachycardia, generalized abdominal discomfort, tender mass in adnexa, guarding, and rebound tenderness are all symptoms. If symptoms continue for more than 48 hours, the chances of preserving a viable ovary become significantly reduced [9]. A predictive score for early preoperative diagnosis was recently proposed in which characteristics such as pain duration >8 hours, vomiting, lack of leucorrhoea/metrorrhagia, and the existence of ovarian cysts>5 cm taken by Ultrasonography (USG) was considered [10].

The primary imaging modality of choice is ultrasound. The ultrasound feature spectrum is determined by the degree of vascular impairment. Unilateral ovarian enlargement with hypo and hyperechoic regions consistent with hemorrhage and necrosis, ovarian edema with peripherally organized follicles [6], and the presence of echogenic free fluid in the pelvis are the classic grey scale ultrasonography findings [4]. Color Doppler imaging reveals aberrant ovarian blood flow, such as the lack of venous flow at first and then arterial flow afterward, which frequently suggests that the ovary is not viable [4]. Twisted arteries within vascular pedicles are described as a 'whirlpool sign' on color Doppler [11]. When ultrasound findings in a patient with suspected ovarian torsion are equivocal, computerized tomography or magnetic resonance imaging may be beneficial with a high negative predictive value [6].

To sustain ovarian function, prompt intervention is required. In prepubescent girls and women of reproductive age with incomplete families, detorsion is the treatment of choice, which may be coupled with oophoropexy or cystectomy as needed [3, 6]. Oophorectomy is the treatment of choice in elderly women and cases of ovarian infarction to eliminate the possibility of retorsion [6]. However, in other circumstances, the pain might be minor or intermittent, making diagnosis difficult. With this background, our study aims to assess the clinicopathological profile of adnexal torsion cases through retrospective analysis from a tertiary care teaching hospital in southern India.

## 2. Materials And Methods

This retrospective study was conducted in the Department of Obstetrics and Gynecology at a tertiary care level teaching hospital in Tamil Nadu, India. Retrospectively, data on women with surgically confirmed adnexal torsion over three years from January 2019 to December 2022 were collected from hospital records. No specific sampling method was followed in this study. Age, parity, severity, duration of complaints, complete blood count, primary imaging modality, treatment approach, as well as outcome-related information, were extracted from the case records. Proper institutional ethical approval was taken before the conduct of the study. Informed consent was taken from all the patients for Laparoscopy and Laparotomy at the time of surgery as a part of the institute's protocol. Confidentiality of the subjects was kept confidential.

Based on age, the patients were categorized into premenarche, reproductive, and post-menopausal age groups. Clinical presentations were noted and categorized based on the nature and severity of the symptoms (abdominal pain, distension associated with nausea and vomiting). The imaging characteristics as well as the surgical findings of the adnexal torsion cases were also taken into account. The histopathologic evaluation of the specimen was also considered for the present study.

Detailed descriptive analysis was done for sociodemographic, clinical, and pathological parameters of the adnexal torsion cases. Medians as well as percentages were used to represent the data. Microsoft Excel 2007 and IBM SPSS version 21 were used for the statistical analysis. A p-value of less than 0.05 was considered statistically significant.

## 3. Results and Discussion

A total of 42 cases with confirmed adnexal torsion cases were identified. The median age of the patients was 24 years. The majority of the patients were in the reproductive age group i.e., 78% with minimal in the premenarche group (5%) (Table 1).

**Table 1.** Age distribution of study participants

| Age groups (n=42)<br>Median age (years)= 24 | Frequency (N) | Percentage (%) |
|---|---|---|
| Premenarche age (<15 years) | 2 | 5 |
| Reproductive age (15-49 years) | 33 | 78 |
| Post-menopausal age (> 49 years) | 7 | 17 |

All the patients reported abdominal pain symptoms with 55% described as acute abdominal pain and 45% as vague abdominal pain. Other clinical symptoms were reported among 76% of patients out of which 14% experienced fever and 62% had nausea. Upon, assessing clinical signs it was found that 38% of patients had palpable abdominal mass, 54.7% had tenderness and 26.1% had leucocytosis (Table 2).

**Table 2.** Clinical presentation of adnexal torsion cases

| Presentation | Characteristics | Frequency (N) | Percentage (%) |
|---|---|---|---|
| Symptoms | Acute abdominal pain (n=42) | 23 | 54.7 |
| | Mild abdominal pain (n=42) | 19 | 45.2 |

| | | | |
|---|---|---|---|
| | Fever (n= 32) | 6 | 14 |
| | Nausea/vomiting (n=32) | 26 | 26 |
| Signs | Palpable abdominal mass (n=42) | 16 | 38 |
| | Tenderness (n=42) | 23 | 54.7 |
| | Leucocytosis (n=42) | 11 | 26.1 |

Ultrasonography (USG) was done in all the cases as a primary imaging modality. Adnexal mass was seen in all the patients (100%). Ovarian cysts and ovarian cysts with free fluid were diagnosed in 54.7% and 16.8% of the cases. Also, Magnetic Resonance Imaging (MRI) was done among 33.3% of the patients in which diagnosis of adnexal torsion was confirmed in 79% of cases. The majority of the adnexal torsion cases were right-sided (71.4%) and 52.3% of cases had ovarian size of 5-10 cm (diameter) with adnexal torsion (Table 3).

**Table 3**. Pre-operative findings of the adnexal torsion cases

| Imaging | Characteristics | Frequency (N) | Percentage (%) |
|---|---|---|---|
| Imaging modality | Ultrasonography (n=42) | 42 | 100 |
| Ultrasonography parameters | Adnexal mass (n=42) | 42 | 100 |
| | Diagnosis of adnexal torsion (n=42) | 24 | 57.1 |
| | Ovarian cyst (n=42) | 23 | 54.7 |
| | Ovarian cyst with free fluid (Free fluid in Pouch of Douglas) (n=42) | 12 | 16.8 |
| | Right-sided adnexal torsion (n=42) | 30 | 71.4 |
| | Left-sided adnexal torsion (n=42) | 11 | 26.1 |
| | Bilateral adnexal torsion (n=42) | 1 | 2.3 |
| | Ovarian size with adnexal torsion 5-10 cm* (n=42) | 22 | 52.3 |
| | Ovarian size with adnexal torsion >10 cm* (n=42) | 11 | 26.1 |
| Imaging modality | Magnetic Resonance Imaging (n=42) | 14 | 33.3 |
| Magnetic Resonance Imaging parameters | Diagnosis of adnexal torsion (n=14) | 11 | 79 |

* Diameter

**Table 4.** Surgical management and findings of the adnexal torsion cases

| Surgical management/findings | Characteristics | Frequency (N) | Percentage (%) |
|---|---|---|---|
| Surgical procedure* | Laparoscopy (n=42) | 21 | 50 |
| | Laparotomy** (n=42) | 21 | 50 |
| Surgical intervention methods | Conservative surgical method (n=42) | 18 | 42.8 |
| | Radical surgical method (n=42) | 24 | 57.2 |
| Surgical findings | Isolated ovarian torsion (n=42) | 30 | 71.4 |
| | Paraovarian or paratubal cyst (n=42) | 11 | 26.1 |
| | Isolated tubal torsion (n=42) | 1 | 2.3 |

* Out of 42 patients, 18 patients had undergone emergency surgery i.e., within 24 hours of presentation

**Out of 21 patients, one patient (35 weeks of pregnancy) with recurrent ovarian cyst with torsion case had undergone an emergency lower segment cesarean section with right salpingo-oophorectomy. (Figure-1)

All of the patients underwent surgery (100%) in which laparoscopy (50%), as well as laparotomy (50%) procedure, was conducted. The time interval from admission to the surgery in the present study was 3 days (median) due to which 18 cases (42.8%) had undergone conservative surgery. Out of all the cases, 42.8% of cases had undergone emergency surgery within 24 hours of clinical presentation. The majority of the surgical findings were reported as isolated ovarian torsion (71.4%), with para-ovarian or para-tubal cysts in 26.1% and isolated tubal torsion in 2.3% of cases (Table 4). One patient (35 weeks of

pregnancy) with recurrent ovarian cyst with torsion had undergone an emergency lower segment cesarean section with right salpingo-oophorectomy (Figure 1).


**Figure 1.** Figure depicting an emergency case of lower segment cesarean section with right salpingo-oophorectomy due to recurrent ovarian cyst with torsion.

An analysis of histopathologic examination of patients who underwent surgery shows that 19% of the cases had serous cystadenoma. Mucinous cystadenoma was seen in 14% of the cases. Teratoma was reflected in 26% and the hemorrhagic cyst was in 17% of the cases (Table 5).

**Table 5.** Histopathological findings of the adnexal torsion cases

| Histopathological findings | Frequency (N) | Percentages (%) |
|---|---|---|
| Teratoma | 11 | 26 |
| Serous cystadenoma | 8 | 19 |
| Hemorrhagic cyst | 7 | 17 |
| Mucinous cystadenoma | 6 | 14 |
| Corpus Luteal cyst | 4 | 10 |
| Borderline serous cyst adenoma cyst adenofibroma | 2 | 5 |
| Benign sex cord-stromal tumor | 1 | 2 |
| Tubal abscess | 1 | 2 |
| Normal ovary | 2 | 5 |

One of the body's organs that is vulnerable to torsion is the adnexa of the uterus, which is made up of the fallopian tubes and ovaries. The ovary is located in the ovarian fossa, where it is secured to the uterus medially by the ovarian ligament and laterally by the infundibulopelvic ligament. The ovary's vascular supply is carried via the infundibulopelvic ligament. It varies greatly in length. Some women may have a short ligament, while others may have one that is rather lengthy. The ovary is vulnerable to torsion because of the lengthy Infundibulo pelvic ligament.

In the present study, we have summarized the demographic characteristics, clinical signs and symptoms, surgical treatment, and outcomes of adnexal torsion among women for 3 years. In our study, a total of 42 cases were registered for the retrospective analysis of adnexal torsion cases which was higher than the observational study conducted by Mohan et al. (n-38) [10] in the southern region of India. However, Mathimaran et al. conducted a prospective observational study on Adnexal torsion cases in which the number of registered participants was comparable with our study [12]. Verma et al. in Northern India did a retrospective analysis of Adnexal torsion among 28 cases [13]. The variation in the cases might be attributable to differences in the timeline of the studies as well as geographic variation in the prevalence of adnexal torsion cases within the Indian sub-continent. On the other hand, Shwyiat et al. conducted a retrospective analysis of 150 patients with ovarian torsion in Jordan [14]. Also, Wang et al. in China assessed the clinical management of adnexal torsion among 82 pregnant women [15]. The

differences in the sample size can be explained by the varied prevalence of cases based on the geographical locations.

In the present study, the median age of patients with adnexal torsion was 24 years, which is comparable to the median age of the participants in the study conducted by Gupta et al. [16], Tsafrir et al. [17] and Vijayalakshmi et al. [18]. The majority of the participants were in reproductive age (78%) which was comparable with studies conducted by Vijayalakshmi et al. [18], Verma et al. [13] as well and Mathimaaran et al. [12] Analysis of retrospective data stated that abdominal pain was the predominant presenting symptom reported by all the patients with the majority having acute abdominal pain (55%). In a study conducted by Ming Chen et al., they showed that among 69 adnexal torsion cases, all of them were presented with abdominal pain [9]. Rossi et al. also conducted a study among pediatric as well as adolescent populations and reported 91% of patients having acute abdominal pain [19].

Out of 42 enrolled patients, 14% were febrile at the time of admission. This was comparable to a study conducted by Mathimaaran et al. which reported 12.5% of fever cases [12]. However, Vijayalakshmi et al. in their study stated that the majority of the patients (95%) were afebrile at the time of admission [18]. Fever at the time of clinical presentation normally signifies extensive adnexal necrosis.

USG is the primary imaging modality used for the evaluation of acute abdominal pain as well as the diagnosis of adnexal torsion. Color Doppler sonography has been proposed to be a useful tool for pre-operative diagnosis of adnexal torsion. However, some studies reported that findings from Doppler have a high false negative rate [20, 21]. Therefore, the decision as well as the surgery should not be based on the finding of Color Doppler alone but on the combined imaging diagnostic procedures such as USG, MRI along with clinical diagnosis. The understanding of clinicians and sonographers is critical to improve imaging sensitivity. The combination of clinical and sonographic characteristics should help clinicians speed up diagnosis, accomplish early surgical intervention, and improve patient outcomes. In the present study, USG was done on all the patients and MRI was done on patients based on the degree of the severity of the acute abdominal pain. Free fluid in the Pouch of Douglas (POD) was observed in 16.8% of cases. This was less as compared to the study conducted by Shobha Nair et al. (23.8%) [22] and C. Spinelli et al. (26.7%) [23]. The majority of the adnexal torsion cases were right-sided (71.4%) with 26.1% left-sided and 2.3% bilateral. This was comparable to C. Spinelli et al. with right-sided adnexal torsion cases 70% and left-sided 30% [23]. In the study conducted by Vijayalakshmi et al. 50% of cases were right-sided adnexal torsion and 38.9% were left-sided [18]. Torsion on the right side is more prevalent than on the left, which is assumed to be due to the increased space in the right pelvis due to the position of the sigmoid colon on the left [24]. In the present study, ovarian size between 5-10 cm associated with adnexal torsion was observed in 52.3% of cases. This was much higher than the study findings by Vijayalakshmi et al. (33.3% of cases with ovarian size 5-10 cm) [18]. On sonography, adnexal mass was reported in all of the patients with adnexal torsion diagnosis in 57.1% of cases. USG revealed ovarian cysts in 54.7% and ovarian cysts with free fluid in 16.8% of cases. Smorgick et al. in their study also used USG and showed unilocular ovarian cysts in 39.5% of cases and multicystic ovaries in 36.8% of cases [25].

Diagnostic laparoscopy being the gold standard for adnexal torsion management was performed in our study (50%). Laparoscopy was the common surgical procedure in studies conducted by Hibbard et al. (81.4%) [2] and Hiller et al. (59%) [26]. In our study laparotomy was performed (50%) in cases with confirmative adnexal torsion diagnosis using imaging and clinical diagnostics. Pathology reports of adnexal torsion in our study revealed Teratoma in 26%, serous cystadenoma in 19%, hemorrhagic cyst in 17%, and mucinous cystadenoma in 14% cases. The size of the ovaries increases the likelihood that the ovary may spin on the axis of the two ligaments that hold it in suspension. Torsion obstructs venous outflow and, subsequently, arterial inflow [27]. Vijayalakshmi et al. reported mucinous cystadenoma in 33.3%, serous cystadenoma, and cystic Teratoma in 16.7% of cases each. (Vijayalakshmi et al. 2014) Shwyiat et al. showed dermoid in 33.8%, functional cyst in 30.8%, and mucinous cystadenoma in 8.8% of cases. (Shwyiat et al. 2023) Mohan et al. also reported benign serous cystadenoma in 18.42%, benign papillary serous cystadenoma in 7.89%, and mature cystic Teratoma in 10.53% of cases. (Mohan et al. 2014) The time interval from admission to the surgery in the present study was 3 days (median) due to which the proportion of the cases that underwent a conservative surgical approach was 42.8%. In a study conducted by Nair et al., the time interval from admission to surgery was 24 hours (median) which led to 54.3% of conservative surgeries. (Tsafrir viv et al. 2012) Also, Tsafrir et al. reported a higher rate of conservative surgical approach (80.4%) among ovarian torsion cases in children as the time interval was 20.75 hours (median). This implies that it is very crucial to diagnose adnexal torsion cases at an early stage of patient admission which will increase the probability of doing a conservative surgical approach. Hence, the combination of clinical expertise as well as proper imaging diagnostic modalities

(USG, MRI) are important for prompt diagnosis of torsion cases in order to increase the ovarian conservation rate.

There are considerable limitations in our study. First, since our study design is retrospective, the possibility of bias could be there due to incomplete data as well as the single-centric design of the study. Second, only surgically proven adnexal torsion cases were included which might have led to missed cases with less-typical presentation of adnexal torsion who did not undergo surgery on spontaneous detorsion cases of ovary which were not classified as adnexal torsion.

## 4. Conclusion

Adnexal torsion is an uncommon condition. The major symptoms are acute abdominal pain, nausea, and vomiting. The imprecise clinical and radiographic symptoms of adnexal torsion make diagnosis challenging for both clinicians and radiologists. As a result, significant clinical practice and radiological skills are required. Early detection and surgical treatment spare the ovary, maintaining its function. Based on the clinical suspicion of adnexal torsion, a surgical decision should be taken as soon as feasible considering imaging modalities such as USG, MRI, etc. along with clinical diagnosis. Laparoscopy is a safe method of diagnosing and treating adnexal torsion. Conservative surgery, such as detorsion with cystectomy or fenestration, can not only preserve ovarian function but also lower the recurrence rate.

## Conflict of interest

No conflict of interest

## Author's contribution

Saranya Balamurugan- Ideation and writing of the manuscript
Sajeetha Kumari R- Overall management of patient's data and manuscript formatting
Dhruva Nandi- Revising and modification of the manuscript
Anushya MC-Data collection process

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