Spectrum of Clinical Presentation of Ovarian Dermoid Cysts Across Different Age Groups: A Two-Year Observational Study

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Abstract

Background: Ovarian dermoid cysts (mature cystic teratomas) are the most common benign ovarian neoplasms in reproductive-age women, yet their clinical presentation is notoriously diverse, ranging from incidental asymptomatic findings to acute surgical emergencies. This study aimed to document the varied clinicopathological presentations, imaging characteristics, surgical management, and histopathological outcomes of ovarian dermoid cysts encountered at a tertiary care centre over two years.

Methods: A retrospective observational study was conducted over 24 months. Nineteen cases of surgically managed ovarian dermoid cysts were enrolled. Clinical data including patient demographics, presenting symptoms, imaging findings (ultrasonography, MRI, CT), tumour marker profiles, surgical procedures, and histopathological reports were collected and analysed.

Results: Patient age ranged from 14 to 48 years. Seventeen cases (89.5%) were benign mature cystic teratomas on histopathology. One case (5.3%) was a mixed malignant germ cell tumour (immature teratoma 87% + yolk sac tumour 10% + embryonal carcinoma 3%), and one case demonstrated struma ovarii as a monodermal variant. Ovarian torsion complicated five cases (26.3%). Three cases occurred during pregnancy (cases 6, 7, 8). Bilateral involvement was documented in three patients (15.8%). AFP elevation (>520 U/mL) was the sole early tumour marker signal in the malignant case. Surgical management ranged from laparoscopic cystectomy to emergency laparotomy with bilateral salpingo-oophorectomy.

Conclusion: Ovarian dermoid cysts exhibit a wide clinical spectrum including torsion, bilateral disease, pregnancy-associated complications, and rare malignant transformation. Individualized surgical planning, careful tumour marker interpretation, and thorough histopathological evaluation are essential. Elevated AFP should raise suspicion for malignant germ cell components even when other markers remain normal.

Keywords: Ovarian dermoid cyst; mature cystic teratoma; ovarian torsion; germ cell tumour; struma ovarii; pregnancy and ovarian cyst; AFP tumour marker; laparoscopy; salpingo-oophorectomy

1. Introduction

Ovarian dermoid cysts, histologically classified as mature cystic teratomas (MCT), represent the single most common ovarian neoplasm in women of reproductive age, accounting for approximately 20–25% of all ovarian tumours and nearly 60% of benign ovarian tumours in women under 45 years of age.[1–3] These tumours arise from totipotential primordial germ cells and characteristically contain well-differentiated derivatives of all three germ cell layers—ectoderm, mesoderm, and endoderm—giving rise to the pathognomonic admixture of hair, sebaceous material, teeth, cartilage, and neural tissue.[4]

Despite their overwhelmingly benign nature, ovarian dermoid cysts display a remarkable heterogeneity of clinical presentation that continues to challenge the gynaecologist. They may be discovered incidentally on routine pelvic ultrasound in a completely asymptomatic woman, present as recurrent dull pelvic pain, or manifest as a life-threatening acute abdomen secondary to torsion, rupture, or infection.[5] Complicating the clinical picture further, a small but important subset (approximately 1–2%) undergoes malignant transformation, most frequently to squamous cell carcinoma, though malignant germ cell components such as immature teratoma, yolk sac tumour, or embryonal carcinoma are also documented.[6]

Additional complexity arises from the occurrence of dermoid cysts during pregnancy, bilateral synchronous disease, monodermal variants such as struma ovarii, and the potential for these benign-appearing masses to coexist with other pelvic pathology including uterine leiomyoma.[7–8] The treatment paradigm is similarly variable, ranging from conservative laparoscopic cystectomy with ovarian conservation in young nulliparous women to radical extirpative surgery in postmenopausal patients or those with suspected malignancy.[9]

Despite the large body of literature on individual complications of dermoid cysts, comprehensive case series documenting the full clinical spectrum encountered at a single tertiary institution are relatively limited from the Indian subcontinent. This study presents 19 consecutive, surgically confirmed cases of ovarian dermoid cysts managed over a two-year period, with the aim of characterising the diverse clinicopathological presentations, evaluating the diagnostic contribution of imaging modalities and tumour markers, and reviewing the range of surgical approaches employed.

2. Materials And Methods

2.1 Study Design and Setting

A retrospective observational study was conducted in the Department of Obstetrics and Gynaecology at a tertiary care teaching hospital over a 24-month period. The study was approved by the institutional ethics committee and conducted in accordance with the principles of the Declaration of Helsinki. Patient confidentiality was maintained throughout.

2.2 Inclusion and Exclusion Criteria

All women of reproductive age (14–50 years) who underwent surgical management for ovarian dermoid cysts during the study period and had confirmed histopathological diagnosis were included. Exclusion criteria-Incomplete clinical or investigation records,Refusal to provide informed consent, Patients lost to follow-up before definitive diagnosis.

2.3 Data Collection

Data were extracted from case records and operative notes and included: patient age, parity, presenting symptoms, duration of symptoms, preoperative investigations (complete blood count, tumour markers including AFP, β-hCG, LDH, CA-125, CA 19-9, CEA), imaging findings (ultrasonography, MRI, CT), intraoperative findings, type of surgical procedure performed, and histopathological report. Tumour marker values were compared with institutional reference ranges.

2.4 Imaging Protocol

All patients underwent pelvic ultrasonography (USG) as the primary imaging modality. Magnetic resonance imaging (MRI) of the pelvis and/or computed tomography (CT) of the abdomen and pelvis were performed where indicated—particularly for large, complex, or equivocal adnexal masses, for suspected torsion, or when malignancy was considered in the differential diagnosis.

2.5 Surgical Management

The choice of surgical approach—laparoscopy versus laparotomy—and the extent of resection—cystectomy with ovarian conservation versus oophorectomy versus salpingo-oophorectomy—were determined by the operating surgeon based on patient age, parity, desire for fertility preservation, cyst size, intraoperative findings, and index of suspicion for malignancy. Intraoperative frozen section was requested at the surgeon's discretion. All specimens were sent for formal histopathological examination.

2.6 Statistical Analysis

Descriptive statistics were used. Continuous variables are expressed as mean ± standard deviation (SD) and range. Categorical variables are expressed as frequencies and percentages.

3. Results

3.1 Patient Demographics and Clinical Presentation

A total of 19 women with surgically managed ovarian dermoid cysts were included. The mean age was 30.2 ± 8.1 years (range 14–48 years). The modal age group was the third decade of life (21–30 years), accounting for 12 cases (47.4%). Obstetric status varied: five patients were nulliparous/unmarried, three cases occurred during active pregnancy (at 13, 37, and 38 weeks of gestation), and the remaining patients had prior deliveries ranging from previous normal vaginal delivery to multiple prior caesarean sections.

The predominant presenting symptom across all cases was abdominal or pelvic pain, present in 18 of 19 patients (94.7%). One patient (case 18) presented primarily with abnormal uterine bleeding. The duration of symptoms ranged from 2 days to several months, with acute presentations of 48–72 hours predominantly associated with torsion. Additional symptoms included vomiting (cases 4, 5), pain during micturition (case 5), and abdominal distension (case 9). Three patients presented as surgical emergencies.

Table 1: Summary of all 19 cases – Clinical, Imaging, and Histopathological data

Case	Age	Diagnosis	Imaging	Procedure	HPE
1	14	Rt. Dermoid + Torsion	CT: 7.7×11.8×13.3 cm	Laparotomy + Rt. SO	Dermoid cyst with torsion
2	20	Lt. Dermoid	USG+MRI: 5.6×5×5.4 cm	Lap. + Lt. Oophorectomy	Mature cystic teratoma
3	22	Bilateral Dermoid	USG/MRI bilateral	Laparotomy + Rt. cystectomy	Benign cystic teratoma bilateral
4	23	Rt. Malignant GCT	USG: 7.7×11×8 cm, AFP>520	Emergency Lap. + Rt. SO	Mixed malignant GCT (IT+YST+EC)
5	23	Bilateral Dermoid + Torsion	USG+MRI bilateral	Emergency + Bilateral cystectomy	Mature cystic teratoma + Struma

6	24	Rt. Dermoid (13 wks pregnant)	USG+MRI: 6.6×7.6×6.3 cm	Rt. Oophorectomy	Mature cystic teratoma
7	26	Lt. Dermoid (37 wks pregnant)	MRI: 4.4×2.8 cm (Rokitansky)	LSCS + Lt. Oophorectomy	Mature cystic teratoma
8	27	Lt. Dermoid (38 wks pregnant)	MRI: 4.5×4×9 cm	Emergency LSCS + Lt. cystectomy	Mature cystic teratoma
9	28	Lt. Dermoid	USG+MRI: 5.1×3.8×5.2 cm	Laparotomy + Lt. SO	Mature cystic teratoma
10	28	Rt. Dermoid	CT: 2.8×3 cm	Lap. Rt. Oophorectomy	Benign mature teratoma
11	28	Lt. Dermoid + Torsion	USG+CT: 9×8 cm	Laparotomy + Lt. cystectomy	Mature cystic teratoma
12	29	Bilateral Dermoid	CT: Lt 3.9×2.6, Rt 3.5×3.1 cm	B/L Ovarian cystectomy + BTL	Benign cystic teratoma
13	29	Rt. Monodermal Teratoma	USG+MRI: 4.2×4.4×3.8 cm	Cystectomy + Rt. SO	Monodermal cystic teratoma
14	34	Rt. Dermoid	MRI: 3.9×3.5×3.3 cm	Rt. Oophorectomy	Mature cystic teratoma
15	37	Rt. Dermoid	CT: 5.6×4.2 cm	Laparotomy + Rt. Oophorectomy	Mature cystic teratoma
16	37	Lt. Dermoid	USG+MRI: 6.6×5.4 cm	Lt. SO	Mature cystic teratoma
17	41	Lt. Dermoid	USG: 4.6×4.1 cm	Laparotomy + Lt. SO	Benign cystic teratoma
18	45	Lt. Dermoid	CT: 5.7×3.5×6.3 cm	Lap. Lt. SO	Left ovary dermoid cyst
19	48	Rt. Dermoid + Leiomyoma	CT: 10.3×11.67×11.8 cm	TAH + B/L SO	Benign cystic teratoma + Leiomyoma

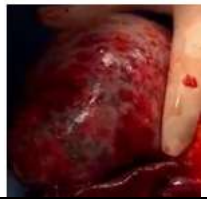
Abbreviations: SO = Salpingo-oophorectomy; GCT = Germ cell tumour; IT = Immature teratoma; YST = Yolk sac tumour; EC = Embryonal carcinoma; HPE = Histopathological examination; Lap = Laparoscopy; BTL = Bilateral tubal ligation; LSCS = Lower segment caesarean section; TAH = Total abdominal hysterectomy; B/L = Bilateral

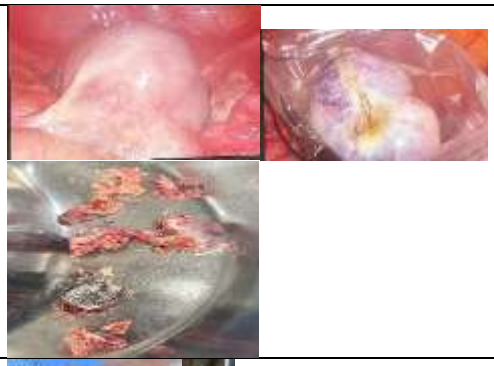
3.2 Imaging Characteristics

Ultrasonography was performed in all 19 cases as the primary imaging modality. Characteristic dermoid features on USG included echogenic nodules with posterior acoustic shadowing (the Rokitansky nodule / dermoid plug), diffuse hyperechogenicity with a fat-fluid level, and heterogeneous cystic-solid architecture. MRI of the pelvis was obtained in 14 cases (73.7%), and CT of the abdomen and pelvis in 9 cases (47.4%). MRI demonstrated fat suppression on SPAIR/T1-fat-sat sequences consistent with mature teratoma in all cases examined, and CT showed characteristic fat-density lesions (HU −50 to −70) with or without calcification.

Cyst size ranged from 2.8 cm (case 10) to 13.3 cm in maximum dimension (case 1). The largest mass was 10.3×11.67×11.8 cm (case 19). Torsion was radiologically suspected in five cases (cases 1, 4, 5, 11) and confirmed intraoperatively. Bilateral ovarian involvement was detected in three cases (cases 3, 5, 12). The Rokitansky nodule was specifically identified on MRI in case 7 (pregnancy-associated dermoid at 37 weeks). Haemorrhagic components were noted in cases 1 and 5.

The single malignant case (case 4) presented imaging findings of a large heterogeneous right adnexal mass (7.7×11×8 cm) without definitive MRI features of malignancy; the diagnosis was clinched by a markedly elevated AFP (>520 U/mL) alongside a normal β-hCG and CA 19-9.

Case-1	

Case-2	
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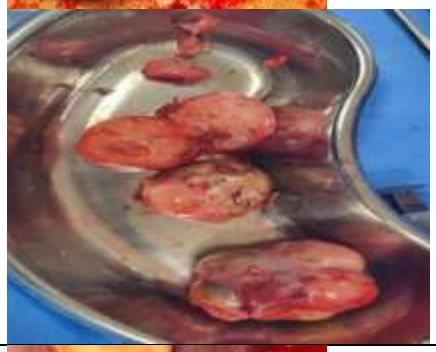
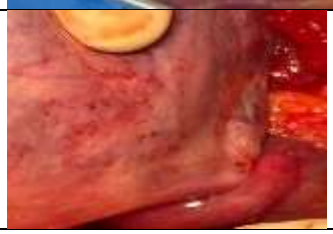
Case-5	 
Case-6	

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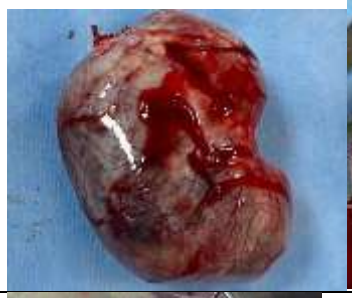
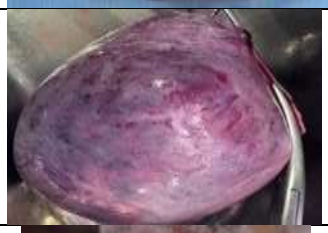
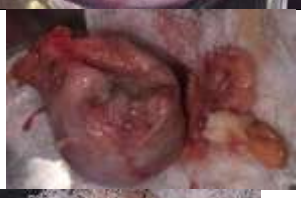
Case-8	 
Case-9	
Case-10	 
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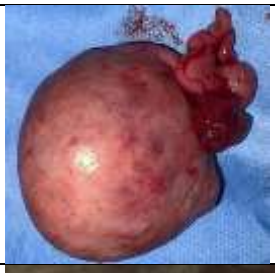
Case-13	
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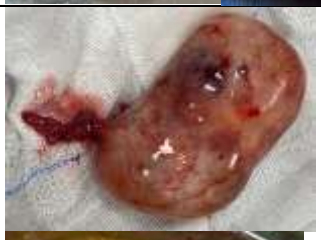
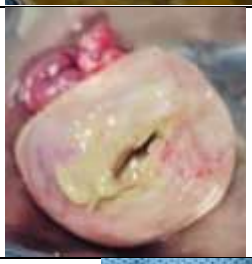
Case-16	 
Case-17	 
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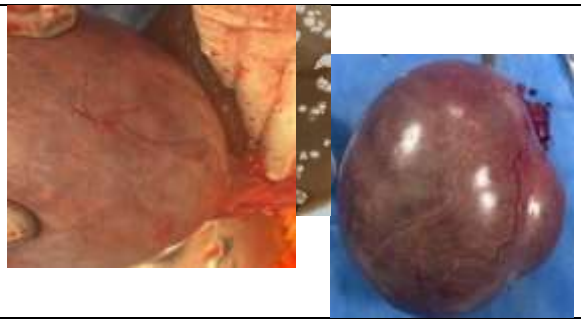
Case-19	

3.3 Tumour Marker Profile

Tumour markers were systematically obtained in 16 of 19 cases. Overall, AFP, β-hCG, LDH, CA-125, CA 19-9, and CEA levels were within normal limits in all cases of benign mature cystic teratoma. Notably, CA 19-9 was mildly elevated in case 5 (195 U/mL preoperatively, normalising to 73.8 postoperatively) and markedly elevated in case 16 (479 U/mL) without histopathological evidence of malignancy—a well-documented phenomenon in benign teratomas due to epithelial cell secretion of this mucin-associated antigen.[10]

The critical finding was a highly elevated AFP (>520 U/mL) in case 4, the only malignant case, with all other markers normal. This case was ultimately confirmed as a mixed malignant germ cell tumour. β-hCG was paradoxically elevated to 409.51 mIU/mL in case 11—a non-pregnant woman—an isolated elevation without clinical or histopathological evidence of malignancy, likely representing non-specific tumour marker perturbation.

Table 2: Tumour Marker Profile in Selected Cases

Case	AFP	LDH	CA-125	β-hCG	CA 19-9	CEA
1	<0.476	245	147	<2.39	—	—
2	0.941	184	11.3	<2.39	—	0.75
4	<0.476 (norm)	—	—	<2.39	53.3	—
5	1.14	263	42.4	<2.39	195	3.69
10	1.15	132	10.6	<2.39	—	—
11	1.47	197	13 (post)	409.51	<1.4	2.20
12	1.32	197	18.9	<2.39	—	—
13	0.792	183	8.5	<2.39	—	1.19
16	1.10	156	16.5	<2.39	479	0.81
18	1.06	188	16.7	<2.39	24.2	1.48

Reference ranges: AFP <7 ng/mL; β-hCG <5 mIU/mL (non-pregnant); LDH 100–190 U/L; CA-125 <35 U/mL; CA 19-9 <37 U/mL; CEA <3 ng/mL. — = not recorded.

3.4 Surgical Management

The surgical approach and extent of resection were tailored to the individual clinical context. Laparoscopic surgery was performed in three cases (15.8%); all remaining cases were managed by laparotomy (84.2%). Emergency surgical intervention was required in five cases (26.3%) due to torsion, acute abdomen, or obstetric emergency.

Ovarian conservation with cystectomy was performed in six cases. Salpingo-oophorectomy was performed in eight cases. One patient (case 19) underwent total abdominal hysterectomy with bilateral salpingo-oophorectomy for coexistent uterine leiomyoma. Bilateral cystectomy was performed in case 5. Concurrent bilateral tubal ligation was performed at the time of ovarian surgery in case 12. Three caesarean sections were performed alongside ovarian surgery in cases 6, 7, and 8.

Intraoperative frozen section analysis was utilised in case 11, yielding a diagnosis of mature cystic teratoma that directed conservative management. Adjuvant chemotherapy with the BEP regimen (bleomycin, etoposide, cisplatin) was planned for case 4 following confirmation of mixed malignant germ cell tumour.

3.5 Histopathological Findings

Histopathological examination confirmed the following diagnoses:

- Mature cystic teratoma (benign dermoid cyst): 17 cases (89.5%)
- Mature cystic teratoma with features of torsion: 1 case (5.3%) [case 1]
- Struma ovarii (monodermal teratoma): 1 case (5.3%) [case 5, component B]

• Monodermal (ovarian parenchyma with a cystic lesion lined by stratified squamous epithelium. Endodermal and mesodermal elements are not seen)cystic teratoma : 1 case (5.3%) [case 13]
• Mixed malignant germ cell tumour (immature teratoma 87% + yolk sac tumour 10% + embryonal carcinoma 3%): 1 case (5.3%) [case 4]
Histopathological features in benign cases included cyst walls lined by keratinising squamous epithelium with associated pilosebaceous units, mature neural tissue, cartilage, thyroid follicles (struma ovarii), and pultaceous (sebaceous) material with hair follicles. There was no evidence of immature elements or malignant transformation in the 17 benign cases.

4. Discussion

This observational series illustrates the remarkable clinical diversity with which ovarian dermoid cysts present in the reproductive-age population, an observation well supported by the published literature. The mean age of 30.2 years in our cohort aligns with data from larger series reporting peak incidence in the third and fourth decades of life, though the youngest patient in our series—14 years—reflects the recognised occurrence of dermoid cysts in adolescent girls, where they constitute the most common ovarian neoplasm.[11]

4.1 Bilateral Disease

Bilateral dermoid cysts were identified in three patients (15.8%), consistent with the reported bilateral incidence of 10–15% in the literature.[12] This finding has important practical implications for surgical planning: routine intraoperative inspection and palpation of the contralateral ovary are mandatory in all cases of dermoid cyst. Failure to identify bilateral disease necessitates reoperation. Cystectomy with ovarian preservation was performed in these cases wherever technically feasible, with preservation of future fertility as a priority.

4.2 Ovarian Torsion

Torsion occurred in five cases (26.3%) in our series—a rate higher than the 2–16% reported in population-based studies—reflecting the tertiary referral and emergency case mix of our institution.[13] Dermoid cysts are particularly prone to torsion due to their size, eccentric weight distribution from the fat-dense Rokitansky nodule, and relative mobility of the ovarian pedicle. Three of our torsion cases presented in women under 24 years, consistent with reports of higher torsion rates in younger women with larger cysts.[14] Detorsion and cystectomy with ovarian conservation were attempted where viability allowed; salpingo-oophorectomy was performed when the adnexal structures were non-viable.

4.3 Dermoid Cysts Complicating Pregnancy

Three cases of dermoid cyst complicating pregnancy were encountered (cases 6, 7, 8), occurring at 13, 37, and 38 weeks of gestation respectively. The overall prevalence of adnexal masses detected in pregnancy is approximately 1:600–1:1000 deliveries, with dermoid cysts being the most common histological type.[15] Management of dermoid cysts in pregnancy must balance the maternal risk of torsion, rupture, and obstruction of labour against the risks of fetal compromise from anaesthesia and surgery. In cases 7 and 8, emergency caesarean section for obstetric indications was performed concurrently with oophorectomy or cystectomy. Current consensus favours surgical intervention in the second trimester for symptomatic cysts larger than 6–8 cm; emergency surgery was unavoidable in all three cases in our series.[16]

4.4 Tumour Markers and the Detection of Malignancy

The single most important finding in this series from a clinical safety perspective is the markedly elevated AFP (>520 ng/mL) in case 4—the only patient with a malignant germ cell tumour. All other tumour markers were within normal limits. This underscores the critical importance of including AFP in the preoperative tumour marker panel for all adnexal masses, particularly in young women. The diagnosis of mixed malignant germ cell tumour was confirmed histopathologically as immature teratoma (87%), yolk sac tumour (10%), and embryonal carcinoma (3%). The preoperative imaging did not definitively distinguish this from a benign dermoid in the absence of tumour marker correlation, highlighting that image characteristics alone may be insufficient to exclude malignancy in large complex adnexal masses.[17]

The isolated elevation of CA 19-9 in cases 5 and 16 without malignancy is a recognised phenomenon. Benign teratomas can produce CA 19-9 as the cyst wall contains mucin-secreting intestinal-type epithelium, and values may normalise postoperatively—as observed in case 5, where CA 19-9 fell from 195 to 73.8 U/mL after surgery.[10] Clinicians should be aware of this benign aetiology of CA 19-9 elevation to avoid unnecessary intervention or patient anxiety.

4.5 Struma Ovarii and Monodermal Variants

One specimen from case 5 (component B) demonstrated struma ovarii—a monodermal teratoma composed predominantly of thyroid tissue, representing approximately 3% of all dermoid cysts.[18] The diagnosis was incidental, as the patient did not exhibit thyrotoxicosis. Thyroid function tests are recommended postoperatively when struma ovarii is identified, particularly in younger women, as hyperthyroidism and, rarely, malignant struma ovarii may occur.[19] Case 13 demonstrated a monodermal cystic teratoma (ovarian parenchyma with a cystic lesion lined by stratified squamous epithelium. Endodermal and mesodermal elements are not seen)with concurrent hydrosalpinx of the right tube, a co-incidental finding requiring concurrent salpingectomy.

4.6 Coexistence with Other Pelvic Pathology

Case 19 demonstrated the coexistence of a large right ovarian dermoid cyst (10.3×11.67 cm) with uterine leiomyoma in a 48-year-old woman. The simultaneous management of both pathologies—total abdominal hysterectomy with bilateral salpingo-oophorectomy—exemplifies the individualised approach that must be taken. Ovarian dermoid cysts do not exist in isolation; other gynaecological conditions may coexist, and their identification preoperatively informs the operative plan.

4.7 Surgical Approach: Laparoscopy versus Laparotomy

In contemporary gynaecological oncology, laparoscopy is the preferred approach for most ovarian cysts in reproductive-age women, offering reduced morbidity, shorter hospitalisation, and faster recovery.[20] In our series, only 3 of 19 cases (15.8%) were managed laparoscopically. This low rate reflects the high proportion of emergency presentations with torsion, large cyst dimensions exceeding 8–10 cm (unsuitable for laparoscopic extraction without spillage), and pregnancy-associated cases requiring concurrent caesarean section. Intraperitoneal spillage of dermoid contents carries a risk of chemical peritonitis; meticulous technique to avoid rupture is essential.[21] For elective, non-pregnant, nulliparous women with cysts under 8 cm, laparoscopic cystectomy remains the procedure of choice.

5. Conclusion

This two-year case series from a tertiary care institution demonstrates the wide clinical spectrum of ovarian dermoid cysts in reproductive-age women. The vast majority (89.5%) follow a benign course, but clinicians must remain vigilant for life-threatening complications including torsion, malignant transformation, and pregnancy-related emergencies. A markedly elevated AFP—even in isolation—should prompt urgent surgical intervention and frozen section analysis to exclude malignant germ cell components. Bilateral disease, monodermal variants including struma ovarii, and coexistent pelvic pathology must be anticipated. Surgical management should be individualised, prioritising ovarian conservation in young women while not compromising oncological safety. Systematic tumour marker evaluation, multimodality imaging, and intraoperative frozen section are the pillars of optimal management.

Conflict Of Interest

The authors declare no conflict of interest. No external funding was received for this study.

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