

ADNEXAL MASSES AND THEIR CORRELATION WITH GYNECOLOGICAL AND GENERAL SURGICAL OUTCOMES

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ABSTRACT

Background: Adnexal masses are a heterogeneous class of pathological entities seen across all age groups in women and vary in surgical complexity depending on the characteristics of the mass, tissue of origin and histopathology. Many times, general and gynaecological surgical skills are required, as well as surgical skills to manage neighbouring organs, and intrinsic difficulties may be encountered during the procedure.

Objective: To determine the incidence and nature of the adnexal masses and their correlation to gynaecological and general surgical outcome among women presenting with adnexal masses in tertiary care hospitals of Pakistan.

Study Design: Observational Multi-center Study.

Place & Duration: various Tertiary Care Hospitals of Pakistan for 6 months duration from Oct 2025 to March 2026.

Methodology: 120 cases of women with diagnosed adnexal masses were enrolled. According to ultrasonographic and histopathological characteristics, masses were categorised into benign functional, benign neoplastic, borderline and malignant types. Gynaecological outcomes, as well as outcomes from general surgical procedures, were documented. The SPSS version 26.0 software was used for data analysis; Chi-square test and independent samples t-test were used and $p < 0.05$ was set as the level of statistical significance.

Results: Benign functional masses were most prevalent ($n=57$, 47.5%), followed by benign neoplastic ($n=39$, 32.5%), borderline ($n=15$, 12.5%), and malignant ($n=9$, 7.5%). Malignant masses were significantly associated with higher gynaecological complication rates (88.9% vs. 12.3%, $p < 0.001$), bowel involvement (55.6% vs. 1.8%, $p < 0.001$), conversion to open surgery (66.7% vs. 5.3%, $p < 0.001$), and prolonged hospital stay (9.4 ± 3.1 vs. 2.7 ± 1.0 days, $p < 0.001$). A majority of patients (93.0%) who underwent surgery for a benign functional tumor had fertility-sparing surgery while 11.1% had surgery for a malignant tumor ($p < 0.001$).

Conclusion: The results showed that histopathology of the adnexal mass shows significant association with both the gynaecological surgery outcome and the general surgical outcome (conclusion). Surgical morbidity is significantly greater with malignant and borderline masses. Preoperative risk stratification and multidisciplinary preoperative planning are very important to improve the surgical outcomes, in resource-limited tertiary care setting.

KEYWORDS: Adnexal Masses, Ovarian Pathology, Gynaecological Outcomes, Surgical Complications, Borderline Tumours, Malignant Ovarian Neoplasm, Pakistan.

INTRODUCTION

Adnexal masses are a diverse range of pathological conditions that arise from an ovary, fallopian tube or other nearby structures of the peritoneum, and are one of the most common diagnostic problems in the practice of gynaecology [1]. The clinical presentation can range from being completely asymptomatic (incidental) to acute presentation such as torsion, rupture, or peritoneal dissemination, and the underlying aetiology is benign functional cysts, endometriomas, benign grapelike tumours, borderline tumours of low malignant potential and overtly malignant tumours [2]. This wide pathological spectrum requires careful preoperative assessment and a structured surgical management approach for a good surgical outcome as well as minimising unnecessary surgical morbidity [3].

Surgical management of adnexal masses often crosses the lines of conventional surgery, especially when bowel, bladder or retroperitoneal structures are involved in the surgical management or intraoperative bleeding warrants vascular control beyond the gynaecologist's reach. In such situations, the cooperation of the gynaecological team with the general surgical team becomes of paramount importance: surgery endpoints of importance include conversion from minimally invasive to open surgery, bowel resection, intraoperative cyst rupture, or longer hospital stay [5,6].

Among the tertiary care centres in Pakistan, a large percentage of cases often deal with the emergency and elective gynaecological admission of cases with adnexal masses. More surgically complex masses are often encountered at the time of initial intervention, higher proportion of delayed presentation due to poor health-seeking behaviour, due to reduced access to transvaginal ultrasonography in rural areas and lack of awareness of symptoms of gynaecology disease. These patients may have the high risk of gynaecological as well as general surgical complications in the face of limited resources in the institutions and limited surgical capacity [9].

Contemporary multicentre data on gynaecological and general surgical outcomes remain limited in Pakistan [10]. In areas where there is centralisation of surgical infrastructure and advanced surgical care is offered in few tertiary centres, the concept of local evidence to inform and develop structured preop risk-stratification frameworks and standardisation of multidisciplinary referral pathways is key. So, this study was conducted to determine the frequency of adnexal masses amongst women undergoing laparotomic surgery at the tertiary care hospitals of Pakistan and to determine the correlation of this with gynaecological and general surgical outcomes [12-15].

MATERIALS AND METHODS

Study Design and Setting

Multi-center, Cross-sectional study at various Tertiary Hospitals in Pakistan. Data were collected from October 2025 to March 2026.

Ethical Approval

The study was conducted in accordance with Declaration of Helsinki. The data collection was done after formal approval from Institutional Ethical Review Committees of all the participating hospitals. All patients enrolled signed a written informed consent.

Sample Size

The consecutive non-probability sampling was used to obtain a total of 120 women with confirmed adnexal masses.

Inclusion Criteria:

- Females aged ≥ 15 years presenting with a known adnexal mass by pelvic Ultrasonography or CT.
- The patients receiving surgical management (either laparoscopic or open) at a participating centre during the study time period.
- Assessment of records (clinical, radiological, intraoperative and histopathological) was available and complete.

Exclusion Criteria:

- Conservatively treated without surgery.
- Masses of uterine origin which are mistakenly diagnosed as adnexal on the initial image.
- Patients lacking a complete documentation of the peri-operative data and/or without a histo-pathological report obtained in the period of the study.
- Patients that did not consent or were lost prior to discharge.

Data Collection

Baseline demographic and menopausal status, parity, and comorbidities were documented. Pelvic US features (size, architecture, vascularity, bilaterality) and serum CA-125 (where indicated) and CT findings (where performed) constituted the preoperative assessment. Histopathology of masses were classified as: (i) benign functional (simple cysts, follicular cysts, corpus luteum cysts), (ii) benign neoplastic (mature teratomas, serous and mucinous cystadenomas, fibromas), (iii) borderline tumours (serous and mucinous tumours of low malignant potential), and (iv) malignant (primary ovarian carcinoma, metastatic deposits). Gynaecological outcomes included the rate of ovarian conservation and fertility-sparing surgery, surgical site infection and intraoperative cyst rupture. These general surgical outcomes include participation of bowel surviving to resection, estimated blood loss >500 mL was considered indicative of intraoperative haemorrhage, laparotomy conversion, and total length of hospital stay in days.

Statistical Analysis

SPSS software (version 26.0) was used. Categorical variables were presented as percentages and frequencies and continuous variables as mean $\pm$ standard deviation and compared by independent samples t-test and Chi-square test. $P < 0.05$ was considered statistically significant.

RESULTS

During the period of the study, 120 women with confirmed adnexal mass were recruited in participating tertiary care centres. Mean age was 36.2 ± 12.6 years (range: 15–71 years); mean parity 2.3 ± 1.6 ; 27 patients (22.5%) were post-menopausal. Lower abdominal pain (67.5%), abdominal distention (40.8%) and irregular menstruation (34.2%) were among the more common presenting symptoms. The mass was detected incidentally on imaging in 17.5% of cases. The distribution of adnexal mass types is shown in Figure 1. Benign functional masses were most prevalent ($n=57$, 47.5%), followed by benign neoplastic ($n=39$, 32.5%), borderline ($n=15$, 12.5%), and malignant ($n=9$, 7.5%). Bilateral masses were much more common in malignant cases (55.6% vs 5.3% $p < 0.001$). The mean

mass diameter was significantly bigger in malignant cases than in benign functional cases (14.0 ± 4.6 cm vs. 6.2 ± 2.8 cm, $p < 0.001$).

Table 1 shows Baseline Clinicopathological characteristics. Malignant cases were significantly older (54.8 ± 9.4 years vs. 30.0 ± 10.2 years, $p < 0.001$), more commonly post-menopausal (66.7% vs. 8.8%, $p < 0.001$), and had elevated CA-125 in 77.8% of cases versus 5.3% of benign functional cases ($p < 0.001$). All malignant cases (100%) and 12.3% of benign functional cases ($p < 0.001$) had complex ultrasonographic features. Gynaecological and general surgical outcomes are shown in table 2. While ovarian conservation was performed in 91.2 percent of the benign functional cases ovarian conservation was performed, none of the malignant cases had ovarian conservation ($p < 0.001$). Fertility-sparing surgery was achieved in 93.0% of cases that presented with benign function masse versus 11.1% of malignant cases ($p < 0.001$). Of all malignant cases, 55.6% involved the bowel compared with 1.8% of the benign functional cases ($p < 0.001$). Over 66.7% of cases of malignancy, 46.7% of borderline, and only 5.3% of benign functional cases were converted to open surgery ($p < 0.001$). During surgery, a hemorrhage of ≥ 500 mL was observed in 66.7% of the malignant and 3.5% of the benign functional cases ($p < 0.001$). When looking at malignant versus benign functional, mean hospital stay was 9.4 ± 3.1 days versus 2.7 ± 1.0 days, respectively ($p < 0.001$).

Table 1: Baseline Clinicopathological Characteristics by Adnexal Mass Category (n = 120)

Characteristic	Benign Functional (n=57)	Benign Neoplastic (n=39)	p-value
Age, years (Mean $\pm$ SD)	30.0 ± 10.2	37.4 ± 9.6	< 0.001
Post-menopausal, n (%)	5 (8.8%)	10 (25.6%)	< 0.001
Mass Diameter, cm (Mean $\pm$ SD)	6.2 ± 2.8	9.0 ± 3.3	< 0.001
Bilateral Masses, n (%)	3 (5.3%)	4 (10.3%)	0.028
CA-125 > 35 IU/mL, n (%)	3 (5.3%)	9 (23.1%)	< 0.001
Complex USG Features, n (%)	7 (12.3%)	18 (46.2%)	< 0.001
Laparoscopic Approach, n (%)	52 (91.2%)	29 (74.4%)	0.021
Characteristic	Borderline (n=15)	Malignant (n=9)	p-value
Age, years (Mean $\pm$ SD)	42.4 ± 11.0	54.8 ± 9.4	< 0.001
Post-menopausal, n (%)	6 (40.0%)	6 (66.7%)	0.012
Mass Diameter, cm (Mean $\pm$ SD)	10.6 ± 4.0	14.0 ± 4.6	< 0.001

Characteristic	Benign Functional (n=57)	Benign Neoplastic (n=39)	p-value
Bilateral Masses, n (%)	3 (20.0%)	5 (55.6%)	0.008
CA-125 > 35 IU/mL, n (%)	8 (53.3%)	7 (77.8%)	< 0.001
Complex USG Features, n (%)	12 (80.0%)	9 (100%)	< 0.001
Laparoscopic Approach, n (%)	8 (53.3%)	3 (33.3%)	0.014

Table 2: Gynaecological and General Surgical Outcomes by Adnexal Mass Category (n = 120)

Outcome	Benign Functional (n=57)	Benign Neoplastic (n=39)	p-value
Ovarian Conservation, n (%)	52 (91.2%)	29 (74.4%)	0.021
Fertility-Sparing Surgery, n (%)	53 (93.0%)	34 (87.2%)	0.038
Intraoperative Cyst Rupture, n (%)	4 (7.0%)	7 (17.9%)	0.046
Surgical Site Infection, n (%)	4 (7.0%)	5 (12.8%)	0.040
Bowel Involvement, n (%)	1 (1.8%)	3 (7.7%)	0.026
Haemorrhage > 500 mL, n (%)	2 (3.5%)	4 (10.3%)	0.031
Conversion to Open Surgery, n (%)	3 (5.3%)	7 (17.9%)	0.018
Hospital Stay, days (Mean ± SD)	2.7 ± 1.0	4.1 ± 1.7	< 0.001

Figure 1: Distribution of Adnexal Mass Types and Surgical Outcome Rates by Classification (n = 120)

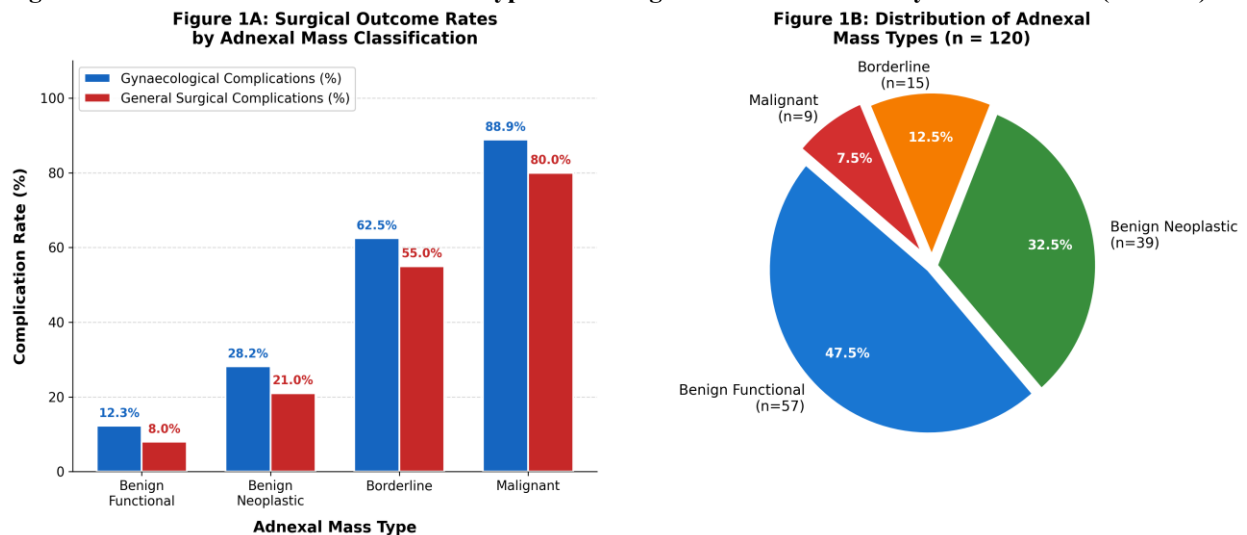


Figure 1A: Complication rates by adnexal mass type. Figure 1B: Histopathological distribution of enrolled cases.

DISCUSSION

This multicentre observational study on 120 women with adnexal masses who were managed in tertiary hospitals throughout Pakistan, was designed to yield locally relevant data on the distribution of the pathologies of the adnexa and their association with gynaecological and general surgical outcomes. The majority of masses are benign functional masses (47.5%) and these findings are in line with existing literature in the field which suggests that functional ovarian cysts are the most common type of adnexal mass in women of reproductive age [1,2]. The prevalence of malignant masses (7.5%) is the same as that found in other studies carried out in LMIC tertiary centres, in which malignant masses are more common due to delayed access to health care and more advanced presentations [7].

In keeping with the international literature, a significant difference was noted between the malignant masses and the gynaecological and general surgical complications, such as bowel resection, intra-operative bleeding, conversion to open surgery and length of admission [3,4] which highlighted the importance of structured pre-operative multidisciplinary planning. The malignant 66.7% conversion rate is due to the intraoperative difficulty of dealing with the malignant peritoneal dissemination and involvement of the internal organs that can only be treated safely by laparotomy [6,7].

The finding that bowel involvement occurred in 55.6% of patients with malignant cases is consistent with evidence that, in late ovarian malignancy, the colon or rectum serosa are often involved, which requires general surgery expertise [5]. Other local studies from tertiary centres in Pakistan have shown the same trends; surgical difficulty at presentation and length of stay disproportionately increase with the severity of disease [7,8]. Ovarian conservation rate (91.2%) and percentage of fertility-preserving surgery (93.0%) achieved in benign functional masses supported the trend of conservative management of most ovarian masses in this group in keeping with the current guidelines [11].

The high association between a high CA-125 level, bilateral distribution, ultrasonographic complex architecture and the presence of malignancy in the histopathology results highlights the importance of structured preoperative risk stratification using validated tools like the IOTA simple rules or Risk of Malignancy Index [13]. The use of these in the routine assessment protocol for all tertiary centres in Pakistan may lead to effective triage and decrease unnecessary surgical conversions [14]. A profound association with intraoperative cyst rupture (33.3%) has been shown and usage of endobags for retrieval of any specimen from an adnexal mass in which the frozen section is not diagnostic of malignancy is suggested to prevent tumour upstaging [15].

LIMITATIONS OF STUDY

However, given the nature of this observational study, causal inferences cannot be made, nor can the effect of the remaining respiratory confounding factors, including operator experience and institutional surgical capacity, be ruled out. The subjects used in the study may not reflect those younger women who present to the primary and secondary healthcare centres. Those numbers of malignant and borderline cases are small, which means that the statistical power for subgroup analysis is small. Larger, prospective and multi-center trials are proposed that involve more patients and would offer more time of follow-up for oncological survival.

CONCLUSION

The histopathology distribution of adnexal masses treated in all tertiary care centres of Pakistan is predominantly benign, and malignant or borderline histopathology status is clinically significant and is seen in a minority of cases. A strong association of malignant masses with increased incidence of gynaecological and general surgical complications and high rates of ovarian preservation and fertility-sparing surgery with benign masses. These results further confirm that emphasis on structured risk stratification prior to the surgery, multidisciplinary operative planning and routine and standardised procedure for specimen handling intraoperatively are key components to preoperatively optimize outcomes of adnexal mass surgery in resource challenged areas of Pakistan.

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