INTRODUCTION

Ovaries are a common site for both neoplastic and non-neoplastic lesions. They have extensive heterogeneity within and between histologic subtypes and the spectrum ranges from harmless simple cysts to aggressive malignant ones. Globally, ovaries are the third most common site of primary malignancy in females after cervix and endometrium. They are also the second most frequent cause of death from gynaecological cancers after cervical cancer.

Even the physical examination, ultrasound and tumor markers aren’t sufficient to differentiate neoplastic and non-neoplastic lesions. Grossly, most benign tumors of epithelial category are cystic, while the findings of necrosis, heterogeneous solid elements and papillary projections make malignancy more likely.

A thorough knowledge of the spectrum of ovarian disorders and its presentation is thus essential. The present study is undertaken to study the varying gross presentation, the histomorphological patterns and degree of differentiation for the specific diagnosis. This has tremendous significance to both pathologist and gynecologist for better understanding of the disease, its prognosis and planning proper patient management.

METHODS

This is a retrospective cross sectional study performed in the Department of Pathology at Nobel Medical College, Biratnagar, Nepal. It was conducted over a period of 2 years from April 2019 to April 2021. Surgically managed cases with ovarian masses su-
bmitted to the Pathology lab were included in the study irrespective of the surgical modality. Thus, cystectomy, oophorectomy, salpingo-oophorectomy and total abdominal hysterectomy with unilateral or bilateral salpingo-oophorectomy were included in the study.

The specimens were fixed in 10% neutral buffered formalin. Gross appearance, laterality and size were noted and representative sections taken. The tissues were processed and stained with Hematoxylin and Eosin stain as per standard protocol. The slides were then examined microscopically by Pathologists. Histologic categorisation was done according to World Health Organization (WHO 5th edition) guidelines. The variables were entered in a database and data were analysed in SPSS version 20.0

RESULTS

Out of 127 specimens with ovarian mass received in the Pathology Department, 95 (74.8%) were neoplastic with 83 (87.4%) benign, 11 (11.5%) malignant and 1 (1.1%) borderline tumors respectively. [Figure-1]

![Figure-1: Distribution of ovarian masses](image)

Figure-1: Distribution of ovarian masses

The mean age of patients was 38.1 (range: 17–77) years in benign, 47.1 (30 – 70) years in malignant, 47 years in borderline (single case) and 36.9 (21-53) years in non-neoplastic tumors. [Figure-2]

![Figure-2: Age wise frequency distribution of ovarian masses](image)

Figure-2: Age wise frequency distribution of ovarian masses

Germ cell tumors were the most common neoplasms were Germ cell tumor (49.5%) followed by epithelial (45.2%) and sex-cord stromal tumor (5.3%). Only two of the 47 (4.3%) germ cell tumors were malignant. Serous cystadenoma was the most common surface epithelial tumor followed by mucinous cystadenoma. There were 11 malignant tumors with high grade serous carcinoma being the commonest malignancy followed by mucinous carcinoma. In the non-neoplastic category, endometriotic cyst was the most common (23; 71.9%) followed by corpus luteal cyst. [Table-1]

| Category | Morphological diagnosis | ∑ |
|----------|-------------------------|---|
| Non-neoplastic | Endometriotic cyst | 23 |
| | Corpus luteal cyst | 8 |
| | Pelvic inflammatory disease | 1 |
| Germ cell | Mature cystic teratoma | 44 |
| | Struma ovarii, NOS | 1 |
| | Germ cell + yolk sac component (Malignant) | 1 |
| | SCC in mature cystic teratoma | 1 |
| | Serous cystadenoma | 21 |
| | Mucinous cystadenoma | 11 |
| | High grade serous carcinoma (Malignant) | 4 |
| | Mucinous carcinoma (Malignant) | 2 |
| | Seromucinous cystadenoma | 1 |
| | Seromucinous borderline tumor | 1 |
| | Brenner tumor | 1 |
| | Endometrioid carcinoma (Malignant) | 1 |
| | Ovarian mesonephric like adenocarcinoma (Malignant) | 1 |
| Epithelial | Adult granulosa cell tumor (Benign) | 3 |
| | Adult granulosa cell tumor (Malignant) | 1 |
| | Ovarian fibroma | 1 |

The non-neoplastic masses were predominantly cystic (93.8%) while only 2 cases out of 32 were solid-cystic. In the benign category, 60.2% of cases were solid-cystic, while 35% were cystic. Solid masses comprised only 4.8 % of the benign tumors. The malignant tumors were however predominantly solid (63.6%). One case in the malignant category was cystic and 3 were solid-cystic in nature. [Figure-3]

Taking into account the largest dimension, mean diameter of non-neoplastic, benign and malignant masses were 5.4 cm, 8.6 cm and 12.4 cm respectively. The single borderline tumor measured 12cm
in largest dimension. Only one of the 13 mucinous neoplasms were bilateral while the rest (92.3%) were unilateral. Serous tumors were however bilateral in 23.8% of cases. All the sex-cord stromal tumors were unilateral and all the seromucinous tumors were bilateral. [Figure-4]

![Figure-4: Distribution of ovarian masses by laterality](image)

**DISCUSSION**

Among the 127 cases studied, 95 (74.8%) were neoplastic and 32 (25.2%) were non-neoplastic. The incidences of non-neoplastic lesions were higher in Indian studies i.e. 51.7% and 87.3% in studies conducted by Kanthikar et al.\(^\text{10}\) and Pudasaini et al.\(^\text{11}\) respectively. Our finding is however consistent with the observation in a similar study in central Nepal\(^\text{12}\) with 24% non-neoplastic cases. Vast majority of the ovarian tumors in our study belonged to benign category with mature cystic teratoma being the predominant one. This finding is also in corroboration with other studies.\(^\text{13-15}\)

Benign tumors were also common in younger age group with the mean age being 37.5 years as opposed to the aggressive tumors which were more common in older age group. This finding is also consistent with that of other studies that showed malignant ovarian tumors more frequent in older females.\(^\text{16-18}\) Only one case of surface epithelial tumor and both the cases of malignant germ cell tumor were below 40 years of age. All the other malignant ovarian tumors comprised patients more than 40 years. Thus, our study agrees with other studies that malignant germ cell tumors frequently present in a younger population.\(^\text{19,20}\)

High grade serous carcinomas was the most common malignancy in our study that is in accordance with the results obtained by other studies.\(^\text{15,21}\) Likewise, endometriotic cyst was the most common non-neoplastic mass (71.9%) followed by corpus luteal cyst (25%). This finding also matches with that of other literatures.\(^\text{12,14}\)

The predominantly cystic lesions were non-neoplastic and the solid-cystic lesions were mostly benign germ cell tumors. Most of the predominantly solid lesions were malignant and only 2 cases in the malignant category were cystic. This is also in agreement with other studies on ovarian tumors.\(^\text{10,22-24}\)

As seen in the study by Kaur et al.\(^\text{25}\), malignant lesions had a larger mean dimension than benign and non-neoplastic lesions. However, size of the only benign seromucinous tumor and some benign mucinous tumors in our study exceeded that of malignant tumors. Similar finding of larger mucinous cystadenomas were noted by Zaman et al.\(^\text{26}\) Hence tumor dimension alone may not be of much help to distinguish benign and malignant lesions.

All the seromucinous tumors and most of the mucinous epithelial tumors, regardless of their nature were bilateral. One of the limitations is that our study had only 2 cases with seromucinous phenotype. Moreover, our study showed a significant number of serous neoplasms and all the sex-cord stromal tumors to be unilateral. Similar observations had been made before in clinical series.\(^\text{4,5,27,28}\)

**CONCLUSIONS**

Benign neoplastic lesions were the most common lesions and presented earlier than borderline and malignant lesions. Endometriotic cysts comprised the most common non-neoplastic lesions. The non-neoplastic lesions were predominantly cystic and the malignant lesions were predominantly solid.
Most of the benign lesions were solid-cystic. Most mucinous tumors and all the sex-cord stromal tumors were unilateral while the seromucinous tumor and a significant number of serous tumors were bilateral.

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