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A Descriptive Study On Correlation Between Radiological Findings With Clinic Pathological Finding In Ovarian Neoplasm In Tertiary Care Centre.

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ABSTRACT

In order to increase diagnosis accuracy, it is necessary to compare the accuracy of these newer imaging techniques to the gold standard of histopathology. When ovarian tumors are small, they can be challenging to diagnose. However, for the management of these tumors to be effective, an earlier diagnosis should be made. The aim of the study was to evaluate the degree of accuracy between the imaging and histopathological findings related to the ovarian lesions. This study was done for a period of one year from April 2023 to April 2024. A total of 30 patients who were clinically suspected to have ovarian pathology were referred to us for ultrasonography. Each patient was examined by Trans abdominal sonography / Trans vaginal sonography, MRI (Pre and Post contrast) and CT when required. Sonography could detect the origin of mass accurately in 29 (80%) masses and MRI could detect the origin accurately in 34 (93.4%) masses. Sonography characterized 27/30 (90%) masses correctly. MRI correctly characterized 28/30 (93.4%) cases and tissue content was identified correctly. The sensitivity of imaging findings for correctly identifying malignant lesions was 100% and sensitivity for correctly making a benign diagnosis was 92.5%. The specificity of imaging findings for correctly identifying malignant lesion was 92% and specificity for correctly making a benign diagnosis was 86.9 %. Because of the exceptional soft tissue contrast and organ-specific information produced in the pelvis, MRI is far superior to US in every way. The pelvic tissue contrast that MRI provides yields particular technique-based benefits. Therefore, we recommend that MR pelvic imaging be performed on all patients whose pelvic abnormality was detected on US or in whom there is a strong clinical suspicion of disease, due to its superior soft tissue resolution and multiplanar capability, which lead to higher accuracy rates.

Keywords: MRI, Sonography, Ovarian neoplasms, histopathology.

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INTRODUCTION

The ovary is a vital organ because it plays a crucial role in the introduction of progeny. The ovary is composed of mesenchymal cells and intercourse cells, which can be totipotent or multipotent, respectively. As a result, a tumour of almost any type may grow larger until it develops into a neoplasm. Even though an adult's ovaries only weigh 14 grams, they are the site of a vast array of benign and malignant tumours due to the significant range of hormonal stimulation and changes brought on by menopause and the length of the foetus. The majority of ovarian lesions are treatable and may improve without significant scientific intervention. An oversized, bothersome cystic lesion may also need surgery.

One major cause of morbidity and death for middle-aged women is ovarian cancer. Ovarian cancer ranks fifth in terms of cancer-related deaths and is the ninth most common type of cancer [1]. It is crucial to understand that the majority of adnexal masses are benign, especially in premenopausal women, despite the fact that many doctors are worried about the inability to identify an ovarian cancer. There are several ways that ovarian tumours manifest themselves. Compared to malignant tumours, which appear in the fifth decade of life, benign ovarian masses manifest at an earlier age. Age, low parity, and infertility all increase the risk of malignant ovarian masses. Since most patients' symptoms are unclear and frequently misinterpreted, they are only discovered when the disease has progressed. For this reason, ovarian cancer is frequently referred to as the "silent killer."

Ovarian cancer is the third most common gynecologic malignancy in women, after cervical and uterine cancers. Compared to breast cancer, ovarian cancer is much less common, but it has a worse prognosis and a three times higher death rate. The worldwide rate of ovarian cancer survival in the general population ranges from 30 to 40 percent. The "age-standardized" incidence and mortality rates for ovarian cancer are 6.6/100,000 and 3.9/100,000, respectively. India is said to have the second-highest ovarian cancer incidence rate in the world. Ninety percent of cases of ovarian cancer occur in menopausal women, who are typically between the ages of 55 and 64. This suggests that increased life expectancy may be a factor in the global rise in ovarian cancer rates [2, 3].

These tumours are difficult to diagnose when they are of small size. But their diagnosis should be done at an earlier stage for effective outcome of the management of these tumours. Transvaginal sonography is frequently used to better characterize an adnexal mass that was suspected using trans-abdominal ultrasound. When a mass is suspected during a bimanual examination or when a trans-abdominal ultrasound is unable to visualize the ovaries, TVS may also be carried out. Research is presently being conducted to assess TVS as a potential ovarian cancer screening method. These investigations must determine whether the higher resolution makes it possible to reliably identify postmenopausal ovaries and the alterations connected to each ovarian cancer case. According to recent studies, TVS has an extremely high sensitivity (>95%) for ovarian cancer detection in its early stages [2, 3].

Computed tomography (CT) and magnetic resonance imaging (MRI) are two newer non-invasive imaging techniques made possible by advancements in imaging technology. When adequate ultrasound imaging is impossible due to obesity, prior surgery, or an unstable bladder, CT may be helpful in the initial diagnosis of pelvic tumors. Additionally, it helps with the staging of ovarian cancers. Contrast enhancement can aid in assessing local invasion and helping to distinguish the main tumors from the uterus. When ascites is present, CT is particularly useful in identifying peritoneal seedling. Nonetheless, because ultrasonography is more accurate and less expensive than computed tomography (CT), it is typically the first imaging investigation of choice. Because CT uses X-ray radiation for imaging, it cannot be used on young patients or pregnant women [4].

It has been found that an MRI is preferable to a CT and USG scan. It is capable of correctly identifying benign adnexal lesions. Using MRI technology, benign adnexal lesions such as ovarian fibrothecomas, exophytic uterine fibroids, dermoids, and broad ligament fibroids can be accurately diagnosed. Furthermore, it can also describe the complex cystic ovarian mass [5]. Present study was carried out to study accuracy of radiological findings compared with that of histopathological findings of the ovarian neoplasms.

METHODS

All patients presenting with ovarian pathology in Sree Balaji medical college and hospital are included in this study. The consent of the patients was taken prior to the investigation. This prospective study included evaluation of 30 cases over a period of one year from April 2023 to April 2024 (30 cases). Imaging findings was correlated with post-surgical and histopathological findings as and when required. Patients with history of contrast allergic reactions, renal failure and pregnant women were excluded. The data collected from these patients will be analysed using descriptive statistic tools like proportions.

The investigation was performed with Trans abdominal scan- GE LOGIQ P10, MRI- GE SIGNA Pioneer 3T, Siemens SOMATOM go now for taking post contrast thin contiguous sections of pelvis and ovarian in the axial plane in supine position.

The following features of a mass were noted on USG like Origin, Unilocular/Multilocular, Anechoic/ Hyper echoic/ Heterogeneous, Thin wall/ Thick wall, Thin septae/ Thick septae, Solid component, Mural nodule, Calcifications, Debris, Fluid- fluid level, Vascularity, Ascites.

MR imaging of pelvis was done for patients using an MRI- GE SIGNA Pioneer 3Tmachine. Patient's position was kept supine with head first, phased array body coil was fixed to gluteal region to study the pelvis. MRI was evaluated for Origin of the lesion. Unilocular/Multilocular, T1 Hypo/ Hyper, T2 Hypo/Hyper, gradient images, stir images, Thin wall/ Thick wall, Thin septae / Thick septae, A solid mass or large solid component, Mural nodule, Calcifications, Contrast enhancement and Ascites.

RESULTS

Out of the 30 patients, 24 patients had unilateral ovarian mass while 6 had bilateral ovarian masses. On imaging findings, 23 masses were determined as benign and 13 masses were determined as malignant. Thus, it can be said that the tumours usually have unilateral location, as it is evident from the table that 80% of the tumours were unilateral. Bilaterality is very less amounting to about 20% only. Most of the tumours were benign in nature as it is evident from the table that 76.7% were benign tumours and only 22.3% were malignant tumours (Table 1).

Table 1: Distribution of cases as per laterality and type of lesion.

Characteristics		Number	%
Laterality	Unilateral	24	80
	Bilateral	6	20
Type as per imaging findings	Benign	23	76.7
	Malignant	13	22.3

In this study, the youngest patient was 18 yrs old and the eldest patient was 66 yrs old. The maximum number of patients was found in the range of 41-60 yrs, accounting for 14 patients, followed by 12 patients in 21-40 years. Thus, it can be said that the tumours are more common in the age group of 41-60 years amounting to 46.7% of the cases i.e. nearly half. 21-40 years age group was second most affected group. Younger age and old age were least affected. Only one case in the age group of 61-80 years.

The ovarian masses were diagnosed based on various ultrasound and MRI imaging characteristics. The various ovarian lesions diagnosed are simple cyst, serous cystadenomas, serous cystadenocarcinoma, cystadenofibroma, Mucinous Cystadenoma, Mucinous cystadenocarcinoma, endometrioma, cystic teratoma, fibroma, dysgerminoma, malignant germ cell tumour. Out of malignant tumours, 3 were found to have metastasis, one was malignant solid tumor, 4 were serous cystadenocarcinoma, one was with mucinous cystadenocarcinoma. Out of benign tumors, seven were Serous Cystadenoma, four were Simple Cyst, one was Cystadenofibroma, three were Mucinous Cystadenoma, two were Haemorrhagic Cyst, one was Endometriosis and three were cystic teratoma (Table 2).

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Table 2: Total number of each lesion detected in the present study.

Final diagnosis	Malignant/ benign	Number of lesions	%
Simple cyst	Benign	4	13.33
Serous cystadenoma		7	23.5
Cystadenofibroma		1	6.7
Mucinous cystadenoma		3	10
Hemorrhagic cyst		2	6.7
Endometriosis		1	3.33
Cystic teratoma		3	10
Metastasis	Malignant	3	10
Malignant solid tumour		1	3.33
Serous cystadenocarcinoma		4	13
Mucinous cystadenocarcinoma		1	3.33

Four lesions were completely missed on ultrasound were as they were picked up on MRI. MRI could detect the origin accurately in 28 (393.4 %) masses. The origin of 2 masses were not accurately detected on MRI due to non- detection of the normal ovary bilaterally and separate from the large lesion (Table 3).

Table 3: Effectiveness of imaging in comparison to histopathology findings in detecting origin of lesion.

Investigation	Total no. of lesions	Origin of lesion accurately detected	% Origin of lesion accurately detected
Sonography	30	24	80
MRI	30	28	93.4

Sonography characterized 33/36 (91.6%) masses correctly. MRI correctly characterized 34/36 (94.5%) cases. Sonography could not characterize a case of endometriotic cyst and 2 cases of cystadenofibroma, whereas the endometriotic cyst was correctly diagnosed on MRI but the 2 masses of cystadenofibroma was diagnosed as serous cystadenocarcinoma due to the presence of solid mass and thick septae within the lesion (Table 4).

Table 4: Effectiveness of imaging in comparison to histopathology findings in detecting characterization of lesion.

Investigation	Total no. of lesions	Lesions accurately characterized	% Lesions accurately characterized
Sonography	30	27	90
MRI	30	28	93.4

Out of the 30 masses, sonographically and MRI combined determined 21 masses as benign and 9 masses were determined as malignant. Imaging findings (USG and MRI) correctly diagnosed 9 malignant lesions and incorrectly classified 1 benign lesions as malignant. Of the remaining 20 benign diagnoses, imaging findings correctly characterized 23 of the lesions. The sensitivity of imaging findings for correctly identifying malignant lesions was 100% and sensitivity for correctly making a benign diagnosis was 92.5%. The specificity of imaging findings for correctly identifying malignant lesion is 92% and specificity for correctly making a benign diagnosis was 86.9% (Table 5).

Table 5: Imaging determination of benignity and malignancy of a lesion.

	Benignity (%)	Malignancy (%)
Sensitivity	92.5	100
Specificity	86.9	92

DISCUSSION

The prospective study confirms previous reports suggesting that imaging investigations (USG and MRI) is helpful in the evaluation of ovarian pathological entities. This study reveals that sonography performs comparatively poorly than MRI for determining the origin of the mass which is the first essential step in characterizing a pelvic mass. For example, large mass size and non-visualization of the adjacent normal ovary are contributing factor to an indeterminate diagnosis of origin of the lesion with ultrasonography.

Salem S et al, is of the view that sonography is commonly used to evaluate a pelvic mass [6]. Occasionally it may be impossible to determine the exact origin of the mass by sonography and MRI may be helpful. Sittig KM et al, are of the opinion that USG is useful in patients with acute abdominal pain because, it provides rapid, safe, low cost evaluation of abdominal and pelvic organs [7].

Sarti DA et al, is of the opinion that large pelvic masses can be difficult to separate on ultrasound [8]. Various masses in the pelvic may have confusing appearances on ultrasound. Jenkins PR et al, is of the view that MRI is well suited to the evaluation of the pelvis, providing high soft-tissue contrast resolution and clear anatomical depiction of the pelvic organ [9]. MRI had become invaluable in the evaluation of malignant disease within the pelvis.

Valentin L et al, says that ultrasound can be considered as first choice of imaging technique in certain conditions like tubal pregnancy etc, as well as adnexal tumors diagnosis whereas MRI should be taken as secondary test in conditions like adenomyosis etc [10].

Hricak H et al, are of the view that Gadolinium-enhanced MR imaging depicted 176 (94%) of 187 adnexal masses, with an overall accuracy for the diagnosis of malignancy of 93% [11]. Komatsu T et al, concluded from their study that "both trans vaginal US and gadolinium-enhanced MR imaging were highly sensitive in identification of solid components within an adnexal mass [12]. Gadolinium- enhanced MR imaging was specific, whereas Trans vaginal US was non-specific for adnexal lesions."

Scoutt LM et al, determined the sensitivity, specificity, predictive value, and accuracy of pelvic MRI in the prospective evaluation of women with a clinically suspected pelvic mass [13]. Magnetic resonance was 100% sensitive and 99% specific in prospectively diagnosing dermoids, 96% sensitive and 100% specific in diagnosing subserosal leiomyomas, and 92% sensitive and 91% specific in diagnosing endometrioma.

CONCLUSION

According to the study, ultrasound, which is currently the first imaging modality used in the examination of pelvic pathology, is only 80.5% accurate in identifying the tissue of origin of the lesion and is inaccurate in characterizing few ovarian lesions. Because of the exceptional soft tissue contrast and organ-specific information produced in the pelvis, MRI is far superior to US in every way. The pelvic tissue contrast that MRI provides yields particular technique-based benefits. Therefore, we recommend that MR pelvic imaging be performed on all patients whose pelvic abnormality was detected on US or in whom there is a strong clinical suspicion of disease, due to its superior soft tissue resolution and multiplanar capability, which lead to higher accuracy rates.

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