Radiopathological Correlation in Diagnosis of Adnexal Lesions: A Hospital Based Comparative Study

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ABSTRACT

Introduction: Transabdominal and transvaginal ultrasound can be used in distinguishing lesions of adnexa. Transvaginal ultrasound has higher diagnostic accuracy than transabdominal ultrasound when compared with gold standard histopathology. It also provides better resolution as compared to transabdominal ultrasound. **Aims**: To find the diagnostic accuracy and efficacy of transvaginal and transabdominal sonographic techniques in adnexal pathologies by comparing against the gold standard of biopsy. **Methods:** Hospital based cross sectional comparative study done in 108 cases who underwent transabdominal and transvaginal sonography and histopathological study post operatively. Diagnostic findings of transabdominal and transvaginal sonogram were compared with the diagnosis of histopathology. **Results:** Of total 108 cases, most cases were benign. Sensitivity, specificity, accuracy, positive predictive value and negative predictive value for transabdominal were 63.15 %, 95.5%, 89.8%, 75% and 92.3% respectively. Sensitivity, specificity, accuracy, positive predictive value and negative predictive values of transvaginal were 73.6%, 95.5%, 91.6%, 77.7% and 94.4% respectively. **Conclusion**: Transvaginal sonography has higher diagnostic accuracy as compared to transabdominal ultrasonography.

Keywords: Adnexa, Histopathology, Transabdominal ultrasound, Transvaginal ultrasound

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INTRODUCTION

Ultrasound is the initial and well recognized method of imaging for pelvic pathologies.[1] Current methods of pelvic sonography in use are transabdominal sonography (TAS) and transvaginal sonography (TVS). TAS and TVS are complementary techniques and can be used extensively in evaluation of pelvic pathologies.[2] Evaluation is often aimed at distinguishing benign from malignant masses.[3] TVS provides better anatomic detail of the individual pelvic organs. TAS gives more information in cases of large pelvic masses, gives a better overall view of the pelvis and easy to perform.[4] The main challenge to the radiologist is to differentiate benign from malignant adnexal lesions for establishing an appropriate treatment algorithm. Histological examination (HPE) post-surgery is performed for accurate diagnosis of benign or malignant lesions which is considered goldstandard.[5] This study was carried out to find accuracy and efficacy of TAS and TVS techniques in diagnosis of adnexal pathologies by comparing with histopathological diagnosis.

METHODS

This comparative study was conducted at Nepalgunj Medical College for 1 year from September 2021 to September 2022. Total 108 patients with adnexal lesions who underwent both TAS and TVS followed by post-operative histopathological examination were included in the study. All unmarried females, patients unwilling for TVS, patients having non-gynecologic pelvic diseases, very old debilitated females and who were menstruating at the time of examination were excluded. Optimally distended urinary bladder was ensured before a TAS. Uterus, adnexa and ovaries were viewed in sagittal, transverse and oblique views. Necessary images were

obtained. Transvaginal ultrasound was done after the patient had completely emptied the urinary bladder. The endovaginal transducer was sheathed in a condom into which a small amount of ultrasound gel had been placed. Scanning was done to get appropriate views of the pelvic organs. The transducer was angled during scanning to depict uterus, ovaries and adnexal regions. TVS was done with 5-7.5MHz transvaginal convex probe and transabdominal ultrasound was done with curvilinear probe of frequency 3.5MHz in General Electronics Machine P-6. Histopathology examination was carried out post operatively. A provisional radiological diagnosis was made after TAS evaluation of the lesion. TVS was also done on same patient and a provisional diagnosis was made. After the patient underwent surgical treatment, histopathological examination result which is considered gold standard was compared with the diagnosis made by TAS and TVS. IBM SPSS version 25 was used to analyze the data. Frequency table was calculated for different disease. Frequency of different diseases in different age groups was tabulated. A 2x2 table was used to calculate sensitivity, specificity, positive predictive value, negative predictive value and accuracy of TAS and TVS.

RESULTS

Total 108 cases were considered in our study that underwent TAS, TVS and histopathological examination post operatively. Age varied from 16 years to 55 years. Most benign lesions were found in age group of 21-30 years 40(37%). Most malignant lesions were found in age group of 41-50 11(10.18%) as shown in Table I.

Age Group	Benign	Malignant	Total
11-20	18	2	20
21-30	40	1	41
31-40	20	2	22
41-50	9	11	20
51-60	2	3	5
Total	89	19	108

Table I: Distribution of disease in different age groups

As shown in Table II, 92(85.15%) cases were diagnosed benign whereas 16(14.8%) were diagnosed malignant in TAS. In TVS study, 90 cases (83.3%) were diagnosed as benign whereas 18(16.6%) were diagnosed malignant. On histopathology, 89 (82.4%) cases were benign and 19(17.6%) were malignant.

	Benign	Malignant	Total
TAS	92 (85.15%)	16 (14.8%)	108 (100%)
TVS	90 (83.33%)	18 (16.6%)	108 (100%)
Histopathological	89 (82.4%)	19 (17.6%)	108 (100%)

Table II: Frequency table of benign and malignant lesions in TAS, TVS and HPE

As shown in table III, most common benign lesion to be diagnosed by TAS was mature cystic teratoma 44(40.7%) whereas malignant was dysgerminoma 8(7.4%). Similar to TAS, in TVS most common benign lesion was mature cystic teratoma 42(38.8%) whereas malignant was serous cystadenocarcinoma 6(5.55%). Two cases each (total 4) which were diagnosed as solid ovarian tumor (dysgerminoma) in TAS and TVS were found out to be subserosal fibroids and Brenner tumor in post-operative histopathological examination.

		Diagnosis of HPE	TAS	TVS
Malignant	Serous cystadenocarcinoma	6 (5.55%)	3 (2.77%)	4 (3.37%)
	Mucinous cystadenocarcinoma	5 (4.62%)	3 (2.77%)	4 (3.7%)
	Immature teratoma	4 (3.7%)	2 (1.85%)	2 (1.85%)
	Dysgerminoma	4 (3.7%)	8 (7.4%)	8 (7.4%)
Benign	Mature cystic teratoma	42 (38.8%)	44 (40.7%)	44 (40.7%)
	Serous cystadenoma	18 (16.6%)	21 (19.4%)	20 (18.5%)
	Hemorrhagic Corpus luteum cyst	12 (11.11%)	14 (12.96%)	12 (11.11%)
	Mucinous cystadenoma	5 (4.62%)	9 (8.33%)	6 (5.55%)
	Hydrosalpinx	4 (3.7%)	2 (1.85%	4 (3.7%)
	Endometriomas	4 (3.7%)	2 (1.85%	4 (3.7%)
	Brenner tumor	2 (1.85%)	0 (0%)	0 (0%)
	Subserosal fibroid	2 (1.85%)	0 (0%)	0 (0%)
	Total	108 (100%)	108 (100%)	108 (100%)

Table III: Diagnoses of adnexal masses in TAS, TVS and HPE

Different parameters like sensitivity, specificity, accuracy, positive predictive value and negative predictive values were calculated for TAS and TVS by comparing with the gold standard histopathological examination. As shown in table IV both TAS and HPE showed 12 lesions positive for malignancy and 85 lesions negative for malignancy. Seven lesions which were positive for malignancy in HPE were diagnosed benign in TAS. Four lesions which were negative for malignancy in HPE were diagnosed positive in TAS. As shown in table V, both TVS and HPE showed 14 lesions positive for malignancy and 85 lesions negative for malignancy. Five lesions which were positive for malignancy in HPE were diagnosed benign in TVS. Four lesions which were negative for malignancy in HPE were diagnosed positive in TAS.

	HPE positive for malignancy	HPE negative for malignancy	Total
TAS positive for malignancy	12 (11.11%)	4 (3.07%)	16 (14.81%)
TAS negative for malignancy	7 (6.48%)	85 (78.7%)	92 (85.15%)
Total	19 (17.6%)	89 (82.4%)	108 (100%)

Table IV: Comparison of diagnosis of TAS with HPE

	HPE positive for malignancy	HPE negative for malignancy	Total
TVS positive for malignancy	14 (12.96%)	4 (3.71%)	18 (16.67%)
TVS negative for malignancy	5 (4.63%)	85 (78.7%)	90 (83.33%)
Total	19 (17.59%)	89 (82.4%)	108 (100%)

Table V: Comparison of diagnosis of TVS with HPE

As shown in table VI, sensitivity, accuracy, positive predictive value and negative predictive value for TAS were 63.15 %, 89.8%, 75% and 92.3% respectively. Higher percentage of sensitivity, accuracy, positive predictive value and negative predictive values as compared to TAS were found in TVS being 73.6%, 91.6%, 77.7% and 94.4% respectively. Both TAS and TVS has similar specificity of 95.5%.

	TAS	TVS
Sensitivity %	63.15	73.6
Specificity %	95.5	95.5
Accuracy %	89.8	91.66
Positive predictive value(PPV) %	75	77.77
Negative predictive value(NPV) %	92.3	94.44

Table VI: Test performance characteristics of TAS and TVS for diagnosis of benign and malignant adnexal lesions

Figure: 1(A)

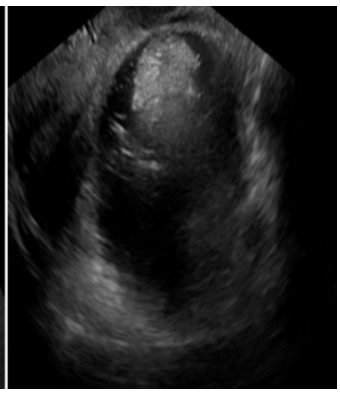


Figure: 1(B)

Figure: 1(C)

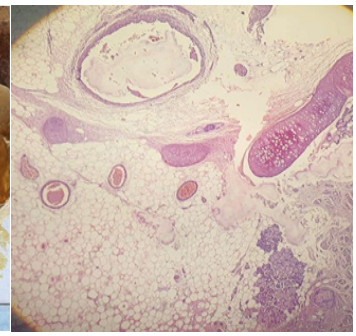


Figure: 1(D)

Figure 1: A, B, C, D: TAS, TVS, gross specimen photograph and photomicrograph of mature cystic teratoma (10 x)

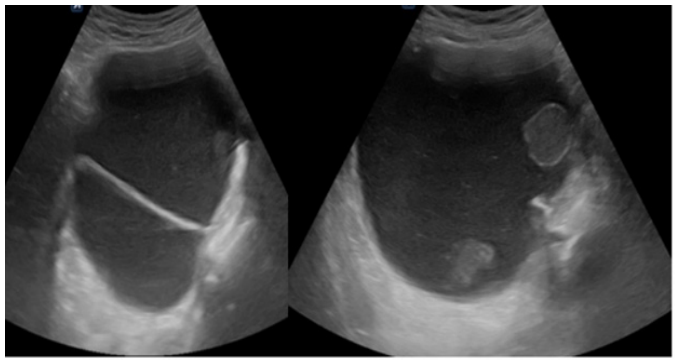
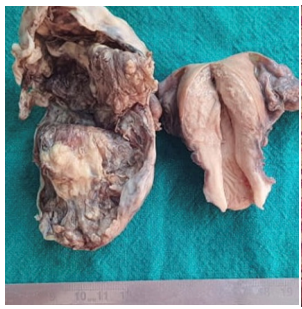


Figure : 2(A)

Figure: 2(B)



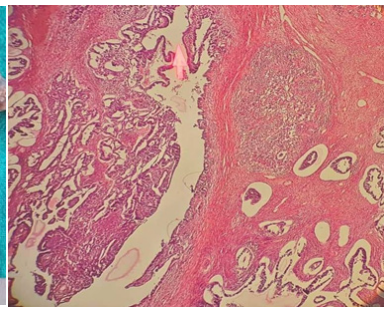


Figure: 2(C)

Figure: 2(D)

Figure 2: A,B,C,D: TAS, TVS, gross specimen photograph and photomicrograph of serous cystadenocarcinoma (10 x)

DISCUSSION

Age range in our study was 16 to 55 years. Very young patients were not in our study as we excluded unmarried females in whom TVS could not be done. Study by Debbarma T et al had wide range of age variation in their study ranging from 9 to 84 years. Similar to our study, their study also showed serous cystadenocarcinoma to be the most common malignant tumor in ultrasound as well as in histopathological studies (38.3%). In our study, mature cystic teratoma was the most common benign lesion in both ultrasound and histopathology. Their study showed serous cystadenoma as the most common benign lesion (31.2%).[6]

Sultana N et al in their study showed high sensitivity and negative predictive values (100%, and 100%) for TAS for distinguishing benign and malignant lesions as compared to our study (63.15% and 92.3%). However, lower specificity and positive predictive values (54% and 58.8%) were recorded as compared to our study (95.5% and 75%).[7] Their study did not include TVS.

According to Abbas TR et al, TAS had a sensitivity of 77%, specificity of 86.8%, and PPV of 85.3% and NPV of 81.9%.[8] Sensitivity was higher than our study whereas specificity, PPV and NPV were lower as compared to our study.

Khan S. in his study found higher accuracy of TVS (100%) when compared with peroperative findings. Our study had lower accuracy for TVS (91.66%) as compared to his study.[9]

In the study by, Bhagde et al, patient ages ranged from 19 to 58 which were similar to ours. Most common adnexal masses on HPE diagnosis were mucinous cystadenoma (20%). No malignant lesion found in their study. However, our study showed multiple malignant lesions and mature cystic teratoma was the most common diagnosis.[10]

In the study by Das MJ et al, sensitivity and specificity of ultrasonography was 86.67% and 96.65% respectively which was similar to the finding in our study. Serous cystadenoma was the most common benign tumor (49.89%) and serous cystadenocarcinoma was the most common malignant tumor (50%).[11] Radhamani S et al and Timmerman D et al also found sensitivity of TVS to be 87.5% and 93% respectively which was similar to our findings.[12,13]

LIMITATIONS

Only cases that underwent histopathological examination post operatively were considered in this study. The values of accuracy may be different for the lesion that did not undergo histopathological examination. Our study had small sample size. Thus, further clinical studies with higher sample sizes are required.

CONCLUSION

Transvaginal sonography is superior to transabdominal sonography in differentiating benign and malignant nature of adnexal lesions as well in diagnosing them as it has higher sensitivity, accuracy, positive predictive value and negative predictive values as compared to transabdominal sonography. Thus, whenever possible TVS should be considered as an investigating tool in diagnosis of adnexal pathologies.

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