

## To Evaluate Role of Transvaginal Sonography over Transabdominal Sonography in Delineating Adnexal Masses

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### Abstract

To compare and find diagnostic accuracy of Transvaginal sonography (TVS) over Transabdominal sonography (TAS) in evaluation of adnexal lesions. A cross sectional comparative study of 50 patients including both pre and postmenopausal women who were clinically suspected to have adnexal mass were scanned on Logiq GE C5 Premium ultrasonography unit. TAS was performed with 3.5MHz electronic macro convex probe followed by TVS with 6.5 MHz end firing electronic TVS probe. TVS was found to be superior in diagnosing adnexal lesions. In comparison with TAS, TVS diagnosed benign cystic teratomas (100% versus 40%), endometriomas (90% versus 57.1%), haemorrhagic ovarian cysts (85.7% versus 50%), hydrosalpinx (75% versus 25%), pyosalpinx/tubo-ovarian mass (75% versus 75%), and ectopic pregnancy (100% versus 77.7%). In our study ovarian cancers were better detected by TAS due to their large size. TVS was found to be superior in diagnosing adnexal masses as compared to TAS with more accurate delineation of internal architectural features as wall thickness and complexity, nodules, septae, papillary projections, internal echoes thereby narrowing the differentials.

### Keywords

Adnexa, cyst, echogenicity, transabdominal sonography, TAS, TVS.

### Introduction

Adnexal masses present a special diagnostic challenge in part because benign adnexal masses greatly outnumber malignant ones. Transabdominal and transvaginal ultrasonography made characterization of the internal structure of the mass (i.e. wall complexity, mass contents) possible. These findings can help determine whether a mass appears more consistent with a physiologic cyst or neoplastic process.(1) The most commonly performed test to evaluate an adnexal mass is TAS or TVS.(2, 3) TVS and MRI being Gold Standard in evaluating adnexal masses.(4) Ultrasonography is a primary imaging modality for evaluating ovarian masses.(5) CT is not significantly superior to other modalities in characterization of ovarian cancer and simple ovarian cysts are better evaluated on TAS.(6,7) Predicting the nature of an adnexal mass is essential regarding counselling, clinical management and surgical planning in such patients.(2) Pattern recognition can

accurately diagnose the majority of the benign masses and malignancies (8). The transabdominal approach visualizes the entire pelvis and gives a global overview, limitation being obese patients, or patients with a retroverted uterus. Because of the proximity of the transducer to the uterus and adnexa, TVS allows the use of higher frequency transducers, producing much better resolution, which provides better image quality and anatomic detail. However, because of the higher frequencies, the field of view (FOV) is limited, which is the major disadvantage of the TVS technique.(9,10) TVS better distinguishes adnexal masses from bowel loops and provides greater detail of the internal characteristics of a pelvic mass, the specificity comparable with MRI.(11) Because TVS allows for the earlier identification of an intrauterine pregnancy, it significantly increases the accuracy in diagnosing the patients with suspected ectopic gestation.(12) TVS has been touted

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as a primary screening method for detection of ovarian cancer and in polycystic ovaries.(13,14) Both TAS and TVS are useful in assessing patients with PID. The transabdominal approach is helpful in assessing the extent of disease, whereas the TVS is sensitive to detect dilated tubes, periovarian inflammatory changes and the internal characteristics of tubo- ovarian abscesses.(15,16) In view of limited success in using TVS to identify postmenopausal ovaries and to detect sizeable adnexal masses that are outside the limited field of view of the TVS transducer, the potential limitations of this technique in the evaluation of the ovary should not be overlooked.(17) The primary aim of this study was to compare TVS with TAS in the evaluation of adnexal masses.

### Material and Methods

A cross sectional comparative study of 50 patients including both pre and postmenopausal women who were clinically suspected to have adnexal mass was conducted in the Department of Radio-Diagnosis and Imaging in co-ordination with the Department of Obstetrics and Gynaecology at Acharya Shri Chander College of Medical Sciences and Hospital, Sidhra Jammu. All the patients were scanned on Logiq GE C5 Premium ultrasonography unit. TAS was performed with 3.5MHz electronic macro convex probe followed by TVS with 6.5 MHz end firing electronic TVS probe. Fortrans abdominal scanning systematic study of the pelvis was done in both sagittal and transverse planes. For TVS scanning patient was placed in a dorsal position (knees flexed partly and feet flat apart on the table approximately a shoulder width apart). The probe is swept antero-posteriorly to visualize the cervix, body and fundus of the uterus. Then the probe is angled laterally out to cornua and broad ligament. Once this region is identified, the ovary is found by slowly sweeping the beam anteriorly and posteriorly. At the end of examination the TVS scans were compared with TAS scans and collected data was analyzed using appropriate statistical methods.

### Results

TAS and TVS evaluation of 50 patients with adnexal masses were enrolled in the study. The results are enumerated in Table 1 to 12.

### Discussion

The present study was conducted on 50 patients with clinical suspicion of adnexal masses. Detection and characterization of various adnexal lesions was made by TAS and TVS imaging. We had patients age ranging from 18 to 65 years. Maximum patients with benign pathology were younger than 40 years whereas malignant

**Table 1. Distribution of Patients By Age (N=50)**

AGE GROUP ( IN YEARS)	NO. OF PATIENTS (n=50)		
	Benign lesions (N=46)	Malignant lesions (N=4)	Total patients (N=50)
11-20	2	1	3
21-30	23	-	23
31-40	14	-	14
41-50	5	1	6
51-60	2	2	4
>60	1	-	1
Total	46	4	50

pathology was more common over 50 years of age, indicating significance of menopausal history in predicting malignant adnexal pathology.(18) Thick walled lesions with mural nodules having vascularity along with ascites and on USG favoured malignancy whereas well defined thin walled lesions without mural nodules and ascites were likely to be benign. Common adnexal pathologies were endometriomas, haemorrhagic ovarian cyst (HOC), ectopic pregnancy, PID and ovarian tumours with commonest symptom in endometrioma/HOC being dysmenorrhoea and in ectopic pregnancy being menstrual irregularities. Thick wall, internal septae, internal echoes, were seen better on TVS in comparison to TAS due to close proximity of high frequency TVS probe to adnexa. In our study endometriomas (18.8%) constituted the most lesions followed by benign cystic teratomas (16.9%) and haemorrhagic ovarian cysts (13.2%). Endometriomas appear complex cysts, either unilocular or multilocular that have ground glass appearance due to internal echoes, thicker walls and presence of echogenic foci in wall. In our study of 10 cases of endometriomas low-level homogenous internal echoes, thick wall and hyperechoic foci in their walls, all better appreciated on TVS (9,8,4 cases respectively) in comparison to TAS. 19 HOC are usually thin walled, well defined, round predominantly hypoechoic lesions with internal lace like reticular echoes due to retracted clots with least noticeable acoustic enhancement and no definite internal

**Table 2. Distribution of Clinical Features In Patients of Common Adnexal Pathology**

CLINICAL FEATURES	NO. OF PATIENTS (n=50) (PERCENTAGE)			
	endometriosis/HOC (n=17)	ectopic pregnancy(n=4)	PID (n=8)	ovarian tumors (n=19)
1. Pain lower abdomen	5(29.4%)	4(100%)	6(75%)	4 (21%)
2. Asymptomatic	6(35.2%)	-	1(12.5%)	3(15.7%)
3. Dysmenorrhoea	8(47%)	-	4(50%)	1(5.2%)
4. Mass per abdomen	-	-	-	6(31.5%)
5. Menstrual irregularities	3(17.6%)	3(75%)	-	1 (5.2%)
6. Abdominal discomfort	2(11.7%)	-	1(12.5%)	3 (15.7%)
7. Discharge p/v	-	1(25%)	7(87.5%)	-
8. Fever	-	-	3(37.5%)	-
9. Infertility	3(17.6%)	-	3(37.5%)	-

**Table 3. Comparison of Sonographic Features of Adnexal Lesion on Transabdominal and Tvssonography**

USG Feature	On TAS	On TVS
1. Thick wall	26	30
2. Septae	8	13
3. Internal echoes	11	25
4. Fat	6	8
5. Calcification	2	6
6. Acoustic enhancement	20	20
7. Mucosal projections	0	4
8. Dermoid mesh	0	3

vascularity. In our study, 7 HOC cases one showed irregular wall on TVS whereas all were smooth walled on TAS, TVS thus showing better wall complexity, Internal echoes were not visualized on TAS whereas they were seen on TVS. Fibrin strands/ thin septae were seen in more lesions on TVS (6 out of 7 cases) as compared to TAS.19 In our study 4 cases of ectopic

pregnancy were included with evidence of gestational sac, fetal pole, and cardiac activity seen in more number of cases on TVS (3,4,1 cases respectively) as compared to TAS due to higher resolution of TVS imaging.20 8 PID patients were included in our study. Tubular anechoic structure with incomplete septae, showing waist sign and separate from ovaries is likely hydrosalpinx, pus

**Table 4. Distribution of Various Adnexal Pathologies (N=53)**

<b>PATHOLOGY</b>	<b>NO. OF LESIONS (n=53)</b>	<b>PERCENTAGE (%)</b>
1. Endometrioma	10	18.8
2. Benign cystic teratoma	9	16.9
3. Haemorrhagic ovarian cyst	7	13.2
4. Benign ovarian epithelial tumors	6	11.3
5. Malignant tumors	4	7
6. Simple ovarian cyst	4	7
7. Hydrosalpinx	4	7
8. Pyosalpinx / TOA	4	7
9. Ectopic pregnancy	4	7
10. Parovarian cyst	1	1.8

**Table 5. Various Sonographic Features of Endometriomas on Tas and Tvs (N= 10)**

<b>USG Feature</b>	<b>On TAS</b>	<b>On TVS (%)</b>
1. Thick wall	8	8 (80%)
2. Septae	-	2(20%)
3. Internal echoes	3	9(90%)
4. Echogenic foci in walls	2	4(40%)
5. Acoustic enhancement	2	2(20%)

**Table 6: Various Sonographic Features Of Haemorrhagic Ovarian Cyst On Tas And Tvs (N= 7)**

<b>USG Feature</b>	<b>On TAS</b>	<b>On TVS (%)</b>
1. Acoustic enhancement	7	6(85.7%)
2. Smooth wall	7	6(85.7%)
3. Irregular wall	-	1(14.2%)
4. Internal echoes	-	4(57.1%)
5. Septae /fibrin strands	5	6(85.7%)
6. Retracted clot	3	3(42.8%)

formation in it with appearance of echoes forming pyosalpinx in PID patients. Other USG findings in these patients were b tubo ovarian complex and fluid in culde

sac. In our study of 8 PID patients with, tubo-ovarian complex, hydrosalpinx, incomplete septae, cogwheel sign, internal echoes and fluid in cul de sac were better seen

**Table 7. Sonographic Features of Ectopic Pregnancy (N=4)**

USG Feature	On TAS	On TVS (%)
1. Foetal products	2	4(100%)
2. Gestational sac	1	3(75%)
3. Cardiac activity	-	1(25%)
4. Complex adnexal mass	1	2(50%)
5. Fluid in cul-de-sac	1	1(25%)

**Table 8. Various Sonographic Features of Pid On Tas And Tvs (N= 8)**

USG Feature	On TAS	On TVS (%)
1. Thick walls	4	4 (50%)
2. Incomplete septae	1	5(62.5%)
3. Hydrosalpinx	1	3(37.5%)
4. Cog-wheel sign	1	4(50%)
5. Internal echoes	-	4(50%)
6. Tubo-ovarian Complex	1	2(25%)
7. Cul-de-sac fluid	3	4(50%)

**Table 9. Various Sonographic Features of Benign Cystic Teratomas On Tas and Tvs (N=9)**

Findings	TAS	TVS
1. Dermoid plug	6 (66.6%)	8 (88.8%)
2. Fat	6 (66.6%)	8 (88.8%)
3. Calcification	1 (11.1%)	4 (44.4%)
4. Dermoid mesh	-	3 (33.3%)
5. Fat-fluid level	-	1(11.1%)
6. Mobile spherical echogenic structures	1 (11.1%)	1 (11.1%)

on TVS (2,3,5,4,4 and 4 cases respectively) as compared to TAS, thick walls were equally appreciated on both TAS and TVS showing TVS was far better in diagnosing patients with PID as compared to TAS. Demoids are

usually easily recognised on ultrasonography. Usually hyperechoic with distal acoustic shadowing. Calcification is often due to bone or tooth. Other features being presence of hyperechoic mesh and fat. In our study all

**Table 10. Comparative Features of Benign and Malignant Ovarian Neoplasms**

Features	Benign (n=15)	Malignant (n=4)
1. Fat	8 (53.3%)	-
2. Thick irregular wall	5 (33.3%)	4 (100%)
3. Calcification	4 (26.6%)	2 (50%)
4. Papillary projections	1 (6.6%)	2 (50%)
5. Thick septae	-	3 (75%)
6. Mural nodule	-	2 (50%)
7. Free fluid in peritoneum	-	3 (75%)

**Table 11. Comparison of Tas and Tvs In Diagnosing Adnexal Lesions**

CONDITION	TAS	TVS	FINAL DIAGNOSIS
1. Endometrioma	4	9	10
2. Haemorrhagic ovarian cyst	4	6	7
3. Simple ovarian cyst	4	4	4
4. Hydrosalpinx	2	3	4
5. Tubo-ovarian abscess/Pyosalpinx	1	3	4
6. Ectopic pregnancy	3	4	4
7. Parovarian cyst	-	1	1
8. Benign cystic teratoma	9	9	9
9. Malignant teratoma	-	-	1
10. Serous cystadenoma	4	3	4
11. Mucinous cystadenoma	2	1	2
12. Serous cystadenocarcinoma	2	2	2
13. Endometrioid tumour	-	1	1
Total	33	46	53

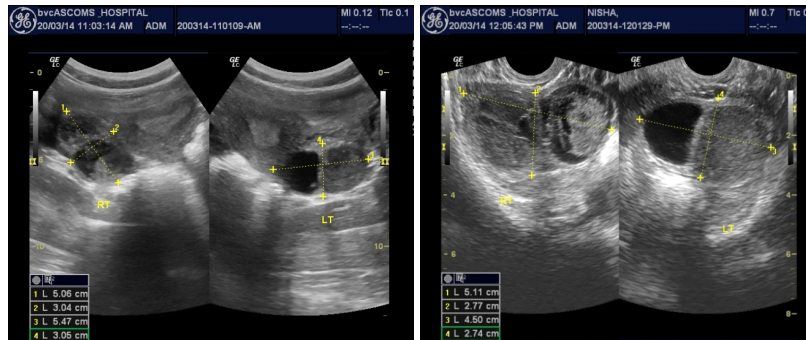
cystic teratomas were detected on TVS, whereas only 77.7% were detected on TAS. Dermoid plug, fat, fat-fluid level, dermoid mesh, calcification were seen in more

number of cases on TVS than on TAS. Mobile spherical echogenic structures were seen equally on TAS and TVS. In our study we found that TVS was better than TAS in characterising 36 lesions by giving additional information

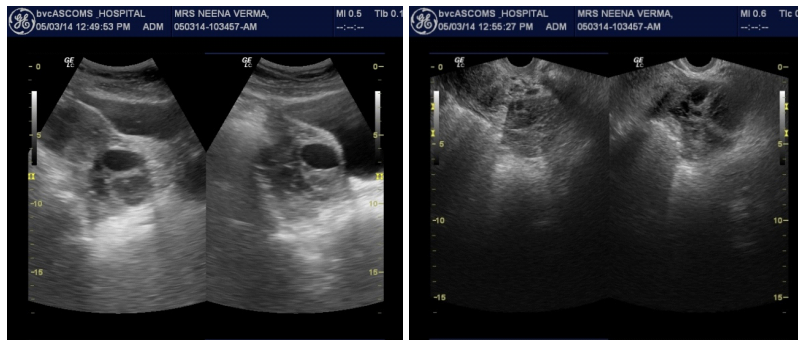
**Table 12: Comparison Of Tas And Tvs In Lesion Detection And Characterization (N=53)**

COMPPARISON	NO. OF LESIONS	PERCENTAGE
TVS>TAS	36	67.9%
TVS=TAS	14	26.4%
TVS<TAS	3	5.7%

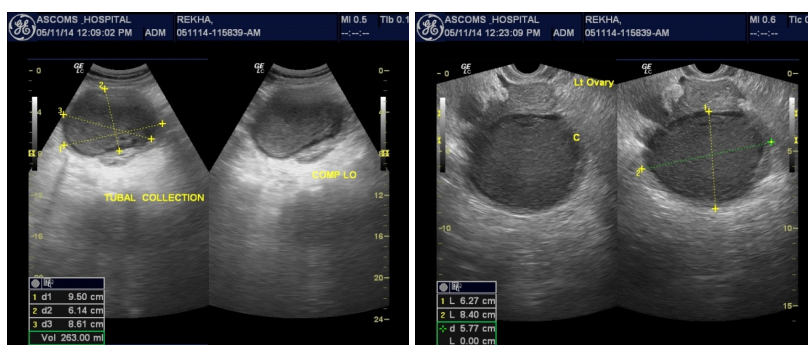
**Fig 1. TAS and TVS of a 34 year old female presented with dysmenorrhoea is showing bilateral complex cysts with internal echoes and solid component.**



**Fig 2. TAS and TVS of patient revealing cystic lesion with diffuse internal echoes and echogenic foci in wall suggesting Endometrioma**



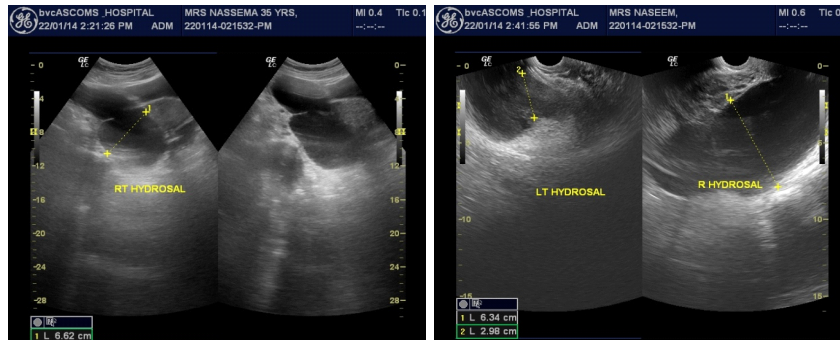
**Fig 3. TAS and TVS image of tubo-ovarian abscess**



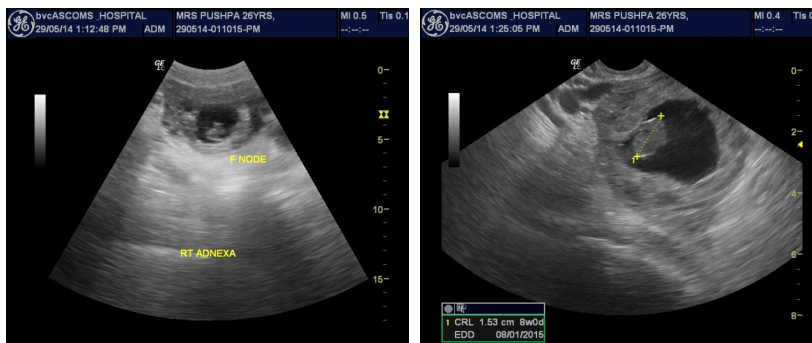
needed for diagnosis. TVS and TAS showed equal findings and had equal diagnostic value in 14 of lesions

whereas TAS was better in 3 lesions due to their large size as they were not completely accessible on TVS.

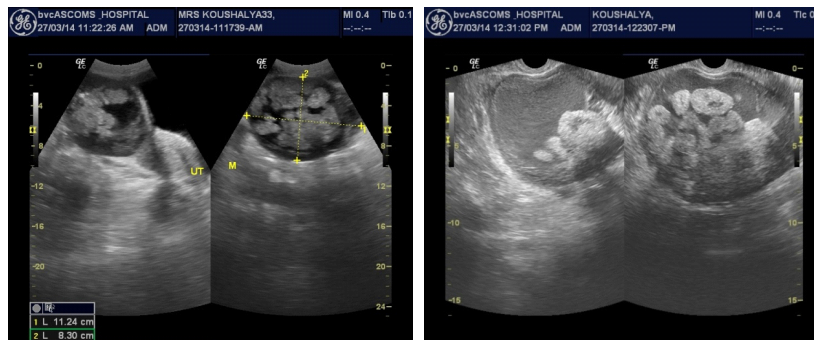
**Fig 4. TAS and TVS images of hydrosalpinx**



**Fig 5. TAS and TVS image of foetal node with measurable CRL and cardiac activity suggesting ectopic pregnancy**



**Fig 6. TAS and TVS image with mobile spherical echogenic structures in benign cystic teratoma**



Conclusion: TVS was found to be superior in diagnosing adnexal masses as compared to TAS, with more accurate delineation of internal architectural features as wall thickness and complexity, nodules, septae, papillary projections, internal echoes thereby limiting the differentials.

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