



**A CROSS SECTIONAL ANALYTIC STUDY TO COMPARE TRANSVAGINAL AND
TRANSABDOMINAL ULTRASOUND IN THE DIAGNOSIS OF ECTOPIC PREGNANCY**

Vivek Kumar Garg¹, Manjula Sharma^{2*} and Varun Kapoor³

¹Department of Radiodiagnosis, NSCB Zonal Hospital Mandi, Himachal Pradesh, India.

²Medical Officer, Civil Hospital, Sundernagar, Himachal Pradesh, India.

³Department of Gynaecology, NSCB Zonal Hospital Mandi, Himachal Pradesh, India.

***Corresponding Author: Manjula Sharma**

Medical Officer, Civil Hospital, Sundernagar, Himachal Pradesh, India.

Article Received on 05/12/2021

Article Revised on 25/12/2021

Article Accepted on 15/01/2022

ABSTRACT

Objective: To compare transvaginal and transabdominal ultrasound in the diagnosis of ectopic pregnancy.

Methods: This cross-sectional study was a prospective study on 35 pregnant patients, conducted for a duration of nine months, from March 2021 to November 2021. All women with suspicion of ectopic pregnancy were evaluated by both transabdominal and transvaginal sonography. Diagnosis made on transabdominal or transvaginal sonography ultrasound was later confirmed by histopathology. **Results:** Ultrasonographic findings of ectopic pregnancy were seen, including presence of extra uterine gestational sac or complex mass 94.2 %, absence of gestational sac in uterus 85.7%, fluid in the pouch of Douglas 65.7%, endometrial thickness > 10mm in 48.57% enlargement of uterus 28.57%. More than one finding was seen in several patients. Most common age group with pelvic masses was between 26-30 years. The study result revealed that sensitivity of transabdominal and transvaginal ultrasonography was 80.95% and 95.65% respectively. Specificity of transabdominal & transvaginal ultrasonography was 83.33% & 92.85%. Diagnostic accuracy of transabdominal ultrasonography was 91.43% and transvaginal ultrasonography was 85.71%. **Conclusion:** Transvaginal ultrasonography is superior to transabdominal ultrasonography for early detection of ectopic pregnancy.

KEYWORDS: Ectopic pregnancy, transabdominal ultrasound, transvaginal ultrasound.

INTRODUCTION

Ectopic pregnancy accounts for approximately 2% of all reported pregnancies.^[1] The main risk factors for ectopic pregnancy includes prior history of ectopic pregnancy, history of pelvic inflammatory disease, history of gynecological surgery, infertility, use of intrauterine device, history of placenta previa, use of invitro fertilization, congenital uterine anomalies, history of smoking, endometriosis and exposure to diethylstilbesterol. Prompt diagnosis and vigorous management is warranted to reduce maternal mortality in ectopic pregnancy. Diagnosis of ectopic pregnancy depends upon clinical features, TVS-USG and doubling time of β -hCG levels.^[2] As the size of ectopic pregnancy increases, chances of its rupture also increase. Ectopic pregnancy presents with variable signs and symptoms and management of ectopic pregnancy can be surgical, medical and expectant depending upon age, history of risk factors and status of contralateral fallopian tube. In recent years, mortality from ectopic pregnancy has decreased substantially due to advancement in ultrasound imaging, earlier sonographic imaging and diagnosis, more responsive hCG tests, and improved laparoscopy and methotrexate (MTX) therapy, as well as increased diagnostic knowledge among clinicians and patients.

Ultrasound has become an important tool in the diagnosis of suspected ectopic pregnancy.^[3] Ultrasonography is a cheap, widely available, simple, rapid and noninvasive diagnostic modality for fast detection, presence and location of pregnancy. A prompt ultrasound scan is an integral part of management of ectopic pregnancy. Vast majority of ectopic gestational sacs, about 95 -99% are located in fallopian tubes.^[4] The differential diagnosis for pelvic pain in early pregnancy includes early pregnancy failure, normal intrauterine pregnancy, salpingitis, torsion or rupture of the ovarian cyst, bleeding corpus luteum, endometriosis, appendicitis, gastroenteritis, diverticulitis, diseases affecting urinary tract. Laparoscopy is still considered as the gold standard test for the diagnosis of ectopic pregnancy.^[5] Diagnosis is confirmed by the direct visualisation of ectopic gestational sac with subsequent visualisation of chorionic villi on histopathological evaluation. Still laparoscopic evaluation doesn't confer 100% specificity for the ectopic pregnancy^[6], as few of the ectopics are too small to detect on laparoscopic evaluation. Ultrasound beside detecting ectopic gestational sac, irrespective of its size can also simultaneously look for intrauterine pregnancy, because 70% to 90% of patients presenting with pelvic pain

and/or vaginal bleeding in the first trimester will ultimately be diagnosed as having an intrauterine pregnancy. On ultrasound findings of an ectopic pregnancy are: an empty uterine cavity or no evidence of an intrauterine pregnancy, decidual cast, increased endometrial thickness(>10mm), Visualization of an

extrauterine gestational sac containing a yolk sac or an embryo (fig. 1) with or without a heartbeat, with a tubal ring sign and “ring of fire” (fig. 3) sign on colour doppler. free pelvic fluid or hemoperitoneum in the pouch of Douglas.

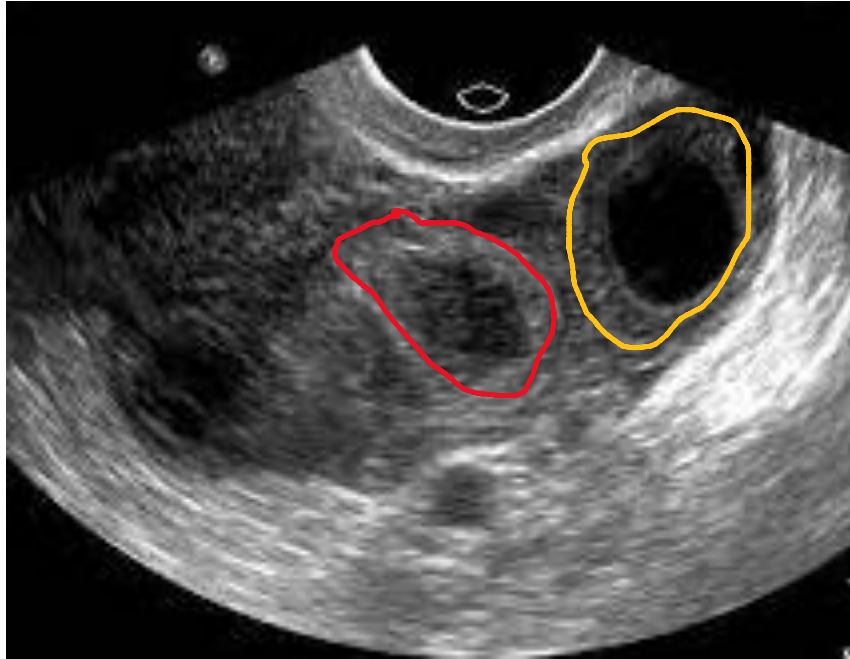


Figure 1: Transabdominal scan of pelvic region showing a complex solid cystic lesion in the left adnexa(red marking), visualised separately from left ovary(yellow marking). After laparoscopy, resected adnexal mass is seen as distension of tube with thin or ruptured wall, dusky red serosa and hematosalpinx, possibly with fetal parts identified. On histopathological evaluation of resected section, following histological features are noted: intraluminal chorionic villi and extra-villous trophoblast, necrosis with blood clots (fig. 2), decidual alteration in the lamina propria in one-third of the cases; reactive mesothelial proliferation with papillary development and psammoma bodies.

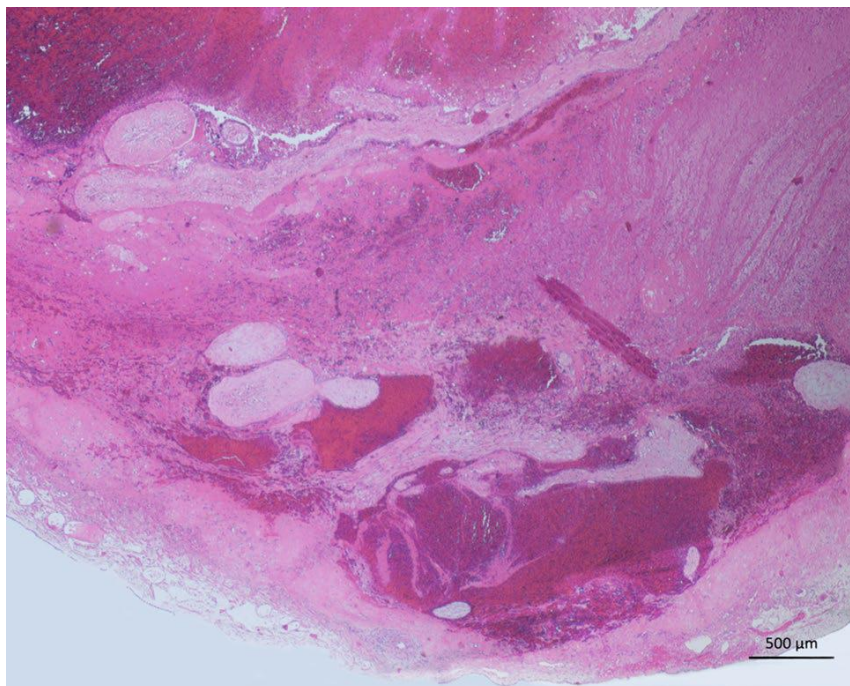


Figure2: Histopathological image showing blood clots with necrosis and degenerated chorionic villi.



Figure 3: TVS-USG showing right adnexal mass with “ring of fire” sign on colour Doppler.

Abdominal ultrasonographic accuracy can be affected by multiple factors such as obesity, insufficient filling of bladder and obscuration of pelvic structures by bowel gas. All these problems can overcome by the use of vaginal ultrasonography because the transducer is closer to pelvic organs than it is with the abdominal method. In addition, improved resolution may be achieved by using higher frequency transducer.^[7] Although TVS is much more sensitive than transabdominal sonography, most experts recommend that scanning begin with transabdominal pelvic ultrasound followed by a transvaginal ultrasound.

MATERIALS AND METHODS

This cross sectional prospective study was done in NSCB Zonal Hospital Mandi to compare transvaginal and transabdominal ultrasound in the evaluation of ectopic pregnancy. This was a 9 months study spanning between March 2021 to November 2021. 35 pregnant patients with a suspicion of ectopic pregnancy were included in this study. All the transvaginal and transabdominal scans were performed using Siemens Accuson unit. All women with suspicion of ectopic pregnancy were evaluated by both transabdominal and transvaginal sonography and was confirmed by histopathology. Inclusion criteria were all clinically suspicion of ectopic pregnancy, pelvic or lower abdominal pain, vaginal bleeding, positive pregnancy test & Raised serum beta HCG level. Exclusion criteria were above 40 years of age, known gynaecological malignancy & known urogenital anomalies. Ethical clearance was obtained from the institution. Whole procedure was explained to the patient prior to the

beginning of ultrasound examination and consent was obtained from them. A female attendant was always present with patient during ultrasound examination. Transabdominal scan with full bladder was performed using 3-5 MHz convex probe and whenever needed transvaginal scan using 5-11 MHz probe frequency with empty bladder. Patient was asked to lie down comfortably in a supine position. Transabdominal probe was placed in the suprapubic area over the bladder and was caudally angled to obtain longitudinal section of uterus, cervix and vagina. Then the orientation was changed to transverse section by angling the probe. While doing so, vaginal walls, cervix and body of uterus were studied. For transvaginal scan, the patient was placed in the lithotomy position after having emptied her bladder. Transvaginal probe was covered with sterile latex condom and secured by a rubber band in order to prevent cross-contamination. Before the condom was pulled over the shaft of the probe, a small amount of acoustic gel was inserted inside the tip of the condom. Further to facilitate the probe insertion, it was coated with the acoustic gel. The transducer was inserted into the vagina. Initially, a longitudinal scan was done followed by transverse scan. A standard format comprising uterus size, echotexture, endometrial thickness, contour, presence of associated abnormalities, right and left ovaries and presence or absence of fluid in pouch of Douglas was used with each patient.

Statistical analysis: Statistical analysis was performed using IBM SPSS 20 for Windows. Sensitivity, specificity, NPV, PPV and accuracy were determined for individual findings and for the final diagnosis.

RESULTS

Table 1 illustrates the distribution of age in the study group with percentage relative to the group. Most of our patients were in 26-30 age group.

Table 1: Age distribution in study group.

AGE	Number	Percentage
21-25	12	34.2
26-30	19	54.2
31-35	4	11.4

Table 2 shows the distribution of parity in the study group.

Table 2: Parity distribution in the group.

PARITY	Number	Percentage
Nullipara	14	40
1-3	18	51.4
4-6	3	8.5

Table 3 shows USG findings in the group:

Table 3: Ultrasound findings in the group.

FINDINGS	Number	Percentage
Presence of extrauterine gestational sac/ complex solid cystic adnexal mass	33	94.2%
No intrauterine gestational sac	30	85.7%
Free fluid in pouch of Douglas	23	65.7%
Endometrial thickness > 10mm	17	48.57%
Enlarged uterus	10	28.57%

Table 4 shows statistical correlation between TVS findings and histopathological findings.

Table 4: Statistical correlation between TVS findings and histopathological findings.

TVS FINDINGS SUGGESTIVE OF ECTOPIC GESTATIONAL SAC ↓	HISTOPATHOLOGICAL FINDINGS SUGGESTIVE OF ECTOPIC GESTATIONAL SAC ↓	
	YES	NO
YES	22	2
NO	1	11

Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and diagnostic accuracy for transvaginal ultrasound were 95.65%, 83.33%, 91.67%, 90.91% and 91.43% respectively when compared with the gold standard test of Histopathological correlation.

Table 5 shows the statistical correlation between transabdominal findings and histopathological findings in case of ectopic pregnancy. Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and diagnostic accuracy for transabdominal ultrasound were 80.95%, 92.85%, 94.44%, 76.47% and 85.71% respectively when compared with the gold standard test of Histopathological correlation.

Ultrasonographic findings of ectopic pregnancy were seen, including presence of extra uterine gestational sac or complex mass 94.2%, absence of gestational sac in

uterus 85.7%, fluid in the pouch of Douglas 65.7%, endometrial thickness > 10mm in 48.57% enlargement of uterus 28.57%. More than one finding was seen in several patients. Most common age group with pelvic masses was between 26-30 years. The study result revealed that sensitivity of transabdominal and transvaginal ultrasonography was 80.95% and 95.65% respectively. Specificity of transabdominal & transvaginal ultrasonography was 83.33% & 92.85%. Diagnostic accuracy of transabdominal ultrasonography was 91.43% and transvaginal ultrasonography was 85.71%.

Table 5: Statistical correlation between transabdominal findings and histopathological findings.

TRANSABDOMINAL FINDINGS SUGGESTIVE OF ECTOPIC GESTATIONAL SAC ↓	HISTOPATHOLOGICAL FINDINGS SUGGESTIVE OF ECTOPIC GESTATIONAL SAC ↓	
	YES	NO
YES	17	1
NO	4	13

DISCUSSION

Ectopic pregnancy is an important cause of maternal mortality and morbidity in early antenatal period. Unruptured ectopic pregnancy sometimes appears difficult to be distinguished from normal intrauterine pregnancy. Diagnosis of ectopic pregnancy has improved significantly due to advances in ultrasound technology, rapid and sensitive serum hormone assays. Early diagnosis reduces the risk of tubal rupture and allows more conservative medical treatments to be employed. In present scenario, diagnosis of ectopic pregnancy heavily relies on combination of TVS-USG with serial serum β -hCG estimations.

The earlier demonstration of an intrauterine pregnancy is the single most important contribution of TVS in the evaluation of patients presenting with suspected ectopic pregnancy. Our study in cahoots with multitude of previous similar studies clearly indicates that TVS is much superior as an imaging modality for ruptured/unruptured ectopic pregnancy in comparison to transabdominal ultrasound.

CONCLUSION

This study shows that transvaginal ultrasonography is superior to transabdominal ultrasonography for early detection of ectopic pregnancy, but to avoid misinterpretation both is required as transvaginal ultrasonography has limited field of view. TVS is better in resolution as compared to the TAS. Diagnosis of the ectopic pregnancy can be made with TVS alone.

REFERENCES

1. Verma I, Chugh C, Santpur U, Pundhir P. Cervical ectopic pregnancy: a rare case report. *Int J Reprod Contracept Obstet Gynecol*, 2018 May 26; 7(6): 2506–8.
2. Murray H, Baakdah H, Bardell T, Tulandi T. Diagnosis and treatment of ectopic pregnancy. *CMAJ Can Med Assoc J J Assoc Medicale Can.*, 2005 Oct 11; 173(8): 905–12.
3. Weckstein LN. Current perspective on ectopic pregnancy. *Obstet Gynecol Surv*, 1985 May; 40(5): 259–72.
4. Gurel S, Sarikaya B, Gurel K, Akata D. Role of sonography in the diagnosis of ectopic pregnancy. *J Clin Ultrasound JCU.*, 2007 Dec; 35(9): 509–17.
5. Ankum WM, Van der Veen F, Hamerlynck JV, Lammes FB. Laparoscopy: a dispensable tool in the diagnosis of ectopic pregnancy? *Hum Reprod Oxf Engl.*, 1993 Aug; 8(8): 1301–6.
6. Condous G, Okaro E, Khalid A, Lu C, Van Huffel S, Timmerman D, et al. A prospective evaluation of a single-visit strategy to manage pregnancies of unknown location. *Hum Reprod Oxf Engl.*, 2005 May; 20(5): 1398–403.
7. Blumenfeld Z, Brandes JM, Bronshtein M. Ultrasonography of Abnormal Early Pregnancy. In: Barnea ER, Hustin J, Jauniaux E, editors. *The First*

Twelve Weeks of Gestation [Internet]. Berlin, Heidelberg: Springer; 1992 [cited 2022 Jan 13]. p. 358–75.