

Evaluation of Diagnostic Accuracy of Transabdominal Ultrasound in Respect to Transvaginal Ultrasound in Diagnosing Ectopic Pregnancy Taking Histopathology as The Gold Standard at Tertiary Care Hospital

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Abstract

Background: An ectopic pregnancy is defined as implantation of the fertilized ovum that occurs outside the normal uterine cavity. Ectopic pregnancy is an outcome of a flaw in the reproductive physiology during the implantation process which ultimately results in the loss of the fetus. The worldwide prevalence of ectopic pregnancy is approximate 0.25-2.0% of all pregnancies. It is reported among the most common cause of maternal mortality and morbidity in the first trimester.

Material & Methods: The present prospective study was conducted at the department of radiodiagnosis and pathology and the department of obstetrics and gynecology of our tertiary care hospital. Patients with clinically suspected ectopic pregnancy and patients having lower abdominal or pelvic pain, vaginal bleeding with a positive pregnancy test, and raised serum beta HCG level were enrolled in the present study.

Results: Based on the sonographic analysis and histopathological analysis, in all 30 cases we got positive results found on the pregnancy test and no intrauterine G sac was demonstrated in any modes of ultrasonography. Transabdominal ultrasound detected 21 cases to be ectopic whereas transvaginal ultrasound detected 24 cases to be ectopic. On the histopathological analysis, 27 cases were confirmed to be ectopic and 3 cases were not confirmed by histopathology respectively. Diagnostic parameters of Transabdominal ultrasound in respect to histopathological examination the sensitivity was 75%, specificity was 80 % positive predictive value was 97% and negative predictive value was 26 %. Diagnostic parameters of transvaginal ultrasound in respect to histopathological examination the sensitivity was 86%, specificity was 82 % positive predictive value was 97.5% and negative predictive value was 30 %.

Conclusion: We concluded from the present study that Transabdominal ultrasound is a good method to diagnose ectopic pregnancy however Transvaginal ultrasound is better in terms of diagnostic accuracy to diagnose ectopic pregnancy.

Keywords: Ectopic pregnancy, Transabdominal ultrasound, Transvaginal ultrasound.

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Introduction

An ectopic pregnancy is defined as the implantation of the fertilized ovum that occurs outside the normal uterine cavity. Ectopic pregnancy is an outcome of a flaw in the reproductive physiology during the implantation process which ultimately results in the loss of the fetus [1]. The worldwide prevalence of ectopic pregnancy is approximate 0.25-2.0% of all pregnancies. It is reported among the most common cause of maternal mortality and morbidity in the first trimester[2]. Without timely intervention and treatment, it can cause life-threatening situations resulting in affecting her fertility because of mutilation of the fallopian ducts, ovaries, and sometimes even the uterus. The presenting sign and symptoms of patients with ectopic pregnancies are mainly pain and vaginal bleeding between 6 to 10 weeks gestation [3].

A majority (98.0%) of ectopic pregnancies occur in the fallopian tube, the most common site of ectopic pregnancy is the ampulla (80.0%), which is followed by the isthmus (12.0%), followed by fimbria (5.0%), followed by interstitial (2.0-3.0%) and cornua (2.0%). The etiology of ectopic pregnancy remains unclear although a various number of risk factors had been identified[4]. Due to advancements in medical technology such as radioimmunoassay of HCG, ultrasonographic diagnosis, and diagnostic laparoscopy, the diagnosis has become very affordable and accurate. However, every method is having its limitation[5]. Accurate patient history and general physical and clinical examination and its correlation to the diagnostic reports are believed to be the most important in the diagnosis of ectopic pregnancy [6].

In the current scenario blood, transfusion facilities, and immediate resuscitation, as well as proper surgical intervention, are the major step of success in reducing maternal morbidity and mortality[7]. Ultra-sonography and serum β -hCG levels are useful for early detection of ectopic pregnancy in an unruptured state. Early diagnosis allows various options for treatment by medical treatment and minimally invasive surgery under the care of skilled personnel [8]. These interventions result in improvement in fertility rate even after a previous history of ectopic pregnancy. Rapidly changing diagnostic techniques and therapeutic approaches make ectopic pregnancy an exploring and dynamic field for study and research[9]. Hence, the present study was conducted to evaluate the diagnostic accuracy of transabdominal ultrasound in respect to transvaginal ultrasound in diagnosing ectopic pregnancy taking histopathology as the gold standard at tertiary care hospitals.

Materials & Methods

The present prospective study was conducted at the department of radiodiagnosis and pathology and department of obstetrics and gynecology of our tertiary care hospital. The study duration was of one year from January 2019 to January 2020. A sample size of 30 was calculated at a 95% confidence interval at a 10% acceptable margin of error. Patients with clinically suspected ectopic pregnancy and patients having lower abdominal or pelvic pain, vaginal bleeding with a positive pregnancy test, and raised serum beta HCG level were enrolled in the present study. Clearance from Institutional Ethics Committee was taken before the start of the study. Written

and informed consent for the procedure was obtained from all the patients. Strict confidentiality was maintained with patient identity and data and not revealed, at any point in time.

Post-menopausal women, patients with known gynecological malignancy, patients with known urogenital anomalies, inability to perform both TAS and TVS, and patients requiring urgent surgical intervention were excluded from the present study. The data were collected by predesigned performa along with general physical and clinical examination. A systematic approach was used for both transabdominal ultrasound and transvaginal ultrasound.

The criterion for diagnosis of ectopic pregnancy was an extrauterine gestational sac which contains a fetus or a foetal pole or an extrauterine sac. All of these ultrasonographic findings were correlated with serum β -hCG levels. All the pre-operative findings were recorded. Surgical diagnosis of ectopic pregnancy was made and in doubtful cases specimen was sent for histopathological examination and

confirmation (gold standard). We recorded all findings from sonographic analysis and histopathological analysis. Data analysis was carried out using SPSS v22. All tests were done at an alpha (level significance) of 5%; means a significant association was present if the p-value was less than 0.05.

Results

In the present study, a total of 30 patients with clinically suspected ectopic pregnancy and patients having lower abdominal or pelvic pain, vaginal bleeding with a positive pregnancy test, and raised serum beta HCG level were enrolled in the present study irrespective of history and etiology. In our study the patients were aged from 22 to 38 years, the mean age of the enrolled patients was 29 ± 4.89 years. The majority (60%) of participants were nulliparous. We recorded that the most common presenting symptom was lower abdominal pain (28 out of 30 patients) which was followed by amenorrhea (17 out of 30 patients) followed by irregular bleeding (14 out of 30 patients). Mass like feeling was noted in the lower abdomen in 10 out of 30 patients. (Table 1)

Table 1: Distribution of study participants according to presenting symptoms.

Symptoms	No. of cases
Lower abdominal pain	28
amenorrhea	17
Irregular bleeding	14
Mass like feeling	10

In the present study, based on sonographic analysis and histopathological analysis, in all 30 cases, we got positive results found on a pregnancy test and no intrauterine G sac was demonstrated in any modes of ultrasonography. Transabdominal ultrasound detected 21 cases to be ectopic

whereas transvaginal ultrasound detected 24 cases to be ectopic. On the histopathological analysis, 27 cases were confirmed to be ectopic and 3 cases were not confirmed by histopathology respectively. (Table 2).

Table 2: Distribution of study participants based upon sonographic analysis and histopathological analysis.

Parameters		Confirmed by histopathology	Not confirmed by histopathology	P-value
Detection by TAS	POSITIVE	20	1	0.207
	NEGATIVE	7	2	
Detection by TVS	POSITIVE	23	1	0.09
	NEGATIVE	4	2	

Diagnostic parameters of Transabdominal ultrasound in respect to histopathological examination the sensitivity was 75%, specificity was 80 % positive predictive value was 97% and negative predictive value was 26 %. Diagnostic parameters of

transvaginal ultrasound in respect to histopathological examination the sensitivity was 86%, specificity was 82 % positive predictive value was 97.5% and negative predictive value was 30 %.



Figure 1: Transabdominal ultrasonography of pelvic region showing ectopic pregnancy.

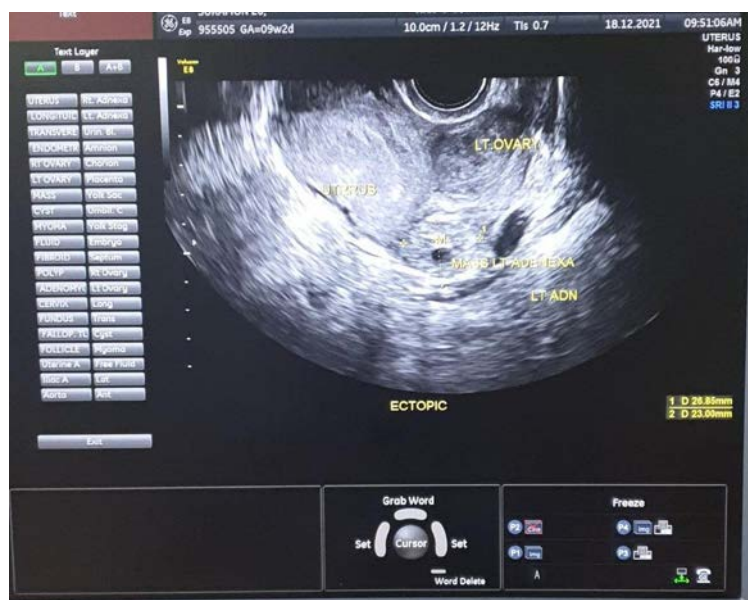


Figure 2: Transvaginal ultrasonography of pelvic region showing ectopic pregnancy.

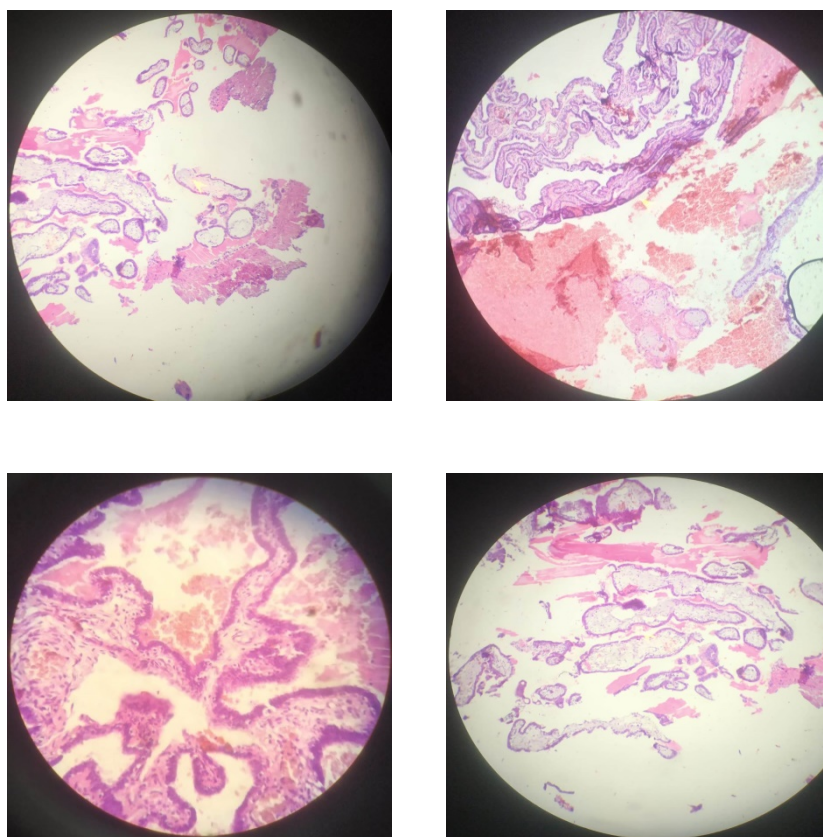


Figure 3: Histopathological findings in ectopic pregnancy.

Discussion

In the present study, a total of 30 patients with clinically suspected ectopic pregnancy and patients having lower abdominal or pelvic pain, vaginal bleeding with a positive pregnancy test, and raised serum beta HCG level were enrolled in the present study irrespective of history and etiology. In our study the patients were aged from 22 to 38 years, the mean age of the enrolled patients was 29 ± 4.89 years. The majority (60%) of participants were nulliparous. We recorded that the most common presenting symptom was lower abdominal pain (28 out of 30 patients) which was followed by amenorrhea (17 out of 30 patients) followed by irregular bleeding (14 out of 30 patients). The mass-like feeling was noted in the lower abdomen in 10 out of 30 patients. Similar results were obtained in a study conducted by Pavle T et al among patients of ectopic pregnancy and reported similar findings to

the present study among the majority of patients of ectopic pregnancy [10] Similar results were obtained in a study conducted by Rajpal H et al among patients of ectopic pregnancy and reported similar findings to the present study among the majority of patients of ectopic pregnancy [11].

In the present study, based on sonographic analysis and histopathological analysis, in all 30 cases, we got positive results found on a pregnancy test and no intrauterine G sac was demonstrated in any modes of ultrasonography. Transabdominal ultrasound detected 21 cases to be ectopic whereas transvaginal ultrasound detected 24 cases to be ectopic. On the histopathological analysis, 27 cases were confirmed to be ectopic and 3 cases were not confirmed by histopathology respectively. Similar results were obtained in a study conducted by AK Manjhi et al among 180 patients of ectopic pregnancy and reported similar findings to the present

study among the majority of patients of ectopic pregnancy [12]. Similar results were obtained in a study conducted by Arora D et al among 80 patients of ectopic pregnancy and reported similar findings to the present study among the majority of patients of ectopic pregnancy [13]

Diagnostic parameters of Transabdominal ultrasound in respect to histopathological examination the sensitivity was 75%, specificity was 80 % positive predictive value was 97% and negative predictive value was 26 %. Diagnostic parameters of transvaginal ultrasound in respect to histopathological examination the sensitivity was 86%, specificity was 82 % positive predictive value was 97.5% and negative predictive value was 30 %. Similar results were obtained in a study conducted by DS Kim et al among 1040 patients of ectopic pregnancy and reported similar findings to the present study among the majority of patients of ectopic pregnancy [14] Similar results were obtained in a study conducted by E Shalev et al among 840 patients of ectopic pregnancy and reported similar findings to the present study among the majority of patients of ectopic pregnancy [15]

Conclusion

We concluded from the present study that Transabdominal ultrasound is a good method to diagnose ectopic pregnancy however Transvaginal ultrasound is better in terms of diagnostic accuracy to diagnose ectopic pregnancy. We recommend from the present study that we should use both ultrasound methods so that we will not miss any ectopic pregnancy.

References

1. Constance ES, Moravek MB. Diagnosis and management of ectopic pregnancy. *Handb Gynecol.* 2017;1(6):291–304.
2. Winder S, Reid S, Condous G. Ultrasound diagnosis of ectopic pregnancy. *Australas J Ultrasound Med.* 2011 May;14(2):29–33.

3. Atri M, Leduc C, Gillett P, Bret PM, Reinhold C, Kintzen G, et al. Role of Endovaginal Sonography in the Diagnosis and Management of Ectopic Pregnancy. *Radiographics.* 1996;16(4):755–74.
4. Kaplan BC, Dart RG, Moskos M, Kuligowska E, Chun B, Hamid MA, et al. Ectopic pregnancy: Prospective study with improved diagnostic accuracy. *Ann Emerg Med.* 1996;28(1):10–7.
5. Hebertson RM, Storey ND. Ectopic pregnancy. *Crit Care Clin.* 1991;7(4):899–915.
6. Buster JE. Ectopic pregnancy. *Endometrium Mol Cell Clin Perspect* Second Ed. 2008 Jan 1;731–44.
7. Tancer ML, Delke I, Veridiano NP. A fifteen year experience with ectopic pregnancy. *Surg Gynecol Obstet.* 1981;152(2):179–82.
8. Poonam, Uprety D, Banerjee B. Ectopic pregnancy - two years review from BPKIHS, Nepal. *Kathmandu Univ Med J (KUMJ).* 2005;3(4):365–9.
9. Pradhan P, Thapamagar SB, Maskey S. A profile of ectopic pregnancy at Nepal medical college teaching hospital. *Nepal Med Coll J.* 2006;8(4):238–42.
10. Palve TT, Bhattacharya R, Magtangi V. Ectopic pregnancy: clinical features, management and complications. *Int J Reprod Contraception, Obstet Gynecol.* 2018;7(4):1484.
11. Rajpal H, Kaur H, Miglani U. Dilemma in diagnosing ovarian ectopic pregnancy. *Int J Reprod Contraception, Obstet Gynecol.* 2020;9(3):1296.
12. Ectopic pregnancy--an analysis of 180 cases - PubMed [Internet]. Available from: <https://pubmed.ncbi.nlm.nih.gov/18232175/>
13. Kathpalia SK, Arora D, Sandhu N, Sinha P. Ectopic pregnancy: Review of 80 cases. *Med J Armed Forces India.* 2018 Apr 1;74(2):172–6.
14. Comparative review of diagnostic

- accuracy in tubal pregnancy: a 14-year survey of 1040 cases - PubMed [Internet]. Available from: <https://pubmed.ncbi.nlm.nih.gov/2442686/>
15. Shalev E, Yarom I, Bustan M, Weiner E, Ben-Shlomo I. Transvaginal sonography as the ultimate diagnostic tool for the management of ectopic pregnancy: experience with 840 cases. *Fertil Steril* [Internet]. 1998 Jan;69(1):62–5. Available from: <https://pubmed.ncbi.nlm.nih.gov/9457934/>