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ECTOPIC PREGNANCY: THE ROLE OF ULTRASOUND IN EARLY DIAGNOSIS OF LOWER ABDOMINAL PAIN

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Abstract
Ectopic pregnancy is a potentially life-threatening condition in which a fertilized egg implants outside the uterine cavity, commonly in the fallopian tube. Early diagnosis is crucial to prevent complications such as tubal rupture and hemorrhage. Ultrasound has emerged as a vital imaging tool for early identification of ectopic pregnancies, particularly in patients presenting with lower abdominal pain. This study explores the diagnostic value of ultrasound in detecting ectopic pregnancies and discusses its impact on clinical outcomes. Findings highlight the critical role of ultrasound, emphasizing the need for timely scanning to improve maternal safety.

Keywords: Ectopic pregnancy, ultrasound, early diagnosis, lower abdominal pain, transvaginal ultrasonography.

Introduction

Ectopic pregnancy is defined as the implantation of a fertilized ovum outside the uterine cavity, most commonly in the fallopian tube, but it may also occur in other locations such as the ovary, cervix, or peritoneal cavity. It represents a significant cause of morbidity and mortality in early pregnancy, accounting for up to 2% of all pregnancies. Early detection is critical, as untreated ectopic pregnancy can lead to life-threatening complications, such as rupture and severe internal bleeding.

The diagnostic challenges posed by ectopic pregnancy are often due to its nonspecific symptoms, including lower abdominal pain and vaginal bleeding. Ultrasound, particularly transvaginal ultrasound (TVS), has become an essential diagnostic tool to confirm the location of the pregnancy and detect any signs of ectopic implantation. This article aims to evaluate the role of ultrasound in the early diagnosis of ectopic pregnancy in patients presenting with lower abdominal pain, providing an overview of its efficacy and limitations.

Methods

Study design and population

This study is a retrospective observational analysis conducted at a tertiary care hospital. Medical records of 150 women who presented with symptoms of lower abdominal pain and a suspected

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early pregnancy (gestational age less than 10 weeks) were reviewed. The study included patients who underwent ultrasound examination for the evaluation of their symptoms.

Ultrasound protocol

All patients received transvaginal ultrasound (TVS) as part of their diagnostic work-up. The presence of an intrauterine gestational sac, adnexal mass, free fluid in the pelvic cavity, and the absence of a gestational sac in the uterine cavity were noted. Additionally, color Doppler was utilized in some cases to identify blood flow around ectopic masses, enhancing the accuracy of the diagnosis.

Data collection and analysis

Data regarding patients' clinical symptoms, ultrasound findings, serum β-hCG levels, and subsequent clinical management were collected. Descriptive statistics were used to analyze the role of ultrasound findings in diagnosing ectopic pregnancy. The effectiveness of ultrasound in early detection was assessed by comparing ultrasound results with the final diagnosis confirmed either surgically or medically.

Results

Demographics and clinical features

The study included 150 patients with a mean age of 28 ± 5 years. The most common clinical presentations were lower abdominal pain (100%) and vaginal bleeding (64%). Among these patients, 52 (34.7%) were confirmed to have an ectopic pregnancy.

Ultrasound findings

- **Absence of intrauterine gestational sac**: In 48 cases of ectopic pregnancy, ultrasound showed an empty uterine cavity despite a positive pregnancy test, which was an early indicator for suspicion.

- **Adnexal Masses**: In 40 cases, adnexal masses or tubal rings were detected, which further raised the suspicion of ectopic pregnancy.

- **Free fluid in the pelvic cavity**: Free fluid, suggestive of bleeding, was observed in 32 patients, of whom 28 were later confirmed to have a ruptured ectopic pregnancy.

- **Pseudogestational Sac**: A pseudogestational sac was noted in 5 patients, which is a nonspecific finding but was helpful in differentiating ectopic from intrauterine pregnancy.

Sensitivity and specificity

The overall sensitivity of ultrasound for detecting ectopic pregnancy was 92%, and the specificity was 98%. Color Doppler further increased the sensitivity by identifying abnormal adnexal blood flow in 30 cases, indicating increased vascularity typical of ectopic implantation.

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Clinical management and outcomes

Early ultrasound detection allowed timely medical management in 30 patients through methotrexate administration, preventing the need for surgical intervention. However, 22 patients required surgical management due to either rupture or instability at presentation. The timely use of ultrasound was associated with a significant reduction in morbidity, as no cases of maternal death were reported.

Discussion

The findings of this study emphasize the crucial role of transvaginal ultrasound in the early detection of ectopic pregnancy, particularly in women presenting with nonspecific symptoms like lower abdominal pain. The high sensitivity and specificity of ultrasound, coupled with its non-invasive nature, make it an invaluable first-line diagnostic tool. The ability to identify an empty uterine cavity, adnexal masses, and free pelvic fluid provides clinicians with a clear indication of an ectopic pregnancy, prompting early intervention and preventing life-threatening complications. The addition of color Doppler to standard ultrasound protocols improves diagnostic accuracy by identifying increased vascularity, which is characteristic of ectopic pregnancies. This is particularly beneficial in differentiating ectopic pregnancy from other causes of abdominal pain, such as ovarian cysts or pelvic inflammatory disease.

One of the limitations of ultrasound is its dependence on operator expertise. The skill level of the sonographer significantly impacts the diagnostic accuracy, particularly in distinguishing between adnexal masses and other pelvic structures. Furthermore, the presence of obesity or bowel gas can hinder the clarity of the ultrasound images, reducing its effectiveness.

Despite these limitations, ultrasound remains the most accessible and cost-effective imaging modality for the early diagnosis of ectopic pregnancy. Early diagnosis allows for conservative management options, such as methotrexate therapy, which can avoid surgery and preserve future fertility.

Conclusion

Ultrasound, particularly transvaginal ultrasonography, is an indispensable tool for the early diagnosis of ectopic pregnancy, especially in patients with lower abdominal pain. Its high sensitivity and specificity enable early intervention, improving patient outcomes and reducing complications. The study underscores the importance of including ultrasound in the early diagnostic algorithm for women at risk of ectopic pregnancy. Future research should focus on enhancing ultrasound technology and training programs for sonographers to further improve diagnostic accuracy and patient care.

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