Impact of Initial Admission Location on Ectopic Pregnancy Diagnosis and Management: Gynecologic vs. Adult Emergency Departments

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ABSTRACT

Objective: This study aimed to evaluate the impact of the initial admission clinic (Gynecologic and Obstetric emergency medicine [GOED] vs. Adult emergency medicine [AED]) on the diagnostic and therapeutic processes of ectopic pregnancy (EP). Additionally, we investigated the influence of clinic-specific factors on the treatment outcomes.

Materials and Methods: This retrospective, cross-sectional study included 164 patients diagnosed with EP between October 1, 2021, and October 1, 2023, at a tertiary hospital. Data, including demographics, clinical presentation, time to diagnosis, diagnostic tests used, treatment modality, and patient outcomes, were collected from electronic hospital records. Statistical analyses were performed to determine the relationship between the initial admission clinic and the diagnostic/therapeutic outcomes.

Results: Patients admitted to the GOED had significantly shorter median diagnostic times than those admitted to the AED (1 hour vs. 2.5 hours, p<0.001). The surgical intervention rate was higher in the AED group (64.7%) than in the GOED group (36.9%; p=0.004). No significant differences were found in patient outcomes or length of hospital stay based on the time of admission (working vs. nonworking hours). GOED admissions were associated with a higher proportion of outpatient management (87.5%) than were AED admissions.

Conclusion: Initial admission to the GOED significantly reduced diagnostic delays and increased the likelihood of noninvasive management of EP. These findings highlight the importance of clinic-specific expertise in optimizing EP management and reducing the need for surgical interventions. Further prospective studies are needed to validate these results and to explore the long-term impact of clinic-specific factors on patient outcomes.

Keywords: Adult emergency department, ectopic pregnancy, gynecologic emergency department, health services utilization, time factors

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INTRODUCTION

Ectopic pregnancy (EP) is a disease that occurs when a fertilized egg implants and continues to develop in a space other than the uterine cavity; its incidence in the United States is 1.58%.[1] It may have a fatal course when ruptured and is thought to be responsible for 2.7% of pregnancy-related deaths.[2] The wait-and-see method and medical or surgical treatment are preferred for EP treatment.[3] When women of reproductive age present to the emergency department (ED) with abdominal pain and vaginal bleeding, a serum β-HCG pregnancy test should be performed as part of the initial evaluation to rule out or confirm pregnancy-related conditions. In cases with a positive pregnancy test, transabdominal or transvaginal ultrasonography (USG) is used to verify EP and its localization or to exclude the diagnosis of EP.[4] Rupture of the EP is the most important complication

that can result in hemorrhagic shock and death, and surgical treatment should be considered in patients with unstable hemodynamics, ruptured EP, sac size >4 cm, and a serum β-HCG level of 10,000 mUI/ml at initial presentation.[5] Emergency physicians in many EDs have seen patients with EP in our country's healthcare system. Patient access to a gynecologist requires an accurate diagnosis followed by referral or consultation. In the literature, the impact of clinic-based differences in the diagnosis and treatment of ectopic pregnancy on patient outcomes has been addressed in a limited way. In particular, more information is needed on the impact of specialty levels in different EDs on diagnosis times and treatment preferences. This study aims to fill an important gap in the literature by comparing the effects of different clinics on diagnostic times and treatment preferences in the diagnosis of EP. Considering that this may affect the outcome of patients, we aimed to examine the effects of the first presentation of EP cases to a gynecologist or emergency physician on the treatment process and patient outcomes. In addition, the effects of other factors that may affect the diagnostic process were examined to explain the results obtained in the general population as much as possible.

MATERIALS and METHODS

Ethical Issues

This study was approved by the Ethics Committee of the Nigde Omer Halis Demir University Faculty of Medicine (decision dated December 28, 2023, 2023/115). This study was conducted in compliance with the 2013 revision of the Declaration of Helsinki and ethical approval was obtained for the use of patient data. The researchers did not access any information that could identify individual participants during data collection or analysis, thus ensuring that all the data were evaluated anonymously.

Study Design and Patient Selection

This study was designed as a retrospective and cross-sectional study in the Adult ED (AED) and Obstetrics and Gynecology ED (GOED) of Nigde Omer Halis Demir University Hospital (hereinafter referred to as 'hospital'). Between 01.10.2021 and 01.10.2023, 210 patients admitted to the adult and gynecology and obstetrics EDs of the hospital with the diagnosis code O00.9 (EP), who were 18 years of age or older at the time of admission, were retrospectively screened through the hospital automation system. Nineteen patients were excluded because the parameters required for the study could not be accessed through the automation system, 22 patients left the hospital voluntarily without waiting for the completion of the treatment process, and five patients were excluded because the diagnosis of EP was excluded after the diagnosis and treatment processes. The remaining 164 patients were included in the study (Fig. 1).

Patient age, marital status, clinical status, consecutive admissions, time of initial admission, status of tests performed at initial admission, time to diagnosis (in hours), treatment methods preferred by the gynecologist for treatment (outpatient follow-up, surgery after outpatient follow-up, hospitalization, and emergency surgery), length of hospitalization, and outcome information (discharge with cure, development of infertility, or death) were electronically recorded on the study form.

Emergency Service Organization and Patient Evaluation Process

There are three services within the emergency service of our hospital, the first of which is the AED, which is served by emergency medicine specialists and welcomes trauma patients of all ages and those over the age of 18 years. The others are the Pediatric Emergency Service, where pediatric specialists take care of patients under the age of 18 years without trauma, and the GOED, where obstetric and gynecological emergencies over the age of 18 years are accepted. Owing to this arrangement in our hospital, women admitted to the GOED were evaluated by a gynecologist and patients admitted to the AED were evaluated by an emergency medicine physician. This allowed us to determine whether women presenting with abdominal pain, vaginal bleeding, and shock due to EP would benefit from evaluation by a gynecologist at their initial presentation.

To determine whether the approach to patients with EP by the gynecologist affected the approach to the patient, the examinations requested by the patients, the preferred treatment method, and the time it took for the patients to reach the diagnosis were examined. Similarly, the treatment/admission times and outcome modalities were analyzed in terms of outcomes. To determine whether there was a delay in the treatment of patients, the time between presentation and diagnosis was calculated, and the number of hours was recorded as the "time to diagnosis." The number of days between diagnosis and outcome was recorded as the "duration of treatment." If patients were treated as inpatients or underwent emergency surgery, the duration of hospitalization was recorded as "length of stay and the number of days was recorded. Because it may have affected the study results, the presentation of patients during or outside working hours and their age, treatment method, and relationship with patient outcome parameters were also analyzed. Similarly, because the preferred treatment method may have affected the study results, its relationship with the outcome parameters was also analyzed.

Figure 1. Flowchart showing case selection according to exclusion criteria
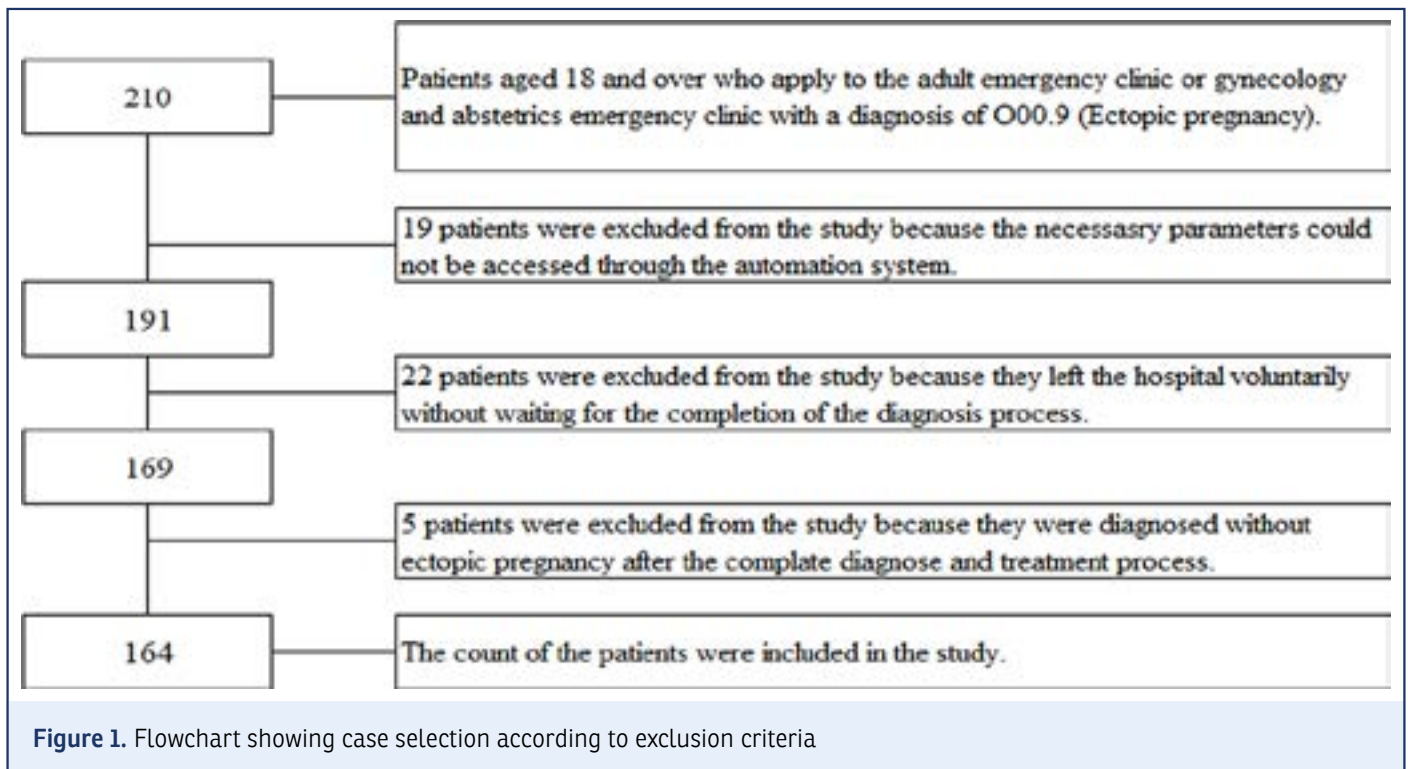
Statistical analysis

Within the scope of the study, whether the data obtained from 164 patients conformed to the normal distribution was tested according to the mean value, median value, mode, and bell curve (normality criteria) using the Shapiro–Wilk normality test. Descriptive data were presented as mean±standard deviation if continuous and conforming to normal distribution and median [interquartile range (IQR, 25–75)] if they did not conform to normal distribution. Categorical variables are presented as frequencies and percentages. The χ^2 test was used to test for significant differences between categorical variables, and appropriate statistical tests (t-test, ANOVA, etc.) were used for 2-way or multiple comparisons of categorical and continuous variables. SPSS Statistics for Windows, Version 22.0 (IBM Corp. Armonk, NY: USA. 2013) package program was used to analyze the data. Graphics and table breakdowns of the data analysis results were created using Microsoft Office Excel (Microsoft Corp. USA. 2019) program. All statistical analyses were performed at a 95% confidence level, and statistical significance was set at p<0.05. The data used in this study were obtained from a hospital's automation system. Post-hoc power analysis was used to assess the reliability of our statistical results, as a requirement of the retrospective design. As a result of the post-hoc power analysis performed using G*Power 3.1 software,[6] the statistical power of this study, which included 164 patients (n1=134, n2=34) categorized according to the place of presentation, was determined to be 82.63% at an effect size of 0.5 and a significance level of 0.05.

RESULTS

The mean age of the 164 patients included in the study was 29.08 ± 5.73 years. 156 (95.2%) of the patients were married and the rest were divorced. A total of 130 (79.3%) patients first presented to the ED of gynecology and obstetrics, while 34 (20.7%) patients first presented to the ED of adults. The median time of presentation to the ED was 14:51, and 50% of presentations occurred between 10:31 and 18:23. 77 (47.0%) patients presented within working hours and 87 (53.0%) patients presented outside working hours (Table 1).

USG was performed in 146 (89.0%), and β-human chorionic gonadotropin (β-HCG) levels were measured in 158 (96.3%) patients. There was no statistically significant difference between the first place of admission for AED or GOED and the order of USG examination and β-HCG tests (P value for USG: 0.214, P value for β-HCG: 0.272). Similarly, there was no statistically significant difference between the USG and β-HCG tests and whether the patients presented during or outside working hours (P-value for USG: 1.000, P-value for β-HCG: 0.421). A total of 156 (95.1%) patients had a complete blood count, 126 (76.8%) had biochemical parameters, and 88 (53.7%) had a complete urinalysis. There was no statistically significant difference be-

Table 1. General information obtained in the study

	n	%
Mean age of the patients	29.08±5.73	
Marital status		
Yes	156	95.2
Initial admission location		
AED	34	20.7
GOED	130	79.3
First admission time		
WH	77	47.0
NWH	87	53.0
Median admission time (time zone)	14:51 (10:31-18:23)	

AED: Adult emergency department; GOED: Gynecologic and obstetric emergency department; WH: In working hours; NWH: Outside working hours

Table 2. Application rates of diagnostic tests in the diagnosis of ectopic pregnancy and distribution according to clinics

Applied diagnostic test	n	%
Ultrasound	146	89.0
Other imaging techniques	4	2.4
β-HCG	158	96.3
Complete blood count	156	95.1
Biochemistry panel	126	76.8
Complete urine test	88	53.7

β-HCG: β-Human coryonic gonadotropin

tween the distribution of investigations in the AED and GOED (p>0.05). 4 (2.4%) underwent non-USG imaging (computed tomography or magnetic resonance imaging) (Table 2).

The median time to diagnosis was 1 (0–600) hours. According to Spearman correlation analysis, patient age did not affect the time to diagnosis (r=-0.026, p=0.742). The median time to diagnosis, including consultation processes, was 2.5 (1–6.5) hours in patients whose first presentation was to AED, whereas this time decreased to a median of 1 (1–2) hours in patients who presented to GOED. The difference in the diagnosis time was statistically significant (p<0.001, Fig. 2). The time to diagnosis was not affected by whether the initial presentation was during or outside of working hours (p=0.435). When the effect of the time of first presentation during working hours was analyzed separately for the AED and GOED, no statistically significant effect of the time of first presentation on the diagnostic times was found in either clinic (p=0.90; p=0.157, respectively).

EP was diagnosed at initial presentation in 136 patients (82.9 %). In 28 patients, the diagnosis was not made at the initial presentation but during recurrent visits within 72 hours after the initial presentation. There was no statistically significant correlation between patient age and diagnosis at the first presentation (p=0.126). There was no significant difference between the first admission to the AED or GOEDs and diagnosis at the first admission (p=0.261). The initial presentation during working hours did not affect diagnosis at the first presentation (p=0.723). The median diagnostic time was 1 (0–24) hour in patients who were diagnosed at the first presentation, whereas the median diagnostic time was 48 (0–600) hours in patients who were not diagnosed at the first presentation. This prolongation of diagnostic time was statistically significant (p<0.001).

After EP diagnosis, 42.7% (70 patients) were treated with emergency surgery, 26.8% (44 patients) were hospitalized, and 19.5% (32 patients) were treated with outpatient follow-up. Eighteen (11.0 %) patients either refused treatment or left the hospital without permission. In 14 (43.8%) outpatients, medical treatment was ineffective and surgical intervention was required. There was no statistically significant correlation between gynecologist treatment method preference and patient age (p=0.888). In 87.5% (28 patients) of the patients who decided to be followed up as outpatients, the first place of presentation was GOED, and emergency surgery was preferred as the treatment method in 64.7% of the patients whose first place of presentation was AED, while this rate was 36.9% in patients who presented with GOED.

Emergency surgery was more common as a treatment modality in patients whose first place of admission was AED, and this difference was statistically significant (p=0.004). Whether the patients first presented during or outside working hours did not have a significant effect on gynecologists' treatment method preference (p=328). There was no significant correlation between the time of diagnosis and treatment modalities in outpatients, inpatients, or patients scheduled to undergo emergency surgery (p=0.428). Similarly, there was no statistically significant difference in the distribution of treatment method preferences between patients diagnosed with EP at the first presentation and those diagnosed with EP at a recurrent presentation (p=0.936).

The mean length of hospitalization of patients treated for EP was 1.88±0.11 days. The mean duration of hospitalization was 1.80±0.10 days in patients who were treated with emergency surgery or hospitalization at the first admission and 2.57±0.54 days in patients who needed surgery due to lack of response to medical treatment during outpatient follow-up; however, there was no statistically significant difference between the groups (p=0.060). A weak but statistically significant correla-
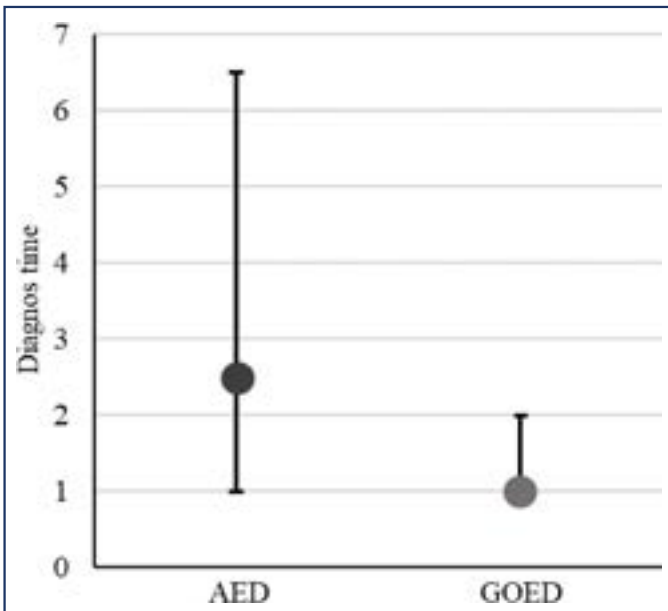
Figure 2. Median and 25%–75% IQR values of the time to diagnosis according to the clinic where the patients first presented

AER: Adult emergency department; GOER: Gynecologic and obstetric emergency department; IQR: Interquartile range

tion was found between patient age and the length of hospitalization (r=0.257, p=0.003). The mean length of hospitalization was 2.10±0.46 days for those who were admitted to AED and 1.86±0.36 days for those who were admitted to GOED, and there was no statistically significant difference between the length of hospitalization according to the place of admission (p=0.346). Whether the initial presentation was during or outside working hours did not have a statistically significant effect on the length of hospitalization (days) (1.80±0.44 vs. 2.03±0.52;

p=0.283). The length of hospitalization was 1.97±0.46 days for patients who were diagnosed with EP at the first presentation and 1.64±0.74 days for patients whose diagnosis was not made at the first presentation. Whether the diagnosis was made at the first presentation did not have a statistically significant effect on the length of hospitalization (p=0.246). There was a weak but significant negative correlation between the time to diagnosis and the length of hospitalization (r=-0.215, p=0.015). The patient outcomes, along with the preferred treatment techniques, are summarized in Figure 3.

In our study, the patient outcomes were classified into three groups: cure, infertility, and in-hospital mortality. Statistical analysis could not be performed on the outcome parameters because 162 of 164 patients (98.8%) were noted to be discharged with a cure in the epicrisis report, and there was no mention of infertility.

DISCUSSION

This study investigated the impact of the initial admission clinic ([AED] vs. [GOED]) on the diagnostic and therapeutic processes in EP, revealing significant differences in diagnostic times and treatment modalities based on the initial point of care. According to our findings, the time to diagnosis was significantly shorter in the patients admitted to the GOED. This result may be related to the level of expertise in gynecology of gynecologists working in the GOED. Gynecologists can quickly assess and diagnose specific gynecologic emergencies such as EP.

The risk of ectopic pregnancy is influenced by several demographic factors, including age and marital status. Research indicates that women aged 20–35 years are at a heightened risk for ectopic pregnancies. For instance, Pemaron et al.[7] reported that the majority of disrupted ectopic pregnancies occurred in women aged 25–34 years, with an average age of
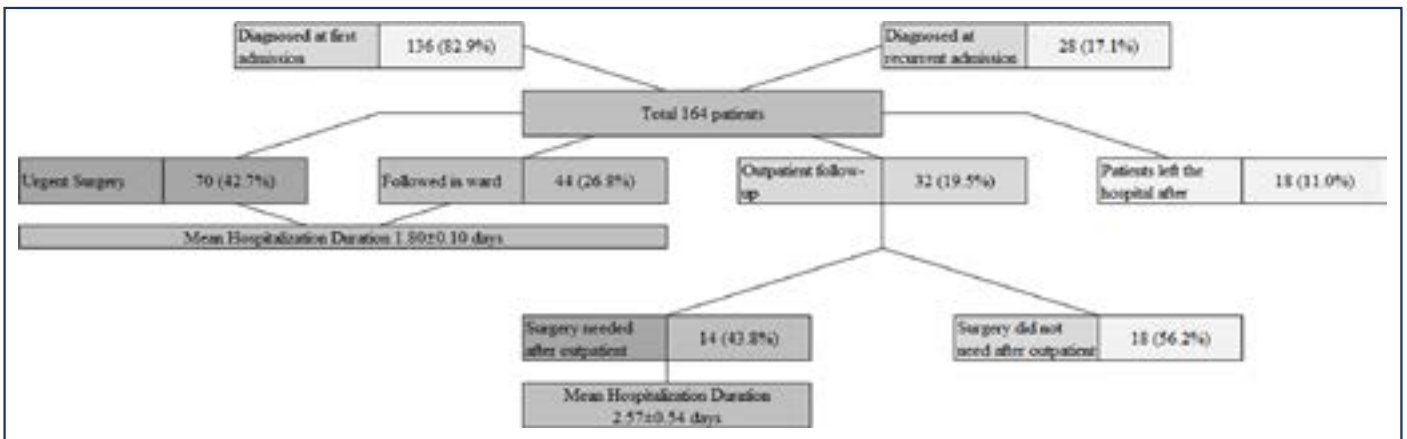

Figure 3. Preferred treatment techniques and outcome information

29.15 years, suggesting that this age group is particularly vulnerable due to their reproductive status. Similarly, Patel et al.[8] emphasized that advancing maternal age, particularly beyond 35 years, significantly increases the risk of ectopic pregnancy. In line with these findings, the mean age of patients in our study was 29.08±5.73 years, confirming that ectopic pregnancies predominantly occur in this demographic. Marital status is another relevant factor linked to the risk of EP. Married women may experience a higher incidence due to factors such as increased sexual activity, exposure to reproductive health issues, and complications from multiple pregnancies or previous surgical interventions.[9] Consistent with these reports, 95.2% of the patients in our study were married, reflecting a population at increased risk due to cumulative reproductive factors.

Studies show that physicians' proficiency in using diagnostic tools such as transvaginal ultrasound and serum β-HCG levels directly affects the accuracy of EP diagnoses. Chen et al.[10] emphasized that although transvaginal ultrasound is the primary diagnostic tool, its effectiveness may be limited by the physician's experience and familiarity with interpreting the ultrasound findings. Improved training in ultrasound techniques has been shown to improve diagnostic accuracy, particularly in differentiating ectopic pregnancies from normal intrauterine pregnancies. Furthermore, the ability to recognize the early signs of EP is often associated with physician expertise. According to Imshiria et al.,[11] early diagnosis is vital to prevent life-threatening complications such as tubal rupture. Experienced gynecologists are more likely to consider EP in the differential diagnosis when they encounter vague clinical symptoms, thereby facilitating timely interventions. This is particularly important given that the clinical presentation of ectopic pregnancies can mimic other conditions, leading to diagnostic difficulties. Conversely, the likelihood of delayed diagnosis is increased given that patients presenting to the AED come from a wider patient profile and require consultation during the diagnostic process. This may explain the longer duration of diagnosis in the patients admitted to the AED.

The importance of the initial presentation in the diagnosis of EP cannot be overstated. Early diagnosis is crucial because of the potential for serious complications including internal bleeding and infertility. Therefore, the timing of the initial presentation is critical. Studies show that ectopic pregnancies not diagnosed during the first visit may progress to chronic ectopic pregnancies, which complicates future treatment options and increases the risk of adverse outcomes.[12] However, less than 50% of ectopic pregnancies are diagnosed at the first visit, highlighting the difficulties encountered during early diagnosis.[13] In our study, the rate of diagnosis at the initial

presentation was higher than that reported in the literature. However, there was no significant difference between patients who were admitted to the AED or GOED and those who were diagnosed at the first presentation. There are several possible reasons for the high rates of diagnosis at first presentation in our study compared to the rates reported in the literature.

Timely evaluation of patients presenting with suspected EP in the AED through effective consultation with gynecologists may accelerate the diagnostic process. Standardized diagnostic protocols in both clinics may have contributed to the homogeneity of diagnostic processes. Furthermore, the retrospective nature of the study and the fact that the sample was based on a specific healthcare institution may have limited the generalizability of the findings. In this context, if this study is supported by prospectively designed studies, the impact of the clinic on the management of EP on long-term patient outcomes can be better understood. In addition, future consideration of factors such as gravida and parity, which could not be screened owing to the retrospective nature of our study, will increase the generalizability of the results. On the other hand, the fact that the effect of the time of presentation (working or non-working hours) on the diagnosis and treatment process was not statistically significant in our study indicates that EDs work effectively 24 h a day and provide high standards of service. This finding may be a valuable reference for practices aimed at increasing the quality standards of intensive care and EDs.

In the literature, it has been clearly stated that delays in the diagnostic process in the management of EP increase the need for surgical intervention and the risk of complications. Jurkovic and Wilkinson,[14] emphasized that delays in diagnosis may lead to worsening of symptoms and an increased frequency of conditions requiring surgical intervention. Similarly, Sivalingam et al.[15] stated that early diagnosis supports the use of minimally invasive methods and increases outpatient follow-up rates, indicating that conservative management strategies are preferred in cases of early EP. In our study, the need for surgical intervention was higher in patients who presented to an AED. This suggests that the longer diagnostic process in AED may be related to the evaluation of patients at an advanced stage. Delays in diagnosis may lead to the worsening of symptoms and increased complications that may require surgery. In contrast, the higher rate of outpatient follow-up in GOED admissions suggests that EP management in this clinic focuses on early diagnosis and minimally invasive treatment. In conclusion, the level of specialization of the clinic and the clinical management steps that patients undergo during the admission process are important for the diagnosis and treatment of EP. Future studies examining the effects of

clinical differences in the management of EP on long-term outcomes may provide valuable information to ensure that these patients receive early diagnosis and optimal treatment.

Limitations

Due to the retrospective nature of the study, parameters such as gravida, parity, abortion, and number of living children, which have a significant impact on EP management, are the main limiting factors that may have affected the results of the study. Future prospective studies are needed to investigate the impact of the place of initial presentation on the diagnosis and management of ectopic pregnancy in a larger and more diverse population. While the duration of hospitalization of the patients could be observed, the fact that the duration of diagnosis could be affected by the secretarial process was another parameter that could affect the results of the study.

CONCLUSION

Our study showed that the clinic (AED or GOED) may have a determining effect on the duration of diagnosis and treatment preference in cases of EP. The fact that the time to diagnosis was longer and the rate of surgical intervention was higher in patients admitted to the AED suggests that patient evaluation processes in the clinic directly affect treatment methods. However, the fact that there was no significant effect on the diagnosis and treatment outcomes, whether the application was made during or outside working hours, reveals that EDs provide effective and uninterrupted service 24 hours a day. Future prospective studies may help us better understand the impact of these findings on long-term patient outcomes by examining the effects of optimization of diagnostic processes and standardization of clinical protocols in the management of EP. Improving clinical consultation processes to expedite the diagnostic process, particularly in AEDs, may reduce the need for surgical intervention.

Disclosures

Ethics Committee Approval: The study was approved by the Nigde Omer Halis Demir University Faculty of Medicine Ethics Committee (No: 2023/115, Date: 28/12/2023).

Authorship Contributions: Concept: A.V., M.C.A.; Design: A.V., T.D., M.O.C., N.A., E.K., M.C.A., H.C.; Supervision: A.V., T.D., M.O.C., N.A., E.K., M.C.A., H.C.; Data Collection or Processing: M.C.A., M.O.C., N.A., E.K.; Analysis or Interpretation: A.V., T.D., M.O.C., N.A., E.K., M.C.A., H.C.; Literature Search: A.V., M.C.A., E.K., N.A.; Writing: A.V., M.C.A.; Critical review: A.V., T.D., M.O.C., N.A., E.K., M.C.A., H.C.

Conflict of Interest: No conflict of interest was declared by the authors.

Informed Consent: Written informed consent was obtained from all patients.

Use of AI for Writing Assistance: We confirm that no artificial intelligence (AI)-assisted technologies, including Large Language Models (LLMs), chatbots, or image creators, were used in the production of this manuscript. Additionally, AI technology was not used in conducting the study, and no AI-related tools were involved in the research process.

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REFERENCES

1. Raine-Bennett T, Fassett MJ, Chandra M, Armstrong MA, Xie F, Shi JM, et al. Disparities in the Incidence of EP in a Large Health Care System in California, 2010-2019. Perm J 2022;26:61–8. [CrossRef]

2. Hendriks E, Rosenberg R, Prine L. EP: Diagnosis and management. Am Fam Physician 2020;101:599-606.

3. Gözüküçük M, Kahraman K, Çetinkaya E, Sezginkurt E, Sönmezer M, Berker B, et al. The effect of the diagnostic criteria to the preferred treatment ın the patients diagnosed as ectopic pregnancy. J Ankara Univ Fac Med 2009;62:135–8.

4. Lee R, Dupuis C, Chen B, Smith A, Kim YH. Diagnosing EP in the emergency setting. Ultrasonography 2018;37:78–87. [CrossRef]

5. Agdi M, Tulandi T. Surgical treatment of EP. Best Pract Res Clin Obstet Gynaecol. August 2009;23:519–27. [CrossRef]

6. Faul F, Erdfelder E, Lang AG, Buchner A. G*Power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences. Behav Res Methods 2007;39:175–91. [CrossRef]

7. Pemaron IBM, Bandem IKMP, Seputra DKA. The relationship between age and parity of pregnant women with the incidence of disrupted ectopic pregnancy at Wangaya hospital. Int J Adv Med 2023;10:16–8. [CrossRef]

8. Patel UM, Gandhi MR, Jani PS, Kakani CR, Thakor N. Clinical profile and management of ectopic pregnancy in patients with ectopic pregnancy at GMERS medical college and hospital Dharpur-Patan, North Gujarat region, India. Int J Res Med Sci 2015;3:841–5. [CrossRef]

9. Lee DH. Recurrent ectopic pregnancy after ipsilateral partial salpingectomy: a case report. Clin Exp Obstet Gynecol 2015;42:540–2. [CrossRef]

10. Chen CY, Hwu YM, Chen CP, Chang CC. Quantitative analysis of total β-subunit of human chorionic gonadotropin concentration in urine by immunomagnetic reduction to assist in the diagnosis of EP. Int J Nanomedicine 2015;10:2475–83. [CrossRef]

11. Imshiria N, Katica V, Imshiria L, Hodzic AV, Galijasevic N. Bilateral tubal pregnancy complicated by rupture of the left fallopian tube. J Gynecol Res Rev Rep 2022;4:1–3. [CrossRef]

12. Anupama S, Devasia JM, Bhavya A, et al. A study on ectopic pregnancies in a tertiary care centre. J. Evid Based Med Health 2019;6:1654–8. [CrossRef]

13. Kömürcü Karuserci Ö, Uğur MG, Balat Ö, Sucu S. No increase in free fetal DNA level in EP: A preliminary study. Turk J Obstet Gynecol 2017;14:156–9. [CrossRef]

14. Jurkovic D, Wilkinson H. Diagnosis and management of EP. BMJ 2011;342:d3397. [CrossRef]

15. Sivalingam VN, Duncan WC, Kirk E, Shephard LA, Horne AW. Diagnosis and management of EP. J Fam Plann Reprod Health Care 2011;37:231–40.