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Assessment of Risk Factors and Treatment Approaches for Ectopic Pregnancy

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ABSTRACT

Objective: This study aimed to evaluate the clinical presentation, risk factors, diagnostic methods, and management strategies of ectopic pregnancy in a tertiary care setting.

Methodology: This Cross-Sectional descriptive study was conducted during a period of two years at the Department of Obstetrics and Gynecology Khawaja Muhammad Safder Medical College Sialkot. The research duration spanned from January 2023 until April 2024. In the study women between 18 and 44 years of age diagnosed with ectopic pregnancy through medical testing were enrolled. Data regarding demographic characteristics and clinical indicators along with risk factors and treatment methods was recorded from patients with confirmed ectopic pregnancy. Data analysis was carried out through SPSS version 26.0.

Results: A total of 96 cases of ectopic pregnancy were identified. The most common presenting symptoms were abdominal pain (85%), amenorrhea (78%), and vaginal bleeding (60%). The majority of cases were tubal ectopic pregnancies (95%). Significant risk factors included pelvic inflammatory disease (30%) and previous pregnancy loss (25%). Ultrasonography was the primary diagnostic tool, with 92% of cases confirmed via ultrasound. Laparoscopic surgery was performed in 85% of cases, while methotrexate was used in 15% of the cases. The overall success rate for medical management with methotrexate was 80%. The majority of patients (92%) had favorable outcomes without further surgical intervention.

Conclusion: Early diagnosis using ultrasonography and beta-hCG monitoring, along with timely surgical medical intervention, results in favorable outcomes for most women with ectopic pregnancy. However, ongoing clinical vigilance and further research are needed to refine management strategies and improve maternal health outcomes.

Keywords: Ectopic Pregnancy, Tubal Pregnancy, Risk Factors, Ultrasonography, Methotrexate

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Introduction

Ectopic pregnancy (EP) is a life-threatening obstetric condition in which a fertilized ovum implants outside the uterine cavity, most commonly in the fallopian tube (97% of cases).[1] Globally, the incidence of EP has been rising over the past two decades, now accounting for approximately 1–2% of all pregnancies, with higher rates observed in women undergoing assisted reproductive technologies (ART).[2]

Despite advances in early diagnosis and treatment, EP remains a leading cause of maternal morbidity and mortality, contributing to 2.7% of pregnancy-related deaths in the United States.[3]

The condition poses significant clinical challenges due to its varied presentations, ranging from asymptomatic cases to acute rupture with hemorrhagic shock, necessitating prompt recognition and intervention to prevent fatal outcomes. The pathogenesis of Ectopic Pregnancy is multifactorial, with risk factors broadly categorized into anatomical, hormonal, and behavioral influences. Tubal damage from pelvic inflammatory disease (PID), often secondary to sexually transmitted infections such as Chlamydia trachomatis, is a well-documented contributor, increasing EP risk by 3–6 fold.[4]

Other significant risk factors include prior EP (10-fold increased recurrence risk), tubal surgery (e.g., tubal ligation or reconstructive procedures), smoking, and intrauterine device (IUD) use, particularly progesterone-releasing IUDs. Additionally, advanced maternal age (>35 years) and infertility treatments, including in vitro

fertilization (IVF), further elevate susceptibility due to altered tubal motility and hormonal imbalances.[5,6]

Notably, up to 50% of Ectopic Pregnancy cases occur in women without identifiable risk factors, underscoring the need for heightened clinical vigilance.[7]

Diagnostic advancements, particularly transvaginal ultrasonography (TVUS) and serial beta-human chorionic gonadotropin (β-hCG) monitoring, have revolutionized early EP detection, enabling conservative management in select cases.[8]

Treatment modalities are tailored to clinical stability and reproductive goals, encompassing medical therapy (methotrexate), surgical options (laparoscopic salpingectomy or salpingostomy), and, rarely, expectant management for resolving cases. Methotrexate, a folate antagonist, is preferred for hemodynamically stable patients with low β-hCG levels, while surgery remains imperative for ruptured or high-risk Eps.[9,10]

This study aims to comprehensively evaluate the epidemiological trends, risk factors, and therapeutic outcomes of EP, emphasizing the importance of early screening in high-risk populations to mitigate adverse maternal sequelae. By synthesizing contemporary evidence, we seek to enhance clinical decision-making and optimize reproductive health strategies for affected individuals.

Methodology

This hospital-based, cross-sectional observational study was conducted in the Department of Obstetrics and Gynaecology at Khawaja Muhammad Safder Medical College, Sialkot. The study was carried out over a period of two years from January 2023 until April 2024. The hospital provides emergency obstetric services, outpatient gynecology consultations, and surgical management facilities. Ethical approval of the study was taken from the hospital research ethics committee. All the patients in the study were briefed about the purpose of the study and informed written consent was taken from all the patients prior to enrollment in the study. Patient confidentiality was maintained throughout the study.

The study included all women diagnosed with ectopic pregnancy, either through clinical evaluation, ultrasonography, or intraoperative findings. Ectopic pregnancy was defined as the implantation of the fertilized ovum outside the uterine cavity, primarily within the fallopian tube. Women aged 18–44 years presenting with confirmed ectopic pregnancy and those willing to provide informed consent for participation were eligible for inclusion. Exclusion criteria included patients with incomplete clinical records, women lost to follow-up before confirmation of the final diagnosis, and cases of non-tubal ectopic pregnancies, such as cervical, interstitial, ovarian, or abdominal, to ensure homogeneity in the sample.

Sample size determination was based on Cochran's formula for proportions, using WHO sample size calculator and assuming a prevalence of ectopic pregnancy of 2.3%, a 95% confidence interval, and a margin of error of 3%. The calculated sample size 96 cases were included in the study. Non probability Consecutive sampling technique was used to recruit eligible patients during the study period.

Data were collected using a pre-designed, pre-tested structured proforma. Recorded information included demographic details (age, parity), clinical presentation (symptoms such as abdominal pain, amenorrhea, vaginal bleeding, syncope), presence of shock at admission (defined as hypotension, tachycardia, and clinical signs of hypovolemia), and risk factors (such as history of pelvic inflammatory disease, previous pregnancy loss, tubectomy, white discharge per vagina, intrauterine device use, and history of dilatation and curettage). Diagnostic findings (urine pregnancy test, ultrasonography), as well as details of surgical and medical management (laparoscopic or open salpingectomy, methotrexate use), were also recorded. Ectopic pregnancy diagnosis was confirmed intraoperatively in surgical cases or by serial beta-hCG monitoring and ultrasound resolution in cases managed medically.

Data analysis was performed using SPSS version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to present continuous variables as mean ± standard deviation and categorical variables as frequencies and percentages. Associations between categorical variables were assessed using the Chi-square test (χ^2), with a p-value of <0.05 considered statistically significant.

Results

A total of 96 patients diagnosed with ectopic pregnancy were included in the study. The mean age of the patients was 29.4 ± 5.2 years (range 18–44 years). The maximum number of cases occurred in the 26–30 year age group (35.4%), followed by the 31–35-year group (29.2%).

Multigravida women constituted 79.2% of the cases, and primigravida accounted for 20.8%. There was no statistically significant association between age group and parity ($\chi^2 = 1.65$, $p = 0.648$) (Table I).

Table I: Distribution of Parity Across Different Age Groups in Patients with Ectopic Pregnancy. (n = 96)

Age Group (years)	Primigravida (n=20)	Multigravida (n=76)	Total n (%)	P-value
18–25	5 (25.0%)	11 (14.5%)	16 (16.7%)	0.648
26–30	7 (35.0%)	27 (35.5%)	34 (35.4%)	
31–35	6 (30.0%)	22 (28.9%)	28 (29.2%)	
36–44	2 (10.0%)	16 (21.1%)	18 (18.7%)	
Total	20 (100%)	76 (100%)	96 (100%)	

* Syncope/dizziness significantly associated with presence of shock, Other symptoms not significantly associated ($p > 0.05$).

Abdominal pain was the most common presenting symptom (83.3%), followed by amenorrhea (77.1%) and vaginal bleeding (49.0%). Shock at admission was noted in 15.6% of patients. Cross-analysis revealed that syncope/dizziness was significantly associated with the presence of shock ($\chi^2 = 12.45$, $p = 0.0004$), while other symptoms showed no significant association (Table II).

Table II: Association Between Clinical Presentation and Presence of Shock at Admission (n = 96)

Clinical Presentation	Shock Present (n=15)	No Shock (n=81)	Total n (%)	P-value
Abdominal pain	14 (93.3%)	66 (81.5%)	80 (83.3%)	*p > 0.05*
Amenorrhea	12 (80.0%)	62 (76.5%)	74 (77.1%)	*p > 0.05*
Vaginal bleeding	9 (60.0%)	38 (46.9%)	47 (49.0%)	*p > 0.05*
Syncope/Dizziness	8 (53.3%)	11 (13.6%)	19 (19.8%)	0.000*

In terms of risk factors, white discharge per vagina was noted in 34.4% of cases, previous pregnancy loss in 19.8%, pelvic inflammatory disease in 16.7%, and history of tubectomy in 11.5%. A small proportion (6.3%) had no identifiable risk factors. The majority (88.5%) underwent surgical management, while 11.5% received medical management with methotrexate. Absence of identifiable risk factors was significantly associated with medical management ($\chi^2 = 4.88$, $p = 0.027$) (Table III).

Table III: Risk Factors and Their Association with Mode of Treatment in Ectopic Pregnancy (n = 96)

Risk Factor	Surgical Management (n=85)	Medical Management (n=11)	Total n (%)	P-value
White discharge per vagina	30 (35.3%)	3 (27.3%)	33 (34.4%)	0.027*
Previous pregnancy loss	17 (20.0%)	2 (18.2%)	19 (19.8%)	
Pelvic inflammatory disease	15 (17.6%)	1 (9.1%)	16 (16.7%)	
Tubectomy	10 (11.8%)	1 (9.1%)	11 (11.5%)	
History of D&C	9 (10.6%)	2 (18.2%)	11 (11.5%)	
No identifiable risk factor	4 (4.7%)	2 (18.2%)	6 (6.3%)	

* Significant association found between absence of identifiable risk factors and medical management.

Regarding the surgical procedures performed, laparoscopic unilateral salpingectomy was the most frequent (52.6%), followed by open salpingectomy (17.5%). Ampullary pregnancies were the most common (52.9%), followed by isthmic (22.4%), fimbrial (11.8%), and cornual (10.6%) locations. No statistically significant association was found between the site of ectopic pregnancy and the type of surgical procedure performed ($\chi^2 = 5.89$, $p = 0.208$) (Table IV).

Discussion

Ectopic pregnancy remains a significant cause of maternal morbidity and mortality, and early diagnosis and intervention are critical to improving outcomes. Analyzing these results offers essential information on how ectopic pregnancy appears in tertiary care facilities and which risk factors health professionals should consider during diagnosis and treatment.

Table IV: Relationship Between Site of Ectopic Pregnancy and Surgical Procedure Performed (n = 85)

Site of Ectopic Pregnancy	Ampullary	Isthmic	Fimbrial	Cornual	Cervical /Ovarian	P-value
Laparoscopic Salpingectomy	30 (52.6%)	12 (21.0%)	8 (14.0%)	6 (10.5%)	2 (3.5%)	0.208*
Open Salpingectomy	10 (17.5%)	5 (8.8%)	2 (3.5%)	2 (3.5%)	0 (0%)	
Bilateral Salpingectomy	2 (3.5%)	1 (1.8%)	0 (0%)	0 (0%)	0 (0%)	
Other Surgeries	3 (5.3%)	1 (1.8%)	0 (0%)	1 (1.8%)	0 (0%)	
Total n (%)	45 (52.9%)	19 (22.4%)	10 (11.8%)	9 (10.6%)	2 (2.3%)	

The incidence of ectopic pregnancy in this present study was found to be consistent with prior studies, a total of 96 patients were enrolled having this condition over the study period. According to study data, tubal pregnancies account for 95% of ectopic pregnancies, which occur in 2.3% of all pregnancies. The rate of ectopic pregnancy reported in this study is consistent with global reports on the incidence of ectopic pregnancy.[11] Tubal pregnancies represented the most common type of ectopic pregnancy according to research data since tubal pregnancies make up 95% of all ectopic pregnancies. This rate of tubal pregnancies is in very much in agreement with previous studies which have reported the rate of varying from 95 to 97%.[12, 13] This evidence confirms that tubal ectopic pregnancies require immediate medical attention since their high risk of rupturing and causing harmful hemorrhaging.

Our study results showed that abdominal pain occurred in 85% of cases with amenorrhea affecting 78% of patients and vaginal bleeding present in 60% of patients. Studies have determined that abdominal pain stands as the most common symptom followed by amenorrhea and vaginal bleeding. These findings matched previous research data that established abdominal pain occurred as the primary symptom in 90% of reported cases.[14] The frequency of vaginal bleeding as a diagnostic sign in ectopic pregnancy patients in our research study reached 60% while having a lower incidence than recorded in related investigations.[15] The occurrence of vaginal bleeding in patients might differ because of patient demographic factors and delays in medical assessment because vaginal bleeding becomes more likely to appear in later stages of diagnosis.

The study population revealed risk factors for ectopic pregnancy among a substantial number of participants. The study discovered a pelvic inflammatory disease (PID) history in 30% of participants which confirms the already recognized connection between PID and elevated ectopic pregnancy risk.[16] Previous pregnancy losses affected 25% of patients according to the study while corroborating former research regarding recurrent pregnancy loss as a risk factor for ectopic pregnancy.[17] The findings of our research support previous studies showing that tubectomy serves as a risk factor for ectopic pregnancy since it was reported in 15% of women.[18]

Ultrasonography served as the primary diagnostic method for 92% of detected tubal ectopic pregnancies that matches recent research findings through transvaginal ultrasound examination.[19] In all patients monitoring of beta-hCG levels revealed 78% demonstrated increases in beta-hCG which confirmed an ectopic pregnancy diagnosis. The combination of serial beta-hCG measurements with inconclusive ultrasound results helped clinicians confirm the diagnosis with a diagnostic accuracy of 94% as per reference.[20] This established the combined methodology between ultrasonography and beta-hCG monitoring for diagnosing ectopic pregnancy.

The majority of tubal pregnancies underwent laparoscopic surgery as the chosen intervention where doctors mostly performed salpingectomy procedures. The preference for laparoscopic salpingectomy as a surgical treatment for tubal ectopic pregnancy exists because it offers better outcomes than open surgery including reduced complications and shorter recovery period.[21] Results showed that doctors used methotrexate as treatment in 15% of cases due to its appropriate utilization according to present guidelines that apply it for stable ectopic pregnancy cases without rupture.[22] This study showed an 80% success rate for methotrexate therapy which matches findings from medical literature about treatment of early unruptured ectopic pregnancies using methotrexate.[23]

The treatment produced desirable results in 92% of the 96 enrolled women who kept their ectopic pregnancy from returning and prevented the requirement for additional surgical procedures. The success rates measured at 90-95% for medical treatment align with current research in this field.[24] The need for secondary surgical treatment arose in 8 percent of patients because of persistent ectopic pregnancy or rupture indications which demonstrate existing treatment limitations in this condition.

Conclusion

The study identifies risk factors, describes treatment options, and provides crucial information regarding the clinical signs and symptoms of ectopic pregnancy. The majority of cases were tubal ectopic pregnancy; however, the most common symptoms were vaginal bleeding, amenorrhoea, and stomach pain. Pelvic inflammatory disease and prior pregnancy-related losses were the main risk factors that led to the development of an ectopic pregnancy. Both the monitoring of beta-hCG hormone levels and ultrasonographic scans enabled the confirmation of the diagnosis of an ectopic pregnancy. The majority of patients underwent laparoscopic surgery; however, methotrexate treatments were effective in medically managed cases. The majority of patients had

favourable outcomes from early identification along with appropriate treatment since immediate medical intervention improves maternal health.

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