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The impact of the first wave of the COVID-19 pandemic on hospital admissions and treatment management of ectopic pregnancy

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Abstract:

OBJECTIVES: We aimed to evaluate the clinical features and treatment strategies applied to the patients with ectopic pregnancy admitted to our tertiary care center before and during the pandemic.

METHODS: Women aged 18–45 years, who were admitted to the hospital with a diagnosis of ectopic pregnancy in the pre- and postpandemic periods, were included in this case–control study.

RESULTS: A total of 173 patients, 116 patients before the pandemic and 57 patients during the pandemic, were included in the study. The rate of admissions from the emergency department was higher during the pandemic than before the pandemic ($P = 0.003$). The rupture was detected significantly higher during the outbreak (13/116 [11.2%]) than before the pandemic (16/57 [28.1%]) ($P = 0.009$). While conservative treatment was applied more frequently in the prepandemic period, it was observed that patients were treated surgically more frequently during the pandemic period ($P = 0.003$). While laparoscopic surgery was preferred before the pandemic, laparotomy was applied to all patients during the pandemic ($P < 0.001$).

CONCLUSIONS: In the first wave of the outbreak, there were delays in the diagnosis of ectopic pregnancies, and these patients presented with ruptures more frequently than before the pandemic. Furthermore, surgical treatment methods were used more than conservative therapies during the outbreak.

Keywords:

Anesthesia, COVID-19, ectopic pregnancy, emergency, surgery

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Introduction

The declaration of COVID-19 as a global pandemic by the World Health Organization in March 2020 has had direct and indirect effects on the health system. With the first wave of virus infection, nonemergency outpatient services were suspended, and elective surgical cases were postponed to prevent overcrowding in hospitals and intensive care units. Besides, a possible transmission to noninfected patients admitted to the hospital for different reasons would also be prevented. Along with these measures taken in health services, hospital applications have decreased significantly due to the "stay-at-home" warnings and the fear of being infected. Unfortunately, it has also been observed that there were delays in hospital admissions in some emergency cases, including myocardial infarction, stroke, and appendicitis.[1-4]

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Box-ED Section

What is already known on the study topic?

- Ectopic pregnancy requires rapid diagnosis and treatment; otherwise, it can lead to severe complications.

What is the conflict on the issue? Has it importance for readers?

- Delays in hospital admissions in many emergency cases, such as myocardial infarction, stroke, and appendicitis, were observed during the COVID-19 outbreak
- The effect of the outbreak on ectopic pregnancy and its complications remains uncertain.

How is this study structured?

- This was a single-center, case–control study that included data from 173 patients.

What does this study tell us?

- Delays were experienced in the diagnosis of ectopic pregnancies in the first wave of the pandemic due to the measures taken and fear of hospital admission
- The delay of the ectopic pregnancy diagnosis resulted in more ruptures than in the prepandemic period
- Surgical interventions were more frequently performed for ectopic pregnancies during the pandemic than during the prepandemic period
- Delays in the diagnosis of ectopic pregnancies during the outbreak can be prevented by developing policies for remote follow-up and treatment.

According to the guidelines published by the international and national gynecology and obstetrics societies, it is recommended that all elective gynecological interventions be postponed during the pandemic period, except for life-threatening conditions such as ectopic pregnancy, nonresponsive or ruptured tubo-ovarian abscess, adnexal torsion, heavy vaginal bleeding, and cerclage.[5,6] However, as in all other emergencies, there is a decrease in hospital admissions of ectopic pregnancies during the pandemic period.[7] As a result, delays in diagnosis and, thus, an increase in complications such as ectopic pregnancy ruptures have been observed.[8-10]

In this study, we aimed to evaluate hospital admissions due to ectopic pregnancy and compare the clinical features of the patients and treatment methods before and during the pandemic.

Methods

Ethical approval for this study was obtained from Kartal Dr. Lutfi Kirdar City Hospital Clinical Research Ethics Committee on November 25, 2020, with a decision number of 514/190/17. The study was conducted in accordance with the Helsinki Declaration and reported in adherence to the STROBE guidelines. Informed consent was not obtained from the patients due to the retrospective design.

The patients aged 18–45 years, who were diagnosed with ectopic pregnancy between January 1, 2018, and June 1, 2020, were included in this historical cohort study. Patients with alcohol or drug abuse, malignancy, bleeding diathesis, abnormal liver and kidney function tests, and patients with pathological findings of an intrauterine pregnancy in the endometrial curettage material were excluded from the study. The study patients were evaluated in two groups: the prepandemic group (between January 1, 2018, and March 15, 2020) and the postpandemic group (between March 16, 2020, and June 1, 2020). Age, gravidity/parity, smoking, history of abortion, type of hospital admission, presence of medical comorbidity, history of ectopic pregnancy, ultrasonographic findings, and serum β-hCG values at the first admission and treatment options (wait-and-see, medical, salpingectomy, milking, and salpingostomy) were recorded from hospital records. The type of surgery (laparoscopy/laparotomy), duration of surgery, and transfusion of blood products were recorded.

The ectopic pregnancy was diagnosed by transvaginal ultrasonography (Esaote Technos MyLab 70 XVision, Genoa, Italy) and serum β-hCG measurement. In the first admission, the diagnosis of ectopic pregnancy was confirmed if extrauterine located gestational sac and yolk sac ± embryo in it were observed in transvaginal ultrasonography. However, if the diagnosis of ectopic pregnancy could not be confirmed by transvaginal ultrasonography and the serum β-hCG value was below 1500 mIU/mL, the diagnosis was confirmed by serial β-hCG measurements. If the values plateaued or β-hCG increased <66% in serial serum β-hCG measurements, endometrial curettage was performed, and β-hCG follow-ups were continued. If β-hCG levels plateaued or increased after endometrial curettage, the diagnosis of ectopic pregnancy was confirmed. The ruptured ectopic pregnancy was diagnosed surgically.

Statistics

Statistical analysis was performed using the Statistical Package for the Social Sciences software (SPSS for Windows, version 25.0, Chicago, IL, USA). Categorical variables were presented as frequencies and numbers (%), and continuous variables were presented as median and 25–75 percentiles. The normality of the distribution of the numeric values was analyzed using the Kolmogorov–Smirnov test. The Mann–Whitney *U*-test was used for the comparison of the numeric data, and the categorical data were compared with the Chi-Square or Fisher's exact test. $P < 0.05$ was considered statistically significant.

Results

A total of 173 patients, 116 before and 57 during the pandemic, were included in the study. The demographic data of the patients and their characteristics on admission are presented in Table 1. Accordingly, there was no difference between the pre- and postpandemic groups in terms of age, comorbidities, gravida, parity, and gestational weeks of patients diagnosed with ectopic pregnancy ($P > 0.05$). Ultrasound findings, hemoglobin and β-hCG levels at admission, and previous ectopic pregnancy history of the patients were similar in both groups ($P > 0.05$). Before the outbreak, 41 of 116 (35.3%) patients, and during the outbreak, 7 of 57 (12.3%) patients were admitted with a referral from another hospital. This rate was significantly higher before the outbreak than during the outbreak. However, emergency admissions were significantly higher during the outbreak compared to the prepandemic period (66.7% and 44%, respectively) ($P = 0.003$). While 13 of 116 (11.2%) patients were found to be ruptured before the outbreak, this rate, which was calculated as 16 of 57 (28.1%) patients during the outbreak, was significantly higher than in the prepandemic period ($P = 0.009$).

The treatment methods for ectopic pregnancy before and during the pandemic are presented in Table 2. Salpingectomy was performed in all ruptured patients. When the prepandemic and postpandemic groups were compared, the need for transfusion, the rate of inpatient treatment, hospital stay, and surgery time were found to be similar in both groups ($P > 0.05$). On the other hand, while conservative treatment was applied more frequently in the prepandemic period, it was observed that patients were treated surgically more frequently in the postpandemic period ($P = 0.003$). While laparoscopic surgery was preferred predominantly before the pandemic (72.3%), laparotomy was applied to all patients during the pandemic ($P < 0.001$).

Discussion

The main result of this study is that the rupture rates of ectopic pregnancies and admissions through the emergency department increased significantly during the pandemic. Furthermore, the patients were treated surgically more than with conservative methods during the outbreak.

During the first wave of the outbreak, hospitals in many parts of the world were inadequate, the treatment capacity

Table 1: Patient characteristics

	Group		Z, χ^2	*P*
	Prepandemic (*n*=116), *n* (%)	Postpandemic (*n*=57), *n* (%)		
Age, median (25–75 *P*)	34 (30–37)	33 (28–37)	*Z*=–0.983	0.326
Admission				
Referral	41 (35.3)	7 (12.3)	χ^2=11.693	0.003*
Emergency department	51 (44.0)	38 (66.7)		
Incidental	24 (20.7)	12 (21.1)		
Medical comorbidity				
None	100 (86.2)	51 (89.5)	χ^2=4.941	0.339
Asthma	3 (2.6)	4 (7.0)		
Diabetes mellitus	3 (2.6)	1 (1.8)		
Hypertensive disease	2 (1.7)	0		
Other	8 (6.9)	1 (1.8)		
Previous ectopic pregnancy				
No	108 (93.1)	50 (87.7)	χ^2=1.399	0.237
Yes	8 (6.9)	7 (12.3)		
Ultrasound findings				
Normal adnexa	28 (24.1)	15 (26.3)	χ^2=5.688	0.128
Tubal ring (without yolk sac)	47 (40.5)	17 (29.8)		
Extrauterine embryo/mass (with yolk sac)	11 (9.5)	2 (3.5)		
Pelvic free fluid	30 (25.9)	23 (40.4)		
Ruptured ectopic pregnancy				
No	103 (88.8)	41 (71.9)	χ^2=7.789	0.009*
Yes	13 (11.2)	16 (28.1)		
Serum β-hCG level, median (25–75 *P*)	2365 (1250–5635)	1490 (1175–4670)	*Z*=–1.449	0.147
Gravidity, median (25–75 *P*)	3 (2–4)	3 (2–4)	*Z*=0.309	0.757
Parity, median (25–75 *P*)	1 (0–2)	2 (1–2)	*Z*=1.212	0.226
Gestational week, median (25–75 *P*)	7 (6–8)	7 (6–7)	*Z*=1.123	0.262
Hemoglobin level (g/dL), median (25–75 *P*)	12.1 (11.1–12.9)	12.0 (10.9–12.6)	*Z*=1.037	0.300

*$P<0.05$

Table 2: Treatment methods

	Group		χ^2	*P*
	Prepandemic (*n*=116), *n* (%)	Postpandemic (*n*=57), *n* (%)		
Treatment				
Medical therapy	22 (19.0)	3 (5.3)	14.138	0.005*
Salpingectomy	66 (56.9)	45 (80.7)		
Wait-see	15 (12.9)	2 (3.5)		
Milking	6 (5.2)	5 (8.8)		
Salpingostomy	7 (6.0)	1 (1.8)		
Conservative/surgical				
Conservative	33 (28.4)	5 (8.8)	8.633	0.003*
Surgical	83 (71.6)	52 (91.2)		
Surgery				
Laparoscopy	60 (72.3)	0	67.663	<0.001*
Laparotomy	23 (27.7)	52 (100.0)		
Blood transfusion				
No	110 (94.8)	52 (91.2)	0.832	0.362
Yes	6 (5.2)	5 (8.8)		
Inhospital treatment				
Accept	108 (93.1)	56 (98.2)	2.049	0.152
Reject	8 (6.9)	1 (1.8)		
Hospital stay time (h), median (25–75 *P*)	59 (43–95)	56 (45–72)	0.103	0.918
Surgery time (min), median (25–75 *P*)	40 (40–50)	45 (40–60)	1.228	0.219

*$P<0.05$

was exceeded, and the growing need for intensive care could not be met. Purpose to alleviate the burden on the health system and give priority to patients in need of urgent treatment, it was tried to reduce the number of patients with nonemergency conditions admitted to the hospital in line with the measures taken in our country and around the world. In addition, the restriction decisions taken across the country and people's reluctance to go to hospitals where infected patients are concentrated caused unfortunate delays in hospital admissions of many emergencies and prolongation of the symptomatic time spent at home.[1,7,11] It has been reported that emergency service admissions decreased by 25% 1 week after the restrictions began in England[12,13] and 41.9% after 2 months.[14] In addition to myocardial infarction, stroke, and appendicitis, delays in hospital admission of obstetric and gynecological emergencies were observed. Thus, the need for urgent surgical intervention increased during the pandemic period.[15,16] Based on the findings of this study, the number of ectopic pregnancy cases in the first wave of the outbreak (which lasted for about 3 months) was significantly high compared to prepandemics. Furthermore, with the "stay-at-home" measures, it is possible to have more pregnancies and, therefore, more ectopic pregnancies during the pandemic period.[16]

Ectopic pregnancies that require rapid diagnosis and treatment can lead to severe complications. Although the articles from England are encouraging that the risk of rupture in ectopic pregnancies does not increase during the pandemic, the same is not valid for other countries.[13,16,17] According to the findings reported from Italy,[18] Israel,[8,9] Delaware,[19] New York,[20] and Boston,[16] the rate of rupture and the frequency of surgical intervention in ectopic pregnancies increased significantly during the outbreak compared to the previous year. Similarly, our findings showed that the frequency of ruptured ectopic pregnancy during the outbreak (28.1%) was significantly higher than the previous year (11.2%). Moreover, the rate of ectopic pregnancies requiring surgical intervention (91.2%) was found to be substantially higher than the year before the pandemic (71.6%).

It is evident that the rupture risk of ectopic pregnancies and the need for surgical intervention in England are not affected by the pandemic period.[14,17] When this issue is evaluated in terms of England, we can see the significant impact of the clinical practice guidelines published by the Royal College of Obstetricians and Gynecologists and the International Society of Ultrasound in Obstetrics and Gynecology in terms of continuing early pregnancy and gynecological ultrasound follow-ups during the pandemic period.[21-23] Accordingly, it was ensured that all women with risk factors or symptoms of ectopic pregnancy were examined by ultrasound within 24 h. When the diagnosis of ectopic pregnancy was made, conservative treatment was started at home in the early period. If these attempts failed, surgical treatment was planned by admitting the patients to the hospital. A telephone-triage plan was implemented to execute all of these remotely without going to the hospital.[17] As a result, it has been observed that conservative treatments are applied more frequently, with fewer hospital admissions and without an increase in complications

during the pandemic period in England.[14] However, the situation is different in other reports from elsewhere and also in this study.[17] During the pandemic, it was observed that the number of patients suitable for conservative surgery decreased, and an increase in ruptured ectopic pregnancies was observed, which may be a result of delays in hospital admissions during the outbreak. It was also reported that there was a decrease in the success of conservative treatment during the pandemic period.[17]

It has been emphasized that compliance with outbreak protocols and guidelines during the pandemic is vital for patients and health-care workers in reducing transmissions. In minimally invasive surgery, intubation and extubation processes, insufflation for pneumoperitoneum, leaks during insertion and removal of instruments from trocars, and tissue coagulation are the riskiest periods in terms of virus spread.[24-26] Considering these critical time points and taking various measures, guidelines support laparoscopic surgery in ectopic pregnancies.[14,17] However, two-thirds of surgeons still prefer laparotomic surgery to laparoscopy in ectopic pregnancies.[27] Similarly in this study, while the most preferred technique in ectopic pregnancies was laparoscopic surgery before the pandemic, laparotomic surgery was applied to all of them during the pandemic. The most important reason for this was the clinically adopted approach to shorten the duration of surgery, allow regional anesthesia by reducing intubation and extubation, and shorten the amount and time of contact.

Limitations

First, the protocol is retrospective, but it is impossible to carry out a prospective investigation on this concept. Second, the number of cases could have been increased by conducting a multicenter study. On the other hand, the importance of this article is that it is the first study from Turkey to reveal how the pandemic affected ectopic pregnancy cases in terms of presentation and management.

Conclusions

Delays were experienced in the diagnosis of ectopic pregnancies in the first wave of the pandemic, and these patients applied to the emergency services more frequently with rupture. For this reason, it was observed that more surgical interventions were used for ectopic pregnancies during this period. In light of the results obtained from this study, it is indisputable that being prepared for possible future pandemics is of great importance.

Author contributions

HG: protocol development, data collection and management, data analysis, and manuscript writing/editing. GB: protocol development, data collection and management, data analysis, and manuscript writing/editing. BK: protocol development, data collection, and manuscript writing/editing. MMA: data collection and management and manuscript writing/editing.

Conflicts of interest

None declared.

Ethical approval

Kartal Dr. Lütfi Kirdar City Hospital Clinical Studies Ethics Committee, Istanbul, Turkey, decision no: 514/190/17, November 25, 2020.

Consent

Informed consent was not obtained from the patients due to the retrospective design.

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