

An Audit of the Gynecological Emergencies requiring Emergency Laparotomy in a Tertiary Care Hospital: Time Line of Events from Arrival to Emergency to Arrival to Operation Theatre

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ABSTRACT

Introduction: Gynecological emergencies can threaten the life of the female and cause loss of fertility and organ. Ruptured ectopic pregnancy is the most prevalent of the gynecological potentially life-threatening emergencies (G-PLEs). Diagnostic tools are medical history, clinical examination, imaging, and lab investigations, mainly human chorionic gonadotropin (β -HCG) and hemoglobin. Surgery is the mainstay of treatment and the approach can be laparotomy and laparoscopy.

Objective: The objective of this study is to assess the time taken from arrival to the emergency department (ED) to arrival to diagnosis and to assess the time taken from arrival to ED to arrival to operation theatre (OT) and correlate the time taken with patient morbidity.

Methods: The study was done between April 1, 2021 and September 31, 2021. All patients with suspected gynecological emergencies requiring emergency laparotomy/laparoscopy arriving at the ED were included in the study. Data collection was from medical records – six time intervals were collected.

Results: There were 16 ruptured ectopic pregnancies during the study period. ED to OB consultation was in <60 min in 12 (75%) cases. ED to ultrasound (USG) and diagnosis were in <60 min in 11 (73%) cases. Diagnosis to OT was in <60 min in only 8 (50%) cases. Delay after diagnosis was due to delay in admission in four (delay in the decision by attendees mostly due to financial constraints), delay in the decision for surgical intervention in three, and nonavailability of blood in one patient. All 5 (100%) patients with grades III and IV of shock had hemoperitoneum >1.5 L and 3 (60%) required postoperative intensive care unit (ICU).

Conclusion: Higher morbidity was seen in a higher grade of shock. It is essential to recognize the degree of physiological deterioration with the help of an early warning scoring system. Timely surgical intervention with simultaneous efforts for resuscitation reduces morbidity and mortality.

Keywords: Gynecological emergency, Gynecological potentially life-threatening emergencies, Ruptured ectopic pregnancy, Timeline of events. *Journal of South Asian Federation of Obstetrics and Gynaecology* (2022); 10.5005/jp-journals-10006-2143

INTRODUCTION

Gynecological emergencies are disease conditions of female reproductive system that threatens the life of the woman, her fertility, and sexual function.¹

They include early pregnancy complications and nonpregnancy-related gynecological complications. Ruptured ectopic pregnancy, hemoperitoneum of any gynecological origin, adnexal torsion, and complicated pelvic inflammatory disease (PID) (pelvic abscess, tubo-ovarian abscess) are some of the potentially life threatening gynecological emergencies.²⁻⁴

Late diagnosis and inappropriate management can lead to mortality, loss of organ, and fertility.² The diagnostic tools are medical history, clinical examination, imaging, and laboratory tests.^{1,2} Surgery is the mainstay of treatment and the approach can be laparotomy or laparoscopy.⁴

According to the National Confidential Enquiry into Patient Outcome and Death (NCEPOD) classification of surgical intervention, the target time to theatre should be within minutes of decision to operate in life-threatening emergencies, where resuscitation is simultaneous with surgical treatment, for example, ruptured ectopic pregnancy.⁵⁻⁷ Where the condition is a threat to organ survival or deterioration of conditions that threaten life, target time to theatre is within hours of decision to operate and is performed once resuscitation is completed, for example, peritonitis.⁵ There

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is no recommendation on the appropriate time for surgical intervention in various gynecological emergencies. Also, there are no published studies addressing this issue.

We planned to audit gynecological emergencies requiring emergency laparotomy and assess our current ability against the standard given by the NCEPOD.

The aim of this study was to analyze the time taken from arrival to the ED to arrival at diagnosis and arrival to OT in various gynecological emergencies requiring surgical interventions (laparotomy/laparoscopy) and correlate the time taken with patient morbidity.

Also, the prevalence of various disease conditions contributing to gynecological emergency requiring surgical intervention (laparotomy/laparoscopy) was estimated.

The study would help to identify the delaying step so that necessary corrective actions can be taken. Early diagnosis and timely intervention are important to reduce morbidity and mortality in these emergencies.

METHODS

This is a retrospective cross-sectional study of gynecological emergencies arriving to the ED and requiring emergency surgical intervention (laparotomy/laparoscopy).

The study was done at a teaching hospital located in Bengaluru, India between April 1, 2021 and September 30, 2021. The IEC approval was obtained prior to the initiation of the study (IEC Ref. No 337/2021). The ED has Emergency Medicine Fellowship program and attached ICU.

The residents and consultant of the department of obstetrics and radiology are available on call round the clock. In majority of cases, USG is done by radiologist in USG room; however, in few cases, USG is done in the ED with portable machine by radiologist or emergency physicians.

All the patients coming to the ED with early pregnancy complication and nonpregnancy-related gynecological complication requiring emergency laparotomy or laparoscopy during the study period were included in the study.

Data were collected from the patients' medical record. Data regarding clinical condition of the patient on arrival like pulse, SBP, DBP, Hb% were noted for each patient. The grade of shock on arrival to ED was analyzed.

The timeline of events was noted. The time intervals measured were as follows:

- ED arrival to obstetric consultation
- ED arrival to laboratory reports
- ED arrival to ultrasound reports or diagnosis
- Diagnosis to OT arrival
- ED arrival to admission
- ED arrival to OT arrival

The demographic details like age and obstetric (OB) index were noted.

The OB consult time was defined by the time taken for the OB consultant to see the patient from the time of arrival to the ED, as documented in the consultant notes. The USG report time was noted from the radiologist notes. Lab reports (hemoglobin, β -HCG, and other reports) were collected by the resident doctors.

The OT arrival was defined by the time documented on arrival to OT by anesthetist. The patient outcome was defined in terms of morbidity and mortality. Morbidity was measured by the estimated blood loss, need for blood and blood products, and need for ICU.

Analysis

Data were analyzed using StataCorp. 2019. Stata Statistical Software: Release 16. College Station, TX: StataCorp LLC. All categorical and continuous measurements were summarized using frequency percentage and mean \pm SD or median inter quartile range (IQR) based on the distribution. The association of time taken for different procedures with clinical outcomes of pregnancy was assessed

using Chi-square test. *p*-value was considered significant at 5% level of significance for all comparison.

RESULTS

We had 20 gynecological emergencies arriving to the ED during the study period with ruptured ectopic being maximum 16 (80%) (Table 1).

Statistical analysis was done for ruptured ectopic cases. The time taken for each stage from arrival to the ED is documented in Table 2.

The time taken by our laboratory to give reports after receiving the sample was 48 minutes (the average time). The median time for arrival to the ED to laboratory reports was 77 minutes. The median time for arrival to the ED to the USG report and diagnosis was 45 minutes, and the median time from diagnosis to OT was 75 minutes.

The percentage of cases where time taken for each stage was <30 minutes, 30–60 minutes, and >60 minutes was analyzed (Table 3).

The ED to OB consultant was <60 minutes in 12 (75%) cases. The ED to USG and diagnosis were in <60 minutes in 11 (73%) cases, and the diagnosis to OT was <60 minutes in only 8 (50%) cases. Diagnosis was followed by decision for immediate laparotomy as per the hospital protocol for rupture ectopic in shock.

Delay of >1 hour from diagnosis to OT was due to delay in admission in four, nonavailability of blood in one, and delay in decision for surgical intervention in three patients.

The time from ED to OT was also analyzed. Five (31%) reached OT in <120 minutes. There was delay of >240 minutes in 5 (31%) cases. The cause of delay in these cases was due to delay in the OB consultation by >3 hours in three cases and delay in admission by >3 hours in 2 cases (Table 3).

There were 11 (68.75%) cases with grades I and II of shock and 5 (31.25%) cases with grades III and IV of shock (Fig. 1).

In four (80%) cases with grades III and IV of shock, the arrival from ED to OT time was <120 minutes. Where the delay was >240 minutes, all were in grade I or II of shock. So, we infer that patients

Table 1: Frequency of gynecological emergencies

Gynecological emergencies	Frequency	%
Ruptured ectopic	16	80
Ovarian torsion	2	10
Pelvic abscess with sepsis	1	5
Post-TAH with hemoperitoneum	1	5
Total	20	100

TAH, total abdominal hysterectomy

Table 2: Timelines from arrival to ED to arrival to OT

Variable (min)	N	P50	P25	P75	Min.	Max.
ED to OB consultation	16	25	10	72.5	10	255
ED to laboratory report	16	77.5	75	110	55	330
ED to USG and diagnosis	15	45	30	90	25	285
ED to admission	16	97	71.5	186	41	347
Diagnosis to OT	16	75	37.5	180	20	300
ED to OT	16	185	107.5	297.5	70	430

with higher grade of shock received care in shorter time intervals (Table 4).

The mean Hb% on arrival was 9.99 gm%, SD 2.05. There was no mortality in our patients. Morbidity was determined by estimating intraoperative hemoperitoneum and need for postoperative ICU care (Table 5).

Table 3: Measured frequencies in each stage

Variable	Frequency	%
ED to OB consultation		
≤30 min	10	62.5
31–60 min	2	12.5
>60 min	4	25
ED to laboratory reports		
31–60 min	1	6.25
>60 min	15	93.75
ED to USG and diagnosis		
≤30 min	4	26.67
31–60 min	7	46.67
>60 min	4	26.67
ED to admission		
<60 min	3	18.75
61–120 min	7	43.75
>120 min	6	37.5
Diagnosis to OT		
≤30 min	3	18.75
31–60 min	5	31.25
>60 min	8	50
ED to OT		
≤120 min	5	31.25
121–240 min	6	37.5
>240 min	5	31.25

For all patients with grades III and IV of shock, 5 (100%) had hemoperitoneum of >1.5 L and 3 (60%) required postoperative ICU care.

None in grades I and II of shock required ICU care (Table 5). We hence infer that higher morbidity was seen in higher grade of shock.

There were four other gynecological emergencies (Table 6). Ovarian torsion in two patients with arrival to ED to arrival to OT of <12 hours and <3 hours and underwent laparoscopic cystectomy, laparotomy and cystectomy, respectively. There was one case of septic shock with ED to OT time of 6 hours. There was one case of post-total abdominal hysterectomy (TAH) with hemoperitoneum with grade III of shock where the ED to OT was 6 hours; the cause of delay was due to delay in admission and there was significant morbidity requiring blood transfusions and postoperative ICU care with ventilator support.

DISCUSSION

This is the first study to look at the time lines for diagnosis and surgical intervention in gynecological emergencies.

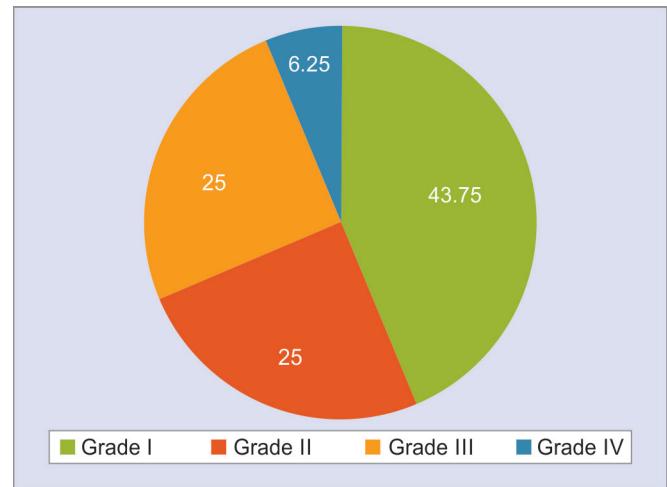


Fig. 1: Grades of shock

Table 4: Correlation of time of arrival to the ED to arrival to the OT with grade of shock

ED to OT	Shock grades I and II (%)	Shock grades III and IV (%)	Total	p-value (Fisher's exact test)
<120 min	1 (9.09%)	4 (80%)	5 (31.25%)	0.027
121–240 min	5 (45.45%)	1 (20%)	6 (37.5%)	
>240 min	5 (45.45%)	0	5 (31.25%)	
Total	11 (100%)	5 (100%)	16 (100%)	

Table 5: Comparison of shock with morbidity

Variable	Shock grades I and II (%)	Shock grades III and IV (%)	Total	p-value (Fisher's exact test)
Blood loss				
≤1.5 L	8 (72.73%)	0	8 (50%)	0.026
>1.5 L	3 (27.27%)	5 (100%)	8 (50%)	
ICU				
No	11 (100%)	2 (40%)	13 (81.25%)	0.018
Yes	0	3 (60%)	3 (18.75%)	
Total	11 (100%)	5 (100%)	16 (100%)	

Table 6: Timeline of events and morbidity in other gynecological emergencies

<i>Patient diagnosis</i>	<i>ED to OB consultation</i>	<i>ED to laboratory reports</i>	<i>ED to USG diagnosis</i>	<i>ED to admission</i>	<i>Diagnosis to OT</i>	<i>ED to OT</i>	<i>Grade of shock</i>	<i>Hemoperitoneum</i>	<i>ICU</i>
Patient 1									
Ovarian torsion	55	185	85	172	660	760	–	250	No
Patient 2									
Ovarian torsion	10	129	30	48	180	220	–	200	No
Patient 3									
Sepsis	10	240	60	90	240	360	4	100	Yes
Patient 4									
TAH with hemoperitoneum	15	105	30	220	270	375	3	2500	Yes

TAH, total abdominal hysterectomy

Maximum cases were of rupture ectopic pregnancy in our study. This was similar to the study by Fauconnier et al. and Hammond et al.^{4,8} The time taken from arrival to ED to OB consultation was within 30 minutes in 62% with a median of 25 minutes.

Urquhart et al. reported arrival to consult time of median of 16 minutes in the point of contact USG done in ED (POCUS) group and 127 minutes in Radiology Department performed USG (RADUS) group.⁹

Ghandehari et al. in their study of time lines in ovarian torsion reported the ED to physician assessment time of median is 1.3 hours.¹⁰

Extreme delay in OB consult in our study was due to misdiagnosis and failure to suspect gynecological cause by the ED physician on arrival to the ED due to varied presentation of the gynecological emergencies mimicking other surgical and medical emergencies. Diagnostic errors for G-PLE conditions are major errors that are likely to lead to delay in treatment.⁴

The USG (TVS) was found to be the diagnostic tool with the highest performance for the diagnosis of G-PLES.²

Diagnosis is based on multiple diagnostic tools and is a process of progressive nature. Exact moment of diagnosis is difficult to determine.⁴ We considered time of the USG as the time of arrival at diagnosis in our study.

Our median time for the USG and diagnosis was 45 minutes. Urquhart et al. reported mean time of 15 and 138 minutes for their POCUS and RADUS group, respectively.⁹

The median time for arrival to the ED to arrival to OT in our study was 185 minutes with interquartile range of 107–297 minutes. Urquhart et al. reported a median time of 122 minutes in the POCUS group and 362 minutes in the RADUS group.⁹

Fauconnier et al. in their study had a median of 4.25 hours intra-hospital time to treatment for gynecological emergencies with an interquartile range of 8 hours.⁴

The cause for delay in arrival to ED to arrival to OT was the delay in admission due to financial constraints, delay in decision for surgical intervention, and delay in the OB consultation.

Adamu et al. found a delay of >6 hours for emergency abdominal surgeries due to financial constraints in 54%.¹¹

Severe morbidity in G-PLE is associated with quality of care.¹² Substandard care due to misdiagnosis of ectopic pregnancy, diagnostic, and therapeutic delay increases severe morbidity due to increased blood loss.¹³

It is crucial to recognize the severity of illness and initiate necessary resuscitative measures to improve the vitals of the patient

simultaneous to efforts to arrive at the diagnosis in emergency situation.¹⁴

In our study those with higher grade of shock received care without undue delay; in spite of it, higher morbidity was observed in this group. We speculate that delayed treatment in this group could have led to mortality.

The strength of this study was that we could contribute to the limited data available in G-PLEs with respect to timelines at various stages from the patient arrival to treatment. Time series data and the correlation with results help to provide health-care team important feedback to improve quality of care.¹⁵ We believe that such a study will help in identifying the delaying step which, will help to take corrective action.

The limitation of this study is its retrospective design. Therefore, causes that are responsible for delay could not be assessed accurately. The number of nonectopic G-PLEs was few and could not be subjected to statistical analysis.

We can improve outcomes and reduce morbidity by delivering the treatment within a time frame appropriate for the emergency. More research is required in the area of G-PLEs as there are no recommendation and standard set for quality measures by the gynecologic advisory bodies as compared with obstetric emergencies.

CONCLUSION

Training of ED physicians to recognize gynecological emergencies, point of care USG in ED, standardized treatment protocol, and recognizing the severity of illness with early warning score to determine and recognize physiological deterioration help to save lives and reduce morbidity by preventing delay in intervention.

Also, the patient and relatives cooperation is required to provide timely care. Models for educating patient and attenders about the emergency condition and appropriate counseling will be useful for effective communication. Hospitals should have protocols to provide services to critically sick patients with financial constraints and prevent delay due to reasons of nonaffordability.

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