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Original Article

An Appraisal of Anaesthesia for Ectopic Pregnancy in a Tertiary Institution North-central Nigeria

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Abstract

Context: Ectopic pregnancy is a life threatening gynaecological emergency; it is a significant cause of maternal morbidity and mortality, thus poses various anaesthetic challenges. **Aims:** To determine the profile of women that present with ectopic gestation, their mode of presentation, the anaesthetic technique used, complications and outcome. **Settings and Design:** This was a retrospective review of ectopic pregnancy at the University of Ilorin teaching hospital from 1st January 2015 to 31st December 2018. **Materials and Methods:** Data were obtained from operating theatre records, anaesthetic records regarding modes of anaesthesia, complications and outcomes were extracted. **Statistical Analysis Used:** Analysis was done IBM SPSS version 22. **Results:** There were 89 cases of ectopic pregnancies that were managed during the period of review. The incidence of ectopic pregnancy in this study was 0.9% of all deliveries. A total of 69 (77.5%) of the case file were available and were retrieved and analysed. The age range was 25–29 years, with mean age of 27.5 ± 5.4 years. Most of the patients presented with ruptured ectopic 57 (82.6%). All the patients had general anaesthesia, and ketamine 47 (68.2%) was the predominant induction agent (P = 0.007). The most common surgical intervention performed was open laparotomy with unilateral salpingectomy 60 (87%). Fifty three (76.8%) of the patients required intra operative blood transfusion. All patients with the American Society of Aanesthesiologists (ASA) IVE had ruptured ectopic, while 88% of patients with ASA IIIE presented with ruptured ectopic. Ninety per cent of the patient that were ASA IVE had an immediate post operative complication. While the least complication was seen in patients with ASA IE 3 (37.5%). No patient required intensive care admission, and no mortality was recorded. **Conclusion:** The most common form of presentation of ectopic pregnancy in this study was ruptured unilateral ectopic, and general anaesthesia for laparotomy was the most common intervention.

Keywords: Anaesthesia, complications, ectopic pregnancy, ruptured ectopic

Introduction

An ectopic pregnancy occurs when the fertilised ovum becomes implanted in a site other than the uterine cavity.[1] It is a common life-threatening emergency and the leading cause of maternal mortality and morbidity in the first trimester.[2] The incidence of ectopic pregnancy varies in different parts of the world and accounts for approximately 1%–2% of all pregnancies in developed countries.[3] In the United States of America and the United Kingdom, a population-based study estimated the incidence of ectopic pregnancy to be 2.2% and 1.6% of live births, respectively.[4] Asia has an incidence of 0.6%–1.3%, which was based on the total number of hospital deliveries.[5,6] In Africa, Guinea Bissau reported an incidence of 1.5% and Ghana 3.2% of the total number of deliveries, respectively.[7,8] In Nigeria, the reported rates of ectopic gestation range from 0.48% to 4.38%.[9-11]

About 95% of ectopic pregnancies are located in one of the fallopian tubes, and most ectopic implantation is found in the ampullary region of the fallopian tube while the rare sites of implantation are the cervix, ovary and abdominal cavity.[12]

Most patients with ectopic pregnancy usually present with pelvic or abdominal pain and they may also present with a history of secondary amenorrhea, abnormal vaginal bleeding, dizziness and/or syncope, which is usually seen in advanced

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stages of intra-peritoneal haemorrhage following rupture of the ectopic pregnancy.[10,13,14] However, early diagnosis of ectopic pregnancy reduces the risk of rupture and allows the use of conservative medical treatment and minimally invasive surgical procedures.[15,16] Unfortunately, most of the cases seen in our sub-region are ruptured ectopic that present with various anaesthetic challenges; this is because they usually present with hypovolemia or cardiovascular collapse and considerable time must have elapsed between rupture time and the arrival time at the hospital and without prompt intervention, it can invariably lead to death.[17]

The mode of surgical intervention in our sub-region is usually open laparotomy with salpingectomy of the involved fallopian tube.[11]

The need for urgent surgical intervention in patients with ruptured ectopic poses various anaesthetic challenges to the attending anaesthetist. We also discovered that no previous study has been done to assess the anaesthesia for ectopic pregnancy in our institution. Therefore this retrospective study is aimed at determining the profile of women that presented with ectopic pregnancy, mode of presentation, the anaesthetic technique used, type of surgical intervention and the eventual outcome.

Materials and Methods

This was a retrospective review of ectopic pregnancies at the University of Ilorin Teaching Hospital, Nigeria, from January 1, 2015 to December 31, 2018. Operating theatre records and anaesthetic records were reviewed to generate a list of patients with ectopic pregnancy operated during the study period. The generated list was submitted to the records department to retrieve the files. All the files with adequate records were included in the study. The labour ward register was used to ascertain the total number of deliveries for the same study period.

Patient's demographic data, parity, gestational age, American Society of Anesthesiologists (ASA) physical status, type of ectopic gestation, anaesthetic technique used, anaesthetic induction agent, estimated blood loss, the number of units of blood transfused, use of inotropes, cadre of the anaesthetist, type of surgery and complications were recorded.

Data generated were analysed and presented as frequencies, percentages (for quantitative variables), and categorical data were analysed using Chi-square and Fisher's exact test as appropriate using the Statistical Package for Social Sciences (IBM SPSS Statistics for Windows, Version 22.0 Armonk, NY, USA: IBM Corp). A value of $P < 0.05$ was considered statistically significant.

Results

Only 69 (77.5%) files of the 89 cases of ectopic pregnancies were available for retrieval and analyses. Over the review period, the hospital recorded 10,396 deliveries; therefore, the incidence of ectopic pregnancy in this study is 0.9% of all deliveries. Table 1 shows the socio-demographic characteristic of the reviewed women with ectopic gestation. The age range of the majority of the patients was 25–29 years (36.2%), while the mean age was 27.5 ± 5.4 years. The least incidence was in the age group >40 years 1 (0.4%). All the cases were done as emergency, and majority of the patients were ASAIIE 26 (37.7%) and ASAIIIE 25 (36.2%), while the least was ASA IVE 10 (14.5%). Primiparous patients constituted 38 (55.1%) of the patients with ectopic gestation, while grand multiparous constituted the least 2 (2.4%). Most of the patients had a previous history of abortion 45 (65.2%).

Table 2 shows that the most frequent clinical sign and symptom the patients presented with was abdominal pain with vaginal bleeding 40 (58%); however, the most frequent modes

Table 1: Socio-demographic characteristics of the patients with ectopic pregnancy (*n*=69)

Variable	*n* (%)
Age	
<20	2 (2.9)
20-24	21 (30.4)
25-29	25 (36.2)
30-34	12 (17.4)
35-39	8 (11.6)
>40	1 (1.4)
ASA classification	
ASA I	8 (11.6)
ASA II	26 (37.7)
ASA III	25 (36.2)
ASAIV	10 (14.5)
Parity	
P0	38 (55.1)
P1	5 (7.2)
P2	10 (14.5)
P3	9 (13.0)
P4	5 (7.2)
P5	1 (1.4)
P6	1 (1)
Previous abortions	
Yes	45 (65.2)
No	24 (34.8)

ASA: American Society of Anaesthesiology

Table 2: Clinical symptoms and signs of patients with ectopic pregnancy

Clinical symptoms and signs	Frequency, *n* (%)
Abdominal pain+vaginal bleeding	40 (58)
Abdominal pain	12 (17.4)
Abdominal pain+dizziness/fainting	5 (7.2)
Vaginal bleeding	4 (5.8)
Abdominal pain+vomiting	4 (5.8)
Missed period	2 (2.9)
Abdominal pain+shock	2 (2.9)
Total	69 (100)

of presentation were abdominal pain (91.3%) plus another sign or symptom. While the least mode of presentation was missed period alone 2 (2.9%) and abdominal pain and shock 2 (2.9%).

Table 3 shows that the most common site of presentation of ectopic pregnancy was at the ampullary region of the fallopian tube 43 (63.2%) while the least site of the presentation was in the broad ligament 1 (1.4%).

Table 4 shows that most of the patients presented with ruptured ectopic pregnancy 57 (82.6%) and only one patient, 1 (1.5%) had chronic ectopic gestation. Among the patients that presented with ruptured ectopic pregnancy 28 (49.1%) of them had a packed cell volume (PCV) above 25% at presentation and 22 (38.6%) of them had PCV <24% at presentation. Fisher's exact test value = 6.794, and the *P* value was 0.271, which is not statistically significant.

All the cases 100% were performed under general anaesthesia and Table 5 shows that the most frequently used induction agent for general anaesthesia in the patients with ectopic pregnancy was ketamine 47 (68.2%) while the least used induction agent was propofol plus fentanyl 1 (1.4%) and propofol plus ketamine 1 (1.4%). Most of the patients that had PCV <25% had ketamine as the induction agent 19 (76%), followed by propofol 4 (16%) and midazolam plus fentanyl 1 (4%). Fisher's exact test value = 21.013 and the *P* value was 0.007, which is statistically significant.

Table 6 shows that a total of 53 (76.8%) of the patients had an intra-operative blood transfusion, of which 3 (4.3%) had four units transfused. Of the patients that had a pre-operative PCV of <15% 2 (50%) of them had four units of intra-operative blood transfusion. Furthermore, 3 (75%) of the patients that had a PCV of <15% had an estimated blood loss of >2 L. While 10 (83.3%) of the patients with a pre-operative PCV of >31% did not require an intra-operative blood transfusion. Fisher's exact test value = 42.471 and *P* value was 0.000, which is statistically significant.

Only 2 (2.9%) of the patients required intra-operative use of inotrope (adrenaline), while 64 (92.7%) did not require intraoperative use of inotropes.

All the 10 (100%) patients classified as ASA IVE presented with ruptured ectopic, 22 (88%) of those classified as ASA IIIE presented with ruptured ectopic while only 4 (50%) of those classified as ASA IE presented with ruptured ectopic. Table 7 shows that all the patients that had shock in the immediate post-operative period were ASA IIIE and IVE and 90% of the patients that were ASA IVE had an immediate post-operative complication. The least complication was seen in patients with ASA IE, of which 5 (62.5%) had no immediate post-operative complication. Fisher's exact test value = 13.581 and *P* value was 0.013, which is statistically significant.

Table 3: Site of the ectopic pregnancy

Site	Frequency, *n* (%)
Ampullary	43 (63.2)
Isthmic	10 (14.5)
Fimbrae	4 (5.8)
Ovary	2 (2.9)
Corneal	4 (5.8)
Broad ligament	1 (1.4)
Not stated	5 (7.2)
Total	69 (100)

Table 4: Comparing the pre-operative packed cell volume and the type of ectopic pregnancy at presentation

Pre-operative PCV range (%)	Ectopic presentation, *n* (%)				Total, *n* (%)	*P*
	Ruptured	Unruptured	Chronic	Not stated		
<24	22 (38.6)	1 (11.1)	0	0	23 (33.3)	0.271
≥25	28 (49.1)	7 (77.8)	1 (100)	1 (50)	37 (53.7)	
Not stated	7 (12.3)	1 (11.1)	0	1 (50)	9 (13.0)	
Total, *n* (%)	57 (100)	9 (100)	1 (100)	2 (100)	69 (100)	

PCV: Packed cell volume

Table 5: Comparing the pre-operative packed cell volume and the induction agents used for general anaesthesia in patients presenting with ectopic pregnancy

Pre-operative PCV range (%)	Induction agents						Total	*P*
	Propofol	Ketamine+propofol	Propofol+fentanyl	Midazolam+fentanyl	Ketamine	Not stated		
<15	0	0	0	1	3	0	4	0.007*
16-20	0	0	0	0	9	0	9	
21-25	4	0	0	0	7	1	12	
26-30	4	1	1	1	16	0	23	
>31	8	0	0	0	4	0	12	
Not stated	0	0	0	0	8	1	9	
Total (%)	16 (23.2)	1 (1.4)	1 (1.4)	2 (2.9)	47 (68.2)	2 (2.9)	69 (100)	

*Statistically significant. PCV: Packed cell volume

Table 6: Comparing the pre-operative packed cell volume to the number of units of blood transfused intra-operatively to patients with ectopic pregnancy

Pre-operative PCV range (%)	Number of units transfused					Total	*P*
	One	Two	Three	Four	None		
<15	1	1	0	2	0	4	0.000*
16-20	1	7	0	0	1	9	
21-25	1	8	2	0	1	12	
26-30	9	11	0	0	3	23	
>31	1	1	0	0	10	12	
Not stated	2	5	0	1	1	9	
Total	15 (21.7)	33 (47.8)	2 (2.9)	3 (4.3)	16 (22.2)	69 (100)	

*Statistically significant. PCV: Packed cell volume

Table 8 shows that 42 (73.7%) of the patients with ruptured ectopic pregnancy had immediate post-operative complications and 15 (26.3%) had no complication. All the patient that had shock in the immediate post-operative 3 (100%) had ruptured ectopic pregnancy. Forty-two patients had severe anaemia out of which 39 (92.9%) had ruptured ectopic. Only 3 (33.3%) of the patients with unruptured pregnancy had an immediate post-operative complication and 6 (66.7%) had no complication. The only patient with chronic ectopic pregnancy 1 (100%) had no immediate post-operative complication. Fisher's exact test value = 12.315 and *P* value was 0.031, which is statistically significant.

The most common type of surgery performed for the patients with ectopic pregnancy was open laparotomy with unilateral salpingectomy 60 (87%), other types of surgeries performed were, wedge resection 4 (5.8%), partial salpingectomy 2 (3%), partial ovariotomy 1 (1.4%), evacuation of broad ligament haematoma 1 (1.4%) and salpingectomy + ovarian cystectomy 1 (1.4%). The attending anaesthetist for the surgeries were all highly skilled, it was either the senior registrar 61 (88%) or the consultant 8 (11.6%). None of the patients with an ectopic pregnancy that had surgery required intensive care unit admission, and no mortality was recorded.

Table 7: Comparing the American Society of Anaesthesiology physical status of the patients that had surgery due to ectopic pregnancy and their immediate post-operative complications

ASA physical status	Post-operative complications			Total	*P*
	Severe anaemia	Shock	None		
ASA I	3	0	5	8	0.013*
ASA II	13	0	13	26	
ASA III	19	1	5	25	
ASA IV	7	2	1	10	
Total (%)	42 (60.9)	3 (4.3)	24 (34.8)	69 (100)	

*Statistically significant. ASA: American Society of Anaesthesiology

Table 8: Comparing the type of ectopic pregnancy to the immediate post-operative complications

Type of ectopic pregnancy	Immediate post-operative complications			Total	*P*
	Severe anaemia	Shock	None		
Ruptured	39	3	15	57	0.031*
Unruptured	3	0	6	9	
Chronic	0	0	1	1	
Not stated	0	0	2	2	
Total	42	3	24	69	

*Statistically significant

Discussion

The peak incidence age range of ectopic pregnancy in this study was 25–29 years, which is consistent with the findings from some other parts of Nigeria.[18-20] This is because this age range corresponds to the age of reproduction and the peak age of sexual activity.[20]

Majority of the patients were nulliparous women 55.1%, which is comparable to the findings in some other studies.[19,21] The reason may be due to the widespread practice of unsafe abortions in unmarried women with unintended pregnancies, which may predispose them to have ectopic gestation in future pregnancy. In this study, 65.2% of the patients had a previous history of abortion, and this high figure may be due to the early age of sexual debut in our environment because it has been reported that 53% of Nigerian women aged between 15 and 19 years have had sexual intercourse.[22] Abdominal pain with or without other signs and symptoms, 91.3% was the most common form of presentation in this study. This type of presentation is similar to that reported by Omokanye *et al*.[11] and Ganitha and Anuradha[23] with 95.7% and 90%, respectively. The commonest site of the presentation was in the ampullary region of the fallopian tube 58%, which is similar to that reported by several studies as their commonest site of presentation.[21,24,25] Ruptured ectopic gestations accounted for 82.6% of the patients that had an ectopic pregnancy in this study and it also accounted for 92.9% of the patients with post-operative anaemia. This finding is similar to that reported in several studies.[11,20] The reason is due to the late presentation of the patients with massive haemoperitoneum as a frequent finding.

All the patients had general anaesthesia with ketamine as the most frequently used (68.2%) induction agent $P = 0.007$. This is not surprising because ketamine is a good induction agent used in emergency settings in patients presenting in shock or hypotension. This is due to the rapid blood-cerebral transfer kinetics, sympathomimetic haemodynamic effects and absence idiosyncratic adverse effects like steroidogenesis associated with ketamine use.[26] In this study, all the patients were subjected to general anaesthesia, including the 9 patients that had unruptured ectopic gestation. Of these 9 patients, 7 (77.8%) were ASA I and ASA II with a PCV range of 29%–35%. These patients were relatively stable that could have been performed under regional anaesthesia. Malavika *et al*.,[27] in their study, reported that general anaesthesia was preferred in all emergency cases and that spinal anaesthesia was given in elective unruptured ectopic cases.

The ASA physical status classification showed that most of the patients that had severe immediate post-operative complications were those of ASA IIIE and ASA IVE, while the least complication was seen in those with ASA IE and the *P* value was 0.013 which is statistically significant. This is not surprising because 100% of the patients with ASA IVE had ruptured ectopic gestation, 88% of the patients with ASA IIIE had ruptured ectopic while only 50% of those with ASAIE presented with ruptured ectopic pregnancy. The outcome of the patients in this study agrees with the report by Hackett *et al*.,[28] who concluded that the ASA physical status classification has a strong, independent association with post-operative medical complications and mortality.

In this study, open laparotomy with unilateral salpingectomy was the commonest life-saving surgical intervention performed, because 82.6% of the patients presented with ruptured ectopic pregnancy with significant haemoperitoneum. The presence of this significant bleed in most of the patients required intraoperative (76.8%) and post-operative blood transfusion. In a developing country like Nigeria, most of the patients present after rupture of the ectopic pregnancy, and therefore simultaneous resuscitation of the patient and emergency laparotomy revived the women in shock sooner. Several studies have shown that laparotomy was the operation of choice in women presenting in shock.[10,25,29] However, women who had an unruptured ectopic pregnancy and were haemodynamically stable would have benefited from laparoscopic surgical intervention. Malavika *et al*.[27] reported that the patients with an ectopic pregnancy who were haemodynamically stable that underwent the laparoscopic procedure had earlier post-operative recovery and were discharged earlier from the hospital.

Strengths and limitations

The strength of this appraisal is that it is the first of such a study focusing on the anaesthetic aspect in the management of patients that present with an ectopic pregnancy that required surgical intervention. Most of the previous studies mainly focused on gynaecological aspects of ectopic pregnancy. The limitation observed in this study was that some crucial information was missing due to the lack of proper documentation due to the retrospective nature of the study.

Conclusion

The most common form of presentation of ectopic pregnancy is ruptured ectopic and general anaesthesia for open laparotomy for unilateral salpingectomy was the commonest intervention. Therefore robust teamwork is required between the surgeon, the attending anaesthetist and the blood transfusion service. The attending anaesthetist should be highly skilled to manage the complications and prevent mortality.

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Conflicts of interest

There are no conflicts of interest.

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