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Original Article

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Challenges in the early diagnosis and management of ectopic pregnancy: A prospective study in two health facilities in Yaounde, Cameroon

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Abstract

Introduction: An ectopic pregnancy (EP) occurs when the blastocyst implants at a site other than the normal uterine cavity. It can greatly affect the reproductive capacity of the woman, especially when there is a delay in diagnosis and management. Despite availability of diagnostic tools, most cases are diagnosed late, and management is predominantly by invasive surgery. This study aims to determine challenges to early diagnosis and management of EP.

Materials and methods: We conducted a prospective cross-sectional study from December 2021 to July 2022 among EP patients managed at the Yaounde Central Hospital and the Yaounde Gynaeco-Obstetric and Pediatric Hospital. The course patients followed from onset of symptoms to point of diagnosis and management was assessed to determine reasons for delayed diagnosis and management. Data was entered and analyzed using Epi Info version 7.2.5.0. Association between possible explanatory variables for misdiagnosis and delays in diagnosis were determined by logistic regression analysis. P values < 0.05 were considered significant.

Results: We registered 113 EP cases out of 2,888 deliveries giving a frequency of 3.9%. Age of patients ranged between 17 and 44 years with a median of 27. Delays from first symptoms to consultation varied between one and sixty days with a median of six days. Misdiagnosis was made at the first health unit in 46.0% of cases. Factors associated with misdiagnosis were; consultation by nurse [OR = 5.88, P < 0.01]; no diagnostic tests [OR=13.0, P <0.01], and not doing a pregnancy test [OR=2.8, P = 0.04]. Invasive surgery was the most used management method (77.9%).

Conclusion: Late consultation and misdiagnosis delay diagnosis and management of EP in Yaounde. Invasive surgery remains the main method used. Women should be encouraged to start antenatal care early and EP should always be considered as a differential in

Key words: Ectopic pregnancy, misdiagnosis, Yaounde, Cameroon

Résumé

Défis liés au diagnostic précoce et à la prise en charge des grossesses extra-utérines : étude prospective dans deux formations sanitaires à Yaoundé, Cameroun

Introduction: Le prise en charge précoce de la grossesse extra-utérine (GEU) facilite le traitement par les méthodes non invasives et pourrait préserver la fertilité. Malgré la disponibilité d'outils diagnostiques, la plupart des cas de GEU sont diagnostiqués tardivement et traitées par la chirurgie radicale. Le but de l'étude est d'analyser les difficultés du diagnostic et de la prise en charge précoce de la GEU à Yaoundé.

Matérielles et méthodes: Nous avons réalisé une étude prospective de Décembre 2021 à Juillet 2022 à l'Hôpital Central de Yaoundé et à l'Hôpital Gynéco-Obstétrique et Pédiatrique de Yaoundé. Le parcours des patientes depuis l'apparition des symptômes jusqu'au point de diagnostic et de prise en charge a été étudié pour déterminer les raisons du retard de diagnostic et de la prise en charge. Les données ont été saisies et analysées à l'aide du logiciel Epi Info version 7.2.5.0 et le seuil de significativité P fixé à 0,05.

Résultats: Nous avons enregistré 113 cas de GEU sur 2 888 accouchements, soit une fréquence de 3,9 %. L'âge des patientes variait entre 17 et 44 ans avec une médiane de 27. Le délai entre les premiers symptômes et la consultation variait entre un et soixante jours, avec une médiane de six jours. Une erreur diagnostique a été réalisée après la première consultation dans 46,0 % des cas. Les facteurs associés à un diagnostic erroné comprenaient: la consultation par infirmière [OR = 5,88, P < 0,01]; non réalisation des tests diagnostiques [OR=13,0, P <0,01]; et non réalisation d'un test de grossesse [OR=2,8, P = 0,04]. Une prise en invasive a été réalisée dans 77.9% des cas.

Conclusion: Les consultations tardives et les erreurs de diagnostic retardent le diagnostic et la prise en charge précoce. La chirurgie invasive reste la principale méthode de prise en charge. Les femmes doivent être encouragées à commencer la consultation prénatale tôt. La GE doit toujours être considérée comme un diagnostic différentiel chez toutes femmes en âge de procréer qui présentent des symptômes évocateurs.

Mots clés: Grossesse ectopique, erreur de diagnostic, Yaounde, Cameroun

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What is known on this topic

- Ectopic pregnancy frequency is on the rise worldwide
  Ectopic pregnancy is the most common surgical emergency in
- early pregnancy and one of the leading causes of first trimester maternal death
- Most cases of ectopic pregnancy are diagnosed late in our setting and management is mainly invasive surgery

What this study adds

- Most patients with ectopic pregnancy consult late
- Misdiagnosis of ectopic pregnancy is common (46%) after first consultation
- Factors associated with misdiagnosis are consultation by a nurse and no pregnancy test after consultation

1 INTRODUCTION

An ectopic pregnancy is a pregnancy in which the developing blastocyst is implanted at a site other than the normal uterine cavity. It is responsible for 1-2% of pregnancies worldwide [1]. If not diagnosed early, it usually becomes a potentially life threatening, acute abdomen emergency when it ruptures. Over the past decades, the incidence of ectopic pregnancies has been on the rise [2-3].

Ectopic pregnancy in Cameroon is still a major cause of maternal mortality in the first trimester, accounting for 12.5% of maternal deaths [4]. Healthcare providers are therefore faced with the task of diagnosing these pregnancies early before they rupture, so they can be treated successfully either with noninvasive treatment or minimally invasive surgery. Diagnosing an ectopic pregnancy early is therefore critical to reducing short- and long-term morbidity, and to preserve fertility. This requires early consultation for pregnancy follow-up by the pregnant woman and healthcare providers who always consider ectopic pregnancy as a differential diagnosis in reproductive age women with suggestive symptoms.

This could be difficult in our setting because only 41% of women have their first antenatal care visit in the first trimester [5], a period where ectopic pregnancies could be diagnosed before they rupture. Seeking care early will also require that women know and are conscious of the date of their last menses which will permit them to easily know when there is a potential pregnancy or its complications. At the Yaounde Central Hospital in 2015 and 2016, 86.4% of ectopic pregnancies were ruptured before diagnosis was made and over 77.8% were diagnosed after a gestational age of 7 weeks [6]. Late diagnosis also had serious consequences on management choices as invasive surgery was required in 93.9% of cases and medical management in only 6.1% [6].

Early diagnosis of ectopic pregnancy could also be potentially rendered difficult because the classical triad of amenorrhea, per-vaginal bleeding and lower abdominal pain may not be seen in all cases of ectopic pregnancy. Women presenting with nonspecific symptoms, who may even be unaware they are pregnant could be misdiagnosed as having early pregnancy symptoms or other gynaecological, digestive or urinary system pathologies [7], further delaying diagnosis and management of ectopic pregnancy even if patients consult early.

While invasive surgical approaches are the most common in our setting, introduction of endoscopic surgery in Cameroon in the 1990s [8] which is the gold-standard treatment, as well as availability of methotrexate for medical therapy after its reintroduction in the 1980s [9,10] has paved the way for noninvasive and minimally invasive surgical management of ectopic pregnancy. With the routine use of early transvaginal ultrasound and serum bHCG, diagnosis of ectopic pregnancy can be established early and medical treatment or conservative surgery done in selected cases.

Unfortunately, that is not always the case judging from the high incidence of ruptured ectopic pregnancies in our milieu and the high proportion of patients that consult in a state of hemorrhagic shock. This study aims to study challenges to early diagnosis and management of EP in Yaounde.

2 MATERIALS AND METHODS

Study design, period and setting

The study was an analytical prospective hospital-based study with data collection that lasted eight months (1st of December 2021 to the 31st of July 2022).

The study was carried out at the Obstetrics and Gynaecology units of the Yaounde Central Hospital (YCH) and the Yaounde Gynaeco-Obstetric and Pediatric Hospital (YGOPH) which are the principal referral hospitals in the City of Yaounde that manage gynaecological and obstetrical emergencies.

Study population

The study was conducted among patients diagnosed of EP at the YCH and YGOPH. It included all consenting patients diagnosed and managed for ectopic pregnancy during the study period.

Sampling and sample size calculation

A consecutive sampling method was used. All eligible patients who were managed at the study

sites during the study period were recruited in this study. A minimum sample size of 63 was calculated with the Cochran's formula using the prevalence of ectopic pregnancy from similar studies in Yaounde [6].

Data collection and study variables

All patients consulting for symptoms suggestive of an ectopic pregnancy or referred for management of ectopic pregnancy were identified at the emergency units and outpatient consultations. After confirmation of diagnosis and management of patients, they were interviewed by residents who had been trained on the questionnaire to collect relevant information. Results from paraclinical exams, operative notes and follow-up reports were collected from the patients' files. Patients were followed up until discharge to evaluate the outcome of treatment. Patients on expectant management and medical management were followed up until their last bhCG results were negative.

Data was collected using structured pretested questionnaires. The tool consisted of socio-demographic characteristics (age, occupation, marital status, risk factors for ectopic pregnancy), clinical presentation, events leading to definitive diagnosis and diagnostic methods used (clinical, biological and ultrasound), management modalities and treatment outcome of ectopic pregnancy patients.

Predictor variables of interest were; age, level of education, socio-economic status, obstetric history, gynecological history, clinical presentation, gestational age at first consultation, delay between first symptom(s) and first consultation, place of consultation, qualification of health worker consulted and paraclinical tests done.

The primary outcome variables measured were; misdiagnosis after initial consultation, late diagnosis of ectopic pregnancy, factors associated with misdiagnosis and late diagnosis, treatment methods used, intraoperative findings and patient outcome.

We set out to evaluate the difficulties in early diagnosis and management of ectopic pregnancy in Yaounde by exploring epidemiological, clinical and therapeutic features of EP, course patients followed from onset of symptoms to diagnosis and management. We then evaluated the socio-demographic, health service and personal factors associated with delays in diagnosis and manage - ment.

Data management and statistical analysis

Data from questionnaires was checked for completion and consistency, entered and analyzed in the Epi Info version 7.2.5.0 software. Mean, median, mode and standard deviation was used to describe socio demographic characteristics and delays to seeking care and diagnosis. Contingency tables were drawn between the characteristics of patients, events leading to diagnosis and the occurrence of misdiagnosis and late diagnosis. Student's t-test was used to compare continuous variables and Pearson's Chi-square test and Fisher exact text where appropriate for categorical variables. The association between possible explanatory variables for misdiagnosis diagnosis after consulting a first health facility such clinical features, place of first consultation, qualification of healthcare providers and para-clinical exams done at first consultation was estimated using logistic regression. Adjusted odds ratios and 95% confidence intervals were calculated to determine the degree of association between associated factors. P values < 0.05 were considered statistically significant.

Ethical considerations

Ethical clearance was obtained from the institu - tional ethics committee of the Faculty of Medicine and Biomedical Sciences of the University of Yaounde 1 (N^{O}:425/UY1/FMSB/VDRC/DAASR/ CSD of 3rd June 2022).

Administrative authorization was obtained from the Directors of YCH (N^{O}: 260/AR/MINSANTE/SG /DHCY/UAF of 11th April 2022) and YGOPH (N^{O}: 266/CIERSH/DM/2022 of 3rd June 2022).

Informed written and verbal consent was obtained from all participants before enrollment into the study. Patients' names were not included in the data collection forms. Codes were used to ensure patient confidentiality.

3| RESULT

During the recruitment phase where we recorded 113 cases of confirmed ectopic pregnancy, there

were 2,888 deliveries in both study sites giving an ectopic pregnancy frequency of 3.91% of deliveries in eight months. Of the 113 cases, 112 were managed, one died before surgery and one died after surgery giving a case fatality rate of 1.7%. Incidence was higher at YGOPH (4.9%) than at YCH (3.4%).

Socio-demographic characteristics of the study population

The age of subjects ranged between 17 and 44 years, with a mean age of 28.1±5.7 years. More than three quarters of our participants (77.9%) were between the ages of 20 and 34 years. More than half of our patients (54.0%) were single, with close to four-fifth (73.4%) not having a university education and about half (52 . 2 %) having no formal employment. (Table I)

Table I. Socio-demographic characteristics of the study population

Characteristic	Number (n=113)	Frequency (%)
Age(years)		
15-19	6	5.
20-24	3	3
25-29	0	26.6
30-34	2	23.9
35-39	7	27.4
40-44	3	15.0
Marital status		
Single	6	54.0
Married	1	28.3
Cohabiting	3	15.9
Divorced	2	1.
Level of Education		
Primary	1	15.0
Secondary	7	58.4
University	6	26.6
Occupation		
Self -	4	36.3
employed	1	11.5
Employed	1	19.5
Student	3	17.7
Unemployed	2	15.0
Housewife		

Obstetric history of study population

Close to three-quarters of our patients (72.5%) had ≤2 previous deliveries, and up to a third (33.6%) were nulliparous.

Most participants (73.5%) had an identified risk factor for ectopic pregnancy, with 29.3% of them having two or more risk factors. The most common risk factors were; previous STIs/PID (35.4%); history of abortion (34.5%), and infertility (12.4%) (Table II). Contraception failure was found in six participants (5.3%), and 14 (12.4%) reported using an emergency contraceptive pill during the last menstrual cycle.

Most participants (38.9%) had one prior delivery, while about a third (33.6%) had no previous deliveries. A history of abortion was reported in 36.3% of subjects. Four participants (3.6%) had a history of ectopic pregnancy, with one participant having two previous ectopic pregnancies (Table II).

Table II. Obstetric history of study population

Characteristic	Number (n=113)	Frequency (%)
Number of deliveries		
0	3	33.6
1-2	8	38.9
3-4	4	14.2
≥ 5	4	13.3
Number of abortions		
0	7	63.7
1-2	2	31.0
3-4	3	4.4
≥ 5	5	0.9
Previous ectopic pregnancies		
0	10	96.4
1	9	2.7
2	3	0.9
Number of risk factors		
0	3	26.5
1	0	44.2
2	5	23.0
3	0	3.6
4	2	2.7
Contraception use		
Yes	6	5.3
No	10	94.7
Pregnancy desire		
Yes	3	32.7
No	7	61.1
Not sure	7	6.2

Clinical history and course of patients

Amenorrhea was reported in only 93 (82.3%) cases. Gestational ages ranged between 4 weeks, 4 days to 20 weeks, 2 days with a mean gestational age of 56 days (8 weeks, 0 days). 77.3% of patients were diagnosed between 7 and 10 weeks.

Pelvic pain was the first symptom (78.8%) and most

common symptom in 96.5% of patients. The classic triad of Amenorhea- Pelvic pain-per vaginal bleeding was reported in 62 (54.9%) patients.

Diagnosis and management at first consultation site

A misdiagnosis was made after the first consultation at the first health facility in 51 (46.0%) cases. Abortion (18.6%) and PID (16.9%) were the most common wrong diagnoses made. Four (3.6%) patients were misdiagnosed as normal pregnancies (Figure 1). Two cases (1.8%) were initially misdiagnosed at the study sites.

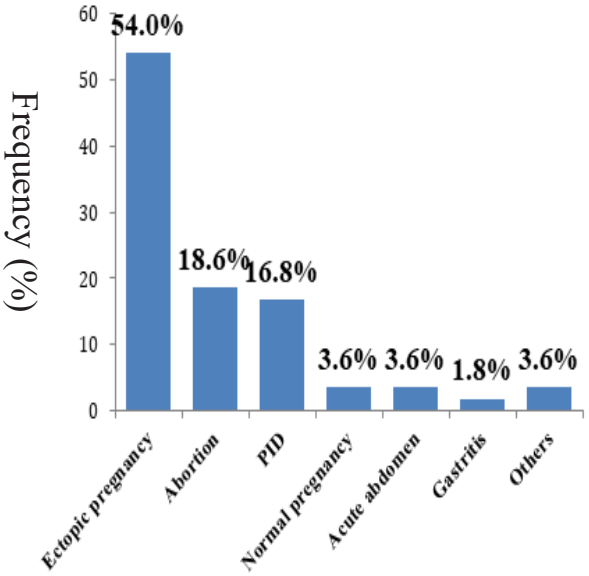


Figure 1. Diagnosis after first consultation (N=113)

Factors associated with misdiagnosis

Misdiagnosis was made at first health unit in 52 patients. Factors associated with misdiagnosis were; consultation by a nurse [OR = 5.7 (2.2-15.4 CI), P < 0.001], doing no diagnostic tests [OR=13.0 (2.8-60.2 CI), P = 0.001] and not doing a urine pregnancy test [OR=2.8 (1.3-6.3 CI), P = 0.010]. An obstetrician / Gynecologist was five times less likely to make a misdiagnosis when compared to a general practitioner (Table III).

Table III. Factors associated with wrong initial diagnosis at first health unit (n = 52)

Variable	Frequency of misdiagnosis (%)		AOR (95% CI)	P value
	Yes	No		
Grade of staff consulted				
Nurse/Midwife	34 (77.3%)	10 (22.7%)	5.7 (2.2 -15.4)	<0.001
OBGYN	3 (10.7%)	25 (89.3%)	0.20 (0.05 -0.8)	0.024
General Practitioner	13	22 (62.9%)	Ref	
Other		4(66.7%)	0.86 (0.14 -5.3)	0.858
Amenorrhea/Pain/Bleeding				
Yes	27 (51.6%)	30 (48.4%)	1.6 (0.78 -3.5)	0.189
No			Ref	
No diagnostic test on first visit	16 (88.9%)	2 (11.1%)	13.0 (2.8 -60.2)	0.001
Yes		59	Ref	
No				
Contraception failure				
Yes	7 (36.8%)	12 (63.2%)	0.64 (0.23 -1.8)	0.381
No	45		Ref	
Presence of risk factors				
Yes	34 (41.0%)	49 (59.0%)	0.8 (0.5 -1.2)	0.314
No			Ref	
Urine pregnancy test not done	46	27	2.8 (1.3 -6.3)	0.010
Yes	15	25	Re	
No				

Diagnosis at study site

The most common general exam findings were tachycardia (51.3%), pallor (50.4%), and signs of shock (24.8%). Physical exam was normal in 46 (40.7%) patients. Paracentesis/culdocentesis was positive in 7.1% of cases. Abdominal tenderness was present in 82.3% of patients while 13.3% had a normal abdominal exam. Bilateral cervical motion tenderness was the most common sign in 82.3% of patients

An ultrasound was done in 37.2% of patients on admission at the study sites but was not required for diagnosis in over a quarter (27.4%) of cases. All ultrasound results revealed findings suggestive of an ectopic pregnancy, with hemoperitoneum being the most common in 76.2% of cases. More than a third of patients (38.5%) were diagnosed and managed more than one day after their first consultation, with up to four (8.0%) taking a week or more.

On admission, the diagnosis was non-ruptured ectopic pregnancy in 21 (18.6%) of patients and ruptured ectopic pregnancy in 79.6% of patients, while two cases initially misdiagnosed were diagnosed as ruptured ectopic pregnancy after a control ultrasound and serum bhCG.

Patient course and diagnosis on admission at study site

Mean gestational age at diagnosis varied between 32 days (4 weeks and 4 days) and 142 days (20 weeks and 2 days) with a mean age of 56 days (8 weeks) and

a median age of 54 days. Mean age of rupture was 57 days (8 weeks, 1 day) and mean age of diagnosis for non ruptured ectopic pregnancy was 53 days. The number of health facilities visited before diagnosis varied between one and four with 3.6% of patients diagnosed only at the third health facility. Management was done at the first health facility only in 15.0% of cases. More than a third of patients (38.5%) were diagnosed more than one day after first consultation with four cases taking 10 or more days (Table IV)

Table IV. Patient course and diagnosis at study site

Variable	Number (n=113)	Frequency (%)
Gestational age at diagnosis		
< 6 weeks	9	8.0
6 wks - 7 wks 6 days	40	35.4
8wks - 9 wks 6 days	31	27.4
10 wks -11 wks 6 days	8	7.1
≥ 12 weeks		
No Amenorrhea/Unknown	5	4.4
Number of health units consulted before diagnosis		
1	61	54.0
2	42	37.2
3	10	8.8
Number of health units consulted before management		
1	17	15.0
2	83	73.5
3	13	11.5
Difference in days from consultation to diagnosis		
0	70	61.5
1-3	31	27.7
5-7	8	7.1
>14	3	2.7

Management modalities employed

All cases of ruptured ectopic pregnancy had surgical management, except for one patient who died before surgery. Initial management was expectant in 3 patients (2.7%) of cases, medical in 12.4% and surgical in 84.0% (Table V).

Table V. Initial management method used

WorkingDiagnosis	Expectant	Medical	Surgical	Die before management	Total
Nonrupturedectopic pregnancy	3	1	4	0	2
Ruptured ectopic pregnancy	0	0	9	1	9
Total	3(2.7%)	14(12.4%)	95(84.0%)	1(0.9)	11

A total of 14 cases received medical management, with most of them, 71.4%, on the multiple dose regimen and four on the single dose regimen. The success rate for medical management was 85.7%.

Surgical management

Surgical management was used in a total of 98 cases: 92 for ruptured ectopic pregnancy on admission, three for non-ruptured ectopic pregnancy with contraindication to medical management, 2 for failed medical management, and one for failed expectant management. Only about a tenth of surgeries (10 . 2 %) were laparoscopic, all at YGOPH, making up just 15.1% of surgeries there. Conservative surgery was done in only one out of 20 (5.1%) surgeries.

A majority of the 98 ectopic pregnancies visualized during surgery were tubal (93.9%), with ampullary pregnancies being the most common site. Four pregnancies were cornual (4.1%) and two were abdominal. Of the 98 cases managed surgically, the contralateral tube was absent in 1 case (1.04%), normal in 77 cases (80.01%), and had adhesions in 18 cases (18.75%).

Expectant management

Expectant management was successful in 2 of 3 cases. One case resulted in rupture and had surgical management at a serum bHCG of 516mIU/mL.

Outcomes and complications

Most ectopic pregnancies (84.2%) resulted in rupture. Rupture was not associated with bHCG levels or gestational age. The most common reasons for rupture were late consultations (83.1%), wrong initial diagnosis (37.9%) and delays in diagnosis (10.5%). Death occurred in two cases with a case fatality rate of 1.8%, accounting for 4.9% of maternal deaths during the study period.

There were three cases of rupture (two cases of bHCG levels below 1000mIU/mL (394, 516, and 531mIU/mL).

4 | DISCUSSION

The ectopic pregnancy incidence of 3.91% was much higher than the 1.43% by Atabong et al in Buea and Limbe in a 10 year (2006-2016) retrospective study [11]; 3.14% by Foedjio et al [6] at the YCH Hospital in 2015; 4.23% by Foumane et al [12] in 2004 to 2008 at YGOPH; and 2.3 % by Dohbit et al in Bafoussam in (1998-2008) [13]. The overall rising trend corroborates several studies which have found an increasing trend in the incidence of ectopic pregnancy over the past decades.

The mean age of subjects of 28.1±5.7 years was similar to findings by Atabong et al (27.68±5.5 years) and Fouedjio et al (28.5±5.9 years) with over three quarters of our participants (77.9%) between the ages of 20 and 34 years, similar to the 80.4% found by Fouedjio et al [6] and 80% by Singh et al in India [1]. This is the most fertile age group with risky sexual behavior predisposing to STIs and abortions, which are the most common risk factors for ectopic pregnancy. Most participants had no university education and no formal employment. This suggests that women with low socioeconomic status are more affected, which is consistent with the literature. Low socioeconomic status has been associated with poor pregnancy outcomes, including ectopic pregnancy.

Low parity in this study could be associated with the young age and single status of most participants or with infertility, which is also a risk factor for ectopic pregnancy. Four participants (3.6%) had a history of ectopic pregnancy, with one participant having two previous ectopic pregnancies. This is lower than the 8% found in India by Singh et al. [1]

Most participants (73.5%) had an identified risk factor for ectopic pregnancy, with 29.3% of them having two or more risk factors. This is in agreement with the findings of Foeudjio et al [6].

Amenorrhea was reported in only 93 (82.3%) cases. Saha et al found amenorrhea in 78.72% of patients, similar to our findings. This shows that relying on amenorrhea alone to diagnose pregnancy and its complications can be misleading because women can consider early pregnancy bleeding as menses and some ectopic pregnancies can rupture or be diagnosed even before the expected date of the next menses. The classic triad of Amenorhea- Pelvic pain-Per vaginal bleeding was reported only in 62 (54.9%) patients. This was similar to the 60% by Singh et al. Relying on this triad to diagnose an ectopic pregnancy will potentially lead to many cases of misdiagnosis and late diagnosis especially as some patients (1.8%) even had no symptoms and only came for routine ANC.

Misdiagnosis rate after the first consultation at the first health facility (46.0%) was higher than the 27.58% of cases by Saha et al [7] who also had abortion (7.43%) and PID (1.9%) as the most common diagnosis made in ectopic pregnancy patients. Our study similarly reported abortion (18.6%) and PID (16.9%) as the most common wrong diagnoses made. The lower rate of misdiagnosis in the study by Saha et al [7] was because 81.91% of their patients first consulted gynaecologists as opposed to 24.8% in our study.

There was a high prevalence of hemorrhagic shock (24.8%) at presentation which shows that many patients are diagnosed very late. This corroborates with the high prevalence of abdominal tenderness (82.3%) and cervical motion tenderness (82.3%) among patients at presentation.

Paracentesis/culdocentesis was positive in 7.1% of cases. This examination is deemed obsolete but was used to confirm diagnosis in these patients and could be an alternative to ultrasound for quick confirmation of diagnosis before surgery after a positive pregnancy test.

On admission, the diagnosis was non-ruptured ectopic pregnancy in 21 (18.6%) of patients and ruptured ectopic pregnancy in 79.6% of patients, while two cases initially misdiagnosed were diagnosed as ruptured ectopic pregnancy after a control ultrasound and serum bHCG. This shows that ectopic pregnancy diagnosis can sometimes be misdiagnosed even in referral hospitals. The total number of cases of rupture on admission (81.4%) is still high and could be a barrier for minimally invasive surgery and non-invasive treatment.

Initial management was expectant in 3 patients (2.7%) of cases, medical in 12.4% and surgical in

84.0%. This was similar to the 1.07, 13.17, and 85.76% respectively found by Foumane et al [12] and 80.1% surgical management in Conakry in 2011 by Baldé et at [17]. This was in contrast to the findings of Fouedjio et al (93.9% surgical, 6.1% medical, and no expectant management). This shows that even though all methods of management are now used in our setting, non-invasive methods are still low compared to cases in developed countries [15]. This could be attributed to late consultation and delayed diagnosis in our setting.

The success rate for medical management was 85.7%. This was slightly higher than the 80.96% recorded by Mboudou et al in 2007 [14]. This is, however, less than the 95% and 90% success rates for multiple-dose and single-dose by Lipscomb GH et al in a meta-analysis of 643 patients in the USA in 2004 [15]. This could be due to the fact that most of our patients were diagnosed late, or the small sample size of patients on medical treatment.

While laparoscopic surgery was slightly higher (7.9%) than in previous studies in Cameroon, it was still significantly lower than in developed countries. Takacs et al [16] in a study found that the proportion of ectopic pregnancy patients managed with laparoscopic surgery increased from 40.9% in 1995 to 86.3% in 2004. This huge difference can be explained by late diagnosis in our setting, lack of endoscopic surgery facilities in some centers, and a small number of obstetricians/gynaecologists who can do it. Salpingectomy was the main technique used (94.9%). Of the 98 cases managed surgically, the controlateral tube was absent in 1 case (1.04%), normal in 77 cases (80.01%), and had adhesions in 18 cases (18.75%). The high number of normal- looking contralateral tubes could mean good prognosis for future fertility, consistent with some studies. Fernandez et al. in the 2013 DEMETER trial

[18] had fertility after an ectopic pregnancy managed at 76% for medical management, 76% for conservative surgery, and 67% after radical surgery. Death occurred in two cases with a case fatality rate of 1.8%, accounting for 4.9% of maternal deaths during the study period. Tebeu et al [4] found ectopic pregnancy was responsible for 12.5% of maternal deaths at the Yaounde Teaching Hospital in 2015. Our lower proportion of maternal deaths could suggest that emergency ectopic pregnancy improved over the years

There were three cases of rupture (two cases of tubal rupture and one case of tubal abortion) at bHCG levels below 1000mIU/mL (394, 516, and 531mIU/mL). This emphasizes the need to monitor patients closely for expectant and medical management since rupture can occur at virtually any gestational age and serum bHCG level.

Limitations

Histopathology was not used to confirm ectopic pregnancies or rule out other possibilities. However, pregnancy tests and serum beta HCG was used to corroborate clinical, ultrasound and surgical findings.

5 | CONCLUSION

Many patients consult late after the onset of symptoms of ectopic pregnancy, and first consultations are done mainly in health centers with nurses and general practitioners (70%). Delays in diagnosis are common and often due to late consultation and misdiagnosis of ectopic pregnancy after a first consultation, especially if the patient first consults a nurse and when diagnostic tests are not done. Many women have to go through multiple health facilities for diagnosis and management. Even though all current treatment options are used, invasive surgery with salpingectomy remains the main method used. Ectopic pregnancy should always be considered as a differential diagnosis in women of childbearing age who present with any suggestive symptoms. A pregnancy test should always be done in women or reproductive age with any suggestive symptoms which would increase considerations of pregnancy complications like an ectopic pregnancy when making a diagnosis.

► **Acknowledgement**

We thank the women who even in their grief following diagnosis of ectopic pregnancy gave consent to be enrolled in the study.

► **Author contributions**

Conception and design of the study: KSO, FE, and REM; data collection: KSO; data analysis: KSO; results interpretation: KSO, FE, and REM; manuscript drafting: KSO, FE, REM,; revision of the manuscript: KSO, FE, REM, AAAM, DWP, MB,

AFEMK and WAT; critical revision: KSO, FE, and REM. All the authors have read and approved the final manuscript.

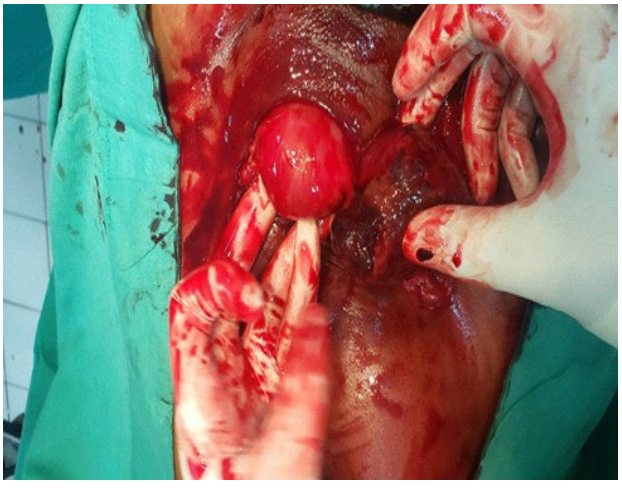
► **Funding**
None

► **Data availability**
The dataset used in this study is available from the corresponding author upon reasonable request.

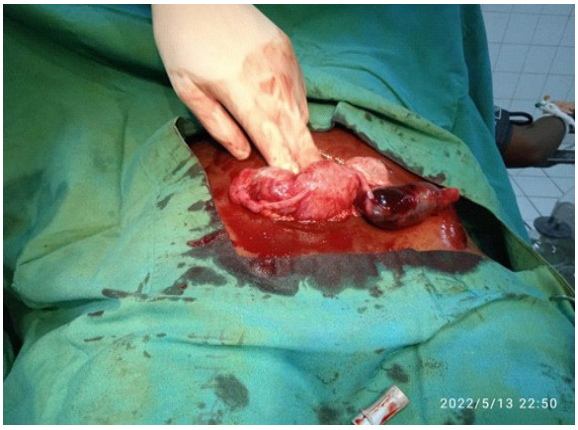
► **Competing interests**
The authors declare that they have no competing interests.

Photo Gallery

Picture 1: Advanced, 11 week non ruptured left ampullary pregnancy in a 27 year old patient

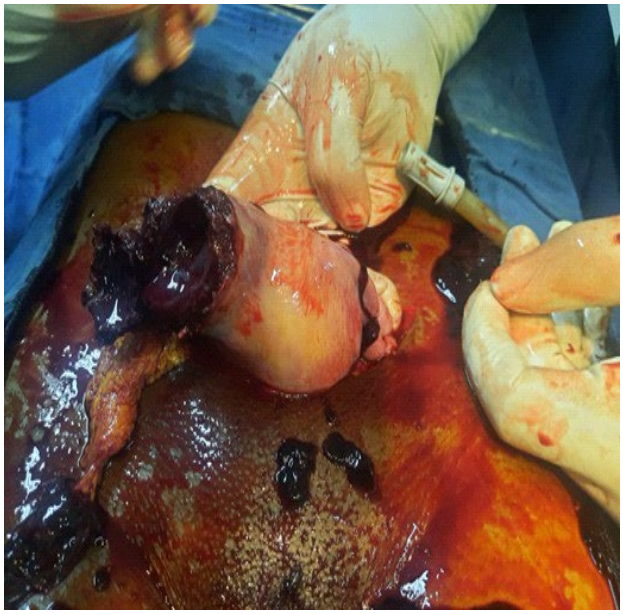


Picture 2: Ruptured left ampullary pregnancy with massive hemoperitoneum of about 2500mL in a 21year old



Picture 3: Ruptured right ampullary pregnancy in a 29 years old patient

Picture 4: Abdominal pregnancy with placenta implanted on posterior uterine wall in a 37 years old patient



Picture 5: Ruptured left cornual pregnancy in a 30 year oldPicture

6: Ruptured ampullary pregnancy with a hmoperitoeum of 3000cc in 23 year old patient

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