

Determination of the Leading Clinical Features of Ruptured Ectopic Pregnancy and the Formulation of Scoring System for the Early Presumptive Diagnosis in a Tertiary Health Institution in Edo State, Nigeria

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Abstract:

➤ *Background:*

Ectopic pregnancy is a life-threatening gynecological emergency and a significant cause of maternal morbidity and mortality in the first trimester of pregnancy.

➤ *Objective*

The aim of this study is to formulate a simple scoring system for the early presumptive diagnosis of ruptured ectopic pregnancy to minimize delay in recognizing the condition to reduce the associated maternal morbidity and mortality especially in the poorly resourced and low-income settings.

➤ *Methods*

A retrospective study of all cases of ruptured ectopic pregnancies at Central Hospital Benin City, Edo State, Nigeria from January 2021 to December 2023 were analyzed. Participants' medical records were used to extract socio-demographic characteristics, clinical presentation and management outcome data.

An acronym known as "PAPPA" was formulated from 'pain', the leading clinical features 'pulse rate', 'adnexal tenderness', 'pallor' and 'amenorrhea' in order from the highest frequencies, with two points given to each clinical feature with a cumulative maximum score of 10. On the application of the PAPPA scoring parameter to the disease conditions that mimic ruptured ectopic pregnancy, in respect to their common clinical features, the maximum score obtained was found to be 6 points each. This meant that seven points could be taken as 'discriminatory zone' against these clinical differentials for early presumptive diagnosis of ruptured ectopic pregnancy.

➤ *Results*

There were sixty-nine (69) cases of ruptured ectopic pregnancies with an incidence of 3.4% of all gynecological admissions and 0.65% of total number of deliveries. The mean age of occurrence was 27.3 years and 49.3% of these cases were nulliparous. Five leading clinical features found to be present in the participants were identified: lower abdominal

pain, adnexal tenderness, fast pulse rate, pallor and amenorrhea in frequencies of 100.0%, 100.0% 94.2%, 89.9% and 75.4% respectively.

➤ Conclusion

PAPPA scoring system is a useful tool which can increase the level of index of suspicion of ruptured ectopic pregnancy with a pelvic ultrasound scan backup for definitive diagnosis when available. This will aid escalation of cases in order to trigger early intervention and prevent maternal morbidities and mortalities.

Keywords: Extra-Uterine Gestation, Presentation, Presumptive Diagnosis, Risk Factor, Ruptured Ectopic Pregnancy.

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I. INTRODUCTION

Ectopic pregnancy (EP) is a condition in which the fertilized ovum implants at a site other than the normal endometrial cavity and is an important cause of maternal morbidity and mortality in the first trimester of pregnancy.^{1,2,3} Poor awareness of the early signs of ectopic pregnancy, poor health seeking behavior of women and suboptimal diagnostic tools for early pregnancy complication, contributed to the high rate of ruptured ectopic pregnancy (REP) and its sequelae.^{1,4-6} Ruptured Ectopic Tubal Pregnancy (RETP) usually occurs around 6-8 weeks, 8-12 weeks and 12-16 weeks in isthmic, ampullary and interstitial ectopic gestations respectively.² Interstitial ectopic gestation rupture much later because of the allowance given by the myometrium given the opportunity for the gestational sac to grow bigger but ultimately with more severe haemorrhage.^{7,8}

The incidence of EP continues to rise globally, due to risk factors in the population concerned.^{8,9} In the UK, it is said to occur at the rate of 11 cases per 1000 pregnancies, at 19.7 cases per 1000 pregnancies in North America and in Nigeria, it occurs at 1.5-2.7/100 deliveries.^{8,10,11} These various factors including high prevalence of sexually transmitted infections (STIs), post abortion sepsis, puerperal sepsis, previous history of induced miscarriage, kartagenar syndrome, use of intra contraceptive device, assisted reproductive technology and smoking have been implicated.⁶ Over 95.0% of ectopic pregnancies occur in the fallopian tubes: other site of ectopic pregnancy includes the abdominal cavity, ovary, cervix, caesarean section scar.^{1,3,4,6,7}

The importance of ectopic pregnancy in developing countries and Nigeria, in particular, lies in the fact that, while the trend of early diagnosis and conservative treatment is prevalent in developed countries, we are still challenged by late presentations with the ruptured form of the ectopic pregnancy in more than 80.0% of cases.^{12,13} The EPs are frequently confused with other conditions such as ovarian cyst, pelvic inflammatory disease and spontaneous abortion. Early detection and prompt management of this condition will reduce maternal morbidity and mortality.

The aim of this study is therefore geared towards finding the five leading clinical features of ruptured ectopic pregnancy looking at their frequencies, with a view of creating a scoring parameter with a maximum score of 10 clearly distinguishing it from other similar conditions such as, appendicitis, pelvic inflammatory disease, threatened miscarriage and twisted ovarian cyst. This will ultimately reduce unnecessary delays in the management of ruptured ectopic pregnancies in our hospital.

II. MATERIAL AND METHODS

➤ Study Area

The Central Hospital in Benin City was founded in the year 1903. It is located on Sapele Road, close to King's Square, in the heart of Benin City, Edo State, Nigeria. The hospital serves as a referral center, providing healthcare services to Benin City and its environs, which have an estimated population of over 1.7 million people. Its primary objective is to provide quality healthcare services to the population it serves and the training of post graduate resident doctors in obstetrics and gynecology and family medicine.

➤ Study Population

The study focused on all cases of ruptured ectopic pregnancy admitted and managed between January 2021 to December 2023. However, cases with incomplete data or missing case notes were excluded from the analysis.

➤ Data Collection and Analysis

A cross-sectional study with retrospective data collection of all the cases of ruptured ectopic pregnancy managed at the Benin Central Hospital, South-South Nigeria between January 2021 to December 2023. Information extracted from the records included demographic and biosocial parameters of the patients, clinical features, treatment given and outcome. The operating theatre records, as well as data pertaining to the number of deliveries during the study period, were also reviewed. A scoring parameter called PAPPA was formulated from 'pain', the leading clinical features (lower abdominal pain, amenorrhea, pallor, pulse rate and adnexal tenderness) was used with two points for each parameter and the maximum score been 10. Seven points was used as cut off point for presumptive diagnosis of ruptured ectopic pregnancy. Ruptured Ectopic Pregnancy

maximum score was 10 points and the lowest was 7 points. The other disease conditions that can mimic ruptured ectopic pregnancy were scored between 0-6 points. The data was analyzed using IBM SPSS Statistics version 27. Descriptive statistics, including frequency, percentage distribution, mean and median were used to summarize the data.

➤ Ethical Consideration

Ethical consideration for this study was granted by the Ethical and Research Committee of Benin Central Hospital.

Approval was also obtained from the Obstetrics and Gynecology Department of the hospital to retrieve and utilize the information in the case notes for this study.

- Financial support and sponsorship: Nil.
- Conflicts of interest: There are no conflicts of interest.

III. RESULTS

Table 1 Socio-Demographic Characteristics

Variables	Frequency (n=69)	Percentage (%)
Age		
Less than 20	4	5.7%
20-24	19	27.5%
25-29	25	36.2%
30-34	15	21.7%
35-39	4	5.7%
≥40	2	2.9%

Mean Age ($\pm$ S.D) = 27.4 $\pm$ 14.8

Table 1 shows that majority 25(36.2%) of the patients were found between 25 and 29 age group, 4(5.0%) were teenagers and only 2(2.9%) of the patients were 40 years and above. The mean age ($\pm$ S.D) 27.4 $\pm$ 14.8.

Table 2 A PAPPa Scoring Parameters

Clinical feature	Ruptured Ectopic Pregnancy	Appendicitis	Threatened miscarriage	Twisted ovarian cyst	P.I.D
Pain	2	2	0-2	2	2
Amenorrhea	2	-	2	-	-
Palor	2	-	-	-	-
Pulse Rate	2	1-2	1-	1-	1-2
Adnexal Tenderness	2	2	-	2	2
Total score	10	5-6	3-4	5	6

Table 2 shows that Ruptured ectopic pregnancy had a cumulative PAPPa score of 10, appendicitis had between 5 and 6, and pelvic inflammatory disease (PID) had a score of 6.

Table 3 Application of PAPPa Scoring Parameters to Cases of REPs Under Review

TOTAL CASES (69)	PAPPa SCORE	PERCENTAGE (%)
36	10	52.2%
14	9	20.3%
16	8	23.2%
3	7	4.3%

Table 3 shows majority of the respondents, 36(52.2%), had a score of 10, diagnostic of ruptured ectopic pregnancy.

Table 4 Distribution of Case with Parity

Parity	Cases	Percentage
0	34	49.3%
1	10	14.5%
2	8	11.5%
3	5	7.2%
4	3	4.3%
≥5	9	13.1%

Table 4 shows higher 34(49.3%) proportions of the patients who had REP were nulliparous, 10(14.5%) were para 1 and the less 3(4.3%) cases occurred among women para 4.

Table 5 Distribution of Case with Gestational Age

Parity	Cases	Percentage
6 weeks	12	17.4%
7 weeks	13	18.8%
8 weeks	24	34.8%
9 weeks	20	29.0%

Table 5 shows that 12(17.4%) of the patients presented at 6 weeks gestation almost in tandem with 16 cases of isthmic ectopic gestation, in the same vein, 37 cases (53/6%) is almost in line with 36 cases (52.1%) found in the ampullary part of the tube which usually rupture about 8 weeks gestation.

Table 6 Distribution of Cases

Variables	Frequency (n=69)	Percentage (%)
Haemoglobin (HB)		
6gm/dl & below	37	53.6%
6-8gm/dl	27	39.1%
>8-10gm/dl	5	7.3%
Presentation		
Amenorrhea	52	75.4%
Lower abdominal pain	69	100%
Dizziness	37	55.6%
Palor	62	89.9%
Pulse rate >100	50	72.5%
Pulse > 80 < 100	15	21.7%
Systolic bp <90	49	71.0%
Bleeding per vaginal	32	46.4%
Adnexal tenderness	69	100%

Table 6 shows that 37(53.6%) of the women were severely anaemic, 27(39.1%) showed moderate anaemia and 5(7.2%) were mildly anaemic. Twelve (17.4%) of the patients presented at 6 weeks gestation almost in tandem with 16 cases of isthmic ectopic gestation, in the same vein, 37 cases (53.6%) is almost in line with 36 cases (52.1%) found in the ampullary part of the tube which usually rupture about 8 weeks gestation. The table above shows that history of amenorrhea has a relativity of 75.4% with 52cases, while the presence of lower abdominal pain was 100.0% (69 cases).

The other three common features are presence pallor 62 (89.9%), fast pulse rate above 80 with 65cases (94.2%) and adnexal tenderness with 69 cases (100.0%).

From the analysis of the clinical features, it was discovered that lower abdominal pain, adnexal tenderness, fast pulse rate, anaemia and history of amenorrhea were the leading clinical features of ruptured ectopic pregnancy.

Table 7 Distribution of Cases with Site of Implantation

Site				Frequency (N=69)	Percentage (%)
	Right	Left	Outside the tube		
Fimria	4	4		8	11.6
Ampulla	22	14		36	52.1
Isthmus	10	6		16	23.2
Interstitial	3	1		4	5.8
Abdominal			2	2	2.9
Ovary	1	1		2	2.9
Intrallamentary			1	1	1.5

From the table 7 above, 36 cases (52.1%) were implanted in the ampullary region while 16 cases (23.2%); 8 cases (11.6%) 4 cases (5.8%) 2 cases (2.9%) were in the isthmic region, fimbria portion, interstitial, ovary

respectively. There are two abdomens and one intraligamentary implantation. The right total implantation accounted for 58% of cases while the left tube accounted for 37.7% of cases.

IV. DISCUSSION

There were 2,029 gynecological admissions during the 3 years of review. All the sixty-nine (69) cases of ectopic pregnancies were ruptured before presentation underlining the core issue of delay. This gave an incidence of 3.4% of gynecological admission close to 3.4% in the University of Lagos. The total number of deliveries in the same period stood at 10,550 with an incidence of 0.65%, much less than that of University of Lagos of 2.2.5%.⁶

Ruptured ectopic pregnancy has become a very common pattern of presentation. As indicated above all the cases seen here over a period of three years were ruptured. Other studies done in notable institutions in this country also found high incidences of ruptured ectopic pregnancies 86.9% in Jos, 84% at Umuahia and 70% at Lafia.^{7,13,14} A similar finding of 100.0% ruptured ectopic pregnancy was found at the University Teaching Hospital, Nnewi.¹⁵ This is in contradistinction to findings in developed countries where majority of ectopic pregnancies present unruptured. This is not unconnected to the high literacy level, availability of health care facilities and early presentation to hospital by patients.

Ruptured tubal ectopic pregnancy can be associated with torrential hemorrhage because of the involvement of ovarian artery, a direct arterial branch of the aorta.¹⁶ This is worse when there is rupture of ectopic pregnancy at the tubo-uterine junction because of the anastomosis of the uterine and ovarian arteries. The consequence of ruptured tubal ectopic pregnancy which constitutes over 95% of all ectopic pregnancy, can range from sudden collapse due to severe hemorrhage, severe anaemia causing hemodynamic instability with ultimate maternal morbidity and mortality. Incidentally there was no maternal death in this review.^{11,17}

To mitigate against the consequences of ruptured ectopic pregnancy a simple scoring system for early presumptive clinical diagnosis was formulated. The first step in this study was to determine five leading clinical features of ruptured ectopic pregnancy. These clinical features were found to be lower abdominal pain, adnexal tenderness, fast pulse rate, pallor and amenorrhea in order of frequency.

This necessitated the formulation of an acronym "P.A.P.P.A" representing each of the clinical features respectively. Each of these five features is given a two point, making a maximum score of ten points. One point is however given to pulse rate between eighty and less than one hundred same with packed cell volume of twenty-five percent to less than thirty. The presence of obvious pallor and pack cell volume of less than twenty-five percent was given the maximum point of two.

When this formular was applied to ruptured ectopic pregnancies under review thirty-six (36) out of sixty-nine (69) cases representing 52.2% scored cumulative maximum points of ten, while fourteen (14) cases (20.3%) scored nine points followed by sixteen (16) cases (23.2%) with eight points and

three (3) cases (4.3%) the least of seven points as shown in Table 2.

The application of this scoring system: PAPP score to other disease conditions that are differentials of ruptured ectopic pregnancy such as threatened miscarriage, pelvic inflammatory disease, acute appendicitis and twisted ovarian cyst with respect to their common clinical features, the cumulative score was found to be six points and less as indicated in Table 1 against the maximum score of ten and least score of seven for ruptured ectopic pregnancies under review.

Therefore, cumulative seven-point score can safely be used as a discriminatory zone, to eliminate these other disease conditions as indicated above.

While pelvic ultrasound scans along with pregnancy test can easily facilitate diagnosis of ruptured ectopic pregnancy, this clinical scoring parameter can serve as an alert mechanism in creating a high index of suspicion of ruptured ectopic pregnancy among medical practitioners, thereby eliminating delay to the barest minimum. This will help to reduce severe maternal morbidity and mortality.

In this study it was found that ruptured ectopic pregnancy was high in the nulliparous and very low parity group as indicated in Table 4, majority of whom are not married and therefore susceptible to multiple sexual partners, incurring sexually transmitted infection and post abortal infection which are major etiological factors for ectopic pregnancy [7].

Prevention of above etiological factors will go a long way to reducing the incidence. Education and advocacy in respect to our women folk and availability of requisite health care facilities can never be over emphasized.

V. CONCLUSION

Ruptured ectopic pregnancy is a major cause of maternal morbidity and sometimes mortality due to delay of presentation by patients in the hospital. It has become necessary to reduce delays when these patients arrive in the hospital and this is the essence of the PAPP scoring system.

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