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Original Research Article

Evaluation of prognostic value of Fernandez scoring system on the management of ectopic pregnancy in the emergency room at Suez Canal University Hospitals, Egypt

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ABSTRACT

Background: Ectopic pregnancy is a major cause of morbidity and mortality in reproductive-aged women, accounting for 9% of pregnancy-related deaths in the first trimester. Clinical prediction tools have been developed to aid management decision making. Fernandez et al "1991" developed a score based on gestational age, β-hCG level, progesterone level, abdominal pain, hemo-peritoneum volume, and hematosalpinx diameter. A score of less than 12 predicts more than 80% success with expectant or nonsurgical management. Aim of the study was to improve the outcome of patients with ectopic pregnancy attending the emergency room at Suez Canal University hospitals, Egypt.
Methods: This is a descriptive (cross-sectional) study conducted on 62 patients diagnosed to have ectopic pregnancy in the emergency department in Suez Canal University Hospital. The patients were subjected to full assessment including full history, examination, investigation and Fernandez score. These data were collected in a questionnaire, interpretted using SPSS program and the score was calculated.
Results: The study revealed that 48.8% of the patients were in the age group between 31-40 years. It was found that in 61 patients (98%) the decision matched using Fernandez score and experts's opinion while only one patient was given a different decision. Using Fernandez score, 40 patients had results less than 12 which guided to conservative management and 22 patients had a score more than 12 which guided to operative management.
Conclusions: It was found that Fernandez score has 100% sensitivity and 95.2% specificity.

Keywords: Ectopic pregnancy, Expectant manngement, Fernandez score

INTRODUCTION

Ectopic pregnancy means implantation and subsequent development of a fertilized ovum outside the uterus.[1] Ectopic pregnancy is a major cause of morbidity and mortality in reproductive-aged women, accounting for 9% of pregnancy-related deaths in the first trimester.[2] Diagnosis of ectopic pregnancy has improved significantly due to advances in ultrasound technology, rapid and sensitive serum hormone assays and an increased awareness and understanding of the associated risk factors.[3] Ectopic pregnancy may be managed surgically, medically or expectantly.[4] Clinical prediction tools have been developed to aid management decision making. Fernandez et al 1991 developed a score based on gestational age, β-hCG level, progesterone level, abdominal pain, hemo-peritoneum volume, and hematosalpinx diameter. A score <12 predicts a >80% success with expectant or nonsurgical management. Similarly, to predict response to a single-dose of

methotrexate, Elito et al developed a score based on β-hCG level, ultrasound findings, size of the mass (cm), and color Doppler image aspects.[5,6] Aim of the study was to improve the outcome of patients with ectopic pregnancy attending emergency room at Suez Canal University hospitals, Egypt.

METHODS

This is a descriptive (cross-sectional) study conducted in the Emergency Department in Suez Canal University Hospital to evaluate the prognostic value of Fernandez scoring system on the management of ectopic pregnancy patients. This study includes 62 patients with ectopic pregnancy attending to emergency department in Suez Canal University hospitals.

All patients diagnosed to have ectopic pregnancy and patients more than 18 (adults) were included in the study. While all patients were excluded who known to have any adnexal mass (cysts or malignancies), any patients known to have hormonal disturbances (e.g. β-hCG or progesterone secreting tumors), any patient receiving hormonal therapy with progesterone for any cause and patients not transferred from other hospitals after performing any medical or surgical procedures as this may interfere with line of chosen treatment (drugs taken may interfere with methotrexate or if surgical procedure that may result in hemoperitoneum or may result in affection of tubal patency). Data was collected in pre-organized data sheet by the researcher. All patients were subjected to baseline assessment by history, clinical examination and investigations. And this was done by using Fernandez score (serum β-hCG- serum progesterone- abdominal pain- hematosalpinx and hemoperitomeum) to evaluate the prognostic value of it in the management of ectopic pregnancy. The patients were followed up and recorded till the full assessment was done and the decision was made to either conservative or operative line of management.

RESULTS

The study revealed that 48.8% of the patients were in the age group between 31-40 years. In this study, the obstetric history of the patients showed that the majority of patients have regular cycles of average amount and ranging from (4-9) days.

Table 1: Age, parity and gravidity in relation to decision of management in studied patients.

	Conservative N=40	Operative N=22	Significance test
Age (Mean±SD (range))	29.5±7.04 (19-43)	28.5±6.7 (19-42)	P = 0.0001 *
Gestational age (Mean±SD (range))	44.3±3.2 (35-51)	51.9±5.7 (42-60)	P = 0.0001*
Gravidity (Mean±SD (range))	2.7±1.1 (1-5)	2.3±1.2 (1-5)	P = 0.2 (NS)
Parity (Mean ± SD (range))	1.3±1.2 (0-3)	1.1±1.2 (0-4)	P = 0.07 (NS)
Contraception (%)	22 (55%)	4 (18.1%)	P = 0.0001 *

* Statistically significant (p-value < 0.05); (NS): Not statistically significant relation (p-value > 0.05)

Table 2: Fernandez scoring system in studied patients.

		Conservative (N= 40)	Operative (N= 22)	Significance test
Serum β-hCG (mIU/mL) (Mean±SD (range))		3806±7869 (960-4910)	6122±1577 (3330- 4810)	P = 0.0001 *
Serum Progesterone (ng/mL) (Mean±SD (range))		6.3±1.7 (3.5- 9.3)	10.3±2.5 (6.4- 13.9)	P = 0.0001 *
Abdominal pain	Absent (%)	0 (0%)	0 (0%)	P = 0.0001 *
	Induced (%)	24 (60%)	0(0%)	
	Spontaneous (%)	16 (40%)	22 (100%)	
Hematosalpinx (cm)	No	6 (15%)	0 (0%)	P = 0.0001 *
	< 1 (%)	30 (75%)	0 (0%)	
	1-3 (%)	4 (10%)	14 (63.6%)	
	> 3 (%)	0 (0%)	8 (36.4%)	
Hemoperitoneum (mL)	0 (%)	2 (5%)	0 (0%)	P= 0.0001*
	1-100 (%)	38 (95%)	4 (18.2%)	
	>100 (%)	0 (0%)	18 (81.8%)	

* Statistically significant (p value <0.05).

The mean of gestational age was 46.9. It was found that 100% of patients aren't smokers. Majority of the patients (58.0%) weren't using any contraception while 35% of them were using IUD as a contraceptive method. And it was also found that there was 91.1% of patients had no history of previous operations. The mean of gravidity among the patients was 2.6 and the mean of parity was 1.2 while the mean of abnormal deliveries 0.2. Majority of patients (96.8%) weren't having any chronic illness and (100%) of patients have no history of previous ectopic.

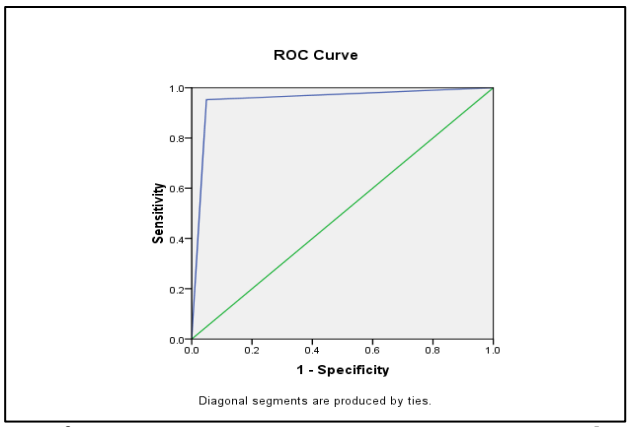
Table 1 shows that the mean age was 29.5 years with mean gestational age 44.3, mean of gravidity was 2.7 and mean of parity 1.3 in patients who received conservative management while was 28.5 years in patients with mean gestational age 51.9, mean of gravidity 2.3 and mean of parity 1.1 who undergo operative management. It was found that 55% of patients who received conservative where using contraception while was only 18.1% in patients who undergo operative intervention. Table 2 shows that mean serum β-hCG in studied patients was 3806±7869 mIU/mL while mean serum progesterone was 6.3±1.7 ng/mL in the patients who received conservative manangement with majority (60%) had induced abdominal pain, (90%) had hematosalpinx <1 cm with (95%) had hemoperitonium of 1-100 mL. on the other side, the mean β-hCG 6122 mIU/mL and mean serum progesterone was 10.3 ng/mL in patients who undergo operative management with majority (100%) had spontaneous abdominal pain, (63.6%) had hematosalpinx 1-3 cm and (81.8%) had hemoperitoneum >100 mL.

Table 3: Comparison of the decision between Fernandez score and our hospital.

Fernandez Score	Our Hospital			Test of significance	Sensitivity	Specificity
	Conservative	Operative	Total			
Conservative	39	1	40			95.2%
Operative	0	22	22	P=0.0001*	100%	
Total	39	23	62			

* Statistically significant (p-value <0.05).

Table 3 shows that 61 patients of 62 had the same decision using Fernandez score and expert's opinion in our hospital while only one patient had different decision. Using Fernandez score, 40 patients had results<12 (conservative management) and 22 patients>12 (operative) while in our hospital only 39 patients had the decision of conservative management with 23 had a decision of operation. It was found that Fernandez score has 100% sensitivity and 95.2% specificity.



Specificity = 95.2%, Sensitivity = 100%, Area under curve = 0.95, Cut of value = 14

Figure 1: ROC curve between decision of management in our hospital and that of Fernandez score.

Regarding the initial clinical assessment and vital signs, this study revealed that 64.5% of patients were have normal pulse rate with 77.4% were normotensive. There was 54.8% of patients had history of amenorrhea but only 29% of patients had history of vaginal bleeding and 71% of them didn't. It was found that majority of the patients (61.3%) experienced spontaneous abdominal pain at time of presentation to emergency room.

In this study, it was found that in the laboratory investigations of the studied patients there was 54.8% had normal hemoglobin level with mean of 11.2 mg/dL. About 74.2% of patients had β-hCG level between 1000-5000 mIU/mL while 51.6% of patients had progesterone level of 5-10 ng/mL.

Regarding the radiological finding in the studied patients, that majority of patients 58.1% had a hematosalpix <1 cm in pelviabdominal ultrasound while 67.7% had hemoperitonium of 1-100 mL.

According to Fernandez score, 64.5 % of the studied patients had a score <12 and received conservative management while 35.5% had score >12 and underwent operative management. In this study, it was found that 74.2% of patients had a β-hCG level 1000-5000 mIU/mL while 51.6% of patients had progesterone level of 5-10 ng/mL with 61.3% of patients experienced spontaneous abdominal pain. It was found that 58.1% of patients had

hematosalpinx <1 cm in pelvi-abdominal ultrasound with 67.7% had hemoperitonium of 1-100 mL.

This study showed that Fernandez score had a statistically significant relationship with each parameter of Obstetric history. And this revealed that the mean age was 29.5 years with mean gestational age 44.3, mean of gravidity was 2.7, mean of parity 1.3 in patients who received conservative management while was 28.5 years in patients with mean gestational age 51.9, mean of gravidity 2.3, mean of parity 1.1 who undergo operative management. It was found that 55% of patients who received conservative where using contraception while was only 18.1% in patients who underwent operative intervention. There was no statistically significant relationship between parity and gravidity with decision of management regarding Fernandez score.

In this study, it was found that mean serum β-hCG in studied patients was 3806±7869 mIU/mL while mean serum progesterone was 6.3±1.7 ng/mL in the patients who received conservative manangement with majority (60%) had induced abdominal pain, (90%) had hematosalpinx <1 cm with (95%) had hemoperitonium of 1-100 mL.

On the other side, the mean β-hCG 6122 mIU/mL and mean serum progesterone was 10.3 ng/mL in patients who undergo operative management with majority (100%) had spontaneous abdominal pain, (63.6%) had hematosalpinx 1-3 cm and (81.8%) had hemoperitoneum >100 mL. And there was a statistically significant relationship between Fernandez score parameters and the decision of management.

Regarding decision using Fernandez Score and exerts in our hospital, it was found that they had a statistically significant relationship. And it showed that 61 patients of 62 had the same decision using Fernandez score and expert's opinion in our hospital while only one patient had different decision. Using Fernandez score, 40 patients had results <12 (conservative management) and 22 patients >12 (operative) while in our hospital only 39 patients had the decision of conservative management with 23 had a decision of operation. It was found that Fernandez score has 100% sensitivity and 95.2% specificity.

DISCUSSION

In this study, 48.4% of studied patients were in the age of thirties. These results match the results of another study conducted by Bouyer J et al, in which 51.6% of the patients were in the age of thirties.[7] Also these results match the results of another study performed by Job-Spira N et al, 1999 in which the majority of patients (63%) were >30 years old.[8]

Our study showed that the mean age of studied patients was 31.1±7.05 year that agree with the results done by Brodowska A et al, in which mean 32±9 years.[9] And matches the study of Cabar FR et al, which revealed mean age of 29.5±6.6 years.[10] Regarding the obstetric history of this study, it was found that mean gestational age of studied patients was 46.9±5.6 days (6.7 weeks±0.8 weeks) ranging between 35-60 days. And this matches the result of study conducted be Clayton HB et al, 2006 in which the mean gestational age at time of diagnosis was 7 weeks±2 weeks.[11] And matches the results of another study performed by Saxon D et al, in which the gestational age of women with an unruptured tube was 6.9±1.9 weeks, and of those with a ruptured tube, the gestational age was 7.2±2.2 weeks.[12]

In the results of this study, it was found that 100% of studied patients weren't smokers unlike that in the results of the study of Bouyer J et al, in which it was found that only 38.9% of the patients aren't smokers and was found to be 38% in the results of Fernandez H et al, 1998 and this difference is mostly due to religious and tradition issues of our country.[7,13] In present study, it was found that 74.5% of patients were multiparous which is similar to the study of Rose I et al, 2005 which showed that 69% of patients where multiparous and also similar to the study conducted by Bouyer J et al, in which it was 60.5%.[7,14] And this is unlike the result of a study by S.E. Akhan et al, which showed that 57.6% of patients were multiparus.[15]

Time trends in the age and regional distribution of ectopic pregnancy suggest that the increasing use of intrauterine contraceptive devices may be a major factor contributing to this recent increase in extra-uterine gestations.[16] This study showed that 58.0% of the patients weren't using any contraception at time of presentation while 35.5% were using IUD as a contraceptive method. Which matches results of a study performed by Rose I et al, that revealed that 38% of the patients were using IUD at time of presentation.[14]

And matches the results of another study done by J. Bouyer et al, in which 25.2% were using IUD at time of presentation.[17] According to the operative history in this study, there was 91.9% of the patients had no history of any previous operations while only 8.9% of them had positive history of operations (most of them was appendectomy) and this agree with the study conducted by Bouyer J et al, in which 94.6% of the patients had no history of previous operations.[7] Unlike the study of Fernandez H et al, 1998 in which it was found that 37% of patients had history of previous operations and in the results of the study performed by Brodowska A et al, that 48.5% of the patients had positive history of previous operations.[9,13] In the results of this study, 100% of the patients had no history of previous ectopic pregnancy while in the study of Bouyer J et al, it was found that 84.1% of patients had negative history of previous ectopic pregnancy.[7] This study showed that 35.5% of the studied patients had a pulse rate >100 beat/min and 22.6% of the patients had a systolic blood pressure <100

mmHg. While in the study of Robert H et al, it was found that 15.3% of the patients had pulse rate >100 beat/ min and 7% of the patients had a systolic blood pressure <100 mm Hg.[18] And was the same in the result of shrestha J et al, 2012 which revealed that 37.5% of patients had signs of shock.[19]

Abdominal pain is the single most consistent feature of ectopic pregnancy.[20] In this study, it was found that 61.3% of patients had abdominal pain as the main presenting symptom which matches the result of Beth C et al, which showed that 70% of the patients had abdominal pain at presentation.[21] Unlike the results of study done by Clayton HB et al, 2006 in which there were 98% of the patients suffered from abdominal pain.[11]

The classic clinical triad of ectopic pregnancy is pain, amenorrhea, and vaginal bleeding. Unfortunately, only about 50% of patients present with all 3 symptoms.[22] According to this study, 54.8% of the patients had amenorrhea and only 29% of them had vaginal bleeding at time of examination that matches in the study of Shrestha J et al, which showed that 65.6% of patients had amenorrhea, 62.5% had vaginal bleeding.[19] And it was the same in the result of Vicken P et al, 2015 it was found that 74.1% of the patients had amenorrhea and vaginal bleeding in 56.4% of patients, And it matches another study performed by Clayton HB et al, 2006 in which 65% of patients had amenorrhea and 80% of them had vaginal bleeding at time of presentation.[11,22]

In this study, mean of Hemoglobin level was 11.2±1.5 mg Which matches the study of S.E. Akhan et al in which the mean hemoglobin level was 10.4±1.7 mg and matches another study done by Yamada T et al, 2003 which revealed a mean hemoglobin level of 11.3±2.04 mg.[23,24]

According to Fernandez score in this study, it was found that 64.5% of the studied patients had a score <12 with subsequent decision of conservative management and 35.5% of them had a score >12 with a decision of operative intervention with mean score was 10.5±2.3. Similar to the result of a study performed by Fernandez H et al, that showed that 77.6% had a score <12 while 22.4% of the patients had a score >12 with mean score of 10.3±1.6.[13] In present results, it was found that the mean age was 29.5±7.04 years in conservative group and was 28.5± 6.7 years in operative group. This showed statistically significant relationship between both groups regarding the decision of the management whether conservative or operative.

And this matches the study results of Fernandez H et al, in which the mean age was 30.8±5.6 years in conservative group and 30.3±4.6 years in operative group and this is relatively unlike the study conducted by S.E. Akhan et al, which revealed mean age of 25.7±4.6 years in conservative group and 26.4±4.6 years in operative group.[13,15] And also we found in this study that the mean gestational age was 44.3±3.2 days in the conservative and 51.9±5.7 days in the operative group. This showed statistically significant relationship between both groups regarding the decision of the management. Which is similar to the results of study of Fernandez H et al, 1998 which revealed that mean gestational age in the conservative group was 48.6±11.1 days while in the operative group it was 48.6±11.8 days.[13]

This study showed that mean gravidity of the studied patients was 2.7±1.1 and 2.3±1.2 in conservative group and operative group respectively while mean parity was 1.3±1.2 and 1.1±1.2 in conservative group and operative group respectively. And this was statistically in significant relationship regarding the decision of management. These match the result of study done by Fernandez H et al, in which the mean gravidity was 2.4±1.2 in conservative group and 2.3±1.3 in operative group while mean parity was 0.6±0.9 in conservative group and 0.7±0.8 in operative group.[13]

Regarding decision according to Fernandez score in this study, it was found that mean β-hCG level was 4628±1581 mIU/mL. While in the study conducted by Megan B et al, 2003 it was found that mean β-hCG level was 2215 mIU/mL.[25] And according to its level in each group of the study, it was found that β-hCG level was 3806±7869 mIU/mL and 6122±1577 mIU/mL in conservative group and the operative group respectively. Which was similar to the study done by Fernandez H et al, which showed that β-hCG level was 3120±5280 mIU/mL and 259±3269 mIU/mL in conservative group and operative group respectively.[13] There was a statistically significant relationship between β-hCG level and the decision of management.

Hematosalpinx and Hemoperitneum are important radiological findings that could be found in ectopic pregnancy and are helpful in diagnosis. Regarding our study, regarding ultrasound, this showed that 85% of patients had hematosalpinx in conservative group but there was hematosalpinx in 100% of patients in operative group. This had a statistically significant relationship with the decision of management of the patients. This agrees with the results of the study conducted by Atri M et al, in which 88.8% of the patients in the conservative group and 100% of the patients in the operative group had hematosalpinx in ultrasound.[26]

And in this study, it was found that majority of the patients (90%) had hematosalpinx <1 cm in conservative and on the other hand (63.6%) of patients in operative group had hematosalpinx of 1-3 cm. And this difference is most probably due to increased gestational age and so increased size of the embryo. It was also found in this study that there was 95% of the patients had positive ultrasound for hemoperitoneum in conservative group while it was positive in 100% of the patients in operative group. And this showed statistically significant relationship between both groups regarding the decision of management.

And this is unlike the result of Vermesh M et al, which showed that ultrasound is positive in 83% of patients with ectopic pregnancy.[27] Using Fernandez score in this study, it was found that 61 (98.3%) of 62 patients had the same decision of management whether using Fernandez score or clinical experience of our hospital doctors. The difference was in one case in which the decision using Fernandez score was for conservative management but in our hospital, she underwent operative intervention.

This was explained by our doctors that in this case the ultrasound revealed a viable fetal pole which wasn't included in Fernandez score and they said that this parameter alone is considered an indication for operative intervention regardless of the other parameters included in the score. At the end of this study it was found that Fernandez score has both high sensitivity 100% and 95.2% specificity.

CONCLUSION

There is statistically significant relationship between decision using Fernandez score and that in our hospital. Fernandez score has both high sensitivity 100% and 95.2% specificity. And this indicates that this score has a good prognostic value for the management of ectopic pregnancy and can be applied in emergency room.

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