FERTILITY FOLLOWING ECTOPIC PREGNANCY

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In addition to the acute adverse consequences of ectopic pregnancy, the subsequent reproductive potential of the affected women has continued to attract the attention of medical scientists in recent times. In a study to evaluate the fertility potentials in 138 patients treated for ectopic pregnancy in the King Khalid University Hospital (KKUH) Riyadh, 105 (76.1%) of the patients had follow-up management for periods varying from 12 to 60 months. Since all these patients desired pregnancies, they were classified as "at risk" for evaluation of their reproductive potentials. Of these, 51 (48.6%) eventually became pregnant and produced 63 viable pregnancies, 18 abortions and one repeat ectopic pregnancy. Many of those who failed to become pregnant over the follow-up period probably had tubal damage due to the antecedent pelvic inflammatory disease (PID), perhaps compounded by the effects of the ectopic pregnancy and the management, among other factors. *Ann Saudi Med* 1994;14(4):322-325.

There has been a dramatic increase in the incidence of ectopic pregnancies in recent years in consonance with the increased numbers of patients with sexually transmitted diseases and the consequent pelvic inflammatory disease (PID).¹⁻⁵ Indeed, acute PID has been observed to be by far the most common cause of tubal lesions responsible for ectopic pregnancy.^{2,3,5,6} It is believed that the loss of tubal morphologic and functional integrity does alter the normal physiologic activity of the tubes and thus predisposes the women to experience abnormal sites of implantation.³

Apart from the acute adverse consequences of ectopic pregnancy, one area that has attracted attention of medical scientists lately is the subsequent reproductive potential of the affected woman. It is known, for example, that almost all ectopic pregnancies occur in women of reproductive age and many of these women are interested in future fertility.⁷ In several studies, it has been reported that only about 50% of women who have had tubal pregnancy subsequently became pregnant and in only about 30% is there the chance of a live birth.^{5,7-10} A few studies, however, have shown a higher proportion of fertile women (60% to 80%) following ectopic pregnancies.¹¹⁻¹³

The present study was undertaken to evaluate the current fertility status among women who were treated for ectopic pregnancy in King Khalid University Hospital (KKUH) over the period 1407H to 1411H (August 1986 to July 1991) and who have been followed up since. In addition, the incidence of repeat ectopic pregnancies among these women was reviewed and analyzed.

Material and Methods

The study population consisted of 138 patients who have had ectopic pregnancy, as confirmed surgically and histologically, managed at King Khalid University Hospital between 1407H and 1411H (August 1986 and July 1991), and followed up in the gynecology clinic until the current year (1412H or 1992). One hundred and five (76.1%) of the patients have had follow-up for periods of time varying from one year to five years (mean 2.8 years) following surgery.

During the follow-up, great importance was placed on the fertility of the patients following their ectopic pregnancy, with particular emphasis on the number of pregnancies that each one has had since the diagnosis and management of her ectopic pregnancy. The outcome of each pregnancy in terms of abortions, repeat ectopic pregnancies and viable pregnancies was assessed. Other pertinent data on their demographic characteristics were also reviewed and analyzed in relation to antecedent risk factors and the type of operative procedures offered. Data were subjected to statistical analysis using the chi-square test for linear trend and association.

Results

Of the 138 patients who were diagnosed as having ectopic pregnancies over the study period, 10 (7.2%) had their second ectopic pregnancies and this resulted in sterility. Another 23 (16.7%) were lost to follow-up. Therefore, only 105 (76.1%) were followed up in the clinics for periods ranging from 12 months to 60 months, with a mean of 33.5 months prior to this analysis. All the patients who had follow-up in the clinic attempted further pregnancies and were therefore classified as "at risk" for

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evaluation of their fertility and reproductive potential. Among the patients "at risk", 51 (48.6%) eventually became pregnant (Table 1).

The percentage of patients "at risk" who became pregnant decreased as the period of follow-up decreased. For example, 73.9% of those followed up for four years became pregnant as compared with only 34.6% of those followed up for one year (Table 2). However, when the pregnancy rate was analyzed in relation to the duration of follow-up, there was no significant difference ($P=0.071$). Similarly, statistical test for linear trend did not show any significance ($P=0.104$).

Table 3 shows the age group of the patients in relation to the total number of patients "at risk" who eventually became pregnant. Pregnancy occurred in each age group. However, the percentage pregnancy rate tended to decrease

TABLE 1. Duration of follow-up and pregnancy rate in "at risk" patients who became pregnant after ectopic pregnancy.

Patients	Duration of follow-up (in years)					Total
	5	4	3	2	1	
No. of patients with EP	22	20	26	29	31	128
Previous hx of repeat ectopic pregnancy (excluded)	3	1	2	2	2	10
Patients capable of pregnancy	19	29	24	27	29	128
Patients lost to follow-up	4	6	6	4	3	23
"At Risk" patients followed up	15	23	18	23	26	105
No. of patients who became pregnant	6	17	9	10	9	51
% of "at risk" patients who became pregnant	40.0	73.9	50.0	43.5	34.6	48.6

EP=ectopic pregnancy; hx=history.

TABLE 2. Pregnancy rates based on years of follow-up.

	Years of follow-up					Total
	5	4	3	2	1	
Pregnant	6(40%)	17(73.9%)	9(50%)	10(43.5%)	9(34.6%)	51(48.6%)
Not Pregnant	9	6	9	13	17	54
Total	15	23	18	23	26	105

Chi-square test for association ($X^2=8.635$ on 4 df $P=0.071$); chi-square test for linear trend ($X^2=2.636$ on 1 df $P=0.104$).

TABLE 3. Age group of patients "at risk" who became pregnant among patients with ectopic pregnancy.

Age groups	Patients with ectopic pregnancy	Patients "at risk"	Patients who became pregnant	% Patients "at risk" who became pregnant
15-19	1	1	1	100.0
20-24	29	20	12	60.0
25-29	48	33	18	54.5
30-34	37	36	18	50.0
35+	23	15	2	13.3
Total	138	105	51	48.6

steadily with advancing age. For example, 49 (54.4%) of the 90 patients below 35 years of age became pregnant as against two (13.3%) among the 15 patients who were 35 years and above (Table 4). The results showed that there is a statistically significant difference in the pregnancy rates between the different age groups ($P=0.024$). There is also a significant linear decline in pregnancy rate with age ($P=0.009$).

Table 5 shows analysis of the total number and outcome of pregnancies achieved by the 51 "at risk" patients during the follow-up period. Forty-five (88.2%) of the 51 patients had at least one viable pregnancy. The only patient who had three viable pregnancies and those who had two or three pregnancies (viable pregnancies and abortions) were those with longer follow-up periods, whereas those with shorter follow-up periods had only one or two pregnancies. In all, there were 82 pregnancies, made up of 63 (76.8%) viable pregnancies, 18 (22.0%) abortions and one (1.2%) repeat ectopic pregnancy, the latter in a patient treated by milking the previous ectopic pregnancy from the tube in an earlier presentation during the study period.

When the total number of pregnancies was analyzed in relation to the duration of follow-up (Table 6), it was found that both abortions and viable pregnancies occurred

TABLE 4. Pregnancy rates in relation to the different age groups.

	Age groups				Total
	25	25-29	30-34	35+	
Pregnant	13(61.9%)	18(54.5%)	18(50%)	2(13.3%)	51(48.6%)
Not Pregnant	8	15	18	13	54
Total	21	33	36	15	105

Chi-square test for association ($X^2=9.452$ on 3 df $P=0.024$); test for linear trend ($X^2=6.708$ on 1 df $P=0.0096$).

TABLE 5. Details of outcome of pregnancies among the 51 "at risk" patients who became pregnant.

Types of Pregnancy	No. of pts.	Viable Pregnancy	Abortions	Ectopic Pregnancy	Total Pregnancies
1 Viable Pregnancy	19	19	-	-	19
2 Viable Pregnancy	13	26	-	-	26
3 Viable Pregnancy	1	3	-	-	3
2 Viable Pregnancy + 1 Abortion	3	6	3	-	9
1 Viable Pregnancy + 1 Abortion	8	8	8	-	16
1 Viable Pregnancy + 2 Abortions	1	1	2	-	3
Subtotal	45	63	13	-	76
1 Abortion only	5	-	5	-	5
Ectopic Pregnancy	1	-	-	1	1
Total	51	63(76.8%)	18(22%)	1(1.2%)	82(100%)

TABLE 6. Total number of pregnancies and duration of follow-up of the "at risk" patients who became pregnant.

Outcome of Pregnancy	Duration of follow-up (in months)									Total
	60	54	48	42	36	30	24	18	12	
Normal Pregnancy	7	2	16	8	2	10	5	6	6	62
IUFD (42 weeks)	-	1	-	-	-	-	-	-	-	1
Abortions	-	-	6	1	-	1	3	1	6	18
Ectopic Pregnancy	-	-	-	-	-	-	1	-	-	1
Total	7	3	22	9	2	11	9	7	12	82

IUFD=intrauterine fetal demise.

throughout the follow-up period with no particularly significant relation to the duration of follow-up. The only ectopic pregnancy during the study period occurred three years following the first ectopic pregnancy, when the patient was being managed for infertility. The only intrauterine fetal death occurred in a patient at 42 weeks of gestation.

Discussion

Many studies have reported fertility rates in women subsequent to ectopic pregnancy to be as high as 60% to 80%,¹¹⁻¹³ although many others have reported much lower fertility rates in the range of 30%.^{5,7-10,14} The fertility rate of 48.6% obtained in this study is within these divergent reports. Similarly, the 45 (88.2%) patients with viable pregnancies among the 51 patients who became pregnant is in consonance with some of these studies.¹³

Several factors may account for the varying results obtained in the different studies. Among these is the effect of the antecedent PID that resulted in the ectopic pregnancy in the first instance. Another factor is the surgical procedure adopted in the management of the patients. The usual surgical treatment for patients with ruptured ectopic pregnancy with irreparable damaged tube is salpingectomy or salpingo-oophorectomy, the latter being advocated on the assumption that it may increase fertility while reducing the risk of repeat ectopic pregnancy.¹⁵ On the other hand, the current management advocated for the unruptured tubal ectopic pregnancy is salpingostomy.¹⁶⁻¹⁹ The age of the patient is equally significant in relation to pregnancy rate as demonstrated in this study and as has been shown in other studies.⁷

The present study has made no distinction in the percentage of the patients "at risk" who eventually became pregnant with regard to the method of surgical management they received, since the figures are too small to arrive at any meaningful conclusions. For example, 91.3% of the patients had salpingectomy, only six (4.4%) of them had salpingo-oophorectomy, and more had salpingostomy. Of those who had salpingo-oophorectomy, only four had follow-up and two of them became pregnant. With regard

to age, it was obvious that pregnancy rates in the patients above 35 years were statistically significantly lower than those below 35 years. This is in agreement with the findings in other studies^{7,10,13} where pregnancy rates decreased with increasing age.

The duration of follow-up also plays a part in the rate of pregnancies following ectopic pregnancies. Those patients with longer follow-up tended to have several pregnancies, although there was no statistically significant difference in this. However, there may be a need to evaluate the pregnancy rate during follow-up in relation to whether or not there was an antecedent history of pelvic inflammatory disease. It is generally accepted that a prior history of pelvic infection at the time of ectopic pregnancy portends an ominous effect on the future fertility, as the pregnancy rates in these patients are usually poor, no matter which operative method was employed.^{7,10,12} This is because the original inflammatory process almost always affects both tubes.

In all, the 51 "at risk" patients who became pregnant in this study produced 82 pregnancies, of which 63 (76.8%) were viable pregnancies. This indeed represents a high fertility rate among the patients. There was one (1.2%) repeat ectopic pregnancy during the study period and this occurred in a patient who has had two previous ectopic pregnancies in the same tube, both of which were treated by conservative surgery. Even this third ectopic pregnancy, which occurred in the contralateral tube this time, was treated to preserve the affected tube also. It would be of great interest, for example, to find out the fertility potential of this patient in the future.

The role of conservative management of ectopic pregnancies in increasing the fertility potential of patients has been raised recently. Hence, more conservative surgery for ectopic pregnancy is being advocated in order to increase the chances of pregnancies in these patients.¹⁶ Indeed, conservative management of the unruptured tubal ectopic pregnancy by salpingostomy is currently the standard procedure.¹⁷⁻¹⁹ Whether salpingostomy is to be done by laparoscopy or by laparotomy should be left to the surgeon's discretion, since conservative management (linear salpingostomy) done by either route has the same efficacy, as shown in several reports,²⁰⁻²² as well as in a randomized prospective trial.²³

It is pertinent to note, however, that in addition to the initial damage of the tubes from PID, which has resulted in ectopic pregnancy, there is the added insult of the ectopic pregnancy. Taking these two "insults" on the tubes together with that of conservative surgery may all add up to compromise rather than increased fertility in these patients.²⁴ Every care, therefore, needs to be taken at surgery to ensure functional, patent tubes in order to increase the fertility potentials of these patients in the future.

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