

Factors affecting fertility following radical versus conservative surgical treatment for tubal pregnancy

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ABSTRACT

Objective: The aim of this study was to analyze the fertility prognosis after conservative or radical surgery for ectopic pregnancy. Also, to identify any biological factors that may influence the fertility outcome after an ectopic pregnancy.

Methods: A retrospective study which was carried out by collating information from the patient's hospital records was performed on 137 cases of confirmed ectopic pregnancy between January 1990 and December 1995 at the Security Forces Hospital Riyadh, Kingdom of Saudi Arabia. The outcome measure of term pregnancy rate and repeat ectopic pregnancy rate was analyzed up to 3 years after the diagnosis of index ectopic pregnancy.

Results: Our results showed that the term pregnancy rates were not significantly different following radical or conservative surgical treatments for ectopic pregnancy, $P > 0.05$, (50% in the conservative group compared with 56% in the radical group). But equally important, the risk of a further ectopic was not increased in the radical

surgery group, $P > 0.05$ (11% in the conservative group as compared to 8% in the radical group). The incidence of intrauterine pregnancy rate (term pregnancy + miscarriage) was also comparable in each group. Multivariate regression analysis showed that the factors associated with higher fertility were age 30 years or less, past history of term pregnancy and a negative history of infertility ($P < 0.05$).

Conclusion: No significant difference in intrauterine pregnancy rates or repeat ectopic pregnancy rates were found after radical or conservative surgical treatment for tubal pregnancy. The patient's age, previous obstetric performance and a history of infertility significantly influenced fertility following the index ectopic pregnancy.

Keywords: Ectopic pregnancy, salpingostomy, salpingectomy, fertility, conservative, radical, biological factors.

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During the last 2 decades, the incidence and management of ectopic pregnancy have changed dramatically. The ectopic pregnancy rate has increased in most Western countries and now reaches approximately 1.5% of all reported pregnancies.¹⁻³ During the same time, progress in terms of earlier diagnosis and conservative surgical and medical management has taken place. The greater clinical awareness, the use of markers for early pregnancy well-being, such as quantitative human chorionic

gonadotrophin (hCG) measurement, and high resolution sonography and laparoscopy have improved the diagnostic sensitivity of tubal pregnancy before it ruptures in 90% of cases thus reducing the morbidity of ectopic pregnancy.⁴ In addition, early and accurate diagnosis has not only permitted the trial of other alternative therapies but has also shifted the surgical management of ectopic pregnancy from salpingectomy, sometimes referred to as radical surgery to salpingostomy, sometimes

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referred to as conservative surgery. In 1953 Stromme⁵ reported the first case in English language literature of salpingostomy for tubal pregnancy. Since then several variations of non extirpative surgery by laparotomy have been described followed more recently by a trend toward laparoscopic salpingostomy.^{6,7} Salpingostomy has gradually replaced salpingectomy as the surgical procedure of choice for unruptured tubal pregnancy in women who wish to preserve fertility. Maintaining the opportunity for subsequent fertility has become the overriding goal based on safety and feasibility of the surgery.⁸ Safety and feasibility are, however, not the only factors that are involved in determining the choice of a medical or surgical procedure. Clearly efficacy, individual surgical skill and training, surgical facilities and clinical appropriateness are also important factors in decision making. Criteria that must be met to qualify patients for conservative surgery vary among centers but the reported incidence ranges from 30-65% of all ectopic pregnancies.⁹⁻¹¹ The purpose of this study was to evaluate the reproductive performance i.e. term pregnancy rate and repeat ectopic pregnancy rate after conservative or radical surgery for tubal pregnancy. We also wanted to investigate whether certain biological characteristics of the patient can influence the subsequent fertility after radical or conservative surgical treatments.

Methods. An analysis of reproductive function subsequent to a first ectopic pregnancy was performed. Initially a retrospective chart review was performed to identify women who had undergone surgery for ectopic pregnancy over a period of 6 years between January 1990 and December 1995 at Security Forces Hospital, Riyadh. One hundred and forty-nine ectopic pregnancy cases were identified. A subset of women was then identified who had undergone surgery (conservative or radical) for first ectopic pregnancy and who subsequently had attempted conception and who could be traced for follow-up. The follow-up period was 3 years after the diagnosis of index ectopic pregnancy. Conservative surgery was through linear salpingostomy or milking of the tube either through laparoscope or laparotomy. Radical surgery was defined as salpingectomy either through laparoscope or laparotomy. Only those patients who were histologically proven to have ectopic pregnancy were involved in the study. The basic information collected for each patient included age, obstetric history, history of infertility, condition of conception (contraception, ovulation induction, and in vitro fertilization), characteristics of the ectopic pregnancy (site, tubal rupture, and hemoperitoneum) and the treatment procedure used. In order to analyze subsequent fertility in this study population,

occurrence of any further pregnancies including miscarriage, further ectopic pregnancies and term pregnancies was recorded. Any patient who was not intending to become pregnant, for example those using some form of contraception, were excluded from the analysis. The main outcome measure was the occurrence of a term pregnancy or ectopic pregnancy at 3 years of follow-up after the index ectopic pregnancy. The continuous data was analyzed by student's t-test and categorical data was analyzed by chi-squared test. The effect of various confounding variables on fertility outcome was assessed by multivariate regression analysis to determine if they are independently influencing the results.

Results. One hundred and forty-nine women with surgically confirmed ectopic pregnancy presented to the Security Forces Hospital between January 1990 and December 1995. During this period the total number of deliveries were 35,202. Thus the incidence of ectopic pregnancies was 0.389%. Out of these 149 women, 12 patients were excluded either because they did not attempt conception (n=2), were lost to follow-up (n=7) or had repeat ectopic pregnancy (n=3). Thus 137 subjects with a primary ectopic pregnancy who could be traced over 3 years after surgery formed the basis for our study. The age range of these patients was between 14-44 years (mean 28) and the parity ranging from 0-11 (mean 6). Of the 137 patients, 18 (13%) patients had been treated by conservative surgery (conserving the tube) and 119 (87%) were treated with radical surgery (removing the tube). Out of the 137 patients, 9 were treated by laparoscopic salpingectomy and 1 had conservative procedure (milking of the tube) performed through the laparoscope. The remaining 127 cases were treated via minilaparotomy undergoing either radical or conservative surgical procedure. Nine patients in the conservative group (50%) and 66 patients in the radical group (56%) achieved term pregnancy. There was no statistical difference between the 2 groups in terms of the chance of a term pregnancy within 3 years, $P>0.05$. Two patients out of 18 in the conservative group (11%) miscarried compared with 16 out of 119 in the radical group (13%), $P>0.05$. The chance of an intrauterine pregnancy (term pregnancy plus spontaneous abortion) was no different in the 2 groups. Eleven out of the 19 patients (61%) in the conservative group versus 82 out of 119 patients (69%) treated in the radical group achieved intrauterine pregnancy, $P>0.05$. The risk of recurrent ectopic pregnancy between the 2 groups was not statistically different ($P>0.05$). Two out of 18 patients treated conservatively (11%) and 13 out of 119 patients treated by radical surgery (11%) had a subsequent ectopic pregnancy. There was persistent

Table 1 - Effect of history of infertility on outcome.

Past history of infertility n = 39 Outcome with			No past history of infertility n = 98 Outcome with		
Conservative	Radical	Total pregnancy	Conservative	Radical	Total pregnancy
7 (54%)	6 (46%)	13 (33%)	2 (3%)	60 (97%)	62 (63%)*
P* < 0.05					

Table 2 - Effect of age of patient on outcome.

Age 30 or less n = 89 Outcome with			Age more than 30 n = 48 Outcome with		
Conservative	Radical	Total pregnancy	Conservative	Radical	Total pregnancy
7 (12%)	50 (88%)	57 (64%)*	2 (11%)	16 (89%)	18 (38%)
P* < 0.05					

Table 3 - Effect of past history of term pregnancy on outcome.

Past history of no term pregnancy n = 26 Outcome with			Past history of term pregnancy n = 111 Outcome with		
Conservative	Radical	Total pregnancy	Conservative	Radical	Total pregnancy
7 (78%)	2 (22%)	9 (35%)*	2 (3%)	64 (97%)	66 (59%)*
P* < 0.05					

trophoblastic tissue in one of the 18 patients treated conservatively but none in those treated with salpingectomy. It is not clear that the latter figure is the true frequency as the patients who had undergone salpingectomy did not have serial measurement of hCG. Multivariate regression analysis showed that infertile patients were less likely to conceive subsequently regardless of the surgical procedure used. Thirteen out of 39 patients (33%) with a history of infertility achieved a term pregnancy whereas 62 out of the 98 patients (63%) with no history of infertility had a term pregnancy. The difference was statistically significant, $P < 0.05$ (Table 1). The term pregnancy rate increased significantly in women who were 30 years of age or less. Fifty seven out of 89 women (64%) age 30 or less achieved term pregnancy compared with 18 out of 48 women (38%) who were above 30 years of age, $P < 0.05$ (Table 2). The history of a term pregnancy before the diagnosis of ectopic pregnancy significantly increased the

chance of a term pregnancy. One hundred and eleven women had a history of term pregnancy and 26 women had no history of a previous term pregnancy. In the first group 66 (59%) patients achieved a term pregnancy whilst 9 patients (35%) achieved a term pregnancy in the latter group, $P < 0.05$ (Table 3).

Discussion. In the treatment of ectopic pregnancy, the decision clinicians are faced with initially is whether surgical treatment should be conservative or radical. The choice of treatment depends to a large extent on the characteristics of the women. In our study, 87% of the patients underwent radical surgery whereas 13% underwent conservative surgical treatment. Radical surgery was usually employed in cases where the tube was already ruptured or the contralateral tube was grossly normal or the patient was of high parity, or all these factors being present. However, if the patient was suffering from infertility or the tube had not ruptured or the

contralateral tube was unhealthy, conservative surgical treatment was employed. This consisted of either dorsal salpingostomy or milking of the tube. The objective of conservative surgery for tubal ectopic pregnancy is to remove the product of conception while inflicting as little damage as possible to the oviduct, thus increasing the chance of an intrauterine pregnancy. The major argument against conservative surgery is the possibility of the failure to remove the pregnancy completely and to increase the risk of recurrence rate of ectopic pregnancy as the damaged tube is left behind. So the balance between the advantages and disadvantages of a conservative treatment strategy are not clear. In the present study the overall 53% term pregnancy rate in patients undergoing treatment for ectopic pregnancy is quite good. This is surprising, as at the time of primary operation for ectopic pregnancy no special surgical technique such as microsurgery was used. This high pregnancy rate could be explained by the fact that most of our patients were potentially fertile multipara. Many authors claim a subsequent live birth in only one third of the cases,^{12,13} although higher rates have been reported.¹⁴⁻¹⁶ Our results showed that there was no significant difference in term pregnancy rate or intrauterine pregnancy rate amongst the radical and conservative surgery treatment groups. The term pregnancy rate was 50% in the conservative group compared with 56% in the radical group. Sixty-eight percent of patients in the conservative group achieved intrauterine pregnancy compared with 80% in the radically treated group. Published comparisons of intrauterine pregnancy rates for conservative surgical and radical treatments have produced conflicting results. Some studies found little or no difference,^{17,18} whereas others found that the rate was higher with conservative rather than with radical treatment.¹⁹⁻²¹ The risk of repeat ectopic pregnancy was comparable in the 2 groups, 11% in the conservative treatment group and 8% in the radical treatment group. This agrees with many research studies^{12,14} although some increased rates of recurrent ectopic pregnancy have been reported with the conservative procedure.¹⁷ Although our results clearly showed that removal of the affected tube did not affect the fertility outcome, conservative surgical management should be considered if the tube is unruptured or the patient has an affected tube on the other side or the patient suffers from infertility, as the risk of repeat ectopic is not increased. Our study showed that fertility after ectopic pregnancy was related more to the characteristics of the women existing before the index ectopic pregnancy rather than the type of surgery whether conservative or radical. Three contributing factors were clearly identified. Firstly, a history of infertility was found to have a significant adverse effect on the chance of subsequent pregnancy. Only 13 out of 39 patients (33%) with a history of infertility achieved a term

pregnancy whereas 62 out of the 98 patients (63%) with no history of infertility had a term pregnancy. Infertile patients are therefore less likely to conceive subsequently regardless of the surgical procedure employed. Similar observations have been made by others.¹¹ Secondly, the fertility after having an ectopic pregnancy was affected by the age of the patient. Age 30 or less was associated with significantly better term pregnancy rate. Fifty-seven out of 89 women (64%) who were 30 years of age or less, achieved a term pregnancy, but only 18 women out of 48 (38%) who were more than 30 years of age achieved a term pregnancy rate. This association of fertility with age has also been observed in cases of unexplained infertility. It is believed that fertility decreases by 9% with each year of a woman's age after 30, due to the aging effect on the ovum.²² Thirdly, nulliparous women with ectopic pregnancy had a poor fertility outcome. Sixty-six women out of 111 (59%) who had a history of term pregnancy before ectopic pregnancy achieved a term pregnancy rate. On the other hand, out of the 26 women who did not have a history of term pregnancy before the diagnosis of index ectopic pregnancy, only 9 (35%) achieved a term pregnancy.

Our study represents retrospective data that reflects the results of day to day gynecological practice rather than outcome in a carefully chosen population of subjects. This study of 137 patients did not support the contention that the type of surgery might affect the reproductive outcome. Nonetheless, operation with minimum additional tubal lesion should be the method of choice when possible i.e. treatment of tubal pregnancy by laparoscope. Radical and conservative surgical procedures performed laparoscopically by properly trained personnel results in lower costs, shorter hospital stays and quicker return to normal activity with low complication rates.^{23,24} Early diagnosis without the use of laparoscope has made medical treatment possible for women with unruptured ectopic pregnancy thus avoiding surgery altogether. To date, 17 studies have reported 400 patients treated with intramuscular methotrexate with a success rate of 92%,²⁵ and lately this method of treatment has shown better intrauterine pregnancy rate than surgical methods whether conservative or radical in certain groups of patients.²⁶ Given its success rate in selected patients, its cost effectiveness and low incidence of side effects, methotrexate can ultimately be used as an alternative treatment.

Finally, if there is little difference in subsequent fertility after radical or conservative procedures, as our results have shown, it may be preferable in selective patients to eliminate the risk of recurrence and to use assisted reproductive technology with its better success rate to achieve pregnancy if necessary.²⁷

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