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Laparoscopic Tubal Salpingotomy Versus Salpingectomy in Management of Tubal Ectopic: Impact on Future Fertility

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Abstract

Background: Ectopic pregnancy (EP) is the main cause of maternal death during the first trimester of pregnancy and accounts for ~10 % of all pregnancy related deaths.

Aim: This research aims to observe fertility outcomes after laparoscopic tubal salpingotomy versus laparoscopic tubal salpingectomy in management of tubal ectopic. As regards decline in human chorionic gonadotropin (HCG) and hysterosalpingogram (HSG) done 3 months post-operative.

Patient and method: This prospective observational study was carried out in Gynecology and Obstetrics Department, El-Hussein University Hospital on 52 pregnant women diagnosed with tubal EPs in the period from May 2021 to October 2022. Our patients were obtained from both emergency units and elective operation.

Results: The decision between salpingotomy and salpingectomy is influenced by a variety of parameters, such as the age of the patient, the state of the tubes, the serum human chorionic gonadotropin (hCG) levels, and the patient's desire for future fertility.

Conclusion: Laparoscopic tubal salpingotomy can be offered for surgical management of tubal ectopic as regards future fertility, desire for pregnancy, and surgical situation.

Keywords: Fertility, Laparoscopic tubal salpingotomy, Tubal ectopic

1. Introduction

Ectopic pregnancies (Eps) are diagnosed when a fertilized egg implants and begins to grow within the Fallopian tube rather than passing on to the uterus as it normally would.¹ These pregnancies are referred to as tubal pregnancies. It is possible that this will result in internal bleeding as well as pain. As a consequence of this, the ectopic pregnancy must be removed through surgical means in the overwhelming majority of cases. It is imperative that an ectopic pregnancy (EP) be treated properly to maintain a woman's fertility after the condition has been diagnosed. Therefore, early detection, breakthroughs in surgical methods, and the selection of medical therapies in situations of intact

pregnancies all serve to boost individuals' fertility and lower the likelihood of recurrence rates for the disease.²

In recent years, there has been a heated debate on the type of surgery that women who want to maintain their fertility should have done: cautious or extreme.² The choice between salpingotomy and salpingectomy is determined based on a number of factors, such as the patient's age, the state of their tubes, the serum human chorionic gonadotropin (hCG) levels, and their desire to become pregnant in the future.³

The preservation of both tubes is regarded to offer good reproductive prospects, hence salpingotomy is preferred over salpingectomy. This is the case despite the potential for larger risks of persisting

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trophoblast and repeat ectopic pregnancy following salpingectomy.⁴

2. Patients and methods

El-Hussein University Hospital's Obstetrics and Gynecology Department recruited (52) women with tubal pregnancies for this prospective comparative study. The women experiencing a tubal pregnancy were randomly split into two groups. Laparoscopic salpingotomy was performed on twenty-four women with tubal pregnancies in group (A). Group (B): consisted of the twenty-eight women who underwent laparoscopic salpingectomy for tubal pregnancy.

Female subjects must be 18 years or older, have a laparoscopically confirmed diagnosis of tubal ectopic pregnancy, have a quantitative B-hCG concentration less than or equal to 5000 mIU/ml, have no fetal cardiac activity, be hemodynamically stable with no evidence of hemoperitoneum, be able to return for frequent follow-up care or remain as an in-patient, have a healthy contra-lateral tube, be scheduled for surgery, and be seeking fertility. The patient's gestational age ranged between 6 and 9 weeks.

2.1. Exclusion criteria

Women with a surgeon-determined contra-lateral tube abnormality or other laparoscopic procedure contraindications, women with other pathology that can delay conception, a quantitative B-hCG concentration greater than 5000 mIU/mL, women who intend to use contraceptive methods after surgery, and subjects unable or unwilling to comply with study procedures or illiterate.

Potential candidates for these therapies were informed of the benefits and drawbacks of each option. Patients who consented verbally and in writing were randomly assigned to one of two therapy groups.

Each case was evaluated by gathering information on the patient's age, reproductive history (including data on pregnancy, infertility, and parity), surgical history, ectopic pregnancy history, physical examination (including pulse, temperature, blood pressure, weight, and height), abdominal examination (including inspection, palpation, and percussion), and vaginal examination (including a bimanual examination).

Fertility was assessed by following up with women once a month for 6 months, and a hysterosalpingogram was done on all patients 3 months after surgery. Serum hCG levels were measured at

diagnosis and then weekly until they were undetectable in both groups to look for signs of residual trophoblast.

2.2. Methodology

Salpingectomy and salpingotomy were the two options offered to women. Unfortunately, randomization was not achievable because women were assigned to one of two groups based on their health status. Patients who were scheduled for laparoscopic salpingotomy underwent the procedure while under general anesthesia and the standard three-puncture laparoscopic technique. The other tube was checked after a complete pelvic and abdominal examination. A linear incision was made with a monopolar needle over the expanded anti-mesenteric portion.

After catching the irrigation tubing with non-traumatic forceps on both sides, the two forceps approximated to aid the gestational sac bulge through the little incision during hydro extrusion of the ectopic mass. Using bipolar hemostasis, we were able to close the incision without cauterizing the tubal mucosa. If heavy bleeding persisted, the mesosalpinx blood arteries directly beneath the tube could be cauterized with a bipolar probe. As secondary healing was encouraged, the pelvis was irrigated and the tubal incision was left open after initial bleeding had been controlled.

If the patient's condition deteriorated during a planned laparoscopic salpingectomy, the surgeon would do an open salpingotomy or salpingectomy instead. Similar to a laparoscopic salpingotomy, the meso-salpinx was coagulated with a bipolar coagulation device close to the tube, and the tube was removed with scissors. The tube was extracted with a 10 mm torcher. Drains of 20 gauges in diameter were used to irrigate 500 cc of normal saline into the pelvis.

2.2.1. Follow-up

Aptitude of subdividing into smaller parts following surgical intervention, serum hCG levels are checked on a weekly basis until the point at which they can no longer be detected in either of the treated arms. This is done in order to detect any remaining trophoblast. The common unit of measurement for the hCG concentration in serum is the international unit per liter. After surgery, persistent trophoblast is suspected when serum hCG levels rise or remain high for an extended period of time.

Patients who have had index tubal EP surgery are contacted by questionnaire once a month beginning 6 months after the procedure to evaluate their

fertility. The topics that are covered in the survey include pregnancy planning, unprotected sexual activity with the possibility of spontaneous conception, the use of contraceptives, treatment for infertility, and the occurrence of any pregnancies as well as the results of any of those pregnancies.

Outcome measures: maintaining tubal patency and having ovulation occur on its own is essential to having a healthy pregnancy that lasts. Ovulation induction, intrauterine insemination (IUI), and *in vitro* fertilization (IVF) all carry the risk of persistent trophoblast, repeated ectopic pregnancies, and ongoing pregnancies. Ovulation induction is also associated with an increased risk of several gestational trophoblastic malformations.

After surgery, patients who have persistent trophoblast, which can be identified by rising or plateauing serum hCG levels, are typically treated with systemic methotrexate or some other method. If an EP is visible on an ultrasound or if a pregnancy of unknown location (PUL) is conducted and the serum hCG level is above the discriminating zone, a repeat EP is performed. Another option is to perform a PUL.

2.3. Statistical analysis

After the data were inputted into the computer, the analysis was carried out with the assistance of the IBM SPSS software program, version 20.0. (Located in Armonk, New York: IBM Corporation) The quantitative and percentage data were used to provide a characterization of the qualitative data. The Kolmogorov-Smirnov test was carried out, and the results showed that the distribution was indeed normal. Along with its mean, standard deviation, median, and interquartile range (IQR), the quantitative data's range was presented. This range

included both the lowest possible value and the highest possible value. The significance of the results that were obtained was determined to be significant at the 5 % level.

The χ^2 test was utilized for categorical variables in order to compare findings from a variety of groups, and the student *t*-test was employed for normally distributed quantitative variables to compare results from the two groups that were investigated. Both of these tests were carried out to determine whether or not there was a significant difference in the outcomes of the various groups.

2.4. Sample size

For the sample size calculation, we used the spss 11 program. A study by 5 found that the expected correlation coefficient between arterial and venous lactate was 68. In order to detect a two-sided 95 % confidence interval with width equal to 0.4 for this correlation coefficient, the sample size will need to be 35 cases.

Calculation of the sample size: using the formula below, we were able to determine that the appropriate size of the research sample was 52.5

$$N = Z^2 * P * (1 - P) / D^2$$

Z: Confidence level at 95 % (1.96)

d: The Proportion of Error (0.05)

P: Probability (50 %)

3. Result

As can be seen in [Table 1](#), there was no discernible difference in preexisting conditions among the two groups.

There was not a statistically noteworthy distinction in symptoms among the groups in [Table 2](#).

Table 1. Comparison among studied cases according to baseline data.

	Group A (n = 24)	Group B (n = 28)	Test of Significance	P
Age (y)				
Range.	21–33	21–33	t = 0.350	0.728
Mean ± SD.	26.67 ± 3.42	26.32 ± 3.64		
Parity	No. (%)	No. (%)		
0	8 (33.3)	8 (28.6)	c ² = 1.535	0.464
1	7 (29.2)	5 (17.9)		
>1	9 (37.5)	15 (53.6)		
History of ectopic pregnancy	3 (12.5)	2 (7.1)	c ² = 0.427	0.514
History of PID	1 (4.2)	2 (7.1)	c ² = 0.211	0.646
Infertility	2 (8.3)	2 (7.1)	c ² = 0.026	0.872

SD, Standard deviation.

c²: Chi square test.

t: student t-test.

P: P value for comparing between studied groups.

^a: Statistically significant at P less than or equal to 0.05.

Table 2. Comparison among studied cases according to symptoms.

	Group A (n = 24)		Group B (n = 28)		c ²	P
Symptoms						
Asymptomatic	1	4.2	4	14.3	7.225	0.065
Pelvic pain	1	4.2	5	17.9		
Vaginal bleeding	4	16.7	8	28.6		
Pelvic pain + Vaginal bleeding	18	75.0	11	39.3		

Table 3 demonstrates that there was no statistically significant distinction among the groups in terms of examination and US characteristics.

Statistically significant differences in operation time were found among the groups as in Table 4.

There was no meaningful change in hCG levels between the salpingotomy and salpingectomy groups, as shown in Table 5.

Table 6 demonstrates there was a large, statistically significant difference in hysterosalpingogram results among two groups.

Table 3. Analyzing the cases studied side-by-side in terms of their examination and US characteristics.

	Group A (n = 24)		Group B (n = 28)		c ²	P
Ectopic site						
Ampulla	19	79.2	22	78.6	1.061	0.588
Fimbria	1	4.2	3	10.7		
Isthmic	4	16.7	3	10.7		
Tubal condition						
Unruptured	23	95.8	27	96.4	0.012	0.911
Ruptured	1	4.2	1	3.6		
Ectopic mass > 4 cm	18	75.0	18	64.3	0.696	0.404
Visualization of fetal heart rate	1	4.2	1	3.6	0.012	0.911

Table 4. Comparison between studied cases according to operation data.

	Group A (n = 24)	Group B (n = 28)	Test of Significance	P
Operation duration				
Range.	49–96	62–110	t = 3.083	0.003*
Mean ± SD.	73.38 ± 16.18	86.64 ± 14.84		
No. (%)		No. (%)		
Conversion to open surgery	0	1 (3.6)	c ² = 0.874	0.350
Blood transfusion	1 (4.2)	4 (14.3)	c ² = 1.523	0.218

Table 5. Comparison among Salpingotomy group (no. = 24) and Salpingectomy group (no. = 28) regarding human chorionic gonadotropin Levels.

Human chorionic gonadotropin Levels	Salpingotomy No. = 24	Salpingectomy No. = 28	Test value*	P-value	Significance
Pre					
Mean ± SD	2614.80 ± 908.18	2603.26 ± 857.64	0.047	0.963	NS
Range	1053–3904	1039–4063			
Post					
1 st week					
Mean ± SD	814.33 ± 816.56	437.82 ± 571.82	1.947	0.057	NS
Range	138–3261	29–2702			
2 ed week					
Mean ± SD	396.63 ± 899.31	176.04 ± 502.17	1.112	0.271	NS
Range	1–3018	1–2656			
3 rd week					
Mean ± SD	433.42 ± 1003.13	128.91 ± 514.14	1.270	0.211	NS
Range	1–2910	1–2480			
4 th week					
Mean ± SD	441.94 ± 986.18	229.00 ± 716.78	0.595	0.557	NS
Range	1–2723	1–2269			

Table 6. Hystrosalpingogram results were compared across instances.

	Group A (n = 24)		Group B (n = 28)		c ²	P
HSG finding						
Normal	17	70.8	0	0.0	31.8	<0.001
Unilateral patency	3	12.5	22	78.6		
Bilateral obstruction	1	4.2	2	7.1		
Patency with alteration	3	12.5	4	14.3		

There was not a statistically significant variation in intrauterine pregnancy (IUP) among the groups as in Table 7.

The Kaplan-Meier survival curve for Time from Initial Surgery to IUP demonstrates that there was no statistically significant difference among groups A and B in terms of the occurrence of IUP, with the former having a mean length of 4.708 months and the latter of 5.286 months. Group A had 41.7 % and group B had only 28.6 % as in Table 8 and Figs. 1–4.

Table 7. Comparison among studied cases according to IUP.

	Group A (n = 24)		Group B (n = 28)		c ²	P
IUP						
No	14	58.3	20	71.4	0.979	0.322
Yes	10	41.7	8	28.6		

IUP, intrauterine pregnancy.

Table 8. Kaplan-Meier survival curve for Time from Initial Surgery to IUP.

	Mean (Month)	IUP %	Log Rank	
			χ ²	P
Group A	4.708	41.7	1.148	0.284
Group B	5.286	28.6		

IUP, intrauterine pregnancy.

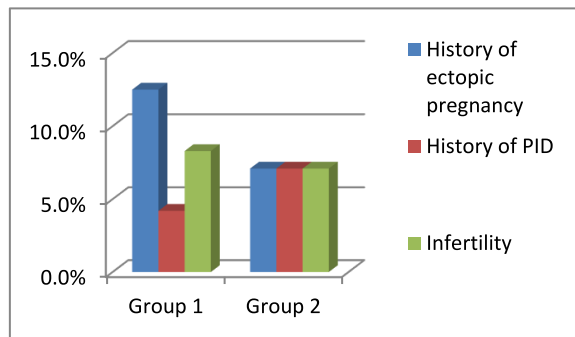


Fig. 1. Data-driven comparison of case studies.

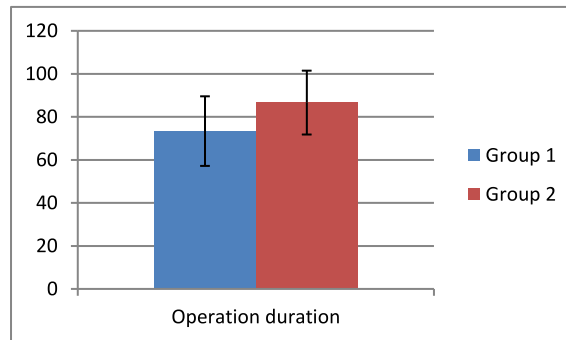


Fig. 2. Examining the range of case studies in relation to the time it took to perform surgery.

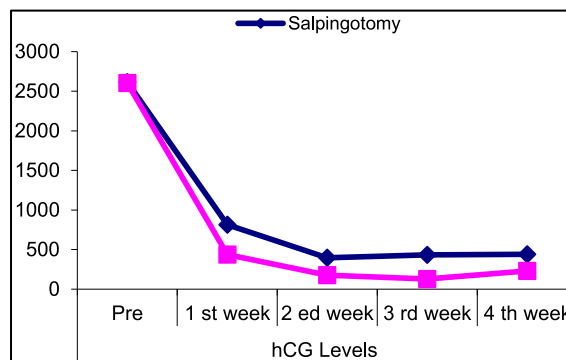


Fig. 3. Demonstrates a distinction among the human chorionic gonadotropin levels of the groups that underwent salpingotomy and those that underwent salpingectomy.

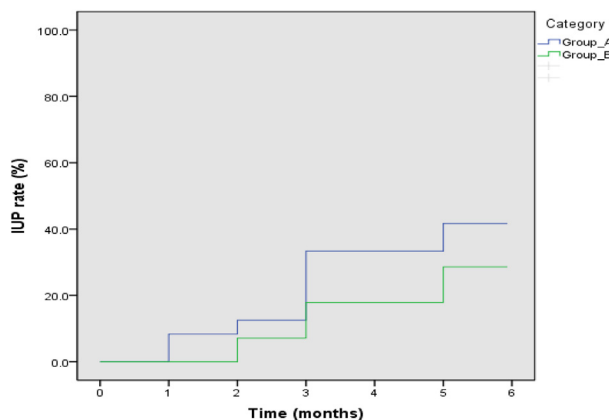


Fig. 4. Kaplan-Meier survival curve for Time from Initial Surgery to IUP. IUP, intrauterine pregnancy.

4. Discussion

EP occur in anywhere from 0.6 % to 2.1 % of all pregnancies. EP remains the greatest cause of maternal death in the first trimester, despite a 30-year drop in mortality. About 70–76 % of tubal EPs

occur in the ampullary portion, 11–16 % in the isthmic section, and about 2–10 % in the fimbria end of the fallopian tube.⁵

In this study, there was no noticeable age gap between group A and group B.

This is consistent with the findings of,⁶ who compared the reproductive outcomes of individuals who underwent various laparoscopic operations in an effort to determine the best surgical treatment for patients with tubal EP who planned to conceive in the future. The ages of patients in all three treatment groups were found to be comparable.

However,⁷ reported that they conducted a study and found that there was a statistically meaningful difference ($P < 0.05$) in the ages of people who underwent salpingectomy and salpingotomy. Women who have never given birth are more likely to want to keep their tubes intact than are older women or women who have already had children.

Parity, ectopic pregnancies, tubal resections, and infertility rates were not significantly different between groups A and B.

Consistent⁶ results showed no appreciable variations in pregnancy rates across the three groups.

In the current study, there was no discernible change in serum hCG concentrations before and after surgery.

The results of,⁸ who evaluated the effectiveness of hysteron salpingography HSG after laparoscopic resection, open resection, and methotrexate (MTX) therapy for endometriosis, corroborate this observation. There were no discernible differences in hCG concentrations between the three groups.

Women who have salpingectomy for an EP have postoperative HCG regression patterns similar to those who undergo fallopian tube-conserving surgery, it has been found.⁶

There were no significant differences between the groups in terms of ectopic mass or other physical and US parameters.

⁶'s findings that there were no significant variations in EP distribution or mean ectopic mass size among the three treatment groups are supported by our results.

Cases with large ectopic masses (i.e., mean mass size >4 cm) or ruptured tubal EPs were ordered to remove the affected tube by salpingectomy 8; one instance in group B resorted to open surgery, which is consistent with prior studies. None of the patients who received salpingotomy were moved to the salpingectomy group, according to Ref. 6 of the studies.

The present study's findings indicated substantial inter-group variability in hystrosalpingogram outcomes. In group A, significantly more individuals had normal HSG results compared with group B.

In this study, there were no significant differences in IUP among groups A and B.

Group A had a somewhat lower incidence of IUP than group B, as shown by the Kaplan-Meier survival curve for Time from Initial Surgery to IUP (mean duration: 4.708 months vs. 5.286 months). In comparison to group B's 28.6 %, group A had 41.7 %.

This is supported by,⁹ which looked at IUP rates up to 24 months after surgery and found no difference among salpingectomy and salpingostomy patients in younger Turkish women.

In contrast, a retrospective cohort study found that the cumulative incidence of IUP after 7 years was lower in women who had undergone salpingectomy rather than salpingostomy.¹⁰

This is in line with the results of a retrospective study⁷ that compared the fertility outcomes after salpingectomy and salpingostomy and found no significant difference.

The current investigation found no statistically significant disparity in the rates of repeat ectopic pregnancies or persistent trophoblasts among the two groups.

Similarly,⁷ observed that recurrent EP and infertility rates were marginally greater (although not significantly so) following salpingotomy. Even though the fallopian tubes were spared in the process, the likelihood of recurrent EP was found to increase afterward. The results were consistent with those found in other articles.³

4.1. Conclusion

The results of this study comparing reproductive outcomes after salpingectomy and salpingotomy found no differences of statistical significance. In addition, β -HCG was not substantially different among the two groups. If an individual with tubal ectopic wants to have children in the future, laparoscopic tubal salpingotomy can be performed.

4.2. Recommendation

Any woman hoping to have children in the future can be offered laparoscopic tubal salpingotomy as part of the surgical treatment for tubal ectopic pregnancy.

Funding

No funds: yes.

Conflicts of interest

No conflict of interest: yes.

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