

Effect of Salpingectomy in Ectopic Pregnancy on Ovarian Reserve

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Abstract

Introduction: Salpingectomy is a common procedure performed for ectopic pregnancy. However, its impact on the ovarian reserve is still uncertain. This study was conducted to explore the potential effect of salpingectomy in ectopic pregnancy on future ovarian reserve by measuring serum anti-müllerian hormone.

Methods: This prospective observational study was conducted on 60 women with ectopic pregnancy managed by salpingectomy. Serum anti-müllerian hormone was measured before the surgical procedure and 3 months postoperative as a marker of ovarian reserve.

Results: No statistical significant difference between serum anti-müllerian hormone levels at admission (2.34 ± 0.8 ng/ml [range 0.994 – 3.78 ng/ml]) and 3 months postoperative (2.48 ± 0.9 ng/ml [range 0.952 – 4.1 ng/ml]), where the mean change in anti-müllerian hormone was 0.14 ± 0.1 [range (-0.04) – (0.32)]. No correlation was found between change in anti-müllerian hormone and the potential influencers: age and serum anti-müllerian hormone level before salpingectomy.

Conclusion: Salpingectomy performed for ectopic pregnancy has no effect on ovarian reserve measured by anti-müllerian hormone.

Keywords

Anti-Mullerian hormone (AMH), Ectopic pregnancy, Salpingectomy, ovarian reserve

Introduction

Ectopic pregnancy is where implantation of the blastocyst occurs outside the uterine cavity. Fallopian tubes ectopic accounts for 96 % of all ectopic pregnancies.¹ Over the last decades, the incidence of ectopic pregnancy increased due to the liberal use of assisted reproduction. Its incidence is estimated to be 1-2% of all gestations.² Ectopic pregnancy is responsible for approximately 10 % of maternal mortality during the first trimester. It increases the possibilities of subsequent ectopic pregnancy and reduces the chance of subsequent normal pregnancy.³

For women in the reproductive age, fertility preservation is an important issue. Therefore, the selection of the best method of treatment for these women is crucial due to the potential risks on ovarian reserve.⁴ Many treatment options are proposed for ectopic pregnancy such as; expectant management, medical (methotrexate), or surgical (salpingectomy or salpingostomy) treatment. Laparoscopic salpingectomy is the most common surgical procedure performed for ectopic pregnancy.⁵ Many women with ectopic pregnancy and still seeking for future pregnancy, need to know about the effect of Salpingectomy on their ovarian reserve. This knowledge is also beneficial for surgeons to become alert of possible outcomes of this surgical procedure.⁶

The effect of salpingectomy on the ovarian reserve is still controversial. Disturbance of ovarian blood flow in the ascending branch of uterine artery present in the mesosalpinx may be the responsible mechanism of possible underlying adverse outcomes.⁷ Salpingectomy might harm both; ovarian reserve and ovarian responsiveness in women undergoing different fertility treatments.⁸ Bilateral or even unilateral salpingectomy preceding IVF treatment was found to do some damage to ovarian reserve.^{9, 10}

On the other hand, other studies denied this negative effect of salpingectomy on either ovarian reserve or response.^{8, 11} A meta-analysis studying ovarian reserve following salpingectomy found no significant changes in serum Anti-Mullerian hormone (AMH) following surgery.¹² Besides, prophylactic salpingectomy performed with hysterectomy is not harmful to the ovarian reserve.^{13, 14}

AMH is thought to be an instructive and dependable ovarian reserve marker,¹⁵ thus, can be used for assessment of possible ovarian harm following surgical procedures as salpingectomy or ovarian cystectomy.¹⁶ Being produced by pre-antral and small antral follicles granulosa cells.¹⁷ serum AMH can be used as a reflection of the total number of follicles, and thereby ovarian reserve.¹⁸

This study aims to assess the effect of salpingectomy in women with ectopic pregnancy on future ovarian reserve by assessing changes in pre- and post-operative serum AMH.

Materials and Methods

This prospective observational study was conducted at the Maternity Hospitals of both Ain-Shams University and Helwan University from February 2019 to December 2019. The study was approved by the institutional Ethics and Research Committee. Informed consent was obtained from all women before enrollment in the study.

The research included women with an ectopic pregnancy that were treated by Salpingectomy excluding women treated by other treatment modalities. Also, women with a history of any disease that might have a potentially negative effect on ovarian reserve were excluded (e.g. ovarian surgery, endometriosis, or systemic chemotherapy). The patient who conceived by assisted reproduction technology (ART) treatments or with a history of infertility were also excluded.

Before salpingectomy, blood samples were withdrawn, centrifuged, and frozen until the analysis time. At the date of discharge, patients were asked to have a revisit 3 months later and their contact details were taken. After 3 months from surgery, post-operative blood samples were withdrawn, centrifuged, and frozen until the analysis time. The rationale of taking 3-month interval between the 2 samples was based on the observation of a decrease in AMH levels after the first month of treatment. However, this decline disappears after three months. This observation is likely due to the reversible effect of altered blood flow on ovarian germinal cells following salpingectomy.⁴

All blood samples (pre and post-operative) were tested for AMH level using enzyme-linked immunosorbent assay (ELISA kit) using a Bio-Rad iMark microplate absorbance reader with reagents kits from Bio-Rad.

Collected data were analyzed using SPSS (v20.0; SPSS, Chicago, IL, USA). Descriptive statistics were done for quantitative data as range, mean and standard deviation (SD), while it was done for qualitative data as number and percentage. Paired comparisons were done using a t-test. A *P*-value <0.05 was defined as statistically significant. Change in AMH (Δ AMH) was estimated as postoperative AMH minus preoperative AMH. The logarithmic transformation of AMH was done to make a linear regression analysis. The correlation of $\Delta \log$ AMH (= log AMH at post-operative – log AMH in preoperative time) with potential influencing variables (age, and level of preoperative AMH) was studied using linear regression analysis.

Results

Sixty women with ectopic pregnancy treated by salpingectomy were recruited in the study based on the inclusion and exclusion criteria. The mean age was 27.9 ± 4.9 years and body mass index (BMI) was 23.6 ± 3.6 kg/m². The mean HCG level was 9091 ± 3857 IU/l and gestational age at the time of intervention was 3.77 ± 1.43 weeks. The incidence of smoking among the studied cases was 8% (5 cases).

No statistically significant difference was found between preoperative serum AMH levels (2.34 ± 0.8 ng/ml [range 0.994 – 3.78 ng/ml]) and 3 months following salpingectomy (2.48 ± 0.9 ng/ml [range 0.952 – 4.1 ng/ml]) ($P = 0.36$), where the mean Δ AMH was 0.14 ± 0.1 [range(-0.04) – (0.32)]. Age and pre-operative serum AMH level did not affect the mean Δ AMH as shown in figures (1) and (2).

Discussion

Salpingectomy is a commonly performed procedure for tubal pathologies, especially hydrosalpinx and ectopic pregnancy.¹⁰ Salpingectomy for ectopic pregnancy may not be comparable with that performed for other indications, due to the depth of surgical intervention, which might involve the ovaries.⁶

The presented study showed that managing ectopic pregnancy with salpingectomy does not affect serum AMH, hence no damaging effect on ovarian reserve. Two other research studies examined the impact of salpingectomy for ectopic pregnancy on ovarian reserve by performing pre- and post-operative AMH comparisons.^{4, 5} In agreement with our study; there was no decline in serum AMH measured 3 months postoperatively. However, one of these research studies investigated an unselected population whether they had conceived naturally or the following ART, unlike our study that included patients who conceived only naturally.

On the other hand, previous studies have revealed a decline in ovarian responsiveness following salpingectomy in women with ectopic pregnancy and seeking assisted reproductive technology (ART).¹⁹ These women needed higher gonadotropin dosage and longer duration of stimulation in comparison to those who had salpingectomy done for other indications.²⁰ However, these studies have focused on women already suffering from sub- or infertility.

One of the strongest points of this study being prospective and involving women who conceived naturally and without previous infertility history. Still, several drawbacks are indeed present such as; ultrasonographic markers of ovarian reserve; antral follicle count and ovarian volume were not used. Longer periods of follow up, 2 or 3 years, for example, might have revealed other important results. Further studies with a larger number of women are needed to ensure the safe effect of Salpingectomy on ovarian reserve, and for studying the effect of Salpingectomy in ectopic pregnancy on women with already low ovarian reserve.

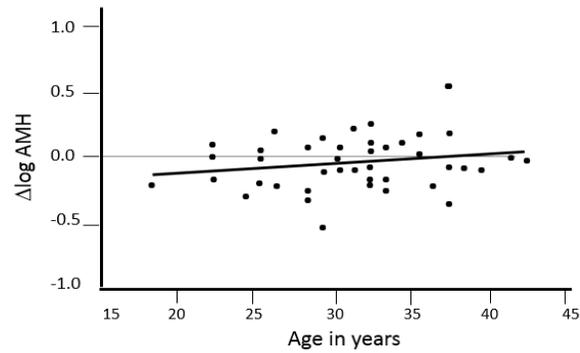
Conclusion

Management of ectopic pregnancy by Salpingectomy has no damaging effect on ovarian reserve measured by changes in serum AMH. This reflects the safety of this procedure when performed in patients with ectopic pregnancy.

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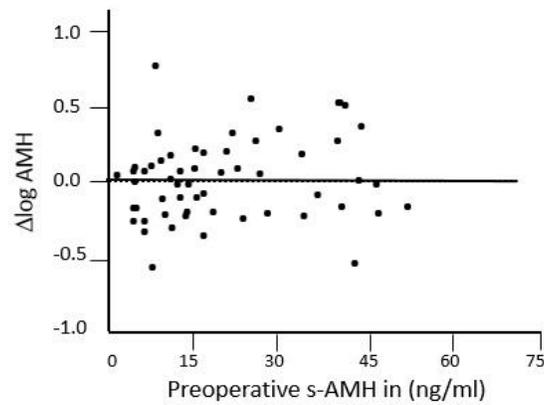
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$(Y = 0.005x - 0.174)$ (NS)

Figure 1: Relationship between ΔAMH and age



$(Y = 0.007x - 0.028)$ (NS)

Figure 2: Relationship between ΔAMH and pre-operative AMH