



Original Research Article

Volume 7, Issue 6 -2021

DOI: <http://dx.doi.org/10.22192/ijcrms.2021.07.06.003>

AMH changes over time in patients undergoing complete and partial removal of endometrioma cysts

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Abstract

Introduction: Several methods can be used to assess ovarian reserves (OR) to assess potential fertility. These methods can be classified into a variety of hormonal markers, ultrasound parameters, and dynamic tests. In most studies, FSH and AMH levels and antral follicle count (AFC) are assessed to measure OR. The aim of this study was to evaluate the AMH changes over time in patients undergoing complete and partial removal of endometrioma cysts.

Methods: This study was a double-blind randomized clinical trial on women with endometrioma referred to Amir Al-Momenin Hospital in Zabol. To analyze the data, the mean hormone levels before and after the operation and also compare the changes between the two groups with repeated measures test. Analyses were performed using SPSS statistical software version.

Results: The amount of AMH in patients undergoing relative removal decreased from 2.47 before surgery to 2.14 postoperatively, which was statistically significant ($p < 0.001$). Three months after surgery and six months after surgery, AMH levels were not statistically significant between the two groups. The difference between the two groups in terms of AMH changes over time after adjustment was not statistically significant in terms of ovarian size and preoperative AMH ($p = 0.805$).

Conclusion: AMH may be a very useful indicator of the extent of ovarian reserve damage following endometrioma or ovarian cystectomy. However, very few studies have been performed to assess the extent of damage to ovarian storage due to ovarian endometrioma or cystectomy using AMH levels.

Keywords: Endometrioma cysts, AMH, cysts

Introduction

Several methods can be used to assess ovarian reserves (OR) to assess potential fertility (1). These methods can be classified into a variety of hormonal markers, ultrasound parameters, and dynamic tests. In most studies, FSH and AMH levels and antral follicle count (AFC) are assessed to measure OR (2). These tests are also sufficient for the initial evaluation of individuals who are to

undergo IVF (3). The use of AMH seems to be increasing to assess OR and the use of FSH assay is decreasing for this purpose (4). The granulosa cells of the small preantral and antral follicles produce AMH, which, in addition to being more specific to FSH, does not change levels at different stages of the menstrual cycle. It is also not affected by the use of oral contraceptive pills (OC) and GnRH analogues (4). Studies have shown that AMH is higher in women who do not

have endometriosis than in women with the disease. In addition, in cases of bilateral endometriosis, AMH levels are lower than in unilateral cases (5). Also patients with endometriosis who underwent surgery had lower AMH levels than those who did not have surgery. Therefore, it can be said that by measuring the ovarian reserves before surgery, we can identify people who have low ovarian reserves and provide appropriate advice in this regard. Assessing AMH levels before surgery helps the surgical team choose the best surgical solution and if AMH is performed as a routine test before ovarian endometrium surgery, it may even in some cases skip surgery and suggest other methods, such as egg or embryo freezing (6-8). Because sometimes a cystectomy in these cases may lead to ovarian failure, especially in cases where the patient is over 35 years old and the ovary is faced with smaller reserves.

Method

This study was a double-blind randomized clinical trial on women with endometrioma referred to Amir Al-Momenin Hospital in Zabol. Inclusion criteria included patients with unilateral endometrioma cysts with a size of more than 4 cm, patients with dysmenorrhea with pelvic pain with vas above 5, age 18 to 35 years and patient satisfaction. Exclusion criteria included no PCOD, bilateral endometrioma cysts, age under 18 and over 35, lack of patient cooperation, and postoperative pregnancy.

The data collection tool and method included a checklist prepared by the researcher including

demographic information and variables in the table of variables. For sampling of patients at the time of admission and candidate for surgery by the researcher by random method using a table of random numbers were divided into two equal groups. To analyze the data, the mean hormone levels before and after the operation and also compare the changes between the two groups with repeated measures test. Analyzes were performed using SPSS statistical software version 22.

Findings

In this study, 86 women with endometrioma cysts who were eligible for inclusion were studied. The youngest and oldest patients respectively were 19 and 35 years old.

Table 1 and Figure 1 show that the amount of AMH in patients undergoing complete resection decreased from 2.22 before surgery to 1.96 after surgery, which was statistically significant (p <0.001).

Also, the amount of AMH in patients undergoing relative removal decreased from 2.47 before surgery to 2.14 postoperatively, which was also statistically significant (p <0.001).

Before surgery, three months after surgery and six months after surgery, AMH levels were not statistically significant between the two groups. The difference between the two groups in terms of AMH changes over time after adjustment was not statistically significant in terms of ovarian size and preoperative AMH (p = 0.805).

Table 1: Changes in AMH over time in patients undergoing complete and partial removal

type of action	Level AMH			P value during the time	P VALUE * between two groups
	Before the operation	Three months after surgery	Six months after surgery		
Full exit	2.22(1.12)	1.81(1.08)	1.96(1.16)	<0.001	0.805
Relative exit	2.47(0.97)	2.04(1)	2.14(0.97)	<0.001	
P value	0.282	0.311	0.425	----	

* After adjusting the effect of ovarian size and AMH before surgery

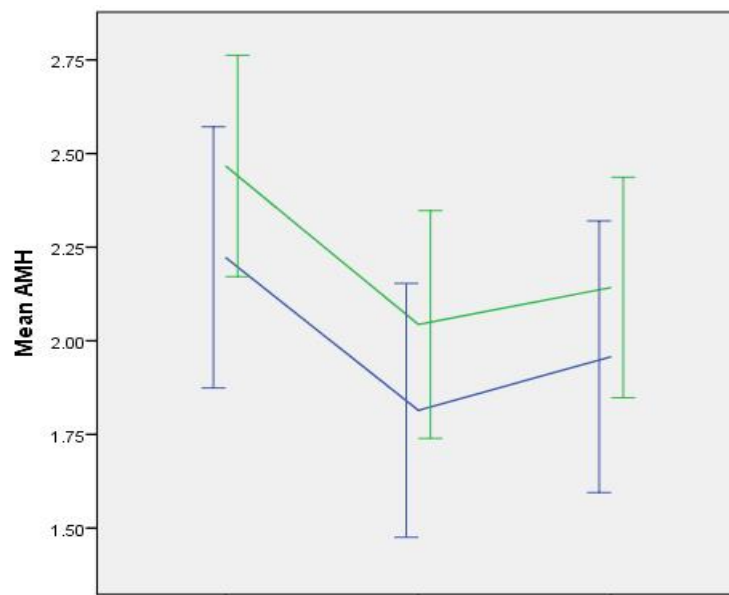


Figure 1: Changes in AMH in two groups of patients undergoing complete and partial removal

Discussion

In the last two decades, antimullerian hormone, FSH on day 3, E2 and Inhibin-B on day 3 have been suggested as markers of ovarian reserves (9-11). However, FSH, Inhibin-B, and E2 are involved in the feedback-negative pathway of the pituitary-ovarian axis (12), which undergo significant changes in the menstrual cycle. In contrast, serum AMH levels remain constant throughout the menstrual cycle (11). Antimullerian hormone (AMH) is a glycoprotein dimer that is a member of the transcriptional growth factor family. In women, AMH is secreted by granulosa cells into the primary and antral follicles (4-6 mm), the secretion of which gradually decreases during the post-follicle growth stages and is clearly undetectable in follicles larger than 8 mm (5). Serum AMH concentration is associated with the number of small follicles, followed by ovarian reserve. The size of small follicles is relatively constant during the menstrual cycle and therefore AMH concentration seems to have the least fluctuations during the menstrual cycle. Gradually, with age, the amount of AMH

decreases, which indicates a decrease in the number of follicles and reaching the stage of menopause (12). Animal studies have shown that AMH has an inhibitory effect on the uptake of primordial follicles, thereby preventing their rapid termination; it has also been shown that AMH reduces the sensitivity of follicles to circulating FSH and can play an important role in normal folliculogenesis (13-14). During follicle growth, the expression of AMH decreases when a follicle reaches a certain size (8 mm), resulting in an increase in the sensitivity of the follicle to circulating FSH; therefore, a decrease in AMH levels provides an opportunity for follicles to grow until ovulation. La Marca et al. Recommend that AMH is a superior marker for predicting ovarian response than FSH or Inhibin B (11,15-19). Therefore, AMH may also be a very useful indicator of the extent of ovarian reserve damage following endometrioma or ovarian cystectomy. However, very few studies have been performed to assess the extent of damage to ovarian storage due to ovarian endometrioma or cystectomy using AMH levels.

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How to cite this article:

Mania Kaveh, Kambiz Sadegi . (2021). AMH changes over time in patients undergoing complete and partial removal of endometrioma cysts. Int. J. Curr. Res. Med. Sci. 7(6): 10-14.
DOI: <http://dx.doi.org/10.22192/ijcrms.2021.07.06.003>