The Effect of Bariatric Surgery on Ovarian Functions and Sex Hormons

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I have no potential conflict of interest to report

- Obesity has a negative effect on reproductive potential, primarily thought to be due to functional alteration of the hypothalamic-pituitary-ovarian (HPO) axis.

- Obese women often have higher circulating levels of insulin, which is a known stimulus for increased ovarian androgen production .

- These androgens are aromatized to estrogen at high rates in the periphery owing to excess adipose tissue, leading to negative feedback on the HPO axis and affecting gonadotropin production

- This manifests as menstrual abnormalities and ovulatory dysfunction

- The AMH level is considered the gold standard for assessing ovarian reserve and ovarian response to stimulations.

- Today, it is one of the best markers in evaluating ovarian function

- There are limited studies on AMH change after bariatric surgery.

- There is no definite consensus on the postoperative change of AMH values.

ORIGINAL ARTICLE

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Evaluation of anti-Müller hormone AMH levels in obese women after sleeve gastrectomy

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ABSTRACT

Introduction: The link between obesity epidemic in fertile age and fertility reduction, in relation with BMI increase, has been demonstrated. An inverse proportionality between BMI and anti-Müller hormone (AMH) has been investigated. This hormone is strictly related to ovarian function. It has been demonstrated that it is significantly decreased in obese women.

Scope: The aim of this study was evaluation of AMH levels in 53 obesity women with BMI >35, at 3 and 6 months after laparoscopic sleeve gastrectomy (LSG). Specific evaluation of comorbidities and of gynecological effects of weight loss was also evaluated.

Results: Cohort of 53 women was considered, treated with LSG. A progressive increase of AMH levels after LSG was confirmed, with statistically significant results at followup of 6 months. In these patients, we also observed an improvement in the menstrual cycle and resolution of dysmenorrhea. All considered comorbidities were ameliorated at both followup.

Conclusion: LSG determined a significant increase of AMH level in women, at early followup, with a comprehensive amelioration of gynecological status. Larger cohorts and a better evaluation of ovarian function after LSG will lead to more powerful results of the effect of weight loss on women.

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KEYWORDS

Obesity; sleeve gastrectomy; anti-Müller hormone (AMH); infertility; dysmenorrhea

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REPRODUCTIVE PHYSIOLOGY AND DISEASE

One-year impact of bariatric surgery on serum anti-Mullerian-hormone levels in severely obese women

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Abstract

Introduction Although bariatric surgery seems to increase spontaneous fertility by improving ovulatory function in young women, its impact on ovarian reserve remains largely unknown.

Objective To evaluate changes in serum anti-Mullerian hormone (AMH) levels in reproductive-age severely obese women after bariatric surgery (BS).

Methods AMH levels were measured retrospectively in 39 women (mean age 34.6 ± 1.1 years, range 18–45) that underwent a sleeve gastrectomy or Roux-en-Y gastric bypass (RYGB) at baseline, and 6 and 12 months after BS. Metabolic and micronutrient status, including fasting plasma insulin and glucose, HOMA-IR, leptin, adiponectin, calcium, albumin, transthyretin, ferritin, vitamins (B9, B12, B1, A, E, D), zinc, and selenium, were assessed in all patients before and 1 year after BS.

Results Of the patients, 79% had class-3 obesity. At 6 and 12 months, mean total weight losses (TWL) were 26 and 30%; mean excess weight losses (EWL) were 61.7 and 70.2%. Compared to baseline, AMH levels significantly decreased by 18% at 6 months, and 32% at 12 months post-operatively ($p = 0.010$ and $p = 0.001$, respectively). There was no correlation between AMH variation and changes in metabolic parameters or micronutrient levels. Remarkably, changes in AMH levels did not differ between sleeve and RYGB patients and were not correlated with EWL.

Conclusion This pilot study shows a drastic reduction in AMH levels at 1 year after BS in reproductive-age severely obese women, which was not related to weight loss: this suggests a negative impact of BS on ovarian reserve, at least in the short term.

Keywords Anti-Mullerian hormone · Bariatric surgery · Obesity · Fertility · Ovarian reserve

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ORIGINAL CONTRIBUTIONS

Bariatric Surgery Reduces Serum Anti-mullerian Hormone Levels in Obese Women With and Without Polycystic Ovarian Syndrome.

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Abstract

Purpose Obesity in fertile women has negative effect on fertility. Anti-mullerian hormone (AMH) represents a good index of fertility, and it is considered a marker of ovarian reserve and of polycystic ovarian syndrome (PCOS) gravity. Previous studies evaluated the relationship between obesity and AMH with contradictory results.

The aim of the study was to investigate the relationship between obesity and AMH and the changes of AMH in obese women in reproductive age submitted to bariatric surgery.

Materials and Methods Fifty-five obese patients between 18 and 39 years with (29 patients) and without PCOS (26 patients) were compared with a control group of normal weight women with (24 patients) and without PCOS (19 patients). Fourteen obese women with PCOS and 18 without PCOS underwent to bariatric surgery. Serum AMH, testosterone, androstenedione, and DHEAS were performed in all patients before and 1 year after surgical intervention.

Results AMH was significantly higher in the PCOS groups ($p < 0.001$), both in obese (5.84 ± 3.94 ng/ml) and non-obese women (7.35 ± 4.39 ng/ml). AMH was positively related to testosterone ($p < 0.0001$), androstenedione ($p = 0.0005$), and DHEAS ($p = 0.003$). After bariatric surgery, AMH levels were reduced in the both PCOS ($p = 0.02$) and non-PCOS group ($p = 0.04$).

Conclusions AMH levels are elevated in PCOS patients regardless of the body weight. Bariatric surgery is effective in the normalization of AMH levels (a possible indirect marker of better fertility) only in obese patients with PCOS.

Keywords Anti-mullerian hormone · Obesity · Bariatric surgery · Polycystic ovarian syndrome

Introduction

Obesity is becoming an epidemic condition in developed countries. In the USA, the prevalence of obesity has increased from 15.3% in 1995 to 23.9% in 2005 [1]. Women, who are more than twice severely obese as men, make up the majority

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Effects of bariatric surgery on the menstruation- and reproductive-related hormones of women with obesity without polycystic ovary syndrome: a systematic review and meta-analysis

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Affiliations + expand

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Abstract

Background: Bariatric surgery is an effective treatment for severe obesity. Several studies have been conducted on the effects of bariatric surgery on the reproductive function of women with obesity who do not have polycystic ovary syndrome (PCOS).

Objectives: To evaluate the effects of bariatric surgery on the menstruation and reproductive related hormones of women of childbearing age with who do not have PCOS.

Setting: A systematic review and meta-analysis at a university hospital.

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Results: Fifteen studies comprising 725 patients were enrolled in this meta-analysis. Results showed a significantly lower incidence of abnormal menstruation (relative risk: .40, 95% confidence interval [CI]: .20-.79, $P = .008$) after bariatric surgery. Moreover, bariatric surgery led to a decrease in serum insulin levels (mean difference [MD] = -13.12 mIU/L, 95% CI: -15.03 to -11.22, $P < .00001$), glucose (MD = -.91 mmol/L, 95% CI: -1.26 to -.56, $P < .00001$), triglyceride (MD = -.61 g/L, 95% CI: -.76 to -.46, $P < .00001$), total testosterone (MD = -.22 ng/mL, 95% CI: -.24 to -.20, $P < .00001$), dehydroepiandrosterone (DHEA) (MD = -25.34 µg/dL, 95% CI: -31.19 to -19.49, $P < .00001$), estradiol (MD = -25.13 pg/mL, 95% CI: -34.13 to -16.13, $P < .00001$), and anti-Mullerian hormone (AMH) (MD = -.40 ng/mL, 95% CI: -.67 to -.13, $P = .003$). Serum sex hormone binding globulin (SHBG) levels increased after bariatric surgery (MD = 43.99 nmol/L, 95% CI: 34.99-52.99, $P < .00001$).

Conclusion: Bariatric surgery can lower fasting insulin, glucose, and triglyceride levels, reduce the incidence of abnormal menstruation, decrease total serum testosterone, DHEA, estradiol, and AMH levels, and increase SHBG level for women with obesity of childbearing age who do not have PCOS. This meta-analysis indicated that bariatric surgery could be effective in improving reproductive function for women with severe obesity.

Keywords: Bariatric surgery; Menstruation; Meta-analysis; Obesity; Reproductive-related hormones.

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- Impact on AMH Three trials assessed AMH after bariatric surgery.
- The fixed effect model was adopted due to clinical heterogeneity ($P=0.28$, $I^2= 21\%$) and showed lower AMH level as compared to the 185 preoperative value (MD=-0.40 ng/mL, 95% CI: -0.67–-0.13, $P=0.003$

- İn our study, we aimed to investigate the effect of bariatric surgery on sex hormones and ovarian functions in patients who underwent bariatric surgery

- Women in reproductive age,
- Between 18-45 years
- BMI≥35
- Underwent Sleeve Gastrectomy were included.

- The patients were assessed with respect to
- Demographic data (age, sex),
- Anthropometric measurements (weight, height, BMI),
- Comorbid diseases, PCOS, smoke,
- Biochemical parameters (lipid profile, HbA1c, fasting blood sugar), Androstenedione, Dehydroepiandrosterone sulphate(DHEAS) ,Estradiol, FSH, LH, Sex hormone-binding globulin (SHBG), Testosterone and AMH levels,
- Weight loss with EWL% and TWL%, on baseline and at 6th months.

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Results

- Totally 48 Patients were evaluated
- All Patients underwent Sleeve Gastrectomy
- 1 patient was excluded from the study because of she became pregnant

	Baseline	6 th month	p
Age	31 (19-45)		
Weight	112,23 ± 16,24 (85-158)	77,98±12,94	<0.001
Height	162,02 ± 5,71 (150-171)		
BMI	43,10 ± 6,84 (35-65)	29,73±4.85	<0.001
EWL% at 6 months		76.79 ±16.35	
TWL% at 6 months		30.75±6.47	
Diabetes Type 2	15 (31.91%)		
Hypertension	7(14.58%)		
Respiratory Diseas	4(8.33%)		
Dyslipidemia	13(27.08%)		
Age of Menarche	13 (11-18)		
Birth History	26(54.1%)		
Age of first childbirth	23 (15-36)		
Number of birth	1 (1-7)		
Use of Oral contraceptive pills	3(6.25%)		
PCOS	8(17.02%)		
Smoker	16(33.33%)		

	Baseline	6th month	p
Hemoglobin	12±1.5	12.3±1.8	0.14
Glucose	107.1±38.4	87.2±8	**<0.001**
Hemoglobin A1C	5.8±1.2	4.9±0.3	**<0.001**
İnsulin	18.6±11.4	7.3±6.8	**<0.001**
Albumin	4.51±0.25	5.3±6.02	0.048
Iron	61.8±23.7	72.8±22.2	0.009
Ferritin	38.5±31.2	50.245.9	0.41
Vitamin D3	14.6±10.6	29.1±10.1	**<0.001**
Cholesterol	182.98 ±35.18	180.85±44.1	0.072
LDL	117.26±28,8	113.43±28.55	0.085
HDL	42.7±10.97	55.79±11.6	**<0.001**
Tryglicerydes	150.13±84	91.02±27.41	**<0.001**
VLDL	30.02±16.8	18.24±5.54	**<0.001**

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	Baseline	6th month	p
Androstenedione,	1.87±1.49	1.75±1.5	0.52
Dehydroepiandrosterone sulphate(DHEAS)	186.9±92.9	184.6±84.1	0.8
Testosterone	1.53±0.85	1.07±0.4	**<0.001**
Estradiol	60.68±52.8	116.61±69.41	**<0.001**
FSH	4.6±1.9	5.1±2.2	0.19
LH	5.9±8.1	7±10.1	0.074
SHBG	35.29±21.74	71.43±35.61	**<0.001**
AMH	3.07±2.64	3.10±2.54	0.46
PCOS(-) (n=39)	1.77 (0.31-9.19)	1.78(0.09-8.48)	0.29
PCOS(+) (n= 8)	3.46 (0.01-12.95)	3.81(2.37-10.05)	0.77
CRP	6.99±7.2	1.88±1.79	**<0.001**

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Affecting Factors of AMH Levels

	UNIVARIATE ANALYSIS				MULTIVARIATE ANALYSIS			
	OR	95% C.I. Lower	95% C.I Upper.	p value	OR	95% C.I. Lower	95% C.I Upper.	p value
İntial Weight	,948	,904	,994	***,027***	,949	,904	,996	**,035**
Excess Weight	,948	,900	,999	***,045***				
HDL	1,073	1,007	1,142	***,029***	1,073	1,002	1,149	***,043***
Vit D preop	1,072	,994	1,156	,071				
SHBG	1,034	,997	1,072	,069				

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Conclusion

- Bariatric Surgery has no negative effect on AMH level.
- İt has positive effect on fertility
- By normalizing Glucose, HgbA1C, Insulin and testosterone levels