

ORIGINAL ARTICLE

OVARY FUNCTIONAL STATE IN FEMALE ADOLESCENTS WITH A HISTORY OF INTACT UTERINE APPENDAGES TORSION

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ABSTRACT

The aim: To assess the functional state of gonads in female adolescents with a history of intact uterine appendages torsion (IUAT).

Materials and methods: A total of 55 adolescent girls aged from 13 to 17 years were examined. 35 patients with a history of IUAT were divided into two groups: group 1 consisted of 21 patients with organ-preserving surgical treatment (detorsion) and group 2 of 14 patients with radical surgical treatment of IUAT. 20 healthy girls formed the control group. Assessment of the ovarian reserve was performed by the determination of serum anti-Müllerian hormone (AMH) level. Ultrasound scan was used to evaluate ovaries volume, number and diameter of antral follicles.

Results: The AMH level in control group (2.4 ± 0.29 ng/ml) has no statistically significant differences compared with group 1 (2.2 ± 0.35 ng/ml, $p = 0.12$) and differed significantly compared with group 2 (0.96 ± 0.11 ng/ml, $p < 0.05$). No statistically significant differences in ovary volume were found between group 1 and control group (6.02 ± 0.21 cm³ and 6.14 ± 0.17 cm³, respectively, $p = 0.125$). The number and diameter of antral follicles in group 1 didn't significantly differ from the control group (3.85 ± 0.35 and 4.00 ± 0.25 , $p = 0.116$, 3.57 ± 0.42 mm and 3.70 ± 0.31 mm, $p = 0.128$, respectively).

Conclusions: The method of choice for IUAT treatment taking into account upcoming motherhood is laparoscopy with detorsion. Dynamic ultrasound results and determination of AMH level indicate the organ-preserving tactics for surgical treatment of IUAT.

KEY WORDS: adnexal torsion, girls, anti-Müllerian hormone

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INTRODUCTION

In recent years a significant attention is paid to gynaecological problems in children and adolescents in Ukraine and abroad [1, 2]. This is especially true for borderline states when deciding the need for surgical treatment. According to statistics, adnexal torsion (ICD-10 code: N83.5. Torsion of ovary, ovarian pedicle and fallopian tube) takes fifth place among gynaecological conditions requiring emergency surgery. Torsion of intact uterine appendages is more common in adolescent girls. This is due to the anatomical features of internal genital organs: small size of the uterus, a relatively high location of the ovaries within a small pelvis. Physiological characteristics can also be the causes of IUAT: premenstrual hormonal activity, overflow of the bladder, juvenile constipation, increased intestinal peristalsis. In addition, this age group is characterized by a more active lifestyle, which may favour IUAT. Excessive length of the fallopian tube, funnel-pelvic ligament and own ligament of the ovary, tortuosity and elongation of the mesosalpinx vessels are also highly important. IUAT may be preceded by abdominal trauma and a history of gynaecological surgery [3-6].

Establishing a diagnosis of adnexal torsion in some cases causes difficulties for specialists. The reliability of preoperative diagnostics is about 37–50 % with extension of pre-hospital and preoperative periods, which is due to

the absence of specific clinical manifestations of the disease in most patients [7].

The question of a choice of surgical tactics for the treatment of adnexal torsion is debatable. For a long time, the classical approach referred to carrying out organ-resecting surgeries, the rationale for which was a risk of thromboembolism after detorsion, fears of malignancy of the affected ovary against the background of prolonged ischemia, dissemination in a malignant process, the opinion that purplish-cyanotic ovaries cannot recover in the post-operative period [8, 9]. Currently this issue is being widely discussed.

Analysis of the long-term observations has shown that risk of thrombosis, including pulmonary artery thromboembolism, at detorsion of twisted appendages is not higher than with removal of appendages without untwisting and is less than 0.2 % [10, 11].

Having analysed the histotypes of ovarian tumors in girls after surgery for adnexal torsion, a number of authors from the USA noted an extremely low risk of detecting malignant tumors: only nine (1.5 %) cases of malignant tumors were identified out of 593 cases of ovarian neoplasms torsion [12-14].

At the World Congress of Paediatrics and Adolescent Gynaecology held in February 2013 in Hong Kong, photographs of the uterine appendages in a state of torsion during laparoscopy and 10 minutes after detorsion, where

the ovary and fallopian tube changed colour and turned purple instead of black, and one month after surgery, where it was clearly seen that the ovary completely recovered after torsion, were presented [1].

Thus, at present guided by international experience and both taking into account upcoming motherhood of young patients some researchers recommend to use conservative treatment tactics for adnexal torsion whenever appropriate. Based on macroscopic data the restoration of tissue viability is carefully assessed after detorsion and adnexectomy or oophorectomy is performed in case of necrosis [15, 16].

In this regard, a topical direction is a study of the long-term consequences of adnexal torsion in girls depending on the nature of treatment tactics for this pathology [10, 11, 17].

THE AIM

To assess the functional state of gonads in female adolescents with a history of IUAT.

MATERIALS AND METHODS

After receiving approval by the Ethics Committee of the Kharkiv National Medical University (KhNMU) in view of full compliance with the standards of the Bioethical Committee, a prospective study was carried out at the clinical bases of the Department of Obstetrics, Gynaecology and Paediatrics Gynaecology of the KhNMU in the period from 2017 to 2019. Based on Informed Consent, inclusion and exclusion criteria, 55 adolescent girls aged from 13 to 17 years took part in the study (35 of them with a history of IUAT and 20 girls were in a control group).

Inclusion criteria for the clinical group: adolescent girls aged from 13 to 17 years old, voluntary informed consent of parents and patients aged ≥ 14 years to participate in the study, a history of unilateral intact uterine appendages torsion.

Exclusion criteria: pregnant women, patients aged < 13 and ≥ 18 years old, no history of IUAT, recurrence of IUAT, cancer, acute infectious diseases, abnormalities in development of reproductive organs, refusal of parents and patients aged ≥ 14 years to participate in the study.

The patients with a history of IUAT were divided into two groups: group 1 consisted of 21 patients with organ-preserving surgical treatment (detorsion) and group 2 of 14 patients with radical surgical treatment (adnexectomy / ovariectomy) of IUAT. Control group included 20 healthy peers without gynaecological pathology.

Assessment of the ovarian reserve was carried out in a comprehensive manner and included a generalization of data of the anamnesis, clinical examination, results of hormonal and ultrasound studies. When conducting ultrasound, the volume of the ovaries was determined on the 2–5th day of the menstrual cycle and the number and diameter of antral follicles were calculated. Hormonal examination included determination of follicle-stimulating hormone, luteinizing hormone, prolactin, estradiol, progesterone, and anti-Müllerian hormone (AMH) levels

in blood. In prognostic terms AMH is the earliest marker of a decrease in ovarian reserve, reflects the number and quality of antral follicles, does not depend on the level of pituitary gonadotropins, and does not change dramatically during the menstrual cycle reflecting processes occurring in the ovary. In this regard many domestic and foreign researchers argue that AMH is the most accurate parameter of the state of ovarian reserve and can be used both as a single-marker and in combination with ultrasound [18] which was used in our study.

Evaluation of the ovarian reserve was carried out by determining a level of AMH in blood serum by immunoenzyme method (Cusabiotech, USA) under fasting condition regardless of the day of menstrual cycle. Volume of the ovaries was also determined in conjunction with calculation of number and diameter of antral follicles by the method of transabdominal (in virgo girls with a full bladder) and transvaginal (in girls who are sexually active) ultrasound on the MEDISON device: ACCUVIXV10 with a central frequency range of 50/60 Hz. To calculate the volume of the ovaries we used formula $V = D1 \times D2 \times D3 \times 0.52$, where D1, D2, D3 are three mutually perpendicular dimensions (longitudinal, anteroposterior and transverse) [19]. Computer tomography and magnetic resonance imaging were performed (according to indications).

Statistical processing of the material was carried out using a package of modern computer programs: Microsoft Office Home and Business 2013 64 box for working with spread sheets, StatSoft Statistica 6.1 using Wilcoxon-Mann-Whitney test.

RESULTS

In adolescent girls of the control group the AMH level was 2.4 ± 0.29 ng/ml. The AMH level in group 1 patients was 2.2 ± 0.35 ng/ml, which did not differ significantly from the control values ($p = 0.12$). Patients of the group 2 showed a significant decrease in the AMH levels compared to the control group: 0.96 ± 0.11 ng/ml and 2.4 ± 0.29 ng/ml, respectively ($p < 0.05$).

At studying the gonadotropic function of the pituitary gland and steroid hormones of the ovaries there were no significant differences between patients of the group 1 and the control group. In patients of the group 2 a decrease in the level of estradiol and progesterone was revealed in 40 % of cases, which was clinically manifested by violations of menstrual function (oligo-opsomenorrhoea).

The volume of the ovary preserved after detorsion was 6.02 ± 0.21 cm³. When compared with similar indicators of the control group patients statistically significant differences were not revealed: 6.14 ± 0.17 cm³ ($p = 0.125$).

The number of follicles in the ovary preserved after detorsion did not differ statistically as compared to the control group (3.85 ± 0.35 and 4.00 ± 0.25 , respectively ($p = 0.116$)). The average follicle diameter corresponded to 3.57 ± 0.42 mm and did not differ statistically significantly from the indicators in the group of healthy girls (3.70 ± 0.31 mm ($p = 0.128$)).

DISCUSSION

According to statistical data the share of adnexal torsion is 2–3 % among all causes of acute abdomen in paediatric gynaecology [20]. The data of this study prove that differential diagnosis of this pathology should be carried out taking into account age, clinical features, results of a comprehensive examination with an assessment of ultrasound results, computed and magnetic resonance imaging (according to indications), which will contribute to the soonest adequate choice of tactics for urgent gynaecological care.

A minimally invasive surgical intervention, laparoscopy with organ-preserving surgeries by detorsion, should be considered justified. When twisting due to bending of vascular bundles, initially the venous outflow is disturbed in the uterine appendages, but arterial blood flow remains. Therefore, the affected tissues can remain viable from several hours to several days from the disease onset. Thus, the speed of making a correct diagnosis in an urgent situation is important [10].

We found that the level of AMH in the control group differs statistically insignificantly from the corresponding indicator in patients with detorsion of twisted intact uterine appendages in history ($p = 0.12$) and statistically significantly differs from the AMH level in patients with radical surgical treatment (ovarectomy / adnexectomy) ($p < 0.05$).

When comparing volume of the ovary retained after detorsion, number and diameter of antral follicles contained in it no statistically significant differences with analogous parameters of the ovaries of the control group patients were revealed ($p = 0.125$, $p = 0.116$ and $p = 0.128$, respectively).

Thus, timely early diagnosis and organ-preserving tactics of adnexal torsion treatment allows to preserve the ovarian reserve and reproductive potential of patients.

CONCLUSIONS

1. Adnexal torsion in adolescent girls require an immediate comprehensive clinical, laboratory and instrumental examination in order to timely verify the diagnosis and select optimal extent of surgical intervention.
2. The method of choice of treatment, taking into account the upcoming motherhood, is a minimally invasive surgical intervention — a laparoscopy with organ-preserving operations.
3. The speed of establishing a correct diagnosis in an urgent situation determines increase in the effectiveness of organ-preserving treatment tactics.
4. Study of ovarian reserve indicators in patients with adnexal torsion in history is a promising direction and allows you to assess a reproductive potential of each individual patient by determining level of serum AMH, as well as volume of the ovaries, number and diameter of antral follicles using ultrasound.
5. Results of dynamic ultrasound and determination of the AMH level fully justify the organ-preserving tactics of surgical treatment of IUAT.

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Conflict of interest:

The Authors declare no conflict of interest.

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