DOI 10.26724/2079-8334-2021-4-78-116-120
UDC 618.3–06:616.346.2–002–089.87–072.1

V.V. Mishchenko, V.P. Mishchenko, I.V. Rudenko[1], V.K. Likhachov[2], L.M. Dobrovolska[2], V.L. Vashchenko[2], O.G. Makarov[2]
Odesa National Medical University, Odesa
[1]College of Medicine Gulf Medical University, Ajman, United Arab Emirates,
[2]Poltava State Medical University, Poltava

LAPAROSCOPIC APPENDECTOMY DURING PREGNANCY

e-mail: vladimir.lihachev@gmail.com

A laparoscopic appendectomy was performed in 73 pregnant women. The Alvarado scale was used for diagnostics. The average age of the examined was 25.7±0.5 years. 17.8 % of pregnant women were operated on in the first trimester of pregnancy, in the second – 46.6 %, in the third – 35.6 %. The time from the onset of the disease was 6 hours in 12.3 % of pregnant women, in 35.6 % – 6–12 hours, in 31.5 % – 12–24 hours, in 20.5 %– more than 24 hours. The postoperative period in all patients was uneventful. All patients were discharged for periods from 2 to 5 days after surgery. Acute appendicitis during pregnancy is a common surgical condition. Appendectomy in pregnant women should be performed even before complications from acute appendicitis and gestational complications develop. Diagnosis of acute appendicitis should be fast and accurate using additional imaging technologies. Laparoscopic appendectomy due to its advantages over open appendectomy, its safety for the health of the pregnant woman and the course of pregnancy should now become the gold standard of operations for acute appendicitis in pregnant women.

Key words: appendicitis in pregnant women, diagnostics, tactical approaches, laparoscopic appendectomy.

В.В. Міщенко, В.П. Міщенко, І.В. Руденко, В.К. Ліхачов, Л.М. Добровольська, В.Л. Ващенко, О.Г. Макаров

ЛАПАРОСКОПІЧНА АПЕНДЕКТОМІЯ ПІД ЧАС ВАГІТНОСТІ

Лапароскопічна апендектомія виконана 73 вагітним. Для діагностики використовували шкалу Альварадо. Середній вік обстежених склав 25,7±0,5 роки. Від числа всіх прооперованих вагітні в I триместрі склали 17,8 %, у II триместрі – 46,6 %, в III триместрі – 35,6 %. У 12,3 %вагітних час від початку захворювання до операції склав 6 годин, у 35,6 % – 6–12 годин, у 31,5 %– 12–24 години, у 20,5 %– більше 24 годин. Післяопераційний період у всіх пацієнток протікав задовільно. Всі пацієнтки були виписані через 2–5 діб після операції. Апендектомію у вагітних слід виконувати ще до розвитку ускладнень з боку гострого апендициту і гестаційних ускладнень. Діагностика гострого апендициту повинна бути швидкою і точною з використанням додаткових візуалізуючих технологій. Лапароскопічна апендектомія внаслідок її переваг перед відкритою апендектомією (безпека для здоров'я вагітної і перебігу вагітності) повинні стати золотим стандартом операцій при гострому апендициті у вагітних.

Ключові слова: апендицит у вагітних, діагностика, тактичні підходи, лапароскопічна апендектомія.

The work is a fragment of the research project "Role of chronic infection of the uterus and lower genital tract in the formation of obstetric and gynaecological pathology", state registration No. 0117U005276).

Prevalence of acute appendicitis (AA) in pregnant women ranges from 0.075 to 0.18 %. This situation can develop at any stage of gestation. AA most frequently develops in the second trimester of pregnancy, much less often – in the third trimester [1, 3, 4].

Atypical clinical picture and difficulty in diagnosing AA in pregnant women, especially in late pregnancy, due to changes in the topography of the cecum and appendix due to their displacement by growing uterus, which can lead to motor-evacuation disorders of the appendix, blood stasis in it, increased intraappendicular pressure and the subsequent development of inflammatory and destructive changes in the wall of the organ. The main difficulties are that nausea, vomiting and vague abdominal pain are not related to appendicitis, often worry women during pregnancy. Palpation of the abdomen is also much more difficult to perform due to the enlargement of the uterus. Protective tension of the anterior abdominal wall's muscles and symptoms of peritoneal irritation are less common, because the abdominal muscles in pregnant women are significantly weakened. The length of the appendix and the presence of viscero-visceral joints around it may be of some importance. It is necessary to remember about hormonal changes in the body of a pregnant woman with high levels of progesterone, which to some extent is a muscle relaxant [1, 2, 6].

Perinatal and maternal mortality rates in perforated forms of HA increase 2-3 times compared to the population, which is the result of late diagnosis. The presence of signs of preeclampsia and eclampsia in such women is especially difficult to diagnose and choose treatment tactics when GA is suspected in pregnant women. 3–7 % of pregnant women with acute appendicitis are diagnosed with preeclampsia of varying severity [1, 3, 4]. Preeclampsia is manifested by hypertension, which first appeared after 20 weeks of pregnancy on the background of proteinuria and signs of dysfunction of other organs and systems. It is accompanied by a combination of increased systemic vascular resistance, increased tendency to platelet aggregation, activation of the coagulation system and endothelial dysfunction, placental dysfunction [3, 4, 5].

Due to the difficulties of clinical, laboratory and instrumental diagnosis of acute appendicitis in 1/3 of pregnant women with this disease, surgery is performed on average one day after the onset of the disease. In this regard, with complicated appendicitis, the risk of fetal death increases to 6 %, the frequency of premature birth – up to 11 %, maternal mortality is 0.0011 %. The issue of diagnosis and the choice of optimal treatment tactics, especially in early pregnancy, is complex, due to the limited use of modern radiological, videoendoscopic research methods [1, 6, 8].

The presence of a postoperative suture or a fresh postoperative scar after appendectomy with an incision in the right iliac region or lower median laparotomy does not always permit to perform effective attempts [4, 5, 7].

From these positions, the issue of acute appendicitis diagnosis and the choice of optimal treatment tactics using laparoscopic technology during pregnancy, of course, are interesting and debatable.

The purpose of the study was to determine the role and place of laparoscopic appendectomy in acute appendicitis at different stages of pregnancy.

Materials and methods. Laparoscopic appendectomy was performed on 73 pregnant women on the basis of the Department of Minimally Invasive Interventions of the Odessa Regional Clinical Hospital. To diagnose acute appendicitis in pregnant women, we used the Alvarado scale (Table 1) [1].

Table 1

Alvarado scale in the diagnosis of acute appendicitis in pregnant women

Symptoms of the disease	Points
Migrating pain in the right iliac fossa	1
Anorexia (lack of appetite)	1
Nausea, vomiting	1
Pain in the right iliac fossa	2
Positive symptom of peritoneal irritation	1
Fever	1
Positive Rovsing's symptom, or a positive cough symptom, or pain at rectal examination	1
Leukocytosis	2
Shift of leukocyte formula to the left	1

Depending on the signs, symptoms, results of laboratory tests and the number of points, decisions are made: less than 5 points – acute appendicitis is unlikely; 5–6 points – acute appendicitis is possible, the patient needs observation; 7–8 points – acute appendicitis is probable; 9–10 points – there is acute appendicitis, the patient needs immediate surgery.

Priority signs of AA, which necessitated urgent surgery, were: pain in the projection of the appendix, taking into account changes in its position depending on gestational age, the shift of the leukocyte formula to the left and ultrasound data with graduated compression.

The presence of peritoneal symptoms was an unconditional indication for surgery, but in a significant number of pregnant women with AA they were absent. In doubtful situations, dynamic monitoring of the patient was performed with an assessment of clinical and laboratory parameters every 2 hours. In the presence of negative dynamics, surgery was indicated. In 17 observations to clarify the diagnosis, the patient underwent an MRI of the abdominal cavity, which confirmed the diagnosis of acute appendicitis.

Protected penicillins were administered at the standard dose in all cases for the purpose of antibiotic prophylaxis of infectious complications in both the mother and the fetus. All patients were prevented from thromboembolic complications. Therapy in the postoperative period was aimed at prolonging pregnancy and included (in case of clinical signs of threatened abortion) in the first trimester of pregnancy hormone therapy, in the second and third trimesters –- tocolytic therapy with ginipral in reasonable doses. All patients were under the joint supervision of surgeons and obstetricians and gynaecologists.

The results of the study were processed using statistical programs Microsoft Excel, Statistica 6.0 for Windows. Student's comparative criterion was used to assess the homogeneity of the groups. The differences were considered significant at $p<0.05$.

Results of the study and their discussion. The mean age of the subjects was 25.7±0.5 years (table 2).

In the first trimester of pregnancy, 13 (17.8 %) pregnant women underwent surgery with an acute appendicitis clinic, in the second trimester – 34 (46.6 %), in the third trimester – 26 (35.6 %). In 9 (12.3 %) pregnant women the time from the onset of the disease to surgical treatment was 6 hours, in 26 (35.6 %) – 6–12 hours, in 23 (31.5 %) – 12–24 hours, in 15 (20.5 %) – more than 24 hours. In all patients admitted to the hospital in the third trimester (26 pregnant women), the diagnosis of acute appendicitis was extremely difficult, as evidenced by the timing of preoperative observation.

Table 2

Main characteristics of the disease course in operated pregnant women

Characteristics of patients	Indices
Age, years	25.7±0.5
Gestation period:	
Trimester I	13 (17.8 %)
Trimester II	34 (46.6 %)
Trimester III	26 (35.6 %)
Time from onset of disease, hours:	
up to 6 hours	9 (12.3 %)
6–12 hours	26 (35.6 %)
12–24 hours	23 (31.5 %)
more than 24 hours	15 (20.5 %)
Form of the appendix inflammation:	
catarrhal	16 (21.9 %)
phlegmonous	45 (61.4 %)
gangrenous	12 (16.4 %)

In 16 (61.5 %) pregnant women the duration of preoperative observation was more than 12 hours; in 6 (23.1 %) – up to 12 hours; in 4 (15.4 %) – up to 6 hours. The mean duration of preoperative observation at all stages of pregnancy was 12.7±3.1 hours. Only one pregnant woman was operated on in the first 2 hours after hospitalization.

In women of the first trimester of pregnancy, the duration of preoperative observation was 5.4±1.2 hours ($p<0.05$ relative to the third trimester). In the second trimester, these values were 10.9±2.3 hours, which did not differ significantly from those in the third trimester of pregnancy ($p>0.05$).

The postoperative period in all patients was without serious complications. In 2 patients with control ultrasound for 3 days, a small amount of fluid was stored in the pelvis, which did not require any intervention. One patient had intestinal paresis, which resolved against the background of conservative treatment for 5 days. All patients were discharged within 2 to 5 days after surgery.

There were no significant complications during the subsequent course of pregnancy and childbirth. The postpartum period and the condition of newborns were also without features. Laparoscopic appendectomy in pregnant women is safe for the mother and fetus primarily due to minimal invasion. Confirmation of the above is the results of childbirth of the examined pregnant women.

In 70 (93.3 %) patients, the pregnancy ended in physiological delivery through the natural birth canal within the terms of 37 to 41 weeks. Delayed fetal development, acute or chronic fetal distress was not observed. Cesarean section was performed according to obstetric indications in 3 (4.1 %) women. The connection between the indications for cesarean section and laparoscopic appendectomy has not been established.

Newborns were born with an Apgar score of 7 to 9, weighing 2.750 to 3.900 grams. There were no fatalities.

The "Olympus" OTV – SC endosurgical complex was used for laparoscopic appendectomy. Anaesthesia – endotracheal anaesthesia. The pressure of carbon dioxide in the abdominal cavity was maintained at the level of 10–12 mm Hg. Before and after the operation to assess the condition of the fetus cardiotocography was performed using a fetal monitor "Corometrics 170 Series" (Finland).

One of the important conditions for laparoscopic appendectomy in pregnant women was the choice of laparoscopic surgical approaches. Typically, laparoscopic appendectomy was performed with three trocar access. The setting of working trocar ports depended on the gestation period [1, 2, 8].

In the first trimester, the pregnant uterus was not too large and did not cause difficulties in performing laparoscopic appendectomy. During pregnancy from 5 to 14 weeks, insufflation of carbon dioxide into the abdominal cavity was performed through a Veresh needle at the classic point of "Olympus" 2 cm below the navel, along the midline of the abdomen, after opening the skin in the transverse direction to 1 cm. Carboxyperitoneum with a pressure of 10–12 mm Hg was applied. The anterior abdominal wall was fixed by pulling up with the help of hooks and the first port for the video camera was installed with the help of a trocar with the diameter of 10 mm; the second port with the diameter of 5–10 mm was installed in the left iliac region, or olong the midline in the middle of the distance between the navel and the womb; the third port with the diameter of 5 mm was installed in the projection of the appendix (usually in the right iliac region). The surgery table was moved to the Trendelenburg position with a lateroposition on the right, to provide a better view of the right iliac region. But changing the position of the pregnant woman on the surgery table does not always permit to see the appendix. In this regard, a manipulator was introduced

through the third working port – a laparoscopic clamp, which can remove the large omentum, loops of the small intestine, bring into view the dome of the cecum, examine the appendix and perform careful instrumental palpation of the appendix, assess the elasticity of the walls of the appendicular process, their density.

During pregnancy for a period of 14 to 22 weeks, the imposition of trocar ports was performed taking into account the size of the uterus. The first trocar was inserted along the midline in the epigastric region 3–4 cm above the height of the pregnant uterus' bottom through an incision under visual control (open method of laparoscopy by Hasson) or below and to the right of the xiphoid process of the sternum. The second trocar was inserted into the projection of the cecum dome, the third – in the left iliac region, or along the midline in the middle of the distance between the navel and the womb ("bikini" level) under the control of a video camera.

In the third trimester of pregnancy, the imposition of trocar ports was also performed taking into account the size of the uterus. The longer the gestation period, the closer to the right hypochondrium one of the working ports was placed. The trocar in all cases was injected perpendicularly to the anterior abdominal wall with dosed pressure and rotation to the point of failure through the aponeurosis and parietal peritoneum into the free abdominal cavity, then the direction of injection was changed parallelly to the uterus towards the right hypochondrium. Carboxyperitoneum in patients was created with a pressure of 10–12 mm Hg. We believe that the use of such insufflation pressure is careful and safe, at the same time sufficient for the necessary surgical examination and laparoscopic manipulations, while this level of pressure does not adversely affect the mother and does not cause acidosis in the fetus. This amount of gas injected into the abdominal cavity permits to bring the functioning of vital systems of pregnant women to the limits of physiological norms [9, 10, 11

The location of trocars depended on the location of the appendix and was determined by the need to adhere to the basic principle of triangulation. Appendectomy was performed using bipolar coagulation in standard modes of exposure, the stump of the appendix was treated with Reder loops - ligature method. The operation ended with the installation of safety drainage.

Thus, laparoscopic appendectomy in pregnant women eliminates acute surgical pathology – acute appendicitis and avoids injuries to the abdominal organs, perforation of the enlarged uterus, less trauma to cellular structures and faster recovery of impaired functions of the pregnant woman's body, thereby promoting prosperous pregnancy period. Accordingly, the endovideosurgical method of intervention permits to reduce the risk of premature termination of pregnancy, to avoid complications associated with the healing of postoperative wounds [8, 9, 11].

Conclusion

Diagnosis of acute appendicitis in pregnant women should be fast and accurate with the use of additional imaging technologies (ultrasound, MRI and with strict indications – CT).

Appendectomy in pregnant women should be performed before the development of complications of acute appendicitis and gestational complications by reducing the duration of the diagnostic phase and timely decision on surgery, which, in turn, will increase the likelihood of a successful pregnancy.

Laparoscopic appendectomy due to its advantages over open appendectomy, its safety for the health of the pregnant woman and the course of pregnancy should become the gold standard of operations for acute appendicitis in pregnant women.

Prospects for further research are aimed at studying the features of laparoscopic surgery in pregnant women for other acute surgical pathology.

References

1. Musina, A.R. & Korchagina Yu.A. Kolichestvennaya otsenka klinicheskikh priznakov ostrogo appenditsita u beremennykh [International student scientific bulletin]. Mezhdunarodnyy studencheskiy nauchnyiy vestnik, 2018;4–1; URL: http://www.eduherald.ru/ru/article/view?id=18648. [in Russian]

2. Kan, Nye. & Khachatryan, ZV. & Tyutyunik, VL. & Lomova, NA. & Donnikov Aye.(2018). Primeneniye folatrov v profilaktike zaderzhki rosta ploda pri beremennosti [Medical advice]. Meditsinskiy sovet.13, 65–67; doi 10.21518/2079–701kh–2018–13–65–67. [in Russian]

3. Petrashenko, II. Laparoskopicheskaya appendektomiya u beremennykh: tehnicheskie osobennosti i bezopasnost vypolneniya [Orenburg medical bulletin]. Orenburgskiy meditsinskiy vestnik, 2016; 4,1(13), 64–67. [in Russian]

4. Rudenko, IV, & Mishchenko, VP . (2020). Patogenetichne obgruntuvannya personifikovanoyi korektsiyi porushen folatnogo tsiklu za dopomogoyu kompleksu z metafolinom dlya profilaktyky vrodzhenykh vad rozvytku. [Reproductive endocrinology]. Reproduktyvna endokrinolohiya 2, 52, 67–72. [in Ukrainian]

5. Sazhin, AV. & Kirienko, AI. & Kurtser, MA. & Konoplyannikov, AG. & Panin, AV. & Son, DA. i dr. Ostryy appenditsit u beremennykh [Surgery. Journal them. N.I. Pirogov]. Hirurgiya. Zhurnal im. N.I. Pirogova, 2019;1, 70–7; https://doi.org/10.17116/hirurgia201901170. [in Russian]

6. Hasanov, AG. & Shevchenko, YaR. & Badretdinova, FF. & Ibatullin, ER. & Shaybakov, DG. Diagnostika i lechebnaya taktika pri ostrom appenditsite u beremennykh s bolshimi srokami gestatsii [Creative surgery and oncology]. Kreativnaya hirurgiya i onkologiya 2019;9(2),100–105; https://doi.org/10.24060/2076-3093-2019-9-2-100-105. [in Russian]
7. Baskıran, A. & Ince, V. & Cicek, E. & Şahin, T. & Dirican, A. & Balıkcı Cicek, I. et al. (2018). Efficacy of laboratory tests and ultrasonography in the diagnosis of acute appendicitis in gravid patients according to the stages of pregnancy [Ulus Travma Acil Cerrahi Derg],24(4),333–6; https://doi.org/10.5505/tjtes.2017.23693.
8. Burns, M. & Hague, CJ. & Vos, P. & Tiwari, P. & Wiseman, SM. (2017). Utility of magnetic resonance imaging for the diagnosis of appendicitis during pregnancy: a canadian experience [Can. Assoc. Radiol. J],68(4),392–400; https://doi.org/10.1016/j.carj.2017.02.004.
9. Devall, AJ. & Coomarasamy, A. (2020). Sporadic pregnancy loss and recurrent miscarriage [Best Practice & Research: Clinical Obstetrics & Gynaecology].69, 30–39; doi: 10.1016/j.bpobgyn.2020.09.002. Epub 2020 Sep 9.]
10. Tase, A. & Kamarizan, MFA. & Swarnkar K. (2017) Appendicitis in pregnancy: difficulties in diagnosis and management. Guidance for the emergency general surgeon: a systematic review [Int J Surg Open], doi: https://doi.org/10.1016/j.ijso.2017.02.001.
11. Winter, NN, Guest GD, Bozin M, Thomson BN, Mann GB, Tan SBM, Clark DA, Daruwalla J, Muralidharan V, Najan N, Pitcher ME, Vilhelm K, Cox MR, Lane SE, Watters DA.. Laparoscopic or open appendicectomy for suspected appendicitis in pregnancy and evaluation of foetal outcome in Australia [ANZ. J. Surg.], 2017; 87(5): 334–3384; https://doi.org/10.1111/ans.13750. 3384; https://doi.org/10.1111/ans.13750.

Стаття надійшла 28.10.2020 р.

DOI 10.26724/2079-8334-2021-4-78-120-125
UDC 616–008

A.H. Mustafayeva
Azerbaijan Medical University, Baku, Azerbaijan

POSSIBILITIES OF FORECASTING COMPLICATIONS IN PATIENTS WITH METABOLIC SYNDROME

e-mail: Statya2021@mail.ru

In the period from 2013 to 2016, 364 patients aged 20 to 80 years (200 men and 164 women) with newly diagnosed metabolic syndrome were prospectively examined. In patients aged 20–60 years and in the age group 61–80 years, the analysis of the results of the examination of patients with metabolic syndrome allowed us to build a number of regression models that allow predicting variants of metabolic syndrome: diabetic, hypertensive or combined. A study of the incidence of complications of metabolic syndrome showed that in the age group of 20–40 years the incidence of myocardial infarction was 1.9 % and that of ischemic stroke in 0.96 %, in the age group 41–60 years, respectively, 14.5 and 7.6 %; In the group of patients older than 60 years – myocardial infarction was observed in 12.9 % of patients, ischemic stroke in 6.7 % of cases. The analysis of the results of the examination of patients with metabolic syndrome allowed us to build a number of regression models that allow predicting variants of the metabolic syndrome. It has been shown that metabolic syndrome is a factor predisposing to atrial fibrillation and a favourable background for the implementation of risk factors for atrial fibrillation.

Key words: metabolic syndrome, complications, regression analysis, prognostic parameters.

А.Г. Мустафаєва

МОЖЛИВОСТІ ПРОГНОЗУ УСКЛАДНЕННЯ У ХВОРИХ З МЕТАБОЛІЧНИМ СИНДРОМОМ

У період з 2013 по 2016 роки проспективно обстежено 364 пацієнти віком від 20 до 80 років (200 чоловіків та 164 жінки) з вперше діагностованим метаболічним синдромом. У пацієнтів віком 20–60 років та у віковій групі 61–80 років аналіз результатів обстеження хворих на метаболічний синдром дозволив побудувати ряд регресійних моделей, що дозволяють прогнозувати варіанти метаболічного синдрому: діабетичний, гіпертонічний або комбінований. Дослідження частоти ускладнень метаболічного синдрому показало, що у віковій групі 20–40 років частота інфаркту міокарда склала 1,9 %, а ішемічного інсульту – 0,96 %, у віковій групі 41–60 років відповідно 14,5 та 7,6 %; у групі пацієнтів віком від 60 років – інфаркт міокарда спостерігався у 12,9 % пацієнтів, ішемічний інсульт – у 6,7 % випадків. Аналіз результатів обстеження хворих на метаболічний синдром дозволив побудувати ряд регресійних моделей, що дозволяють прогнозувати варіанти метаболічного синдрому. Показано, що метаболічний синдром є фактором, що сприяє фібриляції передсердь і сприятливим фоном для реалізації факторів ризику фібриляції передсердь.

Ключові слова: метаболічний синдром, ускладнення, регресійний аналіз, прогностичні параметри.

The work is a fragment of the doctoral dissertation "Features of the course and prediction of manifestations of metabolic syndrome in individuals of different age groups"

It is widely recognized that the prevalence of metabolic syndrome (MS) in many countries of the world became epidemic [1, 3, 5]. In a number of studies, it was shown that the incidence of myocardial infarction in patients with diabetes mellitus (DM) with arterial hypertension (AH) was 3.5 times, and that of stroke was 16.5 times higher than with DM without AH [2]. Thus, diabetes and hypertension are two interrelating components of a deployed complicated MS that affect a variety of target organs: the heart and trunk vessels, the kidneys, the brain, the microvascular bed of virtually all internal organs. There are data that in persons with MS the total cardiovascular risk of developing myocardial infarction (MI) (estimated