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FEATURES OF LAPAROSCOPIC APPENDECTOMY WITH THE ATYPICAL LOCATION OF THE APPENDIX IN PATIENTS WITH A HIGH RISK OF CARDIOPULMONARY INSUFFICIENCY

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Summary

Objectives. The purpose of the work was to expand the capabilities of laparoscopic appendectomy in the atypical location of the destructively altered appendix in patients with a high risk of cardiopulmonary pathology, through the use of new surgical techniques.

Material and methods. In the clinic of Department of Surgery No. 2, Odessa National Medical University, from 2015 to 2020, there were operated on 57 patients for acute appendicitis with an atypical location of the appendix with the presence of concomitant cardiopulmonary pathology. All patients were divided into 2 groups. The first group consisted of 21 (36.8%) patients with an atypical location of the appendix and a high risk of cardiopulmonary failure, who underwent an open appendectomy. The second group consisted of 36 (63.2%) patients with an atypical location of the appendix and a high risk of cardiopulmonary failure, who underwent laparoscopic appendectomy. The procedure was performed according to two methods: with the imposition of pneumoperitoneum in 24 (42.2%) patients and in 12 (21%) patients with the imposition of laparolifting, due to severe cardiopulmonary pathology.

Results. Postoperative complications in group 2 were less than in patients in group 1. Average stay in the hospital of patients of the second group, after laparoscopic appendectomy, was 4.9 ± 2.35 days. In patients of the first group, with open appendectomy – 10.6 ± 5.1 days. After minimally invasive interventions, patients were in the hospital on average 5 days less than patients who underwent "open" appendectomy.

Conclusions. The use of laparoscopic and video-assisted approaches, in an atypical location of appendicitis, can reduce the incidence of postoperative complications and deaths, which generally improves the results of the treatment.

Keywords: acute appendicitis, appendectomy, laparoscopy, cardiopulmonary insufficiency, atypical location of the appendix

Background

The incidence of acute appendicitis (AA) is from 20% to 50% of emergency hospitalizations in surgical hospitals and the only method of treatment is surgery. "Open" methods of surgical treatment, over time, faded into the background. In recent years the most common operation is laparoscopic appendectomy (LAE), which is the main surgical method of surgical treatment of AA [1].

Its advantages over "open" appendectomy are well known. However, with the atypical location of the appendix, which is quite common (2.5% - 25%), it is believed that the level of technical difficulties during LAE will be less than in case of an open appendectomy (AE) [2, 3]. LAE is feasible for almost all atypical variants of the location of the appendix. Conversion to an "open" operation should not be caused by an atypical variant of the appendix position [4]. The use of laparoscopy is known to affect numerous hemodynamic factors, including decreased heart rate and stroke index, and increased systemic and pulmonary vascular resistance.

The choice of the LAE method, especially in patients with a high risk of cardiopulmonary insufficiency, is relevant [5, 6].

Purpose of the study

To expand the possibilities of LAE with an atypical location of a destructively altered appendix in patients with a high risk of cardiopulmonary pathology, through the use of new surgical techniques.

Materials and methods

In the clinic of Department of Surgery No. 2, Odessa National Medical University (ONMedU), from 2015 to 2020, there were operated on 57 patients, for acute appendicitis with the atypical location of the appendix, with the presence of concomitant cardiopulmonary pathology. Of these, 25 (43.9%) were men and 32 (56.1%) – women. The patients' age ranged from 50 to 80 years. In this study the fundamental ethical principles of research were respected. All patients gave informed consent for enrollment in the study.

The diagnosis of AA was made on the basis of the clinical picture of the disease, data from instrumental research methods (ultrasound, computed tomography (CT), magnetic resonance imaging (MRI), chest X-ray, electrocardiogram (ECG)), confirmed by laboratory tests (blood tests, complete blood count (CBC), alanine aminotransferase (ALT), aspartate aminotransferase (AST), urine analysis). The diagnosis of AA with an atypical location of the appendix was made before surgery in 51 (91%) patients (Table 1).

Table 1

Location of the appendix in operated patients

LOCATION	NUMBER OF PATIENTS
Retrocecal	27 (47.3%)
Retroperitoneal	9 (15.7%)
Pelvic	10 (17.5%)
Combination of retroperitoneal and retrocecal	3 (5.2%)
Subhepatic	8 (14.3%)
TOTAL	57 (100%)

All patients were divided into 2 groups. The first group consisted of 21 (36.8%) patients with an atypical location of the appendix and a high risk of cardiopulmonary failure, who underwent open appendectomy. The second group consisted of 36 (63.2%) patients with an atypical location of the appendix and a high risk of cardiopulmonary failure, who underwent laparoscopic appendectomy. LAE was performed according to two methods: with the imposition of pneumoperitoneum in 24 (42.2%) patients and, in 12 (21%) patients, with the imposition of laparolifting, in view of severe cardiopulmonary pathology, where the imposition of pneumoperitoneum was dangerous. Patients of both groups were examined urgently, consulted by specialist (cardiologist, pulmonologist, therapist). The types of concomitant pathology and the number of patients are presented in the table 2.

Table 2

Distribution of patients with comorbidities

Type of pathology	Number of patients
Postinfarction cardiosclerosis with cardiovascular insufficiency	27
Hypertrophic heart with hypertension stage 2-3. Congestive heart failure (CHF)	17
Bronchial asthma with severe respiratory failure, Chronic obstructive pulmonary disease (COPD)	8
Bronchiectasis	5
Total	57

In the preoperative period, antibiotic prophylaxis with antibacterial drugs of a wide spectrum of action was carried out, and correction of water-electrolyte disturbances was performed.

Results and discussions

The nature and volume of surgical intervention in patients of the first group is mainly represented by AE operation from an appendicular incision and drainage of the abdominal cavity with one or two drains, due to the presence of peritonitis or abscess, in 12 (21%) patients. Midline laparotomy was performed in 9 (15.7%) patients according to strict indications, due to the presence of severe concomitant cardiopulmonary pathology, and before arriving in the operating room, ultrasound or X-ray computer diagnostics was performed, for the presence of diffuse or diffuse peritonitis (Table 3).

Table 3

Open surgical interventions in patients of the first group

Surgical procedure	Number of patients
Appendectomy by McBurney incision	7
Appendectomy by McBurney incision, sanitation (purification), and drainage of the abdominal cavity	5
Midline laparotomy, AE, sanitation and drainage of the abdominal cavity	7
Pararectal laparotomy by Lenander, AE, drainage of the abdominal cavity	2
Total	21

Postoperative complications in patients of the first group of 21 patients (100%) were represented by the development of postoperative ventral hernia in 5 (23.8%), exacerbation of chronic obstructive pulmonary disease (COPD) in 3 (14.3%), suppuration of the postoperative wound in 2 (9.5%) patients and 1 (4.7%) patient died from progressive severe cardiopulmonary insufficiency.

The nature and volume of the surgical intervention, in patients of the second group were represented by the main type of operation which was LAE and sanitation of the abdominal cavity, and LAE with sanation and drainage of the abdominal cavity in patients with pneumoperitoneum imposition, which was performed in 24 (66.6%) patients. In 12 (33.3%) patients, the LAE operation with the imposition of laparolifting was supplemented with drainage of the abdominal cavity. Taking into account the various types of the atypical location of the appendix, surgical intervention was carried out using a different position of the patient on the operating table (giving a turn of the patient's body to the left or right side). In 5 patients, after the introduction of the laparoscope into the abdominal cavity, the optimal place for the imposition of laparoscopic ports was chosen for the introduction of the instrument, followed by the main stage of the operation (table 4).

Table 4

Surgical interventions performed in patients of the second group

Surgical procedure	Number of patients with pneumoperitoneum imposition	Number of patients with laparolifting technique
LAE, drainage of the abdominal cavity	17	8
LAE, sanitation, and drainage of the abdominal cavity	7	4
Total	36	

Postoperative complications in patients of the second group, in the form of a hematoma near the umbilical wound, were observed in 4 (11.1%) patients, hernia of the subumbilical region – in 2 (5.5%) patients. There were no deaths in this group.

LAE with the use of laparolifting was performed

using a device developed in the clinic for laparolifting according to Zaporozhchenko-Kolodiy (Ukrainian patent for invention No. 101921 dated 05/13/2013 – a device for performing laparolifting in laparoscopic interventions). Contraindications for performing laparoscopic surgery with pneumoperitoneum overlay in patients of the second group were standard severe cardiopulmonary pathology, therefore, the technique with the imposition of laparolifting was performed. In all patients, surgical intervention was carried out through three ports, which were introduced at typical points, after the application of the system for laparolifting: 1) the umbilical region; 2) in the suprapubic region to the middle of the line in the middle of the distance between the navel and the bosom; 3) in the right ileal region in the place of the projection of the dome of the cecum. The average duration of the surgery amounted to 47.8 + 7.2 minutes. In the postoperative period, patients underwent antibiotic therapy and correction of pathological syndromes of the cardiopulmonary and hepatic-renal systems according to indications. Average stay in the hospital of patients of the second group, after LAE, was 4.9 ± 2.35 bed-days, in patients of the first group, with open AE – 10.6 ± 5.1 bed-days. After minimally invasive interventions, patients stayed on average 5 days less than patients who underwent "open" appendectomy.

Conclusions

1. The use of laparoscopic and video-assisted approaches in an atypical location of appendicitis can reduce the incidence of postoperative complications and deaths, which generally improves the results of the treatment.

2. Performing laparolifting laparoscopic appendectomy according to indications is the optimal method in patients with a high risk of cardiopulmonary complications with concomitant pathology.

3. Laparoscopic appendectomy with an atypical location of the appendix, in patients with a high risk of cardiopulmonary diseases, can reduce hospitalization time and accelerate rehabilitation in the postoperative period.

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