

TBILISI STATE MEDICAL UNIVERSITY

With the rights of manuscript

Oleg Kvitsiani

**LAPAROSCOPIC DIAGNOSTIC AND TREATMENT
OF ACUTE APPENDICIT**

14.00.27 – Surgery

ABSTRACT

Dissertation Thesis in Fulfillment of Requirements for the
Master of medicine Scientific Degree

Tbilisi, 2006

The work has been accomplished in the Georgian State Medical Academy

Scientific chief :

- George Pipia

Doctor of Medical Sciences, Professor
(14.00.27).

Official Opponents:

- Gia Gokieli

Doctor of Medical Sciences, Professor
(14.00.27)

- Temur Tabutsadze

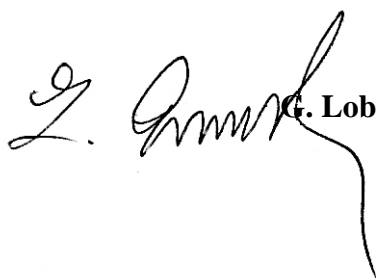
Doctor of Medical Sciences, Professor
(14.00.27)

The Dissertation will be supported on ----- 2006, at the session of
Dissertation Council (m.14.27 No 8) of Tbilisi State Medical University (0177, Tbilisi, 33
Vazha – Pshavela Avenue, Tbilisi).

The Dissertation could be evaluated at the library of Tbilisi Medical University (0160, Tbilisi, 29
Vazha – Pshavela Avenue, Tbilisi).

The abstract has been dispatched on ---- ----- 2006

**Scientific Secretary of the Council,
Doctor of Medical Sciences, Professor -**

**G. Lobzhanidze.**

INTRODUCTION

Development of endo-video technology during the last decade and rapid development of endo-video surgery gave substantial boost to wide use of small invasive operational methods in urgent surgery.

Importance of the Issue: Although studied throughout, the diagnosis and treatment of acute appendicitis remains of an important issue of urgent surgery that is conditioned by frequent spread of the disease, diagnostic difficulties, and considerable amount of avoidable operations. Efficiency of laparoscopic method of diagnosis and treatment of acute appendicitis is widely discussed in modern medical publications. Keen interest of surgeons to this pathology is caused by frequency of the disease forms with atypical clinical course and severe complications caused by diagnostic errors. Development of video-endoscopic surgery and wide use of diagnostic laparoscopy in urgent surgery simplified clinical diagnosis of patients and made it reliable. In addition, it reduced the preoperational period and practically excluded unneeded sections. Use of laparoscopic appendectomy sharply reduced number of instantaneous and prospective postoperative complications and time of full medical and social rehabilitation of the patients. In spite of implementation-assimilation of recent medical technologies and solving the problem of trained specialists of sufficient qualification in developing countries, the use of approved endosurgical methods in general and laparoscopic appendectomy in particular at numerous pathologies of abdominal cavity is quite limited there due to organizational and other subjective reasons.

Based on aforesaid, we may conclude that implementation of diagnostic laparoscopy and laparoscopic appendectomy, the technical and tactical aspects of the operation, development of means and ways of avoiding complications at each stage of operation are of actual problems of urgent surgery.

The Goals and Objectives of the Study: The goal of the study was elaboration of indication-contraindication algorithms for diagnostic laparoscopy and laparoscopic appendectomy at acute appendicitis and optimization of tactical and technical aspects of each stage of the operation in order to improve instantaneous and prospective postoperative complications.

In order to achieve this goal, the following specific problems were set out:

1. To determine diagnostic laparoscopy data at doubtful diagnosis of acute appendicitis and by combined consideration of clinical parameters and laparoscopic indications develop the order of stages of laparoscopic diagnosis and the tactics for the further treatment.
2. To elaborate indication-contraindication algorithms for laparoscopic appendectomy on the basis of comparative consideration of general clinical and laparoscopic indications.
3. To determine the optimal method and extent of operation based on the disease clinical form and diagnostic laparoscopy data.
4. To develop the uniform classification of expected intra-abdominal and postoperative complications characteristic to each stage of laparoscopic appendectomy and determine the ways of their prevention and treatment.
5. To make comparative analysis of the results of open and laparoscopic treatments of acute appendicitis.

Scientific Novelty:

1. Indication-contraindication algorithm for application of laparoscopic appendectomy is proposed.
2. The exact extent of operation and optimal method of actions on every stage of operation according to the clinical form of the disease is defined.
3. The uniform classification of complications characteristic to laparoscopic appendectomy is elaborated and optimal ways of their prevention and treatment are suggested.
4. Original method of insertion of the first trocar using laparolifting is elaborated and applied.
5. Original method of appendix mesenteric and stump ligation is elaborated and applied.

6. Classification of postoperative peritoneal adhesions occurring after classical and laparoscopic appendectomy based on the character of the adhesion processes and their localization is proposed.

Practical value:

Practical recommendations has been worked out that define appropriateness of diagnostic laparoscopy and laparoscopic appendectomy and determine the optimal method and expected extent of the operation based on consideration of the clinical forms of doubtful or confirmed appendicitis, sex and age of a patient, concomitant diseases and other factors in each particular case. Based on clinical study, dependence of frequency of occurrence of intra-, postoperative and prospective complications on clinical forms of appendicitis and operational issues at each stage is investigated.

The uniform classification of complications on different stages of diagnostic laparoscopy and laparoscopic appendectomy and preventive measures proposed by us will substantially support sharp decrease of the number of intra- and postoperative complications, the time of full medical and social rehabilitation of the patients and the operation cost price. In addition, it provides reliable prevention of prospective postoperative complications such as hernia and peritoneal adhesion disease.

The Main Issues Presented for Defense:

1. The method of insertion of the first trocar and creation of pneumoperitoneum proposed by us minimizes the risk of damage of peritoneal organs and major blood vessels and the treatment time.

2. Proposed by us uniform classification of intra- and postoperative complications and strict maintenance of based on it recommendations for each stage of the operation provides safe treatment of appendectomy with diminutive threat of instantaneous and prospective postoperative complications.

3. Method of ligation introduced in the study is practically equivalent to the manual knot and is a reliable method of prevention of dangerous complications connected with appendix mesenteric and stump.

4. Comparative analysis of the results of traditional and laparoscopic methods of treatment of acute appendicitis displays evident superiority of the last one.

Introduction:

The main results of the dissertation are introduced in Tbilisi Administration L.T.D. Akad. Z. Tskhakaia Thoracoabdominal Clinic. The materials and results of the study are applied in Tbilisi State Medical University Thoracoabdominal chair during training course for raising the level of surgeon's skill in laparoscopic surgery.

Approbation of the Work:

Materials of the dissertation were reported:

- On a session of Tbilisi Surgeon Society (March 11, 2005).
- On an unified faculty session of Tbilisi Administration L.T.D. Acad. Tskhakaia Thoracoabdominal Clinic and Tbilisi State Medical University Thoracoabdominal chair (February 8, 2005).

Publications: There are published 4 scientific works on the dissertation issues.

The dissertation volume and structure: The dissertation is presented on 125 pages and expounded in the following chapters:

Chapter 1 – Literary Review;

Chapter 2 – Materials and Methods of the Research;

Chapter 3 – The Grounds of Intra- and Postoperative Complications of diagnostic laparoscopy and laparoscopic appendectomy and their Prevention;

Chapter 4 – Results of the Study;

Chapter 5 – Comparative Analysis of the Study Results.

In addition, it contains Conclusions, Practical Recommendations and Bibliography consisted of 160 publications.

There are attached 15 figures, 8 tables, and 10 diagrams to the main text.

MATERIALS AND METHODS OF THE RESEARCH.

General Description of the Material:

The study is based on the analysis of prospective randomized research of diagnosed with acute appendicitis 544 patients, who were hospitalized in acad. Tskhakaia Thoracoabdominal Clinic at Tbilisi 1-st Clinical Hospital (212 patients) during 1999 – 2004 years and in Department of Urgent Endo-video Surgery at Aleksandrov Hospital in Sankt-Peterburg (Rissua) during 2003 – 2004 (332 patients). In addition, results of retrospective nonrandomized investigation of 30 persons operated due to acute appendicitis during 1996-2002 years were analyzed.

The patients were divided into three groups:

I group: 323 persons hospitalized with acute appendicitis, who were diagnosed and treated by laparoscopic method (the main group);

II group: 221 persons hospitalized with acute appendicitis, who were diagnosed and treated by traditional method (the control group);

III group: 30 persons for retrospective nonrandomized investigation in order to compare frequencies of occurrence of postoperative peritoneal adhesions after traditional (15 patients) and laparoscopic (15 patients) appendectomy.

Distribution of patients by age, sex, and treatment techniques is given in Table 1.

Table 1.

Age	I Group		II Group		III Group		Total
	Female	Male	Female	Male	Female	Male	
15-21	51	24	38	26			139
22-35	91	50	62	34	8	3	248
36-59	53	31	29	17	10	9	149
60-75	9	11	9	4	-	-	33
75-90	3	-	2	-	-	-	5
90 and more	-	-	-	-	-	-	-
Total	207	116	140	81	18	12	574

The I group patients (323 persons) were divided into two sub-groups: I^a sub-group of 193 (65.3%) patients with preoperative diagnosis of acute appendicitis and I^b sub-group of 128 (34.7%) patients with doubtful diagnosis of acute appendicitis. After application of diagnostic laparoscopy, in 136 (70%) cases of I^a sub-group and in 41 (32%) cases of I^b sub-group (177 in total) the diagnosis was confirmed and, consequently, appendectomy was performed using both laparoscopic method and conversion from laparoscopic to open method due to technical difficulties and iatrogenic complications. All operations were conducted under the general endotracheal anesthesia.

The II group patients (221 persons) also were divided into two sub-groups: II^a sub-group of 174 (65.3%) patients with preoperative diagnosis of acute appendicitis and II^b sub-group of 47 (34.7%) patients with doubtful diagnosis of acute appendicitis. In all cases, the diagnosis was made on the basis of anamneses and clinical laboratory data. 174 patients of the II^a sub-group underwent appendectomy with McBurney incision. In the II^b sub-group diagnosis was proved, or disproved both by intraoperative and noninvasive observations (ultrasonography, computerized tomography etc.). Appendectomy with traditional method was performed in 201 cases in all in this group. Local infiltrative anesthesia was used in 2 cases and venous narcosis – in 6 cases. In the rest of the cases, the general endotracheal anesthesia was applied.

The III group consisted of 15 patients operated 2 to 7 years earlier using laparoscopic method and 15 patients operated 2 to 8 years earlier with traditional appendectomy. During

rehospitalization, 29 of them underwent laparoscopic cholecystectomy and 1 – laparoscopic hernia plastic (TAAP). The patients were selected by sex, age, and diagnosis. 15 of them were both times operated in Sankt-Peterburg Aleksandrov Hospital (Rissua) with laparoscopic method and the other 15 – the first time by traditional appendectomy and then by laparoscopic method in our clinic. Supervision of these patients allowed us to estimate and compare intensities of post appendectomy peritoneal adhesions after these methods and make corresponding classification.

The preoperative preparations of the patients included: clinical-laboratory blood tests (general, biochemical, liver function, coagulogram, group, Rhesus factor, serologic markers, active viral hepatitic markers); general urine analysis; electrocardiography; chest radiology-radiography. Concomitant diseases were revealed in 210 patients from the both groups. The most common among those were pathologies of cardiovascular and respiratory systems, stomach and duodenum ulcers, pathologies of urogenital system, varicose diseases of lower extremities etc.

METHODS OF SURGICAL TREATMENT:

Diagnosis and Treatment of Acute Appendicitis by Classical Method was performed on 140 women (63.4%) and 81 men (36.6%). Diagnoses were based on the combined consideration of anamneses, clinical laboratory data, and the results of noninvasive observation. As operational approaches, there were used McBurney section (183, 88.8%) and middle laparotomy (23, 21.2%). In all cases, appendix stump after ligation was tucked into the appendicitis wall by purse-string suture. Z-shaped stitches were also used. Sanation and drainage of abdominal cavity was performed only when destructive and perforated appendicitis took place.

METHOD AND TECHNIQS OF DIAGNOSTIC LAPAROSCOPY AND LAPAROSCOPIC APPENDECTOMY

The Main Instruments: All procedures were performed with surgical instruments and equipments manufactured by the next companies: R.Wolf, Karl Storz, Styker, Olympus, Aksioma. For sanation of abdominal cavity, there were used 0.05% betadine, 1% furaceline and 0.25% chlorhexidine.

Preoperative Preparation of the Patients and Anesthetic Management. Preoperative preparations were carried out according to the standard scheme. The preference was given the method of general anesthetization by tracheal intubation, cardiomonitoring and uninterrupted control of peripheral saturation. Endotracheal anesthesia was provided with oxygen and nitrogen mixture in the ratio 3:1 with narcotic analgesic in conditions of appropriate relaxation. Prior narcosis was made by barbiturates or ketamine.

Position of a Patient, Allocation of the Operating Crew and Instruments: Allocation of the operating crew, the monitor and the trocars is represented in two main ways: I. – The monitor is placed to the right side of the patient on his (her) shoulder girdle level; the operating surgeon and the assistant are to the left side of the patient and the nurse – in the opposite side to the surgeon; II. – The monitor is placed distally of the patients' lower extremities; the operating surgeon and the nurse are to the left side of the patient and the assistant – on the right side of the patient. The both ways of the crew allocation provides maximal surgical approach and visualization of the vermiform appendix. Diagnostic laparoscopy was carried out mostly by one surgeon but there were cases, when use of additional instrument was needed and manipulations were made by two operators.

a) Creation of Pneumoperitoneum . Allocation of the Trocars:

In order to create pneumoperitoneum, we used: puncture by Verish needle in the left hypogastria or umbilical area; the first trocar was inserted by open laparoscopic methods, or by the direct method using improved by us laparolifting, which finally came to the following pattern: about 8-10mm long semicircle lateral incision was made at the upper, or the lower fold of the navel; then

maximum lifting of the abdominal front wall was made using Mikulicz's clamp on the navel stigma. The first trocar (10mm) from incisions is placed in the abdominal cavity at 90° to the aponeurosis and 45° to the horizontal plane with rotational movements and filling each layers when passing. Conducting this procedure, when the trocar tip gets inside an abdominal cavity it rests against the contralateral front wall of the abdominal that was formed by laparolifting. This practically excludes iatrogenic injury and, at the same time, pneumoperitoneum was achieved considerably faster. Pneumoperitoneum was maintained with CO₂ of 8-14 mm.of Hg pressure (6 mm.of Hg in case of local anesthesia).

At diagnostic laparoscopy and laparoscopic appendectomy two sets of working trocars were used: a) one 10mm. and one 5mm. trocars; b) two 5mm. trocars. The trocars were placed by the following scheme: they were inserted symmetrically in both sides in mesogastrium area 2-3 cm low from umbilicus level, or in the femoral fossa mainly closer to the pubic. 10 mm trocar was used purposefully for evacuation of dissected vermiform appendix from the abdominal cavity and was inserted in the area of the right femoral fossa .

b) diagnostic laparoscopy:

After conclusion of the stage of laparoscopic approach, stepwise revision of abdominal cavity was carried out. The inspection started from the upper part of the abdominal cavity in the following order: subphrenic space, paracolic gutters, both femoral fossae, and finally, the Douglas fossa. According to localization of pathology, there were estimated inflammatory changes of visceral and paries layers of the peritoneum, the boundaries of inflammation extent, inflammation forms (hyperemia, suppuration, or fibrin coating), peritoneal adhesions, and inflammatory exudation character, intensity and extension. After the basic disease was diagnosed, serious attention was paid to exposition of possible concomitant pathologies and determination of corresponding surgical tactics.

In case of discharge existence in the abdominal cavity, the liquid was aspirated with the working trocar inserted in the left mesogastrium or femoral fossa, minimizing this way risk of insemination of the inflammatory exudation to other areas.

Reposition of the patient was made according to pathology and localization of exudation. At doubtful diagnosis of appendicitis, the patient was put in Trendelburg position by the left side of the surgical table with 15-20° inclination shifting this way the intestinal loops from the ileocecal area and minor pelvic cavity. During the detailed revision of the right femoral fossa area and the minor pelvic cavity, the priority was given to use of atraumatic "soft" manipulator. In some cases, change of the patient position was enough for observation of vermiform appendix and verification of the diagnosis. Diagnostics of destructive forms of acute appendicitis is not difficult and, correspondingly, appendectomy with laparoscopic or classical method was performed.

Intensive blood vessel picture and minor discharge of the vermiform appendix was not accepted as a criterion for appendectomy. Special significance was given to estimation of inflamational-infiltrational changes in deep layers, which was made as follows: by lifting of the middle part of the vermiform appendix, rigidity of the appendix was defined – its dangling appointed to the absence of inflamational-infiltrational changes in deep layers. Appendix elasticity was checked by apdactil palpation. If inflammation changes took place, increased density and decreased elasticity of the wall could be felt by palpation with soft branch instrument. In the branch manipulation area, multiple fine subserous hemorrhages appeared that appointed to acute inflammatory changes.

In case of atypical (retrocecal, retroperitoneal) location of appendicitis and rough adhesion, or inflammatory infiltrations, when visualization of the appendix was impossible, there were emphasized indirect signs of inflammation such as: intensive blood vessel picture in the ileocecal area, character and amount of discharge, infiltration of the mesocecum wall and the appendix base. In all doubtful cases, existed adhesions and soft inflammatory infiltrates were decomposed in order to verify the diagnosis. At retrocecal position of an appendix, mesocecum mobilization

was performed laterally to it from the fold formed by visceral and paries layers of peritoneum and the area was cleaned out using blunt method until the clear visualization of the vermiform appendix. In some cases, due technical difficulties that might lead to high risk of iatrogenic injuries during conduction of these manipulations, conversion to the open method was exercised and traditional appendectomy was performed.

When diagnosis of acute appendicitis was excluded, reinspection of the abdominal cavity was provided. Minor pelvic cavity organs in women were given the special interest. Diagnostics and treatment were carried out with participation of profiled specialists if it was needed. In case of diagnoses that did not required surgical manipulations, they were reduced to control drainage of abdominal cavity (Douglas fossa), dynamic monitoring and symptomatic treatment for 1 or 2 days.

The stages of laparoscopic appendectomy:

The operation extent and surgical tactics were determined according to the character of pathology and anatomic location of the vermiform appendix. At the presence of adhesions at diagnostic laparoscopy and on the starting stage of operation, in order to mobilize the operational area, appendix and its mesenteric were separated from the adhesions with sharp and blunt methods and also with elektrokoagulation.

Mobilization of a Vermiform Appendix Mesenteric.

I. Clipping, as an independent method, was not used by us for mesenteric mobilization due to relatively high risk of falling out of a clip and less reliability. Clipping of *a.appendicularis* was used just once as an additional measure.

II. Disposable sewing (suture) stapler (ENDO-GIA) enables ligation and cutting of mesenteric and vermiform appendix at once with reliable hemostasis and stump sealing . Disadvantages of this method include disposability and high cost of the staplers, and limited application in cases of atypical location of vermiform appendix and short mesenteric. In the material presented by us, ENDO-GIA was used for mesenteric and stump mobilization three times.

III. L.G.Generator (Liga-Sure) provides in automatic regime safe coagulation and cutting of mesenteric tissue and blood vessels clamped between branches. The most of the authors consider high cost price of Liga-Sure as disadvantage and question its wide application in appendectomy practice. We have used Liga-Sure in 4 cases.

IV. Elektrokoagulation:

a) coagulation with monopolar instrument was conducted on two levels for safety reasons. It started from middle third of the open side of the mesenteric in two rows at 2-3mm distance. Then the mesenteric was cut on the edge of coagulation upper level. In general, we used monopolar coagulation for mobilization of uninfiltrated mesenteric (64 cases).

b) bipolar instrument provides reliable coagulation of the tissues and blood vessels clamped between branches without extensive burn of tissues and guarantees complete hemostasis. As more safe method, we used bipolar coagulation for mobilization of infiltrated, thickened mesenteric and retrograde appendectomy (46 cases).

V. Ligation:

In the process of our investigation, there was refined and developed an original method of ligation of the safety equated with that of knot clipping. The technique consists in the following: nonabsorbable suture is placed in abdominal cavity from the trocar incision of the left femoral fossa with its long ending left extraperitoneally. Intraperitoneal end of the suture is led through the window, which is left by dissector at the base of appendix and intracorporal knot made. The same instrument fixes this end of the suture while the extraperitoneal ending is drawn off manually in parallel with the instrument axle the way that the angle between the ends of the suture on opposite sides of the knot is 180°. Thus, degree of the knot clamp may be controlled by manual feeling. After formation of valid knot, cutting of mesenteric by coagulation is not necessary that simplifies the whole procedure and makes it quicker. It needs to be mentioned that

when a mesenteric is short, infiltrated, or thick, also during performing of retrograde appendectomy, application of the described ligation method is technically complicated. In these cases, we preferred bi- or monocoagulation, or ligation and coagulation coupled (5 cases).

Vermiform Appendix Mobilization:

I. Disposable suture stapler (ENDO-GIA) enables ligation and cutting of the vermiform appendix and mesenteric in one moment with reliable hemostasis and stump closure. It enables also isolated ligation-cutting of the vermiform appendix basis (3 cases) at destructive appendicitis and severely thickened infiltrated mesocecum and appendix basis.

II. Ligation of Vermiform Appendix.

a) Endo-loop is of a simple construction that simplifies its use and provides secure ligation of the vermiform appendix basis and stump closure. This instrument may be used several times bringing it in working condition before each operation. We have used Endo-Loop for stump ligation 9 times.

Based on ligation by Endo-Loop, we have developed and applied modification of Reder Endo-Loop. Prepared in advance endoloop is to be placed from the trocar incision in the abdominal cavity. The loop is tightened by an instrument with soft and wide branch simultaneously moving the instrument and extraperitoneal suture till the final tightening of the loop. After that, by the long end, which was left in advance, an additional intracorporeal knot is made and it is formed manually controlled secure ligature. Application of this modification would totally exclude danger of softening of endoloops and consequent development of leak of stump. We have used this technique in 26 cases. It needs to be mentioned that application of Endo-Loop in case of retrograde appendectomy is practically impossible.

b) Intracorporeal ligation was performed using the above described method of mesenteric ligation. We have used this technique in 125 cases.

When there were no distinct destructive changes on the vermiform appendix basis, we made single ligation and cutting with scissors in 5 mm from the loop. Mucositis was treated by coagulation or iodine. In case of inflammatorily thickened and infiltrated basis of vermiform appendix, double ligation was applied in 2mm intervals. In case of distinct destructive changes in the area of appendix and mesocecum base, we considered necessary to immerse the stump in the wall of the mesocecum using purse-string suture, or Z-shaped stitches.

We did not use additional knots on the distal part of the appendicitis during vermiform appendix ligation at antegrade appendectomy – the appendix was placed in a container right after section, what minimised contamination of the operational area. Ligation of the distal part of the vermiform appendix was performed only in cases of retrograde appendectomy. Distal ligature was applied in 7-8 mm from the proximal one and the vermiform appendix was cut between these knots (23 cases).

Sanation of abdominal cavity by antiseptic solutions was carried out only in case of destructive-perforate appendicitis or abundant purulent discharge. In presence of high amount of purulent discharge in abdominal cavity and of fibrin coating, sanation was carried out by 0.5% solution of betadine, which is characterized by fibrinolytic activity along with antibacterial action. If the exudate was not much, only aspiration of the liquid was performed in order to avoid insemination of infected discharge in other areas of the abdominal cavity.

Drainage of the abdominal cavity was performed when destructive appendicitis and significant inflammatory exudation took place. Drainage was inserted from the troac incision of the right femoral area into the minor pelvic cavity, or more seldom at the appendix stump and was removed in the next day.

On the next stage of operation, the vermiform appendix stump was immersed between the appendicitis and peritoneum paries layers, what in our opinion, provided dependable local healing between the vermiform appendix stump and the peritoneum paries layer. At the same time, it considerably decreased adhesion diseases and strangulated obstruction.

Container Evacuation from abdominal cavity was carried out using of 10 mm trocar, or dilatation of the troac incision. It was special rubber or polyethylene basket used as a container. *On the final stage of operation*, the concluding revision was carried out in order to expose the possible operational complications. The trocars were removed from the abdominal area under video control. 10mm and wider incisions were stitched under visual control using Endo-close type suture needles in order to avoid formation of trocar hernia. In all cases, the navel incisions were closed layer-by-layer with knot stitches.

Causes of Complications during and after Laparoscopic Appendectomy and the Ways of Their Prevention.

Complications of functional character connected with laparoscopy (general anesthesia, tensed pneumoperitoneum atc.) are well studied and discussed in the medical literature. Methods of their diagnosis, prevention and treatment are well developed. Because of it, we do not discuss these issues in our work. Uniform classification of complications characterizing laparoscopic appendectomy is based on the reasons of complications that appear at laparoscopic approach, during operations and postoperative period. (Scheme №1, see pg. 42).

As these complications are linked with tactical or technical mistakes made at certain stage of operation (Table 2), we suppose that it is reasonable to consider all complications and the ways of their prevention and/or correction regarding to these stages. This way, surgeons will be able to make optimal choice of tactical and technical variants for each concrete case, what brings to minimum the incidence of possible complications.

Table 2. Dependence of laparoscopic appendectomy complications on the operation stages

Stages of operation	Type of complication									
	Bleeding	Intestinal injuries		Insemination of infection	Hernia	Peritoneal abscess	Residual appendix	Stump abscess	Infection of trocar inision	Bowel fistula
		Thermal	Mechanical							
Maintenance of pneumoperitoneum	+	-	+	-	+	-	-	-	-	+
Allocation of the working trocars	+	-	-	-	+	-	-	-	-	-
Mobilization of operational area	+	-	+	+	-	+	-	-	-	+
Mesenteric mobilization	+	+	+	-	-	+	-	-	-	+
Vermiform appendix mobilization	-	-	+	+	-	+	+	+	-	+
Sanation-Aspiration	-	-	-	+	-	+	-	-	-	-
Evacuation of vermiform appendix	-	-	+	+	+	+	-	-	+	-

Stage of Laparoscopic Approach and Complications Connected to It:

I. Maintenance of Pneumoperitoneum:

a) **Bleeding** may be caused by Verish needle and injury of arterial (aorta, inferior vena cava) and/or mesenteric blood vessels in the process of trocar insertion. It shows itself by profuse bleeding or retroperitoneal haematoma intraoperatively. Liquidation of this complication requires laparotomy. We did not have complications of this kind during this investigation.

b) Mechanical injury of intestines caused by Verish needle is very difficult to diagnose. As a rule, it reveals itself with diffuse peritonitis postoperatively. In order to prevent this type of complication (to determine the right position of the needle) we used one of the known tests, such as “run-away” drop, syringe test, or apparatus test. Injury of a hollow organ caused at insertion of the first trocar is not difficult to recognize, but its liquidation requires conversion on laparotomy. In order to prevent this complication, we used the direct method of trocar insertion with laparolifting. As for the cases with postoperative adhesions in the navel area, bloated bowels, or the third trimester of pregnancy, the first trocar was inserted using open laparoscopic method. We did not have complications of this kind during this investigation.

c) Postoperative hernia was avoided by layer-by-layer suture of the first trocar incision. We did not have such complications during this investigation.

d) Infection of the trocar incision was watched by its treatment with antiseptic means. We had 3 cases of omphalitis. Suppuration was avoided.

II. Allocation of the working trocars:

a) Bleeding: Based on specifics of laparoscopic appendectomy, during allocation of the working trocars, most often inferior epigastric artery, or its branches are injured, what causes trocar bleeding. In order to prevent the mentioned complication, selection of the spots for insertion of the working trocars' is carried out under transillumination by laparoscopy of abdominal front wall at the most avascular spots. Removal of the trocars also is carried out under laparoscopic control. Always, when intraoperative bleeding is suspected, in order to avoid postoperative trocar bleeding, the incision is stitched with Endo-close type suture, which provides secure hemostasis. This type complication in our investigation was observed in one case and it was corrected intraoperatively.

b) Trocar Hernia: in order to prevent trocar hernia caused, incision of working 10 mm trocar and the dilated incision for evacuation of the appendix were stitched up with Endo-close type suture. This way, we excluded such complications from our material.

c) Infection of the trocar incision caused inflammatory infiltrations in 5 cases during our study and suppuration took place only in one of them, but it did not affect the treatment duration.

Specific complications:

The initial stage – mobilization of the operative area:

a) Bleeding

During mobilization of the operational area, in the process of dissection of inflammatory, infiltrated or increased vascular tissues from adhesions, the danger of capillary diffuse bleeding increases. To prevent it, dissection of the adhesions was carried out with substitution of electrocoagulation, blunt and sharp methods at appropriate traction-contraction. Bleeding stopped by itself in most cases, but sometimes use hemostatic sponge and, in some cases, even conversion to the open method was necessary. In our clinical material, we had 2 cases of this type bleeding arrested intraoperatively using hemostatic sponge and 1 case, when we had to switch to the open method due to heavy blood capillary diffuse leakage from inflammatory peritoneum and mesocecum.

b) Intestine injury:

Thermal injury may be caused by electric current flow from the coagulator working surface to the walls of the intestine located intimately to the adhesions. In order to avoid this complication, dissection angle of coagulation was selected at maximum visualization. At the same time, substitution of electrocoagulation, sharp and blunt methods of adhesion dissection was carried out very carefully. In our material, this kind thermal injury was observed in 2 cases (mesocecum, small intestine). In both of them, the burned area was not more than $2 \times 2 \text{ mm}^2$ and the situation was improved by 2-3 intracorporeal sero-muscular sutures on the intestine walls using laparoscopic method.

Mechanical injury is highly expected during dissection of inflammatory soft infiltrates and adhesions at excessive traction of the tissues. For preventive reasons, mild traction of tissues has

to be used. In addition, excision of located intimately to adhesion intestine must be performed by sharp method. We did not have cases of these kind complications during this investigation

c) Insemination of infection:

One of the basic causes of infection insemination is reposition of the patient. Doing this, inflammatory exudation existent within the abdominal cavity propagates to other areas increasing risk of development of serious complications, such as peritoneal abscess and diffuse peritonitis. In order to avoid it, reposition of the patients with inflammatory-purulent exudation was not allowed until its total aspiration. Postoperative prevention of the consequences of infection insemination in abdominal cavity was carried out using appropriate antibiotic therapy and stimulation of immune system of the patients.

Mobilization of Vermiform Appendix mesenteric:

a) Bleeding takes place after inadequate ligation or coagulation of vermiform mesenteric. When it was used the method of ligation of mesenteric, knotting of mesoappendix was made as close as possible to the mesenteric basis in order to avoid detachment of the ligation. If the ligature strength was questionable, mesenteric coagulation also was carried out.

In case of mobilization of vermiform mesenteric with monopolar or bipolar coagulation of mesoappendix was performed on two levels and was cut on the upper coagulation line. Clipping of *a.appendicularis* also may be done as an additional preventive measure. In our clinical material, intraoperative bleeding of mesenteric took place in two cases and their correction was made intraoperatively by means of additional coagulation and suture. Postoperative bleeding of appendix mesenteric was observed in one case. This was diagnosed again by laparoscopy the day next of the operation and videoassisted open appendectomy with McBurney incision was performed.

b) Intestinal injury:

Thermal injury of vermiform appendix and mesocecum basis may be caused by electric current flow onto the intestinal wall in case of improper dissection by electric surgical instruments. If this complication is found intraoperatively and the surgeon qualified enough, it can be corrected by laparoscopic method. In postoperative period, the complication reveals itself with peritonitis caused by leak of vermiform appendix stump, or perforation of mesocecum wall. To avoid this complication, a gap was left in advance in the appendix mesenteric close to the mesocecum basis by dissector reducing this way probability of contact between coagulator and the intestine wall. In our material, leak of stump and abscess caused by thermal injury was found in 1 case after four days of the operation. The complication was corrected by laparotomy.

Intestine mechanical injury (perforation) can be caused by the tip of the working instrument slipped off the stretched surgical suture in the process of mesenteric ligation and putting the knots. To avoid this kind of complication, the tip of the instrument in this moment must be directed strictly to the lateral wall of the abdominal cavity. In our material, mesocecum perforation by dissector tip happened in 1 case and conversion to the open method became essential.

Mobilization of Vermiform Appendix:

a) Injury of the intestine.

Mechanical injury of vermiform appendix, its fragmentation, or detachment from its base takes place due to excessive traction of destructively changed appendix. Detachment of an appendix from the basis complicates effective ligation of the stump and requires an additional manipulation, such as purse-string suture. In case of further complications, conversion from laparoscopic to the open method is advisable. In order to prevent this complication, appendix traction needs to be performed with mild force (strength). We had 2 cases of fragmentation of vermiform appendix and 2 cases of detachment from the base. In the cases of this complications evacuation of vermiform appendix content, appendectomy and sanitation-drainage of the

abdominal cavity was mastered by laparoscopic method. As a consequence, the postoperative complications were not registered.

Thermal injury of appendix stump may develop due to hypercoagulation of its mucous followed by burn of deeper layers of placed proximally to the ligature stump and mesocecum wall. In postoperative period, this may lead to leak of stump and bounded with it complications: peritoneal abscess, diffused peritonitis and large intestine fistula. To avoid this, stump was cut approximately in 5 mm from the ligature and correspondent superficial coagulation of the mucus, or its treatment with iodine was provided. Intraoperative identification of this injury allows its immediate correction with Z-shaped stitches by laparoscopic method, or conversion to the videoassisted open method. In the materials of earlier years of the Urgent Endo-Video Surgical Department, thermal injury of appendix stump was registered in 0.25-0.5% of the cases. During our investigation, this type of complication did not take place.

b) Vermiform stump abscess is bounded to inaccurate double ligation of the appendix basis. When the area between ligatures is more then 2-3mm, probability of abscess formation in this area considerably increases. In our study, this type of complication was not observed.

c) Development of residual appendicitis appears when the stump left after vermiform appendix ligation is too long and it reveals itself after 2-3 months of the operation. There are only isolated instances of these type complications described in the medical practice world widely. We did not have such incidents.

Sanation-Aspiration of Abdominal Cavity.

a) Insemination of infection is conditioned by insufficient sanation and aspiration of abdominal cavity performed with technical flaws. In order to avoid this complication, purposeful sanation and aspiration of abdominal cavity with antiseptic solutions was carried out only in the presence of perforated appendicitis and fibrin coating. Minor exudations were evacuated with electric aspirator and sanation was not performed in prder to avoid the spread of infection in other areas of the abdominal cavity. 1 case of Douglass fossa abscess by insemination of infection was observed in our clinical material, and it was revealed and verified on 5-6th day from the operation.

Vermiform appendix evacuation.

a) Mechanical injury of vermiform appendix may happen during evacuation of the excised vermiform appendix by container, migration of small or large intestine loop through the dilated trocar incision and in case of manipulations with serrate (Kohher type) instrument. In order to avoid complications, evacuation with container was performed under strict visual control. In our material, 1 case of this injury took place in small intestine loop, which was transported in the dilated trocar incision and of the intestine was resected.

b) Trocar incision infection occurs during evacuation of appendix with container injury.

Acute intestinal strangulated obstruction belongs to nonspecific and rare instantaneous, orprospective postoperative complications. Isolated instances of these type complications are described in the medical practice worldwidely. We did not have such incidents in our practice.

RESULTS OF THE RESEARCH.

Based on observation of our materials, we have evaluated the results of acute appendicitis diagnosis and treatment in both groups by the following criteria: operation time, intra- and postoperative complications, postoperative pain syndrome, hospitalization time, medical and social rehabilitation time, possibility of simultaneous operations. We have also summarized and defined indications and contraindications for diagnostic laparoscopy and laparoscopic appendectomy.

The results of diagnostic laparoscopy:

I group included 323 patients diagnosed with diagnostic laparoscopy. 193(65.3%) of them made I^a subgroup, whose preoperative clinical diagnosis was certain acute appendicitis and the rest 130 (34.7%) formed I^b subgroup of patients with doubtful diagnosis of acute appendicitis. Time of diagnostic laparoscopy varied from 5 to 30 minutes (17-18 minutes in average).

From intraoperative complications 2 cases have to be mentioned that occurred at dissection of adhesions from inflammatory tissues and 1 case of bleeding from trocar incision, which were arrested with laparoscopic method without additional intervention. In all three cases laparoscopic appendectomy was performed after hemostasis.

Postoperative complications were not observed in our clinical materials.

Intra- and postoperative complications of diagnostic laparoscopy, as independent operation, is small in number and is mainly connected with the stages of laparoscopic approach. Because of this, we did not consider it reasonable to make separate classification concerning these issues.

If acute surgical pathologies were excluded, the patients were discharged from the hospital the next day, or continued treatment in the profiled departments.

Postoperative pains of the patients were registered during the operation day and injection of a single nonnarcotic analgetic in the first 8 hours appeared to be sufficient for their relief. In single instances, patients needed the second injection.

The majority of the interviewed patients came back to their normal life style on the 4th-5th days of operation.

In the I^a subgroup, acute diagnosis was confirmed in 136 (70%) cases out of the 193 patients. In I^b subgroup – in 42 (31.5%) cases out of 130. Distribution by diagnoses of the rest 47(30%) patients of the I^a subgroup and 89(68.5%) patients of the I^b subgroup is given in Table 3.

Table 3. Distribution of diagnoses by age and sex of the patients

Diagnosis	I ^a subgroup		I ^b subgroup		total
	female	male	female	male	
Acute appendicitis	70	66	25	16	177
Gynecological pathology	24*	-	18**	-	42
Ulcerous perforation of duodenum.	-	1	1	1	3
Acute cholecistitis	1	-	2	1	4
Crohn's disease	1	2	-	1	4
Acute pancreatitis	1	1	5	2	9
Urologic pathology	1	1	2	-	4
Mesadenitis	17	3	26	14	60
Mesenteric cancer	-	-	1	1	2
Omentum abscessed haematoma	1	-	-	1	2
No pathology	4	1	12	4	21
Nondiagnostic	-	-	1	-	1
Total	118	75	89	41	323

* 2 patients and ** 4 patients also are also among the group with diagnosed acute appendicitis with the concomitant pathologies.

In 20 cases out of 42 gynecologic pathologies was performed just gynecological surgery; 6 simultaneous appendectomy along with gynecological surgery was made. In all 6 cases the vermiform appendix suffered acute phlegmonous changes. Diagnostic laparoscopy was nondiagnostic in 1 case. Indicatives of incidence frequency of diagnosed acute appendicitis clinical forms were distributed as follows: catarrhal appendicitis 3(1,71%), phlegmonous appendicitis 154(87.0%), gangrenous appendicitis 14(7.9%), gangrenous-perforated appendicitis 6(3.4%). The presence of adhesions and soft infiltrations were observed in 116(67,05%) patients. The diagnostic difference was found histomorphologically in 4(2,26%) cases (macromorphologically there were diagnosed 3 cases of phlegmonous appendicitis histologically proved as gangrenous appendicitis and 1 catarrhal form of appendicitis diagnosed macromorphologically, was histologically proved to be chronic inflammation), which did not have any considerable influence on course of the operation and result of the treatment.

After laparoscopic diagnosis, 7(4,00%) patients underwent appendectomy by open method. In this case, indices for conversion were assumed to be existence of multiple rough adhesions in ileocecal area and atypical location of the appendix (retroperitoneal, retrocecal, intramural), appendicular and paraappendicular abscesses, destructional appendicitis with perforation at the basis with complicated diffuse purulent peritonitis.

Results of Laparoscopic Appendectomy:

Average duration of laparoscopic appendectomy made 45 minutes. Among intraoperative complications were 2 (1.13%) of thermal injuries: 1 (0,57%) was small intestine traumatic injury during the container evacuation. Fragmentation of vermiform appendix during its mobilization took place in 4 (2.27%) cases, intraoperative bleeding (summed with the cases of diagnostic laparoscopy) – in 5 (2.82%). The total number of intraoperative complications was 12 (6.79%). Conversion from laparoscopic appendectomy to the open method was made in 4(2.27%) cases due to bleeding, injury of the peritoneal organs and other technical complexities. Among the postoperative complications after laparoscopic appendectomy were bleeding mesenteric – 1(0.57%), leak of stump – 1(0.57%) and abscess Douglas fossa – 1(0.57%). Inflammatory infiltration of laparoscopic incisions was found in 8 (4.54%) cases. There was 1(0.57%) lethal outcome caused by poor somatic condition of the patient and cardiopulmonary decompensation. Duration of postoperative treatment was 2.5 – 3 days. Duration of use of pain-killers in average did not exceed the first 8 hours. The majority of the interweaved patient did not feel any discomfort and were back to their normal life within 5-6 days after the operation.

We have conducted laparoscopic appendectomy on 2 pregnant patients, who were diagnosed with phlegmonous appendicitis in the first and the second trimesters of pregnancy. Postoperational control during two months after appendectomy did not reveal any prenatal complications. In our opinion, analysis of of laparoscopic treatment of pregnant patients requires additional investigation. However, in many recent publications laparoscopic treatment of pregnant women is assumed to be safe and successful.

The Results of Diagnosis and Treatment of Appendicitis Using Classical Method:

Clinical diagnosis of 221 patients of the II group were determined by anamnesis, clinical-laboratory and noninvasive instrumental (sonography, computer tomography) inspection. 174 of them, who were clinically diagnosed with acute appendicitis before the operation, were associated in II^a subgroup. 47 patients with doubtful diagnosis of acute appendicitis made II^b subgroup. In the II^b subgroup 18 gynecologic pathologies were revealed. In 16 cases gynecologic operation and appendectomy (with diagnosis of acute catarrhal appendicitis) were made simultaneously. In two cases only gynecologic operations were performed. In 1 case diagnosis of covered perforation of duodenum was made and there was performed ulceroraphy along with excision of catarrhally changed vermiform appendix. 4 patients, who were put in urgent endo-video surgical department, were not diagnosed with laparoscopy. 2 of them, using noninvasive method (three-dimensional ultrasonography and doplerography, computer tomography), were diagnosed with retrocecaly located appendicular abscess and tissue infiltration in ileocecal area and correspondent appendectomy was performed by laparotomy. The other 2 patients were diagnosed with (dense, thick, solid, compact, firm) appendicular infiltration and delayed appendectomy was performed by laparotomy. In all 4 cases diagnostic laparoscopy was assumed as less diagnostic and unneeded additional minor invasive method and we did not use it.

In the II^b subgroup, we did not use diagnostic laparoscopy towards 17 patients among those 47 hospitalized in the urgent endo-video surgical department. All complaints of 10 of them were totally gone in several hours and were discharged from the hospital under ambulatory control. 4 were clinically diagnosed with renal colic after noninvasive instrumental retest. In 1 case, serious cardiovascular pathology of the patient was assumed as contraindication of diagnostic laparoscopy and, consequently, using the other methods of differential diagnostics he was diagnosed with acute pancreatitis and underwent respective conservative treatment. In 2 cases, diagnostic laparoscopy was assumed as less effective and dangerous method for high risk of iatrogenic injuries due to general peritonitis and strongly pronounced meteorism. Using

diagnostic laparotomy, one of the patients was diagnosed with perforation of Meckel's diverticulum and the other – with destructive-perforated appendicitis. The concluding diagnosis of the rest 30 patients was made intraoperatively. Diagnosis of acute appendicitis was confirmed in 20 cases, acute gynecologic pathology and secondary change(d) (of) inflammatory vermiform appendix was found in 8 patients and only acute gynecologic disease – in 2 patients.

The average duration of traditional operations was 40 seconds. Intraoperative diagnoses were distributed as follows: catarrhal appendicitis – 37(18.5%); phlegmonous appendicitis – 133 (66%); gangrenous – 24 (12%); gangrenous-perforative – 7(3.50%). Soft infiltrations and adhesions were ascertained in 107(53.23%) patients.

Intraoperative bleeding typical to traditional appendectomy occurred in 5 (2.49%) cases, appendix perforation – in 7 (3.48%) cases; intestine traumatic injury (deserozation) – in 4 (1.99%) cases. The total amount of intraoperative complications was displayed in 16 (7.96%) cases. According to our material, the next types of complications in postoperative period were revealed: abscess of abdominal cavity – 2 (0.99%); bleeding – 1 (0,5%); intestinal dynamic paresis – 4 (1.99%); acute intestinal obstruction (from 6 to 14 days after operation) – 1(0,5%); infiltration of postoperative incision – 27 and 16 (7.96%) of them suppurated; postoperative hernia developed in 1 (0.5%) case and 1(0.5%) patient died. The lethal outcome was caused by failure of anastomosis and general peritonitis after the patient underwent relaparotomy because of strangulated ileus and resection of small intestine necrotic area. The total amount of postoperative complications was 26 (12.94%).

Due to the different forms of acute appendicitis, the average duration of postoperative hospitalization was 4-4.5 days. The average duration of use of pain-killers was 28 hours. The full social-rehabilitation period was 14 days.

Analysis of the Results:

Comparing the results of classical and laparoscopic methods of diagnosis and treatment of acute appendicitis, accuracy of diagnostic laparoscopy that reached 98% rate is apparent. In addition, optimal surgical tactics developed on the basis of diagnostics of concomitant and other pathologies, brings to minimum operational traumatism and aggressiveness. In 15% of treatment by classical method, pathologies of adjacent organs were not considered, which required extension of the surgical operations, or execution of additional laparotomy incisions increasing this way the operations' extent and traumatism.

It needs to be mentioned, that comparing effectivenesses of classical and laparoscopic methods, the following results were established: complications developed during operations were 7.96% and 6.79% respectively; those occurred in postoperative period were 14.2% and 2.85% respectively. This makes obvious clear superiority of laparoscopic appendectomy.

It is very distinctive for laparoscopic method that certain types of postoperative complications (postoperative hernia, Acute intestinal strangulated obstruction) practically do not occur at this operation.

Although there was no significant difference in duration of operations (45 min. for laparoscopic appendectomy and 40 min – for traditional), but smallness of postoperative hospitalization, 1/3 rate of used pain-killers and antibiotics, relatively short period of full medical-social rehabilitation (7 in comparison with 16 days) and the consequent total economical effect indicates the superiority of laparoscopic method. Most frequently, in case of necessity, it allows surgeons to make simultaneous operation by the same approach without additional laparotomy incision.

One of the factors showing its superiority is also its cosmetic effect.

Based on the comparative analysis, in our opinion, the results of nonrandomized retrospective investigation of 30 patients of the III group is interesting and important. Here we have evaluated and classified postoperative peritoneal adhesions that were developed after both operational methods. 15 patients were operated 2 to 7 years earlier using laparoscopic method and 15 patients – with open appendectomy 2 to 8 years earlier. During the research, they were rehospitalized and underwent laparoscopic operations due to other diseases. Therefore, we were

allowed to compare postoperative adhesions developed after performed earlier appendectomies with diagnosis of phlegmonous appendicitis. If we divide postoperative adhesions in separate groups due to their extension rate and involvement of adjacent organs, the classification will have the following form:

1. **local** – adhesion between vermiform appendix stump and peritoneum paries layer.

2. **regional:**

I level - adhesion between mesocecum and one of the peritoneal organs. It does not exceed the area of the right femoral fossa.

II level – adhesion between mesocecum and one or two (small pelvic) peritoneal organs together with peritoneum paries layer.

3. **Total:**

I level – includes the lower half of abdominal cavity.

II level – includes abdominal cavity completely.

The results according tu this classification are presented in Teble 4.

Table 4. Distribution of the patients according to adhesion level

Method of operation	local	regional		total	
		I level	II level	I level	II level
laparoskopic appendeqtomy	9	5	1	-	-
traditional appendeqtomy	-	2	12	1	-

The results of our investigation allows to evaluate and determine risk of development of mechanical obstruction in prospective postoperative period after using these two methods and see superiority of laparoscopic method in comparison with the traditional one.

Based on the research results, we can give an account of contraindications for diagnostic laparoscopy and laparoscopic appendectomy.

Contraindications for diagnostic laparoscopy are: 1. high risk of complications connected with tensed pneumoperotoneum; 2. high risk connected with laparoscopic approach; 3. poor informativity of diagnostic laparoscopy against the background of peritonitis and loops of bloated bowels; 4. diagnosed in advance with noninvasive methods inflammatory infiltrates and abscesses of solid sizes, when diagnostic laparoscopy is less effective.

Contraindications for laparoscopic appendectomy are: 1. coexistence of massive rough adhesions in ileocecal area and atypical location of the appendix ; 2. existence of a solid size paraappendicular retrocecal abscesses; 3. distinct destructive and perforative changes on the bases of vermiform appendix and mesocecum.

The majority of the accounted conditions should be considered as relative contraindications as it depends on the technical and tactical capacities of a surgeon.

Conclusions:

1. Diagnostic laparoscopy enables the exact determination of macromorphological features of the inflammatory changes of a vermiform appendix, to make differential diagnosis with other diseases of peritoneal organs with 98% of accuracy, to avoid unnecessary appendectomies and selection of optimal variant of the treatment tactics.

2. Insertion of the first trocar in abdominal cavity using laparolofting practically excludes iatrogenic injuries and considerably decreases the time of creation of pneuperitoneum.

3. The suggested methods of ligation of mesenteric and stump of a vermiform appendix allows to bring down to minimum frequency of incidence of complications during and after laparoscopic appendectomy.

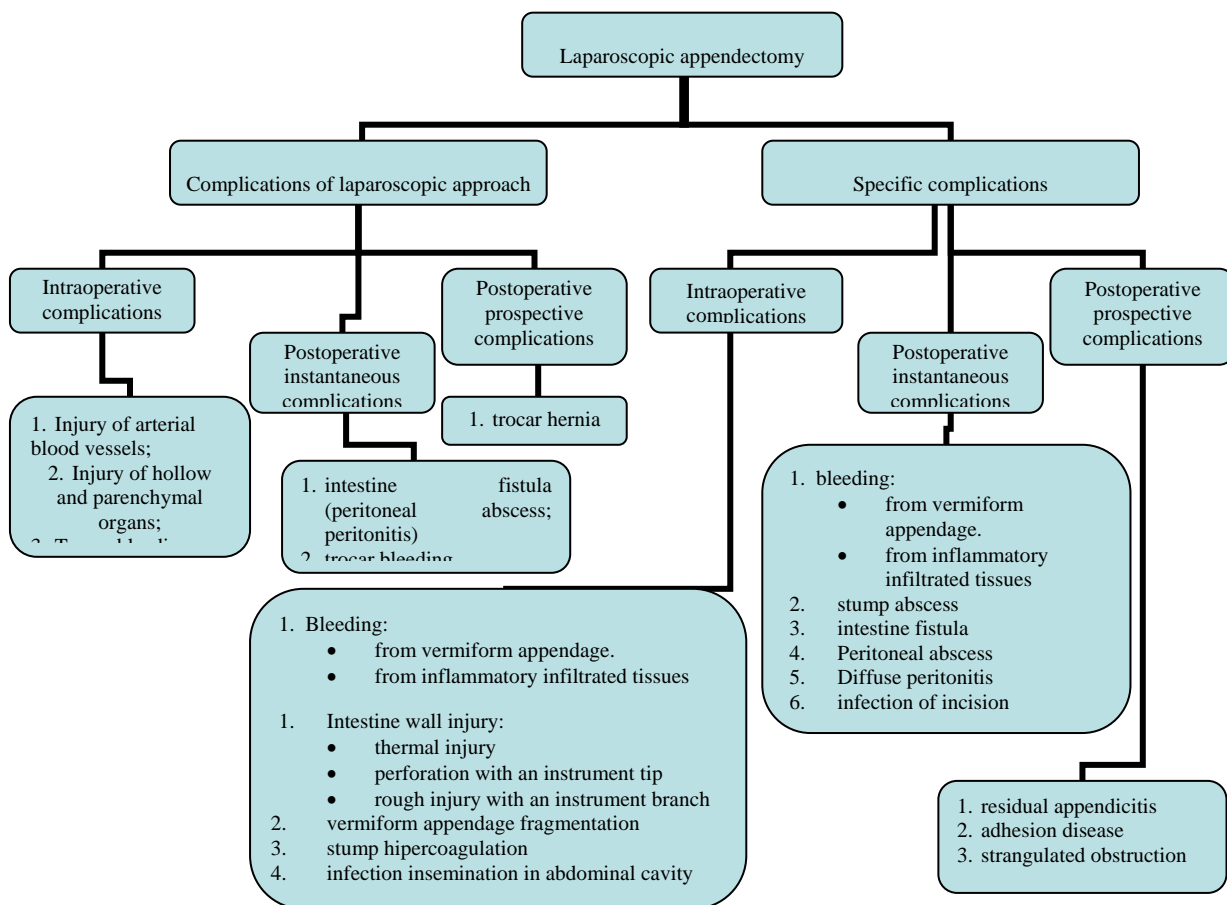
4. Uniform classification of caused by laparoscopic treatment complications allows to select optimal surgical tactics for each stage of the operation.

5. Laparoscopic method of treatment of acute appendicitis allows considerable decrease of number of postoperative complications, periods of the patients' hospitalization and medical-social rehabilitation that provides significant economic effect.

Practical Recommendations:

1. Using individual approach and considering subjective and objective data indications and contraindications of laparoscopic method must be determined and correspondent optimal tactics of treatment must be selected.
2. Operation extent and tactics must be determined considering suggested by us classification of complications typical to laparoscopic treatment.
3. In order to avoid iatrogenic complications, it is desirable to insert the first trocar using method of laparolifting.
4. In order to minimize probability of intra- and postoperative complications, ligation of vermiform appendix and the mesenteric must be done using suggested by us method always, when it is possible.
5. In order to avoid dissemination, e patient should not be repositioned until the full aspiration of existent exudates.
6. Stump shell be deeped between the mesenteric wall and paries layer of peritoneum, what practically excludes adhesion between the stump and ather organs of the abdominal cavity.

Scheme №1. Intra and postoperation complications of laparoscopic appendectomy.



LIST OF ARTICLES PUBLISHED CONCERNED DISERTATION

1. Laparoscopic diagnostic of acute appendicitis // “Sakartvelos Samedicino Moambe”, Tbilisi, 2005, № 1, pg. 47-51 // co-authors: G. Fifia, D. AbulaZe, M. KilaZe, J. Pkhaladze, T. CharTolani.

2. Laparoscopic appendectomy – Technical aspects // “Sakartvelos Samedicino Moambe”, Tbilisi, 2005, № 1, pg. 52-56 // co-authors: G. Fifia, D. AbulaZe, M. KilaZe, J. Pkhaladze, T. CharTolani
3. Comparative analysis of laparoscopic and tradicional methods of acute appendicitis treatment // “Bulleted of the Georgian academy of saience”, Tbilisi, 2005, №3, pg.569-571 // co-authors: G. Fifia, D. AbulaZe, M. KilaZe, T. CharTolani.
4. Laparoscopic Diagnostic and Treatment of Acute Appendicitis // “Experimental & Clinical Medicine”, Tbilisi, 2006, №3, pg. 48-51// co-authors: G. Fifia, T. CharTolani, D. AbulaZe.