



## Research Article

# Errors and complications in laparoscopic surgery

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### Abstract

**Background.** In laparoscopic surgery errors are unavoidable and require proper acknowledgment to reduce the risk of intraoperative and accurately assess the appropriate therapeutic approach. Fortunately, their frequency is low and cannot overshadow the benefits of laparoscopic surgery.

**Materials and Methods.** We made an epidemiological investigation in General Surgery Department of Emergency Clinical Hospital "St. John" Bucharest, analyzing 20 years of experience in laparoscopic surgery, during 1994-2014. We wanted to identify evolution trends in complications of laparoscopic surgery, analyzing the dynamic of errors occurred in all patients with laparoscopic procedures.

**Results.** We recorded 26847 laparoscopic interventions with a total of 427 intra-or postoperative complications that required 160 conversions and 267 reinterventions to resolve inconsistencies. The average frequency of occurrence of complications was 15.9‰ (15.9 of 1,000 cases). In the period under review it was a good momentum of laparoscopic procedures in our department. Number of minimally invasive interventions increased almost 10 times, from 266 cases operated laparoscopically in 1995 to 2638 cases in 2008. Annual growth of the number of laparoscopic procedures has surpassed the number of complications.

**Conclusions.** Laborious work of laparoscopic surgery and a specialized centre with well-trained team of surgeons provide premises for a good performance even in the assimilation of new and difficult procedures.

**Keywords:** minimally invasive procedures, conversion, morbid obesity, bariatric surgery, performance



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## Introduction

The complication itself is the consequence of either intraoperative incidents/ accidents (recognized or overlooked) or improper laparoscopic technique, all competing inevitably to the emergence of intraoperative inadvertences. Not infrequently we have experienced incidents related to the access into the peritoneal cavity. More than once have we been confronted with hemorrhagic incidents while attempting to gain access into the peritoneal cavity. These incidents appear at the beginning of the surgical procedure, are obvious, have an important psychological impact and can, in some situations, mark the progress of the entire operation. If at the beginning of our laparoscopic experience we used to consider that lesions of parietal vessels raise no particular therapeutic problems, we have presently reconsidered our attitude concerning parietal hemorrhagic incidents in certain patient categories (patients with hepatic cirrhosis, obese patients, hemodialysis patients, etc.) (1-3).

In order to avoid iatrogenic parietal or visceral lesions, we prefer to insert the first trocar in the "open", Hasson's manner. At the same time, lesions of intra- or retroperitoneal vessels (aorta, cava) impose precise recognition and prompt treatment because they pose a vital danger to the patient (4-7).

Medical equipment are complex systems in which human error, derived from one or more participants (medical staff, technical staff), could affect their correct operation. Existing statistics show that human error is the origin of 20-90% of cases of malfunction. This leads to the need to include human error in the assessment of the security of a system, for a realistic assessment of the risk to be made (8). The concept of human error can be defined as an action that exceeds a

certain limit of acceptability and is in most cases the result of the unpredictability of human behavior.

Note the classification of errors: errors caused by lack of proficiency, errors caused by breach of the rules, procedures, protocols and errors generated by knowledge level (9, 10).

### *Objectives*

Identify evolution trends in complications of laparoscopic surgery, analyzing the dynamic of errors occurred in all patients with laparoscopic procedures.

## Materials and Methods

The purpose of this work consists in evaluating the tendency of evolution of complications occurred in case of laparoscopic surgeries and the factors that favor their occurrence. As a consequence of the research theme, the desire of obtaining an effective management of postoperative morbidity and decreasing the death rate (now estimated at 1-2% in case of minimally invasive surgery) should be the fundamental concern of any laparoscopic surgery centre. The study aims to answer some relevant questions, such as:

- What are the complications occurring diseases treated laparoscopically?
- What are the risk factors responsible for the appearance of complications in laparoscopic surgery?
- When do the intraoperative incidents occur and how they appear?
- What were the mechanisms behind the occurrence of complications?
- What is the severity of complications in laparoscopic surgery?

To meet the objectives it was used a descriptive epidemiological investigation, followed by an analytical epidemiological investigation.

We conducted a retro- prospective analysis based on the laparoscopic experience of the General Surgery

Clinic in the Clinical Emergency Hospital “Sf. Ioan” in the last 20 years (1994-2014). The clinic has 3 laparoscopy lines fully equipped, with advanced surgical instruments, with various degrees of wear. We have 2 ” High Definition” laparoscopic kits, vascular sealing device (LigaSure) and ultrasonic dissection (Ultrascission).

There were used three statistical data sources:

- Existing statistics in the Clinical Emergency Hospital “Sf. Ioan” Bucharest.
- Patient observation charts.
- Operation protocols provided data on the nature of laparoscopic surgery, emergency or non-emergency (scheduled or elective surgery), the training level of the operating surgeon in laparoscopic surgery, time of the incident or complication, the mechanism of appearance, the way of solving by laparoscopic surgery (relaparoscopy) or conventional surgery.
- Limits of the study are determined by the retrospective selection of cases plus the heterogeneity of the surgical experience of the operating surgeon and the laparoscopic team – the surgeries were performed by a large number of surgeons (20 residents, specialists and primaries).

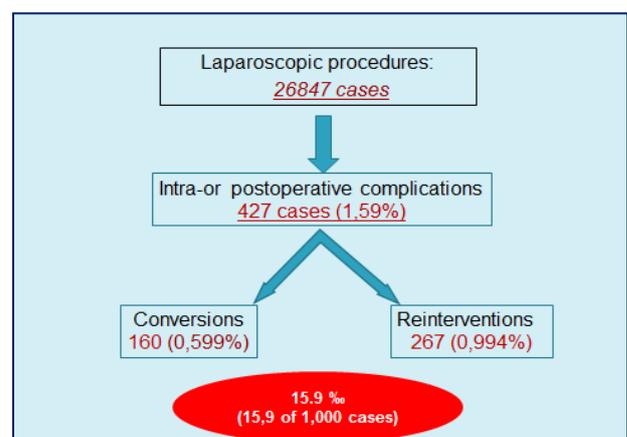
## Results

In this work, in order to identify the risk factors involved in the appearance of complications. We recorded 26847 laparoscopic interventions with a total of 427 intra-or postoperative complications that required 160 conversions and 267 reinterventions to resolve inconsistencies (Table 1).

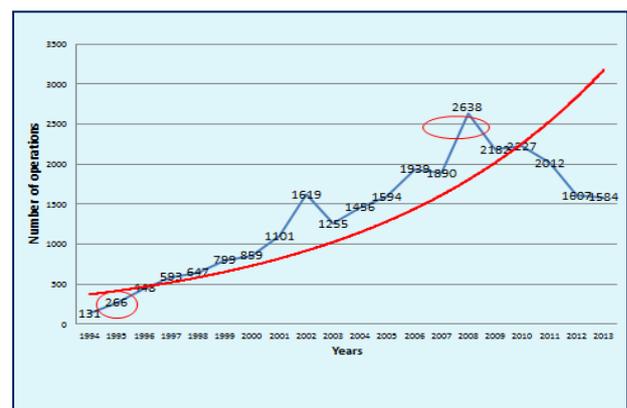
In laparoscopic surgery, the same as classic, errors are unavoidable and require proper acknowledgment to reduce the risk of intraoperative and accurately assess the appropriate therapeutic approach. The average frequency of occurrence of complications was 15.9 % (15.9 of 1,000 cases) (Figure 1).

Year of interventions	Total number of laparoscopic interventions	Conversions	Reinterventions
1994	131	2	0
1995	266	11	6
1996	448	16	8
1997	593	8	9
1998	647	13	3
1999	799	10	11
2000	859	3	7
2001	1101	3	6
2002	1619	5	10
2003	1255	3	13
2004	1456	6	11
2005	1594	8	10
2006	1939	3	18
2007	1890	8	11
2008	2638	3	36
2009	2182	10	28
2010	2227	10	27
2011	2012	5	20
2012	1607	18	8
2013	1584	15	5
TOTAL	26847	160	267

**Table 1.** Results of laparoscopic experience (1994-2014) Department of General Surgery, “Sf. Ioan” Clinical Emergency Hospital, Bucharest

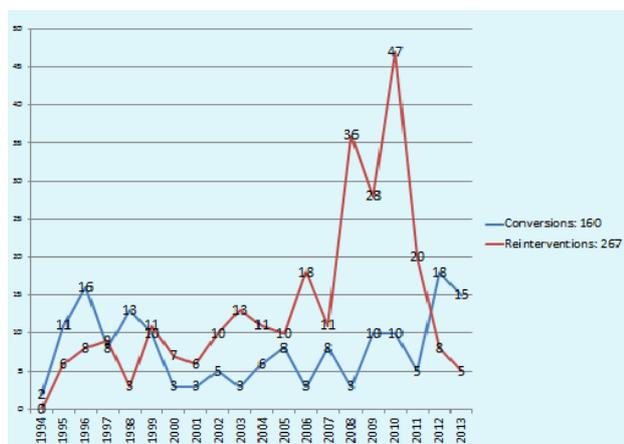


**Figure 1.** Average frequency of occurrence of complications, after Drăghici I. Meta-analysis of errors and complications from a laparoscopic training center. CD-ROM Litera AVN Chişinău 2014, ISBN 978-9975-74-618-2



**Figure 2.** 20 years of laparoscopic surgery Clinical Emergency Hospital “Sf. Ioan” Bucharest, Department of General Surgery; after Drăghici I. Meta-analysis of errors and complications from a laparoscopic training center

In the period under review it was a good momentum of laparoscopic procedures in our department. Number of minimally invasive interventions increased almost 10 times, from 266 cases operated laparoscopically in 1995 to 2638 cases in 2008 (Figure 2). Annual growth of the number of laparoscopic procedures has surpassed the number of complications. In 1994-2014 we required 160 conversions and 267 reinterventions to resolve the postoperative complications of laparoscopic procedures (Figure 3).



**Figure 3.** Evolution of conversions and reinterventions; after Drăghici I. Meta-analysis of errors and complications from a laparoscopic training center, CD-ROM Litera AVN Chişinău 2014, ISBN 978-9975-74-618-2

Based on literature and empirical observations made during laparoscopic practice, but also constrained by the small number of complicated cases that I have had I grouped the reasons for conversions and reinterventions into:

- Post-surgery peritonitis ("peritonitis" complications) - 150 cases (35,12%);
- Bleeding complications - 119 cases (27,86%);
- Perforation of hollow organs - 30 cases (7,02%);
- Obstruction of the digestive tract - 21 cases (4,91%);
- Pneumothorax - 7 cases (1,63%);
- Other causes - 100 cases (23,41%);

## Discussions

The case analysis allowed us to identify sources of bleeding frequently encountered in practice. They had their origin at both parietal (trocar holes) level and in various vascular structures of viscera (short gastric vessels, cystic artery, vascular colon pedicles, urogenital, splenic pedicle etc.), parenchymatous organs (liver, spleen, kidneys, adrenal glands, lymph nodes, etc.) or mesenteries (the great omentum, mesentery, round ligaments, gastrosplenic, mezosalpinx etc.). We want to draw attention though to some bleeding sources less frequent in practice, but not unimportant. For example, we have experienced bleeding from the points of attachment of various prosthetics or from the mechanical suture of gastric segments in bariatric operations (11, 12).

Rarely was post laparoscopy peritonitis a consequence of intracavitary visceral perforation (7,02%), events that could be related particularly to the access to the peritoneum. Most often this type of complication was the result of laparoscopic gestures performed beyond the first time. Recognition and immediate resolution of any perforation incident is a prerequisite for a favourable post-surgery evolution of patients. The analysis of septic complications included both abscesses/parietal suppurations and intraperitoneal septic processes (peritonitis, abscess) (13-15).

A number of 128 "other complications" have been reported others than those septic or bleeding ones (0,47% of 26847 of laparoscopy surgeries). Out of the "other complications" encountered in our practical work, we mention some intraoperative incidents and post-surgery complications: major bile duct avulsion, perforation of the oesophagus, small intestine and colon, stump appendix amputation with wire ligature

excessively tight, evertion of the trocar, a drainage tube left in the peritoneal cavity, inefficient bariatric devices, mechanical complications caused by bariatric devices (gastric dilatation with gastric banding, band intragastric migration, connection tube migration, ring slip, etc.), metabolic complications of bariatric surgery, technical problems (light source, camera, cautery), difficulties in handling modern tools (stapler, morsel, etc.) (16-19).

Reinterventions rate in our study (267 reinterventions in 26847 laparoscopic surgeries = 0,99%) is in line with data in the literature. Schick et al. (20) believes that the reduced rate of reinterventions in laparoscopic appendectomy (4.2%) could recommend the method as a technique of training of young specialists. By analogy, we can say that the celioscopic method as a whole is recommended to the new generations of surgeons (21, 22).

We have also considered reintervention according to how they are performed, but not relating them to the total complications, considering that the solving methods largely reflect the maturity of the laparoscopic teams. From the analysis of the distribution of cases with (classical, laparoscopic, endoscopic) reinterventions, we found that: the decision of reintervention must be timely in order not to endanger the patient's life; the celioscopic method was preferred to open surgery, in order to perform certain reinterventions (23).

## Conclusions

Laborious work of laparoscopic surgery and a specialized center with well-trained team of surgeons provide premises for a good performance even in the assimilation of new and difficult procedures. For a complete analysis of the dynamics of errors in laparoscopic surgery requires a long experience of about 10-20 years.

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