

Twenty years of minimally invasive surgery in the Czech Republic

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Abstract

Aim: To outline the history and evaluate the development and current situation of miniinvasive surgery in the Czech Republic (CR).

Material and methods: The authors discuss their experience with the introduction of miniinvasive surgery in CR. Questionnaires used repeatedly in surgical departments in CR provide the data for the evaluation of the development and current status of endoscopic surgery.

Results: In the Czech Republic laparoscopic surgery was first performed in 1991, and by 1997 laparoscopic interventions were performed at all surgical departments. The proportion of the laparoscopic approach within overall abdominal surgery increased between 1997 and 2002 from 22% to 37%. The most frequent laparoscopic (L) treatment applied today is cholecystectomy (CH), which is a method used at all departments. Nowadays, the proportion of LCH within all cholecystectomies performed is between 71% and 76%. CH is followed by appendectomy (A), which is carried out in 94-97% of surgical departments; the proportion of LA is between 38% and 41%. Laparoscopic herniotomy (H) is performed at 85-87% of surgical departments, and its proportion within all herniotomies reached 19%. In 1997-1999 resection of the colon was performed at 9% of surgical departments, in 2004 at 26%, and in 2006 at as many as 58% of surgical departments. Between 2004 and 2006 the proportion of laparoscopic management of resection of colorectal carcinoma increased from 7% to 15%. A smaller number of departments perform highly specialized endoscopic surgery. In 2006 we recorded 365 gastric bandings for the treatment of obesity, 90 resections of the stomach, 139 resections of the liver, 60 splenectomies, and 70 adrenalectomies. Video-assisted thoracoscopic interventions also became routine: in 2006 we recorded 953, in 2007 there were 1214 this procedures performed, and in 2008 the number increased to 1163.

Conclusions: The proportion of endoscopic surgery within all forms of surgical management has increased over the last twenty years, and the range of types of surgical therapies has enlarged.

Key words: miniinvasive surgery, laparoscopy, history of miniinvasive surgery.

Introduction

Surgery has always been characterized by invasive methods of therapy, and operations became the typical method of treatment. However, the last decades have seen substantial changes. Methods

and work in surgery have changed profoundly, and this change is characterized by a gradual decrease of invasive approaches and increasing use of modern technologies. The changes are the result of the development and use of flexible endoscopy, sonography, interventional radiology, and – above all – endoscopic

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surgery. The introduction of video-assisted laparoscopy in 1991 represents a true revolutionary outcome.

History

The first to use the laparoscopic approach were gynaecologists, years before surgeons. K. Semm, a German gynaecologist, performed the first laparoscopic appendectomy in 1981. However, only after the first laparoscopic cholecystectomy was performed in Lyon by P. Mouret in 1987 did the technique start the new era in surgery. At the beginning there were doubts and a number of surgeons refused the method. However, since the 1990s, laparoscopic surgery has started to spread worldwide. In the Czech Republic the first miniinvasive operations were carried out in 1991, and the method quickly spread in all surgical departments in the country. New associations of surgeons aimed at the development of minimally invasive and endoscopic surgery, and the development and coordination of research in the field, were established. In 1990 Paris became the place where the European Association for Endoscopic Surgery (EAES) was founded. At the symposium on laparoscopic surgery held in Třinec in September 22-23, 1994, the Section of Endoscopic and Miniinvasive Surgery was set up as a part of the Czech Association of Surgeons. The first board of the section was appointed: prim. MUDr. Stanislav Czudek – Třinec, prim. MUDr. Jan Dostalík – Ostrava, prim. MUDr. Václav Drahoňovský – Prague, prof. MUDr. Miloslav Duda, DrSc. – Olomouc, MUDr. Jiří Ochman – Brno, MUDr. Jan Pařha – České Budějovice, doc. MUDr. Miroslav Ryska, CSc. – Prague, doc. MUDr. Jiří Vomela, CSc. – Brno, and prim. MUDr. Michael Vraný (President of the Board) – Jablonec nad Nisou. Over the past twenty years the Section has been headed also by doc. MUDr. Stanislav Czudek, CSc, doc. MUDr. Jan Dostalík, CSc, and today by MUDr. Lubomir Martinek, PhD. Apart from the founding members, there are other significant surgeons working in the Section: MUDr. Lubomír Martínek, Ph.D. – Ostrava, doc. MUDr. Čestmír Neoral, CSc. – Olomouc, and prim. MUDr. Jan Smetka – Kyjov. The 1994 symposium in Třinec started the close professional and friendly cooperation of Czech, Polish and Slovak miniinvasive surgeons. The cooperation resulted in annual international meetings of surgeons [1, 2].

The authors of the article started with video-assisted laparoscopic interventions in 1991 in Třinec

(Czudek) and in 1992 in Olomouc (Duda, Gryga). The authors played an active part in the introduction of a wide spectrum of these interventions [3-6]. They also initiated the first Czech monograph on miniinvasive surgery [7] and published an audio-visual version [8].

Material and methods

With the help of the Section of Miniinvasive Surgery the development of the new trends in surgery in the Czech Republic has been followed in the last twenty years. By the beginning of the millennium, research and repeated inquiry were being done in all surgical departments. The required data were obtained via questionnaires in 1994, 1997, and 2002. In 1997 we got a reply from 58% of surgical wards addressed, and in 2002 we got data from 50% of surgical wards. The latest survey was carried out by J. Dostalík and L. Martínek in 2004 and 2006, respectively (67% and 73% of surgical departments addressed provided the data). Thus we were able to evaluate the development and current situation in the use of miniinvasive techniques in surgery. We have reported about that in Czech and Slovak journals [9-12].

Results

In the Czech Republic the first laparoscopic cholecystectomy was performed in České Budějovice in 1991. By 1997 the method had been introduced in virtually all surgical departments throughout the country (Figure 1). Our surgeons proved their ability to adapt to new methods. At the same time other types of endoscopic surgeries were introduced (Table I). Apart from laparoscopic cholecystectomy the range of other types of miniinvasive surgery increased.

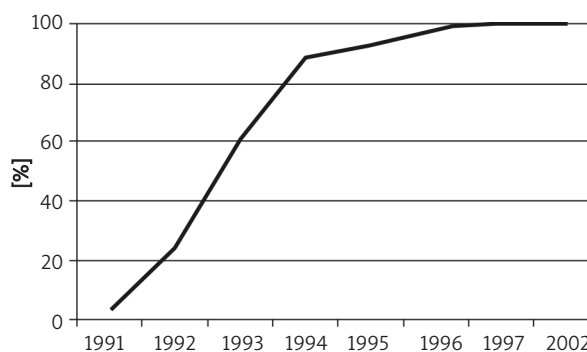


Figure 1. Laparoscopy at surgical departments in the Czech Republic

Table I. Types of endoscopic procedure performed at surgical departments in CR

Endoscopic surgeries	1997 (114 dpts.)	2002 (81 dpts.)
Laparoscopy [%]	100	100
Arthroscopy [%]	43	58
Thoracoscopy [%]	21	33
Transanal microsurgery [%]	16	9
Mediastinoscopy [%]	8	19
Retroperitoneoscopy [%]	7	8
Varices LE (ES) [%]	5	17
Other [%]	4	question not included

LE – lower extremities, ES – endoscopic surgeries

These surgeries bring about a benefit for patients (Table II). In some cases, such as cholecystectomy, fundoplication for oesophageal reflux and other surgical treatments in the area of oesophageal hiatus, laparoscopy became the method of first choice. In other cases, such as inguinal hernia or appendectomy, laparoscopy became an alternative to open surgery. The choice of the method applied depends on the preferences of the attending surgeon and the patient. Laparoscopic management still remains subject to expert discussion, especially in the case of surgery for malignant diseases. Recent conclusions of experts suggest that the laparoscopic approach in the treatment of malignant tumours of the colon is

Table II. Types of laparoscopic procedure performed at surgical departments in CR

Laparoscopic surgeries	1997 (114 dpts.)	2002 (81 dpts.)
Cholecystectomy [%]	97	100
Appendectomy [%]	81	96
Inguinal hernia [%]	67	92
AAD [%]	55	74
Varicocele [%]	35	46
Peptic ulcer perforation [%]	36	56
Vagotomy [%]	15	17
Stomy [%]	15	37
Fundoplication [%]	13	44
Achalasia [%]	9	13
Colon resection [%]	9	24
Stomach resection [%]	question not included	6

AAD – acute abdominal diseases

an equal alternative to open surgery. In the Czech Republic, between 1997 and 2002 the proportion of laparoscopic surgeries of the abdominal area increased from 22% to 37%. Despite the economic problems of our health care system the equipment of all surgical departments has been improving steadily (Figures 2, 3, Table III).

The latest survey by J. Dostálík and L. Martínek [10, 12] was carried out in 2004 and 2006. In 2004,

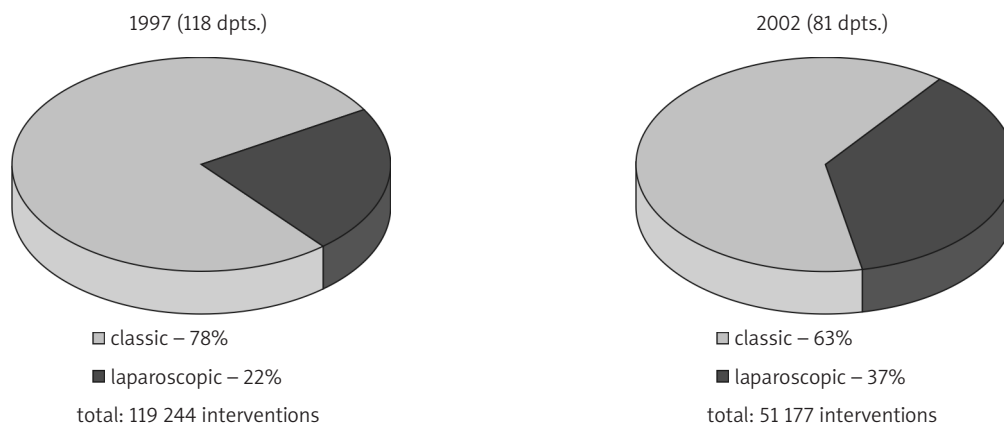


Figure 2. Proportion of laparoscopic surgeries in all abdominal interventions

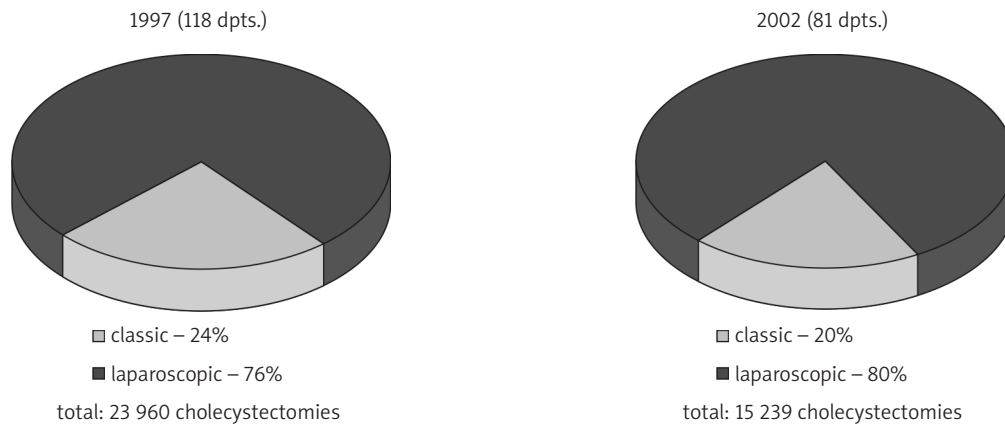


Figure 3. Proportion of laparoscopic cholecystectomies in all cholecystectomies performed

109 surgical departments that provided the data (67% of those addressed) reported the following numbers of laparoscopic operations: 17 159 × cholecystectomy, 6259 × appendectomy, 5847 × hernioplasty, 1124 × adhesiolysis, 897 × fundoplication, 527 × colorectal resection, 193 × perforated gastroduodenal ulcer, 191 × liver resection, and 165 × gastric banding. Cholecystectomy is performed at all surgical departments, appendectomy at 94%, hernioplasty at 85%, and colorectal surgery at 28% of surgical departments addressed. The proportion of laparoscopic interventions within all operations is as follows: cholecystectomy – 76%, appendectomy – 38%, hernioplasty – 19%, colorectal resection – 7%. In 2006, 73% of surgical departments addressed provided the following data (there is no substantial difference between the years 2004 and 2006). Cholecystectomy is performed at 99% of surgical departments, appendectomy at 97%, hernioplasty at 87%. The proportion of laparoscopic interventions within all operations is as follows: cholecystectomy – 71%, appendectomy – 41%, hernioplasty – 19%. A significant increase is seen only in the number and proportion of colorectal resections. The number of surgical departments performing laparoscopic colorectal resection increased from 26% (in 2004) to 58% (in 2006), and the proportion of laparoscopic resection increased from 7% to 15%. A small number of surgical departments provide highly specialized endoscopic treatment. In 2006 we recorded 365 gastric bandings, 90 stomach resections, 139 liver resections, 60 splenectomies, and 70 adrenalectomies. Even thoracoscopic interventions became common in our hospitals. In 2006 we recorded 953 video-assisted

Table III. Equipment at surgical departments

	1997 (114 dpts.)	2002 (78 dpts.)
Endoscopic tower, n (%)		
none	3 (2.4)	1 (1.3)
one	71 (62.5)	33 (42.3)
two	38 (33.3)	34 (43.6)
three	2 (1.8)	8 (10.3)
more	–	2 (2.6)
X-ray C-arm, n (%)	114 (100)	72 (93.5)
Choledochoscope, n (%)	20 (16)	18 (23.1)
Laser, n (%)	6 (5)	3 (3.9)
Ultrasound scalpel, n (%)	1 (0.9)	31 (39.7)
Laparoscopic sonography, n (%)	2 (1.8)	2 (2.6)
Operative rectoscope, n (%)	question not included	5 (6.4)

thoracoscopic surgeries (VATS), 87 sympathectomies, 195 mediastinoscopies, and 10 lung lobectomies with VATS. Thoracic interventions are also registered by the Section of Thoracic Surgery, which is a part of the Czech Association of Surgeons. According to the data [11], in 2007, thoracic surgery was performed in 19 departments in the Czech Republic. Overall, 1214 video-assisted procedures were performed. However, there were only 10 lobectomies and 233 mediastinoscopies. In 2008 the Section registered thoracic interventions at 21 surgical departments. Overall, 1163 VATS and 253 mediastinoscopies were performed. The VATS approach was used in the following

cases: 290 wedge resections, 22 lobectomies, 205 decortications and pleurectomies, 257 diagnostic VATS, and 371 × management of pneumothorax.

We can assume that the number of miniinvasive interventions has not changed over the recent years. The miniinvasive approach has become routine in everyday treatment. Over the last two decades miniinvasive techniques substantially changed the field of surgery.

Discussion and conclusions

Over the last decades surgery was influenced by a wide range of miniinvasive techniques. The trend was very demanding in terms of new ways of thinking and learning new techniques, especially for older and middle-aged surgeons. After the first laparoscopic cholecystectomy in the Czech Republic [14, 15] our surgeons adopted techniques of endoscopic surgery very fast. Soon, more complex laparoscopic interventions were performed [3, 16, 17], including colon resections [18]. Between 1997 and 2002 the number of departments performing laparoscopic cholecystectomy as well as laparoscopic appendectomy and inguinal hernia surgery increased to 90%, and the trend continued during the 2004-2006 period; e.g. in 2002 laparoscopic fundoplication was carried out in 44% and colorectal carcinoma resection in 24% of our surgical departments (Table II). The number of departments performing colorectal resection increased to 28% by 2004, and to 55% by 2006 (data from the departments addressed) [12].

In the late 1990s laparoscopic cholecystectomy and laparoscopic treatment in the area of oesophageal hiatus became the method of first choice in the Czech Republic. Comparisons of sets of open and laparoscopic cholecystectomy reveal no difference with regard to biliary duct injury (Table IV). ERCP pre-

vails both in diagnostics and treatment of biliary duct obstructions. Laparoscopic treatment is used only occasionally (Tables V and VI).

In other interventions, e.g. appendectomy, inguinal hernia, and minor abdominal emergencies, laparoscopy has become an equal alternative to open surgery. The method chosen depends on the decision of both the surgeon and the patient. The increasing proportion of the laparoscopic approach within all abdominal interventions is evidence of the increasing popularity of the approach – between 1997 and 2002 the proportion increased from 22% to 37%. Endoscopy is also widely used in thoracic surgery, the only exception being large lung resections [13, 19, 20].

The use of the laparoscopic approach in large abdominal surgery, especially in cases of malignant diseases, is still subject to discussion. In 2004 the fundamental standpoints on laparoscopic resection of colorectal carcinoma were published [21]. They support the laparoscopic approach: laparoscopic resection of colorectal carcinoma is a safe and relatively easy technique that shows good results during the immediate post-operative treatment. The results of long-term survival of patients obtained by means of extensive multicentric studies and research justify the position of laparoscopic resections in general surgery. This is reflected in the increasing number of laparoscopic colorectal resections in the Czech Republic.

The content and working methods of surgery have changed considerably over the recent decades. Endoscopic surgery has replaced some open interventions, and the trend will undoubtedly continue. The new quality is brought about by robotic surgery and the NOTES (natural orifice transluminal endoscopic surgery) approach, i.e. access and performance of individual operations via natural body orifices

Table IV. Bile duct injury due to cholecystectomy

Injury	1997 (118 dpts.)		2002 (81 dpts.)	
	open	laparoscopic	open	laparoscopic
Partial, n (%)	22 (0.4)	26 (0.14)	9 (0.28)	19 (0.16)
Complete, n (%)	3 (0.05)	19 (0.1)	2 (0.06)	20 (0.16)
Total, n (%)	25 (0.45)	45 (0.24)	11 (0.35)	39 (0.32)
Total CHCE	5 624	18 066	3 120	12 207

CHCE – cholecystectomy

Table V. Preoperative examination of bile duct

	1997 (118 dpts.)	2002 (74 dpts.)
Cholangiography, n (%)		
rare	55 (48)	39 (53)
exceptional	48 (42)	26 (35)
regular	11 (10)	9 (12)
Choledochoscopy, n (%)		
yes	6 (5)	5 (7)
no	108 (95)	69 (93)
Sonography (data from 76 dpts.), n (%)		
yes	question not included	5 (9)
no	question not included	71 (91)

Table VI. Resolution of bile duct obstruction

	1997 (114 dpts.)	2002 (78 dpts.)
ERCP only, n (%)	90 (80)	14 (18.2)
Laparoscopic only, n (%)	0 (0)	0 (0)
Laparoscopy + ERCP at one session, n (%)	14 (16)	1 (1.3)
Open surgery only, n (%)	5 (4)	1 (1.3)
Open or ERCP, n (%)	–	51 (66.2)
Open, ERCP or laparoscopic, n (%)	–	10 (12.3)

ERCP – endoscopic retrograde cholangiopancreatography

using the endoscopic technique. One of the most important tasks thus becomes the future qualification of surgeons and their adaptation to the new methods that are replacing open surgery.

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