

Department of Surgery of the Medical Care Centre in Jarosław
Department of Surgical Oncology, Skubiszewski Medical University of Lublin

ARTUR MROZOWICZ, WOJCIECH POLKOWSKI

*Initial three years' experience with laparoscopic cholecystectomy
in a district hospital:
evaluation of early results and operative measures*

Cholelithiasis is one of the most frequent reasons for surgical intervention in both large surgery centres and district surgical wards. The annual number of patients operated on for cholelithiasis in Poland exceeds 50 thousand. Laparoscopic cholecystectomy has become an alternative to classical cholecystectomy used since the end of the 19th century (Langenbuch 1881) and is currently considered the gold standard. M o u r e t in Lyon (9) first applied this technique in 1987. The first laparoscopic procedures in Poland were carried out in 1991 (8). Widespread use of this technique has been impeded by high equipment prices as well as the fact that surgeons need to be properly trained to be able to apply this new surgical technique. Our team of two surgeons and two scrub nurses underwent such training under the supervision of Professor A. Cieñciała at the surgical ward of the Fifth Military Clinical Hospital in Cracow.

The use of video-assistance brought certain characteristics and limitations, which were previously not encountered, in open surgical procedures: the lack of three-dimensional depth, limited direct access and restricted evaluation of the operational field, lack of palpation and the necessity to use other instruments. All these new elements, together with more and more widespread use of laparoscopic cholecystectomy, have contributed to the increased incidence of complications, including serious ones such as bile duct injury (3). The incidence of complications in relation to the experience gained by the surgeon is reflected by the learning curve. An increase in the number of complications is observed during the first procedures and after the surgeon has gained some experience and skill (2). The incidence of complications tends to be underestimated when a new surgical method of treatment is introduced. This is also the case with laparoscopic cholecystectomy and results from either a lack of or the existence of only few reports documenting early results of the surgical treatment with the new method. As surgeons are responsible for the assessment of treatment results, the aim of this study is to analyse a series of 313 laparoscopic cholecystectomies carried out in the treatment of symptomatic cholelithiasis at a surgical ward in the district hospital in the first three years of using this method.

MATERIAL AND METHODS

This study is a retrospective evaluation of the results of treatment by laparoscopic cholecystectomy of patients with cholelithiasis. A total of 646 cholecystectomies were performed between 5 November, 1999 and 5 November, 2002 at the Department of Surgery of the Medical Care Centre (MCC) in Jarosław, Poland. Three hundred thirteen (313/646; 48.5%) were laparoscopic cholecystectomies. Two

hundred and forty-nine patients (79.5%) were female and 64 (20.5%) were male, with cholecystitis of varying stage of progression. The age of the patients ranged between 16 and 86 years (mean \pm SD: 54.4 \pm 15.2) among the female and between 30 and 82 years (mean \pm SD: 58.5 \pm 13.3) among the male patients. Initially laparoscopic cholecystectomy was performed only on patients with uncomplicated cholelithiasis, but as the team gained experience, the indications for this technique were extended to include all the cases of cholelithiasis except for those with accompanying cholestatic jaundice and peritonitis. Patients were qualified for the procedure based on clinical examination performed by the surgeon and the anaesthetist, ultrasound evaluation of the gallbladder and the bile ducts and the rest of abdominal organs, chest x-ray and basic laboratory tests. In patients with co-morbid conditions all the necessary additional diagnostic tests were performed. The patients signed written consent for surgical treatment after they had been informed of the type of procedure, the possible complications and the possibility of conversion. In all the patients, anti-thrombotic prophylaxis and antibiotic preventive therapy were administered. Following intubation, a gastric tube was inserted. A team of two surgeons and one scrub nurse operated the patients on. Two 11-mm and two 5-mm ports were inserted in typical locations (trocar insertion sites were anaesthetised with Lidocaine 1%) following the creation of pneumoperitoneum (12 mmHg) with the Veress needle. Depending on the need, the gallbladder was prepared with a dissector, scissors or an electrocoagulation hook. The cystic duct and the blood vessels were usually secured with single titanium clips below and above the section site. Where the use of endoretractor or an endoloop was necessary, sterile condoms and previously prepared loops tied with the Roeder knot were used for economic reasons. As part of a routine procedure, a polyethylene No. 16 drain was introduced through the nearest 5 mm port and placed in the site of the gallbladder. If no discharge in alarming volumes was observed or if no discharge suspected of containing bile was observed, the drain was removed after 24 hours. In the first 24 hours post-op, the patients received fluids orally and a light hepatic diet.

A chi-square test at the significance level of $p < 0.05$ was employed to compare the percentage of operations extending beyond 60 minutes with respect to the level of progression of cholecystitis (Table 1).

RESULTS

Of the 313 procedures analysed, the first author performed 40.3% operations. Head of the department carried out the remaining 59.7% of operations. The operation time ranged between 18 and 177 minutes with the average duration being 48 minutes. Figure 1 shows a graphical representation of the operation time variability. Of the 298 operations without conversion, the duration of 47 (15.8%) exceeded 60 minutes (Table 1). Operations lasting over 60 minutes were significantly more frequent in the group of the first 50 operations than the remaining 248 operations ($p < 0.001$, chi-square test; Table 1). In the group comprising the first 50 operations, the duration of 18 (36%) of them exceeded 60 minutes (a maximum of 177 minutes). This was mainly due to the team's inexperience and only partially due to the technical difficulties related to the intensity of inflammation of the gallbladder in 7 cases (39%). The incidence of uncomplicated cholelithiasis was significantly higher in the group of the first 50 operations than in the group comprising the remaining 248 ($p < 0.001$, chi-square test; Table 1). In the group of the remaining 248 operations, 29 (11.7%) lasted longer than 60 minutes (a maximum of 124 minutes), which was a result of the extended indications for laparoscopic cholecystectomy and a purposeful qualification of patients with more advanced cases of cholecystitis. The majority of this group was formed by patients with gallbladder hydrops or empyema (24/29, 83%). Gallbladder hydrops and empyema were significantly more frequent reasons for operations exceeding beyond 60 minutes in the remaining 248 operations than in the group comprising the first 50 operations ($p = 0.022$, $p = 0.015$, chi-square test, Table 1). Of the 251 operations whose duration did

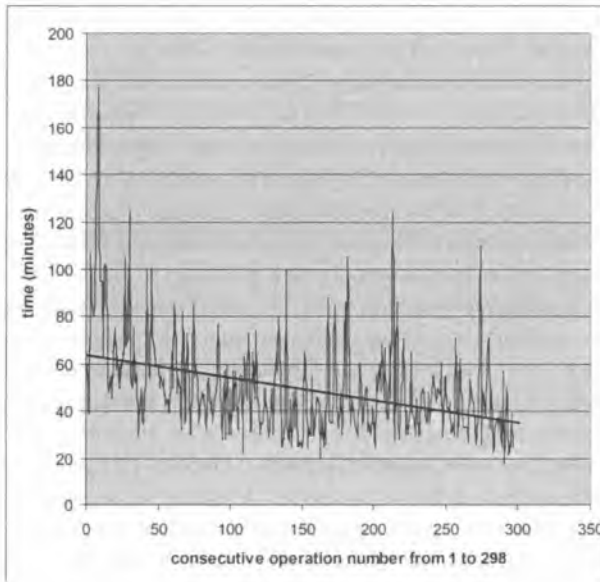


Fig. 1. Duration of the operations (trend line depicted). Operations completed with conversion have been eliminated (n = 15)

Table 1. Time of operations extending beyond 60 minutes in relation to various stages of cholecystitis in the course of cholelithiasis

	Number of operations lasting > 60 min, n = 47		Significance of differences (chi-square test)
	within the first 50 operations n = 18	within the remaining 248 operations n = 29	p < 0.001
Uncomplicated cholelithiasis	11 (61.1%)	2 (6.9 %)	p < 0.001
Acute cholecystitis	5 (27.8%)	3 (10.3 %)	p = 0.252
Hydrops of the gallbladder	2 (11.1%)	14 (48.3 %)	p = 0.022
Empyema of the gallbladder	0 (0%)	10 (34.5 %)	p = 0.015

not exceed 60 minutes, 129 (43.2%) were performed on patients with uncomplicated cholelithiasis, 96 (34.9%) on patients suffering from cholelithiasis and cholecystitis, 17 (5.7%) on patients with hydrops and 9 (3.0%) on patients with empyema. Conversion turned out to be necessary in 15 patients (4.8%) Table 2. The main reason for the conversion were the progression of inflammatory changes of the gallbladder accompanied by infiltration of the area surrounding the triangle of Calot (n = 6) which made a safe preparation of the anatomical structures in this location impossible, and adhesions from previous operations. In one patient, the drain was sucked into the peritoneum, which was probably caused by failure to suture the drain onto the skin. The drain located between the ascending colon and the abdominal wall was removed during relaparoscopy. Table 2 shows intraoperative complications and postoperative in-hospital and post-discharge complications. The most serious complication was damage to the extrahepatic portion of the bile tract (Bismuth III), which occurred in the first month of

Table 2. Causes of conversion and complications in the first 313 patients treated by laparoscopic cholecystectomy

	Number of patients	Percentage of patients
Conversion	15	4.8
Infiltration of the triangle of Calot	6	
Adhesions	5	
Thickened gallbladder wall	3	
Cirrhotic gallbladder	1	
Early complications	7	2.2
Common bile duct injury	1	
Intraperitoneal haemorrhage	3	
Intestinal damage	1	
Injury of the diaphragm	1	
Bile leak	1	
Late complications	3	0.9
Implantation of cancer in the integument	1	
Cholangitis	1	
Wound infection	1	
Deaths	2	0.6
Method-related	0	
Method-unrelated	2	

employing the laparoscopic technique (ninth operation lasting 130 minutes). Postoperative intraperitoneal haemorrhage in two cases was treated conservatively. The patients required transfusion of 2 and 3 units of blood, respectively. During laparotomy on the third patient, the bleeding was controlled by placing Spongostan and sutures on the gallbladder site. One patient with a history of operated abdominal hernia experienced jejunal damage following the insertion of the umbilical trocar. The minor damage manifested as an intestinal fistula, which was managed surgically. Injured right phrenic dome was a result of an accidental contact with the electrocoagulation electrode and was endolooped. Bile leak from the drain observed in one patient resolved spontaneously without resulting in the formation of intraperitoneal fluid collection. The drain was removed 24 hours after the bile leak had subsided. Late complications related to the laparoscopic technique were port site metastases in the epigastrium and the right hypochondrium. Histopathological examination of the gallbladder revealed chronic inflammation only, while the examination of the intracutaneous lesions revealed metastatic adenocarcinoma. The patient refused to undergo further diagnosis and treatment after discharge and died 5 months after the diagnosis of metastatic disease had been made. Jaundice developed in one patient on day 4 post-discharge. The clinical symptoms were suggestive of cholangitis and withdrew following conservative treatment. In one case the umbilical trocar wound infection required ambulatory treatment. The technique-specific symptom was shoulder pain due to insufflation of CO₂, which occurred in approximately 3% of the patients. The mean duration of postoperative hospitalisation was 5.8 ± 2.1 days (median = 5 days). The total duration of hospitalisation on the ward (including the preoperative

hospitalisation) ranged from 3 to 67 days (with the mean of 9.6 ± 4.4 days). The duration of in-hospital stay of patients with uncomplicated cholelithiasis was 8.1 ± 4.6 days, and for complicated cases, including those with conversion, was 10.4 ± 4.5 days.

DISCUSSION

Laparoscopic cholecystectomy has been considered the gold standard in the treatment of symptomatic cholelithiasis. The staff of the CMC surgical ward in Jaroslaw started using this technique in November 1999. Until November 2002, laparoscopic cholecystectomy was performed on 313 patients, which represented approximately 50% of all the patients operated on for cholelithiasis. The main reasons for such percentage of laparoscopic cholecystectomies were limitations of the equipment and the lacking skills and experience in the use of laparoscopic technique of the remaining surgeons working in the team. The duration of the procedure was initially the result of inexperience and the imprecise preoperative ultrasound assessment of certain patients. With the surgeons' growing experience, the duration of the procedure stabilised on a level dependent on technical difficulties (6). The number of conversions (4.8%) was comparable with that quoted by other Polish and foreign centres (4, 14). The most common causes were similar to those reported in literature, namely inflammatory infiltrate of the liver hilum, which rendered the identification and therefore the safe preparation of adjacent anatomical structures impossible, adhesions from past operations, substantially thickened gallbladder walls, cirrhotic gallbladder. The incidence and nature of both early and late complications occurring in the study patients did not differ from cases described in Polish and foreign reports (1, 11, 12). The incidence of injured major bile tract, which is the most serious complication of laparoscopic cholecystectomy, raises much controversy. In comparison to open cholecystectomy, an increased incidence of bile tract injury has been noted with the introduction of laparoscopic technique (5, 7). The incidence of this complication is lower in Poland than abroad, this information however, is only based on the data available from reference centres (13). The duration of hospitalisation was significantly different from that reported by foreign centres, which is due to complications prolonging the in-hospital stay, comorbidity, patients' mentality and the situation resulting from contracts with the Regional Sick Fund (15). The low mortality associated with the laparoscopic technique is one of the numerous advantages of this method (10).

REFERENCES

1. Barkun A. et al.: Postcholecystectomy biliary leaks in the laparoscopic era: risk factors, presentation and management. *Gastrointestinal Endosc.*, 3, 277, 1997.
2. Calvete J. et al.: Bile duct injury during laparoscopic cholecystectomy. Myth or reality of learning curve? *Surg. Endosc.*, 7, 608, 2000.
3. Fletcher D. R. et al.: Complications of cholecystectomy: risk of the laparoscopic approach and protective effects of operative cholangiography. *Arch. Surg.*, 4, 449, 1999.
4. Kiviluoto T. et al.: Randomised trial of laparoscopic versus open treatment of patients with acute cholecystitis. *Hepatogastroenterology*, 46, 753, 1999.
5. Kozicki I. et al.: Leczenie śródwnęzkowych urazów dróg żółciowych po cholecystektomii laparoskopowej. *Pol. Przegl. Chir.*, 11, 1049, 2000.
6. Krawczyk M. et al.: Laparoscopic cholecystectomy – initial experience. *Br. J. Surg.*, Supl. 1, 16, 79, 1992.
7. Krawczyk M. et al.: Powikłania po cholecystektomii laparoskopowej. *Acta Endosc. Pol.*, 2, 97, 1992.

8. Krawczyk M. et al.: Cholecystektomia laparoskopowa. *Pol. Przegl. Chir.*, 2, 158, 1992.
9. Mouret Ph.: La chirurgie coelioscopique. Evolution ou revolution? *Chirurgie*, 116, 829, 1990.
10. Muller B. P. et al.: Laparoscopic cholecystectomy: Quality of care and benchmarking. *Surg. Endosc.*, 2, 300, 2003.
11. Schafer M. et al.: Trokar and Veress needle injuries during laparoscopy. *Surg. Endosc.*, 3, 275, 2001.
12. Soper B., Nathaniel J.: Diagnosis and management of biliary complications of laparoscopic 669 cholecystectomy. *Am. J. Surg.*, 6, 663, 1993.
13. Stanowski E. et al.: Powikłania po cholecystektomii laparoskopowej – wynik ankiety. *Wideochir.*, 1, 24, 1996.
14. Stanowski E. et al.: Konwersje cholecystektomii laparoskopowej. *Pol. Przegl. Chir.*, 10, 869, 2002.
15. Voyles C. R., Berch B. R.: Selection criteria for laparoscopic cholecystectomy in ambulatory care setting. *Surg. Endosc.*, 12, 1145, 1997.

SUMMARY

The article describes results of cholelithiasis treatment by laparoscopic cholecystectomy in a district hospital in the face of rising controversy surrounding the incidence of complications related to the widespread use of this operating technique. Laparoscopic cholecystectomy may be safely applied into the routine district hospital surgical ward activities, taking advantage of its effectiveness, low incidence of complications and low postoperative mortality rate.

Doświadczenie początkowych trzech lat stosowania cholecystektomii laparoskopowej w szpitalu powiatowym: ocena wyników wczesnych i parametrów operacyjnych

Opisano wyniki leczenia kamicy pęcherzyka żółciowego techniką cholecystektomii laparoskopowej w ciągu pierwszych trzech lat stosowania tej metody w oddziale chirurgicznym szpitala powiatowego. Wobec narastających kontrowersji dotyczących wzrostu liczby powikłań związanych z rozpowszechnieniem tej techniki operacyjnej można stwierdzić że cholecystektomia laparoskopowa jest metodą efektywną, obciążona niską ilością powikłań i niską śmiertelnością pooperacyjną i może być bezpiecznie włączona w zakres rutynowej działalności powiatowych oddziałów chirurgicznych.