

Laparoscopic Cholecystectomy in Obese Patients Compared with Nonobese Patients

Luigi Angrisani, M.D., Michele Lorenzo, M.D., Giovanni De Palma, M.D.,
Luigi Sivero, M.D., Carlo Catanzano, M.D., Beniamino Tesauro, M.D., and
Giovanni Persico, M.D.

Summary: Obese patients treated by laparoscopic cholecystectomy currently appear to be the largest risk subgroup amenable to consistent scientific evaluation. Here we report our experience and compare the results in obese patients with those obtained in nonobese patients undergoing the laparoscopic procedure. Laparoscopic cholecystectomy in obese patients was technically more difficult with significantly longer operating time ($p < 0.01$), but intraoperative and postoperative technical complications were not significant in the groups analyzed. Obese patients present significant anesthesiological complications ($p \leq 0.001$). The results of this experience and the literature review indicate that the therapeutic advantages proved in nonobese patients can be extended to the obese population. **Key Words:** Laparoscopy—Cholecystectomy—Obesity.

Laparoscopic cholecystectomy is now widely considered the treatment of choice for symptomatic gallstones (1,2). Although it can be also performed in difficult clinical conditions with local or general risk factors, few analyses have reported on the results of this approach in a homogeneous group of patients at risk of complications (3). At present, obese patients treated by laparoscopic cholecystectomy appear to be the largest risk subgroup amenable to consistent evaluation. In the early experience with laparoscopic cholecystectomy, obesity was considered by some as a contraindication for this procedure (4). This topic has been reviewed recently in some U.S. and French series (4-7). This study reports a retrospective analysis of a Southern Italian series of obese patients treated by laparo-

scopic cholecystectomy. Patients were stratified into three groups: morbidly obese (MOB); obese (Ob), and nonobese (NOB). Data were compared to determine the safety and risk of complications of obese and morbidly obese patients undergoing laparoscopic cholecystectomy.

PATIENTS AND METHODS

From November 1990 to February 1993, 140 patients with gallstones were referred to the authors; of these 140, 11 (7.8%) were excluded preoperatively for the reasons listed in Table 1. Since the beginning of this experience, obesity has not been considered a contraindication for laparoscopic gallbladder removal. Potential candidates were classified according to the body mass index (BMI) (Table 2). The following parameters were collected prospectively: clinical and laboratory data, ultrasound and intravenous preoperative cholangiography, macroscopic gallbladder appearance, adhesions in the hepatobiliary region quantified by a subjective score expressed by the surgeon (0 = absence, 1 = minimal, 2 = mild, 3 = massive), operative time, in-

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From the Cattedra di Chirurgia Generale e Microchirurgia (L.A., M.L., G.P., B.T.) and the Servizio Centralizzato di Endoscopia Digestiva (G.D., L.S., C.C.), Università Degli Studi di Napoli, Federico II, Napoli, Italy.

Address correspondence and reprint requests to Dr. Luigi Angrisani, piazza Vittoria, 7, I-80121 Napoli NA, Italy.

TABLE 1. Patients preoperatively excluded from laparoscopic cholecystectomy

Reason for exclusion	No. of patient
Nonbiliary pain	2
Liver cirrhosis (child C)	2
Cancer	2
Liver	
Gallbladder + metastasis	2
ERCP failure or refusal	1
Anesthesiological risk (ASA 3)	1
Previous laparotomy (n = 4)	1
Indication for combined HSV and cholecystectomy ^a	1

HSV, highly selective vagotomy; ERCP, endoscopic retrograde cholangiopancreatography; ASA, American Society of Anesthesiologists.

^a In the first year of experience.

traoperative and postoperative complications and treatment, hospital stay, and outcome.

Laparoscopic cholecystectomy was performed under general anesthesia induced by thiopentone, and maintained using nitrogen monoxide, oxygen, enflurane, fentanyl; myorelaxation was obtained with atracurium. Surgical principles followed the traditional technique with closed pneumoperitoneum and the left-side American approach using the two-hand Cushieri maneuver (8). Antithrombotic prophylactic treatment was not done. Statistical analysis was done by the chi-square test, Student's *t* test, and Fisher's exact test. Statistical significance was defined as $p < 0.05$. All data are expressed as mean \pm SD except when otherwise indicated. The general scheme for comparisons between the groups was the following: Ob versus NOb, MOb versus NOb, Ob + MOb versus NOb.

RESULTS

The three patient groups were comparable in terms of sex, age, and symptoms (Table 2). Dura-

TABLE 2. Classification of patients according to body mass index

Body mass index (BMI) category	No. of patients	Age range, yr (range)	Sex (M/F)	Clinical presentation (acute/chronic)
Non-obese ≤ 29.9	96	46.3 \pm 13.4 (20-78)	26/70	27/71
Obese ≥ 30 - ≤ 39.9	25	53.9 \pm 12.2 (32-72)	8/13	8/17
Morbidly obese ≥ 40	8	55.5 \pm 3.5 (51-60)	1/7	1/7

^a Mean \pm standard deviation.

tion of symptoms ranged between 1 month and 24 years (mean, 95 \pm 99 months). The incidence of previous abdominal operations in the lower quadrant for NOb, Ob, and MOb was 42.1, 33.3, and 16.7%, respectively ($p = \text{NS}$), but these operations did not represent a problem to pneumoperitoneum or to laparoscopic performances. Two patients had undergone partial gastrectomy (Billroth II) for peptic ulcer 23 and 27 years before laparoscopic cholecystectomy. One of these two patients was converted to the open procedure because 2 h after the laparoscopic procedure the gallbladder had not been identified. Preoperative intravenous cholangiography was done in 121 patients. The gallbladder was not identified in 22 cases (47% Ob, 0% MOb, 19.2% NOb; $p = \text{NS}$) by intravenous cholangiogram. The presence of gallstones in the bile duct was radiologically suspected in three cases and confirmed in two of the three, all of which had undergone endoscopic retrograde cholangiopancreatography ERCP (one false positive). Both these patients underwent endoscopic papillotomy with stone extraction. On admission, four patients had jaundice. Two patients with acute cholecystitis resolved spontaneously. The remaining patients underwent preoperative diagnostic ERCP. In one patient Mirizzi syndrome was diagnosed, and the other patient, proved to have stones in the bile duct and underwent papillotomy and stone extraction.

The presence of adhesions in the hepatobiliary region and intraoperative macroscopic gallbladder appearances are reported in Table 3. The significantly longer operating time in Ob (125 \pm 49; $p < 0.01$) and Ob + MOb (122 \pm 47; $p < 0.01$) compared with NOb patients (85 \pm 48) was not related to the

TABLE 3. Surgical anatomy of the hepatobiliary region and macroscopic gallbladder appearances

	Body mass index (BMI)		
	≤ 29.9 no. (%)	≥ 30 - ≤ 39.9 no. (%)	≥ 40 no. (%)
Adhesions			
0 = absence	51 (53.1)	10 (40.0)	2 (25)
1 = minimal	15 (15.6)	3 (12.2)	2 (25)
2 = mild	17 (17.7)	7 (28.0)	2 (25)
3 = massive	13 (13.6)	5 (20.0)	2 (25)
Macroscopic anatomy			
Normal	74 (77.1)	18 (72.0)	5 (87.5)
Hydropic	9 (9.4)	3 (12.0)	
Empyema	4 (4.1)		
Scleroatrophic	8 (8.3)	3 (12.0)	1 (12.3)
Adenomyoma	1 (1.1)		
Mirizzi syndrome		1 (4.0)	

LAPAROSCOPIC CHOLECYSTECTOMY IN OBESE PATIENTS

operative findings (adhesions or macroscopic pathological diagnosis). The incidence of intraoperative complications, conversion to laparotomy, and postoperative complications were not statistically different in the three groups (Tables 4 and 5). The surgical intraoperative complications were gallbladder rupture, bleeding, and inability to visualize the gallbladder and its pedicle. Gallbladder rupture includes both small puncture with minimal bile leak and those with gross spillage and loss of stones. Hemorrhage independent of the site of bleeding has been considered a complication when it has required attempts or particular maneuvers to resolve it. Only one patient with liver bed hemorrhage required 2 U of blood transfusion during and after laparotomy. Seven (9.1%) patients were converted to laparotomy. Surgical complications, listed in Table 4 were responsible for conversion in four NOb patients. Nonsurgical anesthetic complications were the reason for conversion in two Ob and one MOb patients. These kinds of complications were significantly more frequent ($p < 0.001$) in the Ob and MOb patients compared with the NOb patients during laparoscopic cholecystectomy (Table 6). No other postoperative complications, for example, deep venous thrombosis, atelectasis, or pneumonia, occurred. The only wound complications were hematoma ($n = 3$) or infection ($n = 3$), all in NOb patients. Postoperative recuperation and hospital stay were similar for the three groups (2.2 days).

TABLE 4. Surgical intraoperative complications

Body mass index (BMI)	Complications (n)	No. of conversions to laparotomy (%)
≤29.9	Gallbladder rupture ^a (9)	1 (33.3)
	Cystic artery bleeding ^b (5)	
	Trocar bleeding (3)	
	Gallbladder bed bleeding (3)	
	Omental bleeding (1)	
	Unclear anatomy (1)	
Total 22/96	1 (100)	
≥30-≤39.9	Gallbladder rupture (2)	4 (4.1)
	Cystic artery bleeding (1)	
	Gallbladder bed bleeding (1)	
	Total 4/25	
≥40	Cystic artery bleeding (1)	4/26
	Total 1/8	
Overall total 27/129		

^a Including both small punctures with minimal biliary leak and those with gross spillage and loss of stones.

^b Bleeding has been considered as a complication when it has required attempts or particular maneuvers to resolve it.

TABLE 5. Postoperative complications

Age (yr)/sex	BMI	Complication	Treatment	Follow-up (yr)
49/F	31.2	External biliary fistula	ERCP-papillotomy	1
59/F	23.9	External biliary fistula	Conservative	2
52/M	44	Respiratory arrest	Reintubation	2

BMI, body mass index; ERCP, endoscopic retrograde cholangiography.

DISCUSSION

Abdominal intervention in obese patients is well known to the general surgeon as a procedure at increased risk of complications compared with the same procedure performed on nonobese patients. Potential surgical complications are wound infections, burst abdomen, incisional hernia, deep venous thrombosis, and pneumonitis. Diabetes, cardiomyopathy, hypertension, lung dysfunction, coagulopathy, found frequently in obese subjects, increase the risk of complications. Further problems are those specifically related to the abdominal disease for which surgery was indicated. Intraoperative and postoperative complications are responsible for prolonged hospitalization and hospital mortality (9-11).

Definitive data on the results of general surgery in obese patients are not reported in the international literature. Buchwald anecdotally reported no contraindications to surgical procedure for 2,000 obese patients in Minnesota (12). Corso and Griffen reported a 25 to 35% wound infection rate on morbidly obese patients undergoing bariatric surgery (13,14). To our knowledge, the only paper on open cholecystectomy in obese patients was published in 1971 by a U.S. group reporting on a series of 400 patients who underwent surgery from 1965 through

TABLE 6. Intraoperative nonsurgical complications in obese and morbidly obese patients^a

Age (yr)/sex	BMI	Complications	Procedure	Follow-up (mo)
58/F	32	Hemodynamic instability	Laparotomic cholecystostomy	18
72/M	32	Hypertension >250 mm Hg	Laparotomic cholecystectomy	16
60/F	42.9	Hypotension	Abstinence ^b	14

BMI, body mass index.

^a $p \leq 0.001$ vs. nonobese (Fisher's exact test).

^b 30 days later, laparotomic cholecystectomy under epidural anesthesia.

TABLE 7. Video-laparoscopic cholecystectomy in obese patients in an international literature review

Author (ref)	Total no. of patients	No. of obese patients	No. of morbidly obese (%)	Obesity classification	Operative time		Complications (postop. MOB)
					NOB	Ob	
Collet (4)	310	28	2 (0.6)	BMI	184 ± 33	89 ± 32	1 (3.8) ^a
Unger (5)	325	NR	24 (7.4)	IBW	NR	114	4 (16.6) ^b
Schirmer (6)	270	96	27 (10)	IBW	123 ± 2	131 ± 4	None
Miles (7)	179	NR	21 (11.7)	IBW	151 ± 4	160 ± 10	None

NOB, nonobese; Ob, obese; MOB, morbidly obese; NR, not reported; BMI, body mass index; IBW, ideal body weight.

^a Ascites.

^b Respiratory distress (n = 1), pyrexia (n = 3).

1969 with an incidence of postoperative complications that was not statistically significant among the various compared groups. This study included only obese patients without associated diseases, excluding those who underwent more complex surgical procedures. The high complication rate in all the operated groups (28–48%; mean, 40%) must be considered, and we conclude that obesity per se is not associated with increased morbidity or mortality after cholecystectomy.

With the introduction of laparoscopic cholecystectomy to surgical practice, obesity has been considered by some a relative or absolute contraindication to this type of approach. Miles et al. reported the results of their retrospective study comparing three groups of patients: morbidly obese patients (n = 11) treated by open cholecystectomy between 1987 and 1990 (prelaparoscopic era), normal-weight patients (n = 158), and morbidly obese patients (n = 21) operated on by laparoscopic cholecystectomy in subsequent years (7). This study concludes that cholecystectomy in obese patients is less time consuming by laparotomy than by laparoscopy, but hospital stay and rehabilitation are significantly longer and higher complications rates higher (18%) with laparotomy. The therapeutic advantages of laparoscopic cholecystectomy versus open cholecystectomy in obese patients could be proven only by a prospective randomized clinical trial. Nevertheless, the open cholecystectomy as the first choice does not appear ethically justified in the laparoscopic era. Following this concept, we and other authors have not considered obesity a contraindication to the laparoscopic approach (4–6,16). We rather explored this new type of surgical access, according the idea of extending the well-known proved advantages of laparoscopic surgery to the risky group of obese people, who could especially benefit from such a procedure.

From a technical standpoint, video-laparoscopic

cholecystectomy differs with the type of obesity. In patients with the gynoid type of obesity, a potential problem is the thickness of subcutaneous fatty tissue of the abdominal wall, which implies the need to use longer trocars and positioning of the optic system through an access 1 to 2 cm above the umbilicus because of the longer xyfoid-umbilical distance. In patients with the androgenic type of obesity, the main technical problem is the limited view of the Calot's triangle because of the prevalent distribution of fatty tissue in the omentum and the transverse mesocolon. In these cases, it can be necessary to use one or two more trocars or an angulated optic system (30–45 degrees).

In our own experience, we did not find an increased thickness of the subcutaneous fatty tissue of the abdominal wall and routinely used traditional metal trocars. On one occasion, in a morbidly obese man, an additional trocar inserted into the left hypochondrium was used to push down the transverse colon to obtain optimal exposure of the gallbladder pedicle. Laparoscopic cholecystectomy in obese patients is technically more complex compared with nonobese patients. The literature data report a longer although nonstatistically significant operating time. In our experience, duration of procedure was significantly longer comparing Ob and Mob + Ob versus Nob patients. These data were not related to the presence of adhesions in the hepatobiliary region or to the macroscopic gallbladder appearances. As to the problem of intraoperative complications, laparotomic conversion, and postoperative complications, the data do not report statistically significant differences between obese and nonobese patients undergoing laparoscopic cholecystectomy (Table 7).

In contrast to others, our laparoscopic series of obese patients showed a higher incidence of intraoperative anesthetic nonsurgical complications compared with nonobese patients undergoing the

same procedure (Table 6). Two patients (cases 1 and 2) had a preoperative diagnosis of cardiomyopathy, one of whom also had jaundice from an ERCP-proved Mirizzi syndrome. One patient (case 3), operated on for acute cholecystitis, was found to have gallbladder empyema. Anesthesiological complications occurred in only one patient (case 3, Table 5, postextubation respiratory arrest) without local or general associated diseases.

In our experience and in other series, the postoperative course and rehabilitation of patients with successful laparoscopic cholecystectomy did not differ in obese and normal-weight persons. Obese patients who underwent conversion to laparotomy for technical or anesthesiological problems had an uneventful recovery period without complications and with satisfactory follow-up.

CONCLUSION

The results of this study show that laparoscopic cholecystectomy in obese patients is a more complex technical procedure, with a significantly longer operating time but without intraoperative and postoperative mortality. Intraoperative and postoperative morbidity is not significantly different than it is in normal-weight patients, but obese patients (Ob + MOb) have an increased risk of anesthetic complications ($p < 0.01$) in the presence of additional risk factors (cardiomyopathy or biliary complications). Video-laparoscopic exploration prior to laparotomic conversion should always be considered. Data in the literature and our own experience indicate that the therapeutic advantages that are well proved in nonobese patients can be extended to the obese population as well, supporting the concept that obesity represents an indication rather than a contraindication to video-laparoscopic access for gallbladder removal (17).

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