Efficacy and safety of elective laparoscopic cholecystectomy in elderly: a case-controlled comparison with the open approach

Ann. Ital. Chir., LXXIII, 2, 2002

P.M.A. Fisichella, A. Di Stefano, I. Di Carlo, G. La Greca, D. Russello, F. Latteri

Divisione Clinicizzata di Chirurgia d'Urgenza e Pronto Soccorso
Direttore: Prof. Ferdinando Latteri
Azienda Ospedaliera "Cannizzaro" - Catania

Abstract

Background: *Minimally invasive laparoscopic surgery is the method of choice for the surgical treatment of gallbladder disease. However, surgery of the biliary tract in the elderly is often associated with high morbidity and mortality.*
Patients and Method: *To evaluate the efficacy and safety of the laparoscopic cholecystectomy in the elderly with symptomatic, uncomplicated gallbladder disease, we retrospectively compared the records of 24 consecutive patients over 70 years of age with symptomatic uncomplicated gallbladder disease, who underwent elective laparoscopic cholecistectomy, with a similar cohort of patients who underwent elective open cholecystectomy for the same indications.*
Results: *In the laparoscopic group we found a significantly low incidence of postoperative complications, low analgesics and antibiotics administration, rapid recovery, short length of stay and considerable cost savings.*
Conclusion: *We conclude that elective laparoscopic cholecystectomy in elderly with uncomplicated gallbladder disease is safe and effective and we suggest that it may become the surgical procedure of choice.*
Key words: Minimally invasive laparoscopic surgery, laparoscopic cholecistectomy, elderly, cost.

Riassunto

EFFICACIA E SICUREZZA DELLA COLECISTECTOMIA LAPAROSCOPICA NELL'ANZIANO: STUDIO COMPARATIVO CASO-CONTROLLO VERSUS COLECISTECTOMIA LAPAROTOMICA

Introduzione: *L'approccio chirurgico mini-invasivo è considerato ormai l'approccio chirurgico di scelta per il trattamento della colelitiasi. Tuttavia, gli interventi chirurgici eseguiti sulle vie biliari negli anziani sono spesso gravati da un alto tasso di mortalità e morbidità.*
Pazienti e Metodi: *Per valutare l'efficacia e la sicurezza della colecistectomia laparoscopica in pazienti anziani con colelitiasi sintomatica non complicata, gli Autori hanno paragonato in maniera retrospettiva i dati relativi a 24 pazienti consecutivi di età superiore a 70 anni con colelitiasi sintomatica non complicata sottoposti a colecistectomia laparoscopica in elezione, con quelli relativi a un simile gruppo di pazienti che invece sono stati sottoposti allo stesso tipo di intervento effettuato però con il tradizionale approccio chirurgico laparotomico.*

Introduction

Minimally invasive laparoscopic surgery has profoundly altered the surgical approach to many diseases, particularly the operative management of gallbladder disease, for which it has become today the procedure of choice (7). However, because of their physiologic status and their frequent underlying comorbid conditions, the elderly tend to present more frequently with acute symptomatic biliary tract disease or with its related complications (2). This is usually associated with a high postoperative morbidity and mortality rate. Therefore, in these patients a safe and effective procedure should be performed, before acute complications requiring emergency operation develop. Allowing less surgical trauma, decreased pain, decreased postoperative ileus, shorter hospital stay, and better cosmesis, elective laparoscopic cholecystectomy seems to be a safe and effective approach for the surgical treatment of gallbladder disease in the elderly. Conversely, a disadvantage of this surgical approach might be the increased total hospital charges.
Our first aim in this study was, therefore, to evaluate the efficacy and safety of the laparoscopic cholecystectomy in the elderly with symptomatic, uncomplicated gallbladder disease, and the second was to perform a cost analysis between the two surgical approaches to assess the cost-effectiveness of the laparoscopic procedure. To answer these questions, first, we retrospectively compared the out-

Pervenuto in Redazione il 22 Maggio 2001

Risultati: *Nel gruppo laparoscopico gli Autori hanno riscontrato una minore incidenza di complicanze postoperatorie, un minore uso di analgesici ed antibiotici, una più rapida guarigione clinica, una riduzione della degenza ospedaliera ed un considerevole contenimento dei costi.*
Conclusione: *Gli Autori concludono che l'approccio chirurgico miniinvasivo eseguito in elezione nei pazienti anziani con colelitiasi sintomatica non complicata è da considerarsi un intervento sicuro ed efficace e suggeriscono che possa validamente rappresentare l'approccio chirurgico di scelta.*

come of patients over 70 years of age with symptomatic, uncomplicated gallbladder disease who underwent elective laparoscopic cholecistectomy, with a control group of patients who instead underwent elective open cholecystectomy for the same indications, and second, we compared total hospital charges in both groups.
Our results show that laparoscopic cholecystectomy in elderly with uncomplicated gallbladder disease is more safe and effective than the traditional open approach, it is well tolerated, cost-effective, and most important, it allows curative treatment with low morbidity.

Patients and methods

The records of 24 consecutive patients who underwent elective laparoscopic cholecystectomy for symptomatic, uncomplicated gallbladder disease and 11 consecutive controls who underwent elective open cholecystectomy for the same indications, from June 1995 to October 1998, were retrospectively reviewed.
Patients were selected on the basis of an age over 70 years and a clinical and diagnostic evaluation of symptomatic, uncomplicated gallbladder disease. All patients with complications, such as diffuse or localized peritonitis, septic shock, and gallbladder malignancy were excluded from the study.
The diagnostic evaluation of all patients included laboratory exams and an abdominal ultrasound. An endoscopic-retrograde-cholangio-pancreatography (ERCP) was performed in all patients with lithiasis of the common bile duct. When necessary, an endoscopic sphincterotomy was performed in the same session. For those patients with positive anamnesis for acute biliary pancreatitis or acute cholecystitis, the laparoscopic or open cholecystectomy was performed after a varying period from the acute episode (2 weeks in most cases). Conversely, endoscopic sphincterotomy, when needed, was usually performed two days before surgery.
Patients were then submitted to laparoscopic or open cholecystectomy on the basis of the surgeon's skills and attitude at laparoscopic surgery.
Laparoscopic cholecystectomy was performed with 4 trocars and the patient placed supine with the lower legs wide, inclinated to 45°, and placed on stirrups. The first trocar was always introduced bluntly after the pneumoperitoneum was established with the Verres needle introduced through the umbilicus.
Open cholecystectomy was performed by a right subcostal incision with a classic anterograde or retrograde cholecistectomy.
Intraoperative cholangiography was not routinely performed in all patients. It was performed only when difficulties in identifying the anatomy of the Calot's triangle arose during surgery.
In the postoperative period, analgesics and antibiotics were administered to all patients in both groups for pain relief and for infection prophylaxis, respectively. A liquid diet was resumed as soon as the patients' canalization was restored. Ileus was defined as the lack of canalization for more than 3 days.
All patients were followed-up weekly for a mean of 2 weeks (range 1 to 4 weeks).
To determine the efficacy and safety of the laparoscopic approach, all patients were evaluated for the incidence of intraoperative and postoperative complications, analgesics and antibiotics administration, time to liquids, and hospital stay. To estimate the eventual cost-effectiveness of the laparoscopic approach, total hospital charges from all patients were also calculated. These variables were then compared between the patients who underwent laparoscopic cholecystectomy and the control patients who instead underwent open cholecistectomy.
Data are summarized as mean ± SD; 95% confidence intervals (CI) for the difference were also calculated to assess the size of the difference in comparison with the variability in the data sample. Primer of Biostatistics 4.0 software (S.A. Glantz, McGraw-Hill 1996) was used to analyze data statistically. To determine the difference from the mean of the control group, Student's t-test was performed on parametric data; chi-square was performed to compare proportions. Differences were considered statistically significant at $P<0.05$.

Results

Patients operated on with the laparoscopic and open approach were comparable with regard to age, sex, severity of disease and prevalence of major underlying comorbid diseases. Differences in both groups were not statistically different (Table I).
The most common major underlying comorbid diseases were hypertension, diabetes mellitus, and lithiasis of the common bile duct (Fig. 1). Conversely, respiratory diseases, such as chronic bronchitis, were not so prevalent: they were present only in 2 (8%) of the 24 patients in the laparoscopic group. Moreover, distribution of comorbid diseases was equal in both the laparoscopic group and the open group of control and differences in both groups were not statistically different (Fig. 1). Nevertheless, both the laparoscopic group and the open group of control had a comparable percentage of patients with

Tab. I – CLINICAL CHARACTERISTICS OF THE PATIENTS

Surgical approach	*n. of patients*	*Age (yr.)*		*Sex*		*Prevalence of major comorbidity (%)*
		Mean ± SD	*Range*	*Male*	*Female*	
Open	11	74 ± 4.1	70-83	7	4	73
Laparoscopic	24	74 ± 2.4	70-78	18	6	58

different numbers of comorbid diseases, associated each other in a varied fashion (Fig. 2).

Intraoperative complication rate was low for patients of both the laparoscopic and the open group of control. Only two laparoscopic procedures were converted to the open approach (conversion rate= 8.3%): one because of adhesions due to a previous acute inflammatory process, and the other because of chronic inflammatory sclerosis of the gallbladder. In this last case, difficulties in identifying the anatomy of the Calot's triangle mandated an intraoperative cholangiography. Difficulties in identifying the anatomy of the Calot's triangle mandated an intraoperative cholangiography also in one case in the open group of control. Therefore, the rate of intraoperative cholangiography performed was almost equal in both the laparoscopic and the open group of control (4.1% vs. 9%; 95% CI =-0.2 to 0.1, P=0.8).

Postoperative complications rate was 75% lower in the laparoscopic group, than in the open group of control (12.5% vs. 54.5%; 95% CI= -0.73 to -0.11, P= 0.026) (Table II). Postoperative complications in the laparoscopic group consisted of ileus in three patients, which prolonged their hospital stay to 7, 8, and 9 days respectively. The first patient was one of the two whose laparoscopic procedure was converted because of adhesions. The second patient was the other in which the laparoscopic procedure was converted because of chronic inflammatory sclerosis of the gallbladder. He also suffered in the 4th postoperative day from pleural effusion. The third patient had only ileus as complication. Postoperative complications in the control group occurred in five patients. One patient complained ileus, two patients wound infection, and the other two patients urinary infection. The former three patients prolonged their hospital stay to 15, 9 and 10 days respectively. The latter two patients both prolonged their hospital stay to 8 days.

The lower incidence of postoperative complications in the laparoscopic group reflected a shorter hospitalization. In fact, comparison of hospital stay showed a 50% shorter hospitalization in the laparoscopic group, than in the open group of control (3.5±2.1 days vs. 7.6±3.1 days; 95% CI=-5.3 to -2.9, P<0.001) (Table II).

Analgesics and antibiotic consumption was respectively 40% and 50% lower in the laparoscopic group than in the open group of control (4.3±2.5 ml vs. 7.5±3.1 ml, 95% CI=-4.6 to -1.9, P<0.001; 5,8±3.2 ml vs. 12.1±4.9 ml, 95% CI=-8.2 to -4.4, P<0.001).

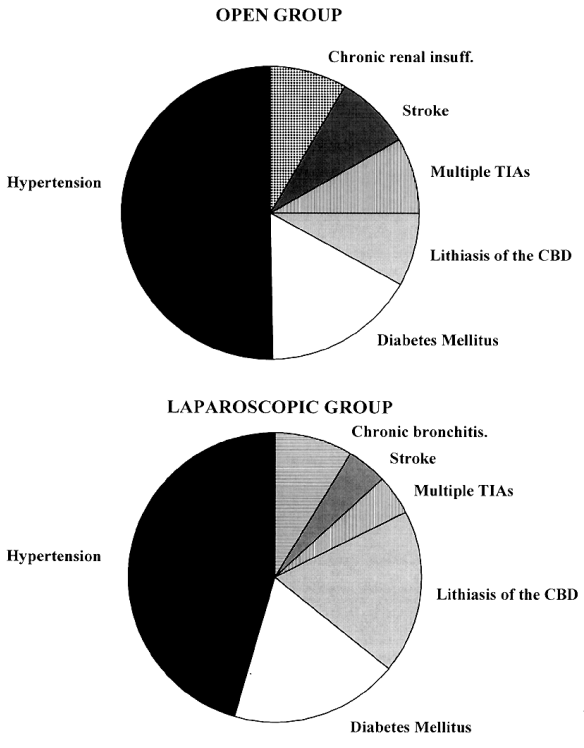

Fig. 1: Distribution and prevalence of major underlying comorbid diseases in elderly undergoing laparoscopic and open cholecystectomy.

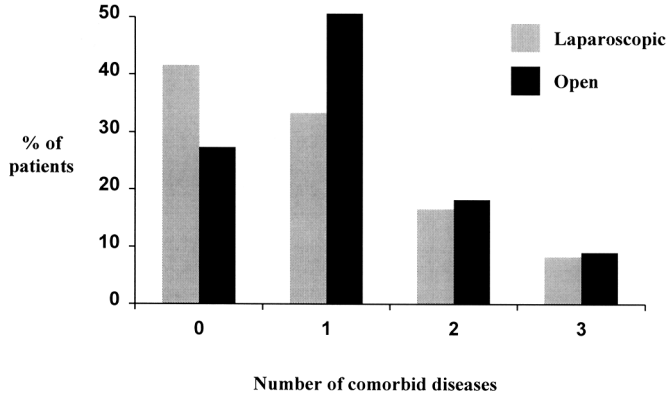

Fig. 2: Percentage of patients with major underlying comorbid disease(s).

Tab. II – EFFICACY, SAFETY, AND COST-EFFECTIVENESS OF ELECTIVE LAPAROSCOPIC CHOLECYSTECTOMY IN ELDERLY

Surgical approach	*Postoperative complications*	*Length of stay (days)*	*Analgesics consumed (ml)*	*Antibiotics consumed (gr.)*	*Time to liquids (days)*	*Total hospital charges (US $)*	*Mortality*
Open	54.5%	7.6 ± 3.1	7.5 ± 3.1	12.1 ± 4.9	3.1 ± 0.5	3578 ± 1199	0
Laparoscopic	12.5%†	3.5 ± 2.1*	4.3 ± 2.5*	5,8 ± 3.2*	2.1 ± 1.4*	2565 ± 805*	0

Values are means ± SD for 24 patients of the laparoscopic group and for 11 patients of the open group (control).
† chi-square; P<0.05 vs. open (control).
* t-test; P<0.05 vs. open (control).

A 30% faster resumption of a liquid diet was observed in the laparoscopic group, than in the open group of control (2.1±1.4 days vs. 3.1±0.5 days; 95% CI= -1.6 to -0.4, P<0.001). Mortality rate was zero in both groups. Cost analysis revealed a 25% percent cost savings in the laparoscopic group, as deducted from the total average hospital charges comparison (2565±805 US$ vs. 3578±1199 US $; 95% CI= -1486 to -540.7, P<0.001). Surgeon's, anestesiologist's, and nurses' fees were identical for both surgical procedures.

Discussion

Our first aim in this study was to evaluate the efficacy and safety of the laparoscopic cholecystectomy in the elderly with symptomatic, uncomplicated gallbladder disease, and the second was to perform a cost analysis between the two surgical approaches to assess the cost-effectiveness of the laparoscopic procedure.

Our study shows the efficacy and safety of the elective laparoscopic cholecystectomy in the elderly with symptomatic, uncomplicated gallbladder disease, and also demonstrates the cost-effectiveness of the laparoscopic procedure. In fact, our results show that in patients operated on with the laparoscopic approach the incidence of postoperative complications, analgesics and antibiotics administration, and recovery was significantly low, and the length of stay significantly short. Mortality rate was zero in both groups. In patients operated on with the laparoscopic approach we also found considerable cost savings that prove the cost effectiveness of the laparoscopic approach. Minimally invasive laparoscopic surgery has profoundly altered the surgical approach to many diseases, particularly the operative management of gallbladder disease, for which it has become today the method of choice (7). Our findings confirm this concept, its applicability to the geriatric population, and are in line with the results of other investigators.

Lujan et al. (5) found that patients over 65 years of age who underwent laparoscopic cholecistectomy had a lower rate of postoperative complications (13,53%), than patients over 65 years of age who underwent open cholecistectomy (23,6%). They found also that hospital stay was significantly longer in the open group (9.9 days), than in the laparoscopic group (3.71 days). These results confirmed the applicability of elective laparoscopic cholecistectomy in elderly, as they were better than those obtained with the traditional open approach, the morbidity rate was lower, and the hospital stay was shorter. In our series, mortality rate was zero in both the laparoscopic and the open group. However, the 1994 Connecticut Statewide survey (3), which analyzed a much greater number of patients (2865 patients from October 1, 1988, to December 31, 1992), showed a statistically significant reduction in mortality rate in the 70-79 age group following laparoscopic surgery, as compared with a similar cohort of patients who underwent open cholecystectomy in the pre-laparoscopic era. These results clearly proved that laparoscopic cholecystectomy in the elderly with symptomatic, uncomplicated gallbladder disease was as safe, if not safer, than open cholecystectomy as measured by mortality rate.

Our conversion rate was 8.3%, similar to that of Wiebke et al. (8), who reported a conversion rate of 8%. The risk factors responsible for conversion from laparoscopic to open cholecistectomy, might be due to a combination of increasing age and acute cholecystitis. Golden et al. (4) reported a conversion rate of 28% in their series of elderly patients undergoing laparoscopic cholecistectomy for acute cholecystitis. Conversion of the surgical procedure increases both the length of stay and total hospital charges. We suggest therefore that a careful selection of patients submitted to surgery could reduce the number of conversions, its related complications, thus further reducing the length of hospital stay.

The lower incidence of postoperative complications in the laparoscopic group reflected a shorter hospitalization, according to what reported by other researchers (2, 5, 6). Total average hospital charges comparison for patients operated on with the laparoscopic and open approach showed considerable cost savings for patients operated on with the laparoscopic approach. Our results confirmed the reports of those studies, which tried to assess the cost-effectiveness of the laparoscopic procedure (1, 2) basing on the evidence that a markedly reduced hospitalization could be reflected in less total hospital costs. Although the present study is neither prospective, nor

randomized, it offers the advantage of that compensates the limitation of this study design. Careful selection of patients allowed that patients operated on with the laparoscopic and open approach were comparable with regard to age, sex, severity of disease and prevalence of major underlying comorbid diseases. Moreover, distribution of comorbid diseases was equal in both groups and both groups had a comparable percentage of patients with different numbers of comorbid diseases.

In summary, this study shows that elective laparoscopic cholecystectomy in elderly with uncomplicated gallbladder disease is a safe and effective procedure, expecially when performed by a well trained laparoscopic surgeon. Therefore, on the basis of our findings, we suggest that the elective laparoscopic approach can become the procedure of choice even for these patients, because it is well tolerated, cost-effective, and most important, allows curative treatment with low morbidity.

References

1) Anderson R.E., Hunter J.G.: *Laparoscopic cholecystectomy is less expensive than open cholecistectomy.* Surg Laparosc Endosc, 1:82-4, 1991.

2) Behrman S.W., Melvin W.S., Babb M.E., Johnson J., Ellison E.C.: *Laparoscopic cholecystectomy in the geriatric population.* Am Surg, 62:386-90, 1996.

3) Feldman M.G., Russell J.C., Lynch J.T., Mattie A.: *Comparison of mortality rates for open and closed cholecystectomy in the elderly: Connecticut statewide survey.* J Laparoendosc Surg, 4:165-72, 1994.

4) Golden W.E., Cleves M.A., Johnston J.C.: *Laparoscopic cholecystectomy in the geriatric population.* J Am Geriatr Soc, 44:1380-3, 1996.

5) Lujan J.A., Sanchez-Bueno F., Parrilla P., Robles R., Torralba J.A., Gonzalez-Costea R.: *Laparoscopic vs. open cholecystectomy in patients aged 65 and older.* Surg Laparosc Endosc, 8:208-10, 1998.

6) McIntyre R.C. Jr., Zoeter M.A., Weil K.C., Cohen M.M.: *A comparison of outcome and cost of open vs. laparoscopic cholecistectomy.* J Laparoendosc Surg, 2:143-8, 1992.

7) Peters J.H., Ellison E.C., Innes J.T., Liss J.L., Nichols K.E., Lomano J.M., Roby S.R., Front M.E., Carey L.C.: *Safety and efficacy of laparoscopic cholecystectomy.* Ann Surg, 213:3-12, 1991.

8) Wiebke E.A., Pruitt A.L., Howard T.J., Jacobson L.E., Broadie T.A., Goulet R.J. Jr., Canal D.F.: *Conversion of laparoscopic to open cholecistectomy. An analysis of risk factors.* Surg Endosc, 10:742-5, 1996.

Commento Commentary

Prof. Massimo SAVIANO

Professore Ordinario di Chirurgia Generale
Università di Modena e Reggio Emilia

Gli Autori hanno voluto verificare i vantaggi dell'approccio videolaparoscopico rispetto a quello laparotomico confrontando 24 pazienti sottoposti a videlaparocolecistectomia con 11 casi di colocistectomia laparotomica.
Sono impliciti i limiti di uno studio retrospettivo, obbligato per altro dalle difficoltà anche etiche nel proporre oggi per uno studio prospettico con approccio laparotomico a pazienti candidati ad una colecistectomia per litiasi semplice della colecisti. Il proposito degli Autori risulta, infatti, quello di confrontare gruppi omogenei di pazienti affetti da litiasi della colecisti sintomatica ma non complicata. È tuttavia da rilevare che della casistica presentata fanno parte anche pazienti con litiasi della via biliare principale, così come pazienti andati incontro a fenomeni di colecistite acuta ed a pancreatite, senza che ne venga inoltre precisata né la consistenza numerica né l'appartenenza ad un gruppo o l'altro di pazienti. Questo indubbiamente pone dei limiti ad una reale completa possibilità di confronto nei riguardi di incidenza di complicanze postoperatorie e di valutazione in termini di costo-benefici. In tal senso sarebbe necessario un confronto di casistiche più ampie nelle quali disaggregare i pazienti in funzione delle suddette variabili. Ancora un limite dello studio potrebbe apparire una scelta dell'approccio videolaparoscopico o laparotomico determinata dalla esperienza dell'equipe chirurgica disponibile più che da criteri oggettivi inerenti la patologia in atto e la tipologia dei pazienti al di là della loro età cronologica. Gli Autori, tuttavia, riscontrano e confermano nella loro esperienza personale i dati già presenti in letteratura circa i vantaggi dell'approccio video-laparoscopico in relazione al suo carattere mini-invasivo ed ad un migliore decorso post-operatorio con l'esperienza acquisita. In casistiche più ampie è possibile rilevare, in particolare, i vantaggi legati ad una minore incidenza di complicanze post-operatorie di ordine generale alle quali appaiono più esposti i pazienti in età geriatrica (1, 4, 5). Per quanto riguarda l'analisi dei costi gli Autori sottolineano il risparmio in termini di degenza post-operatoria, pur non descrivendo in dettaglio i costi considerati e non facendo riferimento ai costi di sala operatoria. I maggiori costi di sala operatoria legati ad attrezzature e materiali impiegati nelle tecniche video-laparoscopiche non possono né debbono essere ignorati, ma risultano comunque compensati dal risparmio in termini di giornate di degenza postoperatoria (2, 3).

The authors analysed 24 patients submitted to video-laparocholecystectomy with 11 cholecystectomized by laparotomy to verify the advantages of videolaparoscopy compared to laparotomic technique.

Implicit are the limits of a retrospective study besides unavoidable also for ethical reasons in patients affected by simple cholecistolithiasis.
The aim of the authors is infact that of comparing homogeneous groups of patients with symptomatic but no complicated cholecystolithiasis. However, the series include also patients with biliary tract lithiasis or patients with acute cholecystits and pancreatitis without defining the number of the patients and their belonging to one or the other group. Undoubtedly that limites a complete possibility to compare the incidence of postoperative complications and the evaluation of cost-benefit relation. So it would be necessary a comparison of wider series where the patients related to the mentioned variants are disaggregated.
Also, an other limit of this case report would be the choice of videolaparoscopic or laparotomic procedure adopted in relation with the surgical team experience. In fact, in this situation pathology and patients typology, are less important beyond their age.
The authors confirm in their personal experience the literature data about the advantages of videolaparoscopic procedure related to mininvasive effects and a better postoperative course, particularly, it is possible to note in wider case report that geriatric patients have a lower incidence of general postoperative complications.
Concerning costs analysis, the authors claim a saving during the postoperative course without describing examined costs and without reporting operating theatre costs.
We can't ignore that the higher costs of operating theatre related to instruments and materials of videolaparoscopic procedure, that are anyway balanced by saving of postoperative course.

Reference

1) Saviano M., Piccoli M.,Heydari A.,Gelmini R.: *Cholécystectomie coelioscopique en Italie: Rapport sur 45187 cas.* Annales de Chirurgie, 50 (Suppl. n. 7):14, 1996.

2) Saviano M., Piccoli M., Heydari A., Gelmini R., Pezcoller C., Guarasci N.: *Costi della colecistectomia dopo l'avvento della chirurgia video-laparoscopica.* Ann Ital Chir, 47:463-468, 1996.

3) Saviano M., Heydari A., Gelmini R., Piccoli M., Menozzi M., Fundarò S.: *Diritti e doveri del chirurgo nella gestione delle risorse alle soglie del 2000 alla luce di nuovi modelli organizzativi e diffusione di nuove tecniche chirurgiche mini-invasive.* Arch Atti Soc It Chir, 2:97-108, 1996.

4) Saviano M., Piccoli M., Heydari A., Gelmini R., Menozzi M., Spallanzani A.: *La videolaparocolecistectomia in Italia.* Advances in Surgery and Oncology, 1:227-231, 1966.

5) Saviano M., Piccoli M., Heydari A., Gelmini R.: *Incidenti e complicanze della videolaparocolacistectomia. Analisi di 45.187 interventi eseguiti in 147 Ospedali Italiani.* Chirurgia, 10:205-209, 1997.

Autore corrispondente:

Piero M.A. FISICHELLA
400 Parnassus Ave. Room A-6103 Box 0310
SAN FRANCISCO, CA 94143-0310
Phone: 001-4153532634
Fax: 001-4153532977
E-mail: marcof@itsa.ucsf.edu