



## Ambulatory and admitted laparoscopic cholecystectomy patients have comparable outcomes but different functional health status

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### Abstract

**Background:** Laparoscopic cholecystectomy is frequently an ambulatory procedure, but some patients are best admitted for a brief hospital stay. In this study, we compared the functional health status, symptoms, and outcomes of patients undergoing ambulatory elective laparoscopic cholecystectomy to those with brief hospital admission. The purpose was to assess patient satisfaction and to identify factors that might assist in selecting patients for ambulatory vs short-stay operations.

**Methods:** A total of 140 patients scheduled for elective cholecystectomy completed the SF-36 health survey and provided additional information regarding symptoms preoperatively, at 2 months, and at 6 months after operation.

**Results:** All patients had symptomatic gallstones; 76 were admitted to the hospital, and 64 were ambulatory. Admitted patients reported more emotional role limitations on preoperative SF-36. They also reported symptoms of depression more often. Patients in both groups were equally relieved of symptoms of pain, nausea, vomiting, and tenderness. Satisfaction with care was similar for both groups; however, at 2 and 6 months, admitted patients continued to report significantly poorer functional health status than ambulatory patients.

**Conclusion:** A reliable, reproducible measure of functional health status, such as the SF-36, may be useful for identifying patients who are appropriate for short-stay hospital admission after laparoscopic cholecystectomy as part of a decision process that tries to optimize outcomes while utilizing resources efficiently.

**Key words:** Ambulatory surgical procedures — Cholecystectomy — Laparoscopy — Health status — Outcome assessment

Laparoscopic cholecystectomy has become the standard surgical technique for the treatment of patients with symptomatic gallbladder disease [7]. As experience with this operation has grown, more and more patients have undergone operation on a fully ambulatory basis, despite initial reservations regarding this practice [3,9]. Recent surgical literature supports the safety of ambulatory laparoscopic cholecystectomy for selected patients [8]; moreover, anecdotal evidence suggests that most patients now undergo laparoscopic cholecystectomy on an ambulatory basis. Nevertheless, a number of pertinent practical questions related to this practice remain unanswered. How does one select a patient for an outpatient vs an inpatient procedure? Are there differences in outcomes between patients treated on an ambulatory basis and those who are admitted to the hospital? Do ambulatory and admitted patients have the same preoperative symptoms and achieve the same relief of symptoms postoperatively? Are patient-reported functional health status and satisfaction with care comparable for patients undergoing ambulatory surgery and those with overnight stays in the hospital? What information might help guide preauthorization decisions and determine which patients are most likely to require and benefit from short-stay or inpatient admission after elective laparoscopic cholecystectomy?

Reliable objective determinations of functional health status and well-being can now be made through the use of simple survey instruments completed by the patients. The information obtained through these instruments is multidimensional and may provide better insight into their health status than standard informa-

**Table 1.** Demographic characteristics of 140 patients undergoing elective laparoscopic cholecystectomy

		Inpatient (n = 76)	Outpatient (n = 64)	p value
Age (yr)		47.4 ± 13 <sup>a</sup>	44.0 ± 14 <sup>a</sup>	0.239
Sex	Female	84%	87%	0.614
	Male	16%	13%	
Marital status	Married	69%	70%	0.942
Employment status	Employed	64%	50%	0.116
Education	High school	18%	27%	0.403
	Some college	34%	38%	
	College graduate	26%	15%	
	Postgraduate study	22%	20%	
Insurance	Medicare/Medicaid	15%	10%	0.836
	HMO/PPO	53%	58%	
	BC/commercial	28%	28%	
	Other	4%	3%	

<sup>a</sup> Mean ± standard deviation (SD)

tion gleaned via routine histories and physical examinations. Among these instruments, perhaps the one most widely applicable to surgical patients is the Short-Form 36 or SF-36 Health Survey [11].

The purpose of the present study was to examine patient-reported functional health status and symptoms before and after elective laparoscopic cholecystectomy, and to compare the characteristics, complaint, and outcomes of patients undergoing ambulatory procedures (i.e., these sent home the same day) to those admitted to the hospital at least overnight (i.e., both 23-h and full admission). Our intent in this analysis was to identify factors that might assist in the selection of patients for ambulatory vs short-stay operation.

## Materials and Methods

Between March 1994 and July 1999, a convenience sample of patients with symptomatic cholelithiasis scheduled for elective cholecystectomy in the general surgery division at the University of Michigan Health Systems were asked to complete the SF-36 and to provide additional demographic and condition-specific information for a prospective surgical outcomes study. The plan for obtaining informed consent and for patient participation in the study was approved by the University of Michigan Medical School Institutional Review Board. Patients who agreed to participate were asked by graduate nurse research assistants to complete the SF-36 Health Survey and to fill out brief questionnaires designed to obtain information about demographics, coexisting health conditions and diseases, condition-specific symptoms, medications, and complications. The patients also answered questions regarding their satisfaction with various aspects of their care. More than 90% of the patients who were approached agreed to participate in the study.

### SF-36 Health Survey

The SF-36 health status questionnaire was developed at RAND Corporation under contract to the Health Care Financing Administration (now renamed the Center for Medicine and Medical Services) as part of the Medical Outcomes Study [5,11]. It is a generic health status measure that allows comparisons of the burden of illness among diseases and populations; it is equally applicable to all persons, regardless of condition. The SF-36 asks simple questions that, when scored and aggregated, define the following eight domains of health status: general health perception (GH), physical function (PF), physical (RP) and

emotional (RE) role limitations, social function (SF), mental health (MH), bodily pain (BP), and energy/fatigue or vitality (VT). The number of questions contributing to each domain varies from two to ten. Value responses range from one to six. All scales are standardized from 0 to 100, with higher scores signifying better health status.

### Supplemental data and condition specific measures

The SF-36 data were supplemented by additional questions that helped to define the demographic characteristics of the population being studied and to describe the burden of chronic illness in that population. Demographic data included personal characteristics, such as sex, race, marital status, education, and income level. Supplemental health-related data included a survey of coexisting health conditions (comorbidities), such as high blood pressure, arthritis, and back pain. We requested this information from all patients enrolled in the study.

Condition-specific information was also requested from all patients. It consisted of questions directed at specific symptoms and complications of biliary tract disease and included specific inquiries regarding abdominal pain, nausea, vomiting, tenderness, food intolerance, belching, heartburn, gas, and diarrhea. Operative technique, operative findings, length of stay, and any operative or postoperative complications were also recorded. The methods for this data collection were adapted from those used by Kane et al. [4].

The SF-36, supplemental questionnaire, and condition-specific forms were administered preoperatively in the outpatient clinic. Follow-up SF-36, condition-specific forms, and satisfaction questionnaires were completed by mail at 2 months and 6 months after operation using a preaddressed stamped envelope. Telephone reminders were used when responses were not received or information was not complete.

There was clinical follow-up on all patients; the number of visits was at the discretion of the operating surgeon. Clinical data, such as operative and pathologic findings, were obtained from medical records and from laboratory information systems at 1 month after operation.

Analysis and scoring of SF-36 data were carried out according to the guidelines developed by Ware [6,10]. Normal population data were taken from Ware [10]. Data were entered into a Microsoft Access database. Analysis was done using SAS for the PC. Tables and figures were generated using Microsoft EXCEL.

## Results

In all, 163 patients undergoing elective cholecystectomy were enrolled in the study over a 5-year period. This sample represented 20% of all patients undergoing cholecystectomy during this time period. Twenty-three patients who underwent planned open cholecystectomy or were converted from laparoscopic to open cholecystectomy because of intraoperative findings were

**Table 2.** Prevalence of comorbid conditions among patients undergoing elective laparoscopic cholecystectomy on an inpatient or outpatient basis

	Inpatient ( <i>n</i> = 76) (%)	Outpatient ( <i>n</i> = 64) (%)	<i>p</i> value
Back pain/sciatica	22	12	0.119
Hypertension	16	21	0.448
Arthritis	19	7	0.040 <sup>a</sup>
Asthma	7	13	0.213
Hearing problems	5	15	0.067
Cancer	8	2	0.092
Angina	4	3	0.812
Prior myocardial infarct	3	3	0.844
Averaged no. comorbidities ± SD	1.0 ± 1.5	0.8 ± 1.2	0.565

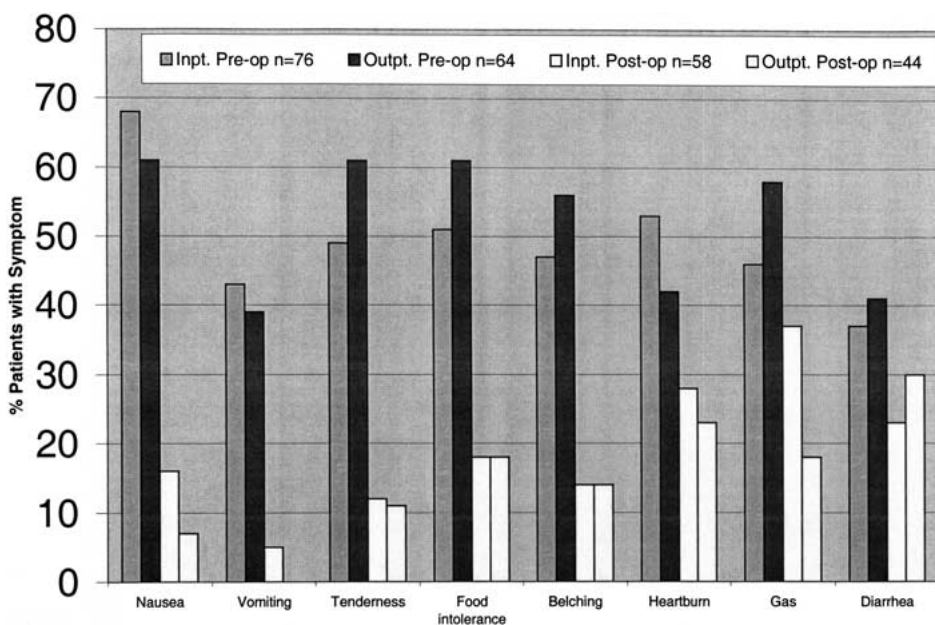
<sup>a</sup> *p* < 0.05

Fig. 1. Symptoms of ambulatory and admitted patients before and 2 months after elective laparoscopic cholecystectomy. There were no significant differences between groups with regard to any symptoms at baseline or at 2 months, with the exception that at 2 months fewer ambulatory patients complained of gas symptoms (*p* = 0.015).

excluded from the analysis. The remaining 140 patients, all of whom underwent laparoscopic cholecystectomy, constitute the basis for this analysis. Demographic characteristics for the study groups are shown in Table 1. Approximately 85% of the patients in each group were female.

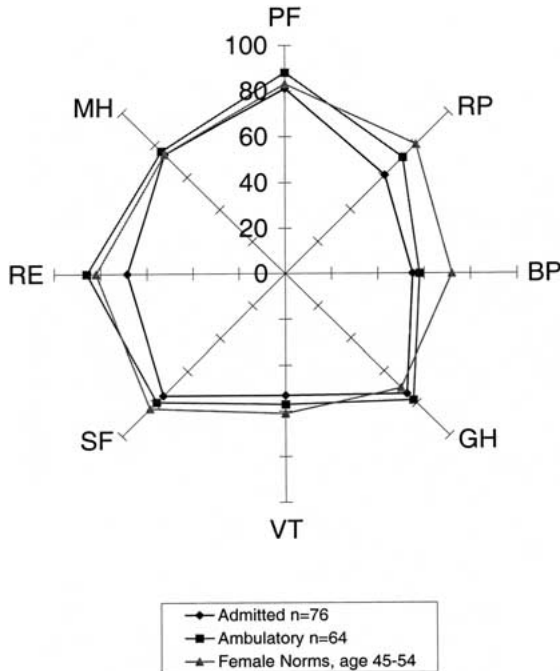
Seventy-six of these patients were admitted to the hospital for postoperative care; 64 were discharged home the same day. During the first half of the study period, 20% of patients underwent fully ambulatory procedures; during the last half of the study period, that percentage rose to just over 50%. Three of the admitted patients subsequently developed bile leaks that were managed nonoperatively. There was one wound infection among the admitted patients. One ambulatory patient had a missed common duct stone, which was managed nonoperatively.

Admitted and ambulatory groups were comparable in all demographic variables. Patient comorbidities are shown in Table 2. There were no dramatic differences between the groups, although patients who had inpatient stays reported preexisting or preoperative arthritis more

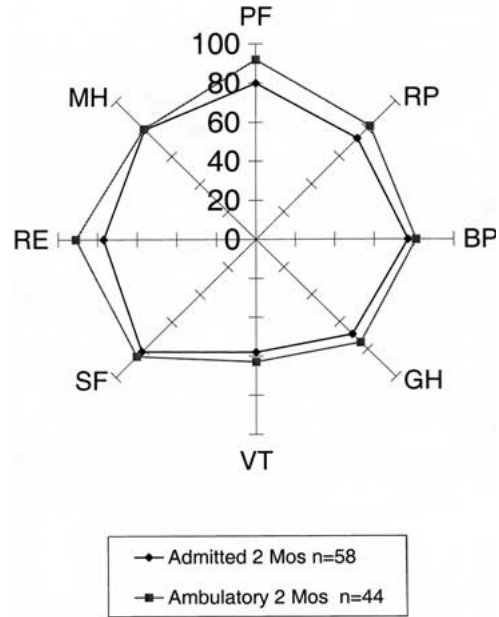
often. Patient-reported symptom frequencies for both groups are shown in Fig. 1. Virtually all patients had biliary colic or pain attributable to gallstones. Nonpain symptoms commonly associated with gallstone disease — such as nausea, vomiting, food intolerance, and belching — were reported by 50–60% of patients preoperatively.

The self-reported functional health status of patients in both the admitted and ambulatory groups is shown in Fig. 2. Preoperatively, as expected, both admitted and ambulatory patients showed significant differences from the norm with regard to pain (BP in Fig. 2), which corresponds directly to their symptomatic complaints of biliary colic. However, patients who were admitted also reported significantly more preoperative emotional role limitations (RE) (*p* < 0.05) than patients who were treated on an ambulatory basis. In addition, a substantially higher proportion of admitted patients reported symptoms of current or recent depression (23% vs 12%; *p* = 0.08).

The change in symptom frequency in each group 2 months after surgery is also shown in Fig. 1. Follow-up data showed dramatic improvement in the symptom of



**Fig. 2.** Preoperative functional health status of ambulatory and admitted patients undergoing elective laparoscopic cholecystectomy compared to normal values. Admitted patients had significantly lower emotional role limitation scores (RE) than ambulatory patients ( $p = 0.005$ ).



**Fig. 3.** Functional health status of ambulatory and admitted patients 2 months after elective laparoscopic cholecystectomy. Ambulatory patients had significantly higher scores in physical function (PF) ( $p = 0.005$ ), physical role limitations (RP) ( $p = 0.039$ ), and emotional role limitations (RE) ( $p = 0.028$ ).

**Table 3.** Measures of patient satisfaction after elective inpatient and outpatient laparoscopic cholecystectomy

	Inpatient (%)	Outpatient (%)	<i>p</i> value
Symptoms fully relieved	75	86	0.178
Quality excellent	45	59	0.189
Prepared for operation	65	54	0.262
Prepared for discharge	90	78	0.136
Postoperative needs met	59	73	0.164
Expectations met	80	81	0.941

pain, as well as dramatic reductions in nausea, vomiting, and tenderness. Food intolerance and belching persisted in 10% of the subjects at 6 months. However, some other symptoms commonly attributed to gallstones did not improve as dramatically. Only about half of the patients reported symptomatic improvement in heartburn and gas. Also, 37% and 40% reported diarrhea preoperatively and 24% continued to have this symptom after operation.

There was no difference in the proportion of patients in either group who reported (a) that their symptoms were relieved, and (b) that their expectations for the outcome of the operation were met (Table 3). Some variations were apparent, but no clear pattern emerged to indicate that one group was more satisfied than the other.

The functional health status of both admitted patients and ambulatory patients at 2 and 6 months after operation is shown in Figs. 3 and 4. Patients who were admitted for short hospital stays continued to report significantly poorer functional health status than those who were able to undergo ambulatory procedures. Significant differences were found in physical function,

physical role limitation, and emotional role limitation scores, even though admitted patients showed greater improvement in emotional role limitation scores after operation than ambulatory patients. The self-reported functional health status of the outpatient group at 6 months approximates that of female population norms; the functional health status of the admitted patient group remains poorer.

## Discussion

As experience with laparoscopic cholecystectomy has accumulated, surgeons have found in that this procedure can be performed safely and successfully on an ambulatory basis in selected healthy, motivated patients [8]. Although it should seem obvious that not all patients are candidates for ambulatory operations, separating those who are from those that aren't remains highly subjective. Our anecdotal experience prior to undertaking this study was that some ambulatory patients were quite unhappy with their experience and

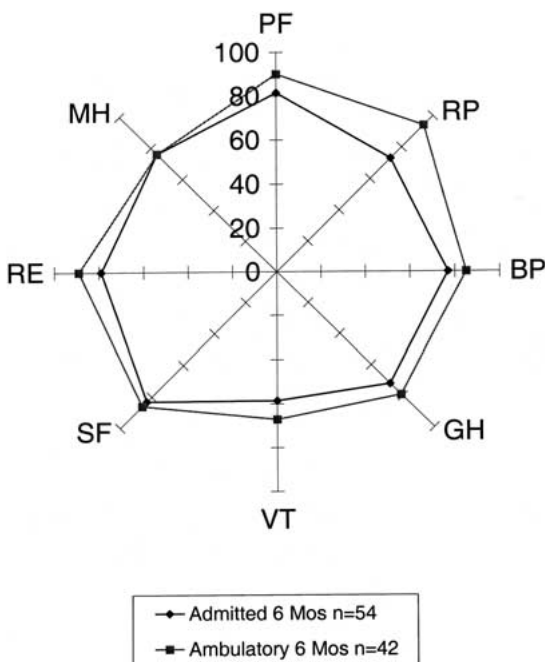


Fig. 4. Functional health status of ambulatory and admitted patients 6 months after elective laparoscopic cholecystectomy. Relative functional deficits seen at 2 months persisted at 6 months.

later strongly expressed the wish that they had been admitted to the hospital after operation rather than having been sent home. The present study provides more objective data.

In this prospective study of functional health status, symptoms, and satisfaction after elective laparoscopic cholecystectomy, we found no differences between ambulatory and hospitalized patients in symptoms before or symptom relief after operation. We found, in addition, equivalent high levels of satisfaction with the surgical experience. However, we also found that the patients who were selected for brief inpatient hospitalization after laparoscopic cholecystectomy had poorer preoperative functional health status than the ones managed on a fully ambulatory basis. Other more conventional measures of comorbidity between the two groups were similar, although a higher proportion of patients with overnight stays had a history of arthritis. The functional deficits identified by preoperative SF-36 were even more dramatic postoperatively; therefore, they were not the result of the gallbladder disease, but rather derived from nongallbladder-related health defects. Patients admitted to the hospital were also more likely to exhibit symptoms of depression.

Although it seems intuitively logical that patients with better functional health status should be better candidates for ambulatory operations, and that patients with poorer functional status would be better candidates for brief hospitalization, it nevertheless requires an exercise of judgment, based on direct patient interview and examination, to select between the two. These findings suggest that patient-reported functional health status evaluation, including both physical and emotional attributes, may provide useful, objective information that could be helpful in selecting patients for ambulatory vs

short-stay operations, such as laparoscopic cholecystectomy. It was clearly more helpful in distinguishing ambulatory patients from those who might best be managed by overnight or brief hospitalization than was a simple inventory of comorbidities, which is the kind of information usually found in a standard review of systems.

Whether or not the operation had been performed on an ambulatory basis did not appear to affect patient outcome with regard to biliary tract disease. Virtually all patients in both groups were relieved of their preoperative symptoms of pain, as well as the nausea, vomiting, and tenderness associated with it. Food intolerance was also improved (Fig. 1). Symptoms of heartburn, intestinal gas, and diarrhea, however, were far less likely to be relieved by cholecystectomy. These last findings are consistent with those of other authors who have examined relief of symptoms after laparoscopic cholecystectomy [2, 4]. With regard to diarrhea in particular, fewer patients complained of diarrhea postoperatively than preoperatively and although this difference was small, we found no evidence of so-called postcholecystectomy diarrhea in our patients.

It is informative to compare the outcomes of the present series of patients with similar reports on patients undergoing cholecystectomy prior to 1990, when the laparoscopic era began [1]. Consistent with our findings, preoperative symptoms of nausea and vomiting improved after open cholecystectomy more often than did belching, gas, and heartburn. Moreover, a very high proportion of patients undergoing standard cholecystectomy in that era reported persistent abdominal painspecifically, 34% at 1 year and 27% at 2 years after operation. Although Fenster et al. reported persistent pain in 20% of patients after laparoscopic cholecystectomy [2], there was a much lower proportion of patients with persistent pain in our series. This difference may be a reflection of better patient selection for operation, but our patient population was also younger and may have been different in other ways as well.

From a quality-of-care standpoint, these data support the contention that the surgeons caring for the patients in this study exercised judgment in selecting patients for ambulatory operation and did not indiscriminately schedule patients for outpatient procedures. Even so, not all patients were pleased with their outpatient surgery experience. In the 2-month follow-up questionnaire, patients were asked, "Were you prepared for discharge? If not, why not?" Those who thought they should have been admitted overnight were, in general, older and had no caregiver either in the home or readily available to provide assistance. Those undergoing outpatient procedures were also more likely to report lack of preparation for surgery. In spite of these complaints, patients undergoing outpatient procedures were more likely to report having had their immediate postoperative needs met than were inpatients and were more likely to rate their overall care as excellent. It would appear that the clinical care delivered through ambulatory surgery is equivalent or better than inpatient case, but that the associated

education and preparation of patients for the surgical experience may be suboptimal.

The chief limitation of this study is that, although it was prospective in all respects, it was observational in design. Because patients were not randomized to ambulatory vs inpatient groups, we cannot assert that a poorer preoperative self-reported functional health status would be more likely to lead to unplanned hospital admission or poorer outcome, although that would seem to be a logical conclusion. Another limitation is that we do not have accurate data on the number of patients for whom ambulatory operation was intended but who were admitted overnight for any reason, or vice-versa. Finally, we are not able to provide cost comparisons between the two groups.

Because of these limitations, it is not possible to immediately put the results of this study to use clinically. The next logical step is to design a prospective study that compares decision making using functional health status data such as those we have described herein with other factors that have been thought to possibly influence hospital admission after laparoscopic cholecystectomy.

On the basis of these data, we conclude that deficits in functional health status are associated with a need for overnight stay after laparoscopic cholecystectomy. Therefore, determination of functional health status should be considered when planning ambulatory operations. A reliable, reproducible measure of functional health status, such as the SF-36, with particular attention to physical function and emotional role limitation

scores, may be useful as part of a decision process that tries to optimize outcomes while utilizing resources efficiently.

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