

Patient Perception of Single-Incision Laparoscopic Cholecystectomy

Sigi P. Joseph, MD, B. Todd Moore, MD, Geoffrey Slayden, MD, George B. Sorensen, MD, Conrad Boettger, David Potter, MD, Daniel Margolin, MD, Kimberly Brown, MD

ABSTRACT

Background and Objectives: Single-incision laparoscopic cholecystectomy (SILC) is gradually being adopted into general surgical practice. The potential risks and benefits are still being studied, and little is known about how patients perceive this new surgical technique.

Methods: After providing patients with basic educational materials on laparoscopic cholecystectomy (LC) and SILC, we administered a questionnaire exploring patients' perspectives of the importance of postoperative pain, scar appearance, risk of complications, and cost regarding their preference for SILC versus LC.

Results: Among 100 patients (mean age, 43.3 years), the majority were women (85%), white (85%), college educated (77%), and privately insured (85%). Indications included biliary dyskinesia (43%), biliary colic (48%), and acute cholecystitis (9%). Patients stated that they would be somewhat or very interested in SILC if recommended by their surgeon (89%), although 35% were somewhat or very concerned about the lack of long-term results. The majority would accept no additional risk to undergo SILC. Scar appearance was somewhat or very important to <40% of patients, whereas pain was somewhat or very important to 79%. Only 27% of patients would spend >\$100 to undergo SILC. When asked to rank pain, appearance, symptom resolution, personal cost, and risk of complications, 52% ranked symptom resolution, 20% ranked pain, and 19% ranked risk of complications as most important.

Conclusions: Safety and relief of symptoms are most important to patients with gallbladder disease, whereas

postprocedural esthetics was relatively unimportant and few would be willing to pay more for SILC versus LC. However, if the surgeon recommends SILC, most patients would trust this recommendation.

Key Words: Laparoscopic Cholecystectomy, Perception.

INTRODUCTION

Single-incision laparoscopic cholecystectomy (SILC) is among the first of many single-incision procedures being performed. This procedure uses a single periumbilical incision to insert a camera and multiple laparoscopic instruments. Single-incision laparoscopic surgery was initially described as early as 1992 by Pelosi and Pelosi,¹ who performed a single-puncture laparoscopic appendectomy in 25 patients. Since then, only a few case reports or small case series had been reported^{2,3} until about 3 years ago, when camera and instrumentation advances made single-incision laparoscopic surgery more technically feasible, and as a result, the surgical literature on this subject expanded.⁴⁻¹⁷ SILC may offer a better cosmetic outcome with less pain compared with traditional laparoscopic cholecystectomy (LC), although the short-term and long-term outcomes are unknown. Presently, most available literature focuses on the feasibility and safety of SILC.⁴⁻¹⁷

As the benefits and risks of single-incision surgery are being studied and adopted into practice, it is unclear how patients view this new technology. Patients may perceive benefits that have not been shown, or they may perceive a reduction in risk compared with LC that has not been established. In the current era of personalized medicine, it is important to match the selected treatment with the patient's values and desired outcome while minimizing cost and risk. It is also important to provide accurate, relevant information to patients to facilitate informed decision making, which can be particularly challenging when one is discussing a new technology or procedure.

This study examines patients' perceptions of the technique of SILC and how the different risks and benefits influence decision making between selecting the established technique (LC) or the new technology (SILC).

Department of Surgery, University of Missouri-Kansas City, Kansas City, MO, USA (Drs. Joseph, Moore, Sorensen, Margolin, Brown).

Saint Luke's Hospital of Kansas City, Kansas City, MO, USA (Drs. Joseph, Moore, Slayden, Sorensen, Potter, Margolin, Brown; Boettger).

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Address correspondence to: Sigi P. Joseph, MD, Bothwell Regional Hospital, 601 E 14th St, Sedalia, MO 65301, USA. Telephone: (660) 827-0423, Fax: (660) 827-5510, E-mail: sjoseph@brhc.org

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MATERIALS AND METHODS

This study consisted of a self-administered questionnaire of patient opinions on the technology of SILC and was approved by the Institutional Review Board at Saint Luke's Hospital. Inclusion criteria were (1) English-literate patients aged 18 years or older; (2) patients referred for consultation—because of symptoms consistent with gallbladder pathology—with 1 of 3 participating surgeons who perform both conventional LCs and SILC; and (3) patients who agreed to complete the questionnaire. The institutional review board deemed this study exempt from the requirement of informed consent.

We provided basic educational material on gallbladder anatomy, function, and pathology necessitating removal, as well as the techniques of LC and SILC and what is known about the potential risks. The patients completed the questionnaire in the waiting room before consultation with the surgeon. Basic non-identifying demographic information was collected, such as age, gender, insurance status, and prior abdominal surgery. The survey was designed to understand the relative influence of factors such as postoperative pain, scar appearance, risk of complications, and cost on patient decision making and preference for SILC versus LC (Appendixes 1 and 2).

RESULTS

One hundred patients completed the survey over a 6-month period. The mean age of the patients was 43.3 years; 85% were women and 85% were white. Eighty-five percent of patients had commercial insurance, and 77% of patients had a college education. Forty-eight percent of patients had biliary colic, and 43% had biliary dyskinesia. Fifty-three percent of patients had some form of previous gynecologic or general abdominal surgery.

Thirty-nine percent of the patients had heard of single-incision surgery before our survey. Fifty percent of patients were somewhat or very interested in the procedure after being informed that the long-term results were unknown. However, 89% of the patients were somewhat or very willing to have this procedure performed if the surgeon recommended it (Figure 1). Eighty-six percent of patients aged <50 years and 87% of women were somewhat or very willing to have this procedure performed if the surgeon recommended it. Whereas 2% of women remained somewhat or very opposed even if the surgeon recommended this procedure, 10% had no opinion.

Forty-eight percent of patients were willing to accept SILC only if the risks were the same as those of LC, whereas only 4% were willing to accept up to 3 times the risk to have this procedure performed (Figure 1). Fifty-two percent of the patients believed that the appearance of the

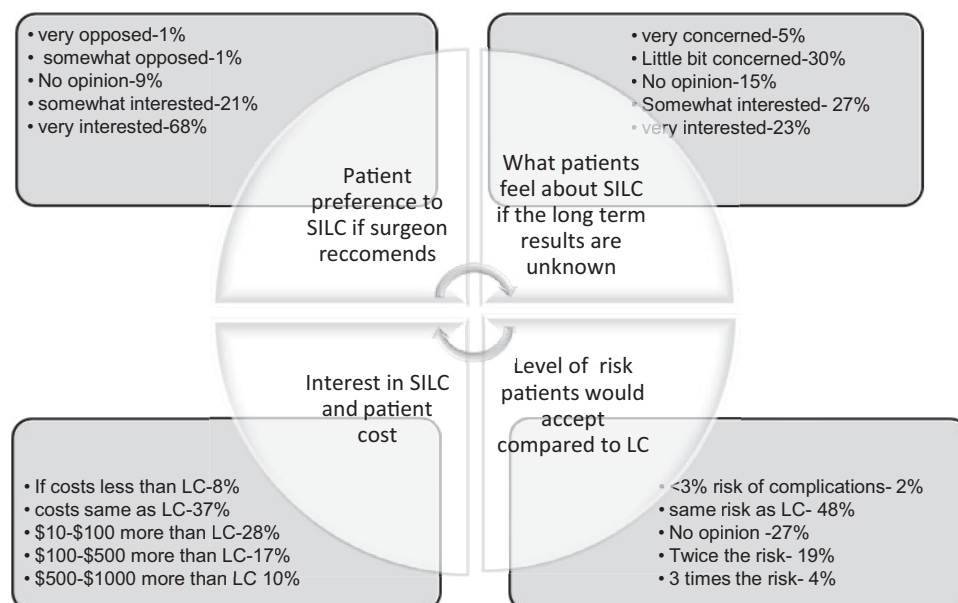


Figure 1. Patient preferences and interest in SILC with regard to surgeon's recommendation, unknown long-term results, cost, and acceptable level of risk.

scar was somewhat or very unimportant in their decision making, whereas 39% believed that it was somewhat or very important (**Figure 1**). Among all women, 38.8% believed that scars were somewhat or very important. However, 50.8% of women aged 50 years or younger believed that scars were somewhat or very important in their decision making. College-educated patients' responses did not differ from non-college-educated patients (39% responded that scars were somewhat or very important).

Seventy-nine percent of patients believed that postoperative pain was somewhat or very important to them in choosing the technique for cholecystectomy. When asked about the risk of incisional hernia that they were willing to accept, 55% were willing to undergo the procedure only if the risk of incisional hernia was the same as that with LC (**Figure 2**). Sixty-five percent of patients were willing to undergo the procedure if the patient cost was the same as or up to \$100 more than LC (**Figure 3**). However, if the increased cost would have been paid by the insurance company, more patients were willing to undergo this procedure. Thirty-five percent of patients were willing to undergo the procedure only if the cost to the hospital or insurance company was the same as that of LC, whereas 38% undergo the procedure if it cost up to \$100 to \$1000 more than LC and 13% would undergo the procedure at any cost.

Patients were asked to rank the relative importance of pain, scar appearance, symptom relief, patient cost, and risk of complications in choosing SILC. Fifty-two percent

ranked fixing symptoms as the most important reason in choosing SILC, and an additional 23% ranked symptom resolution second. Twenty percent of patients ranked pain as the most important factor in choosing SILC, and 25% ranked it second. Nineteen percent ranked risk of complications as most important in choosing this new technique, and 33% ranked it second. Although appearance was the most important reason in choosing SILC for 8% of patients, cost was the most important reason for only 1% of patients (**Figure 4**).

DISCUSSION

SILC is being reported in an increasing number of studies, although overall adoption rates across the country are unknown. As the debate over its potential benefits compared with conventional LC continues, little is known about patients' perceptions of this new technique. This study offers insights into the patient experience of the introduction of new techniques into surgical practice. No studies have been performed previously that have surveyed patient perception on SILC. Unlike studies in which subjects are selected at random, we chose to target patients who were referred for surgical consultation for consideration of cholecystectomy; thus the decision making was not abstract or theoretical but was actually facing the patients who took this survey.

The present study summarizes a few important observations. First, patients perceive relief of symptoms as the

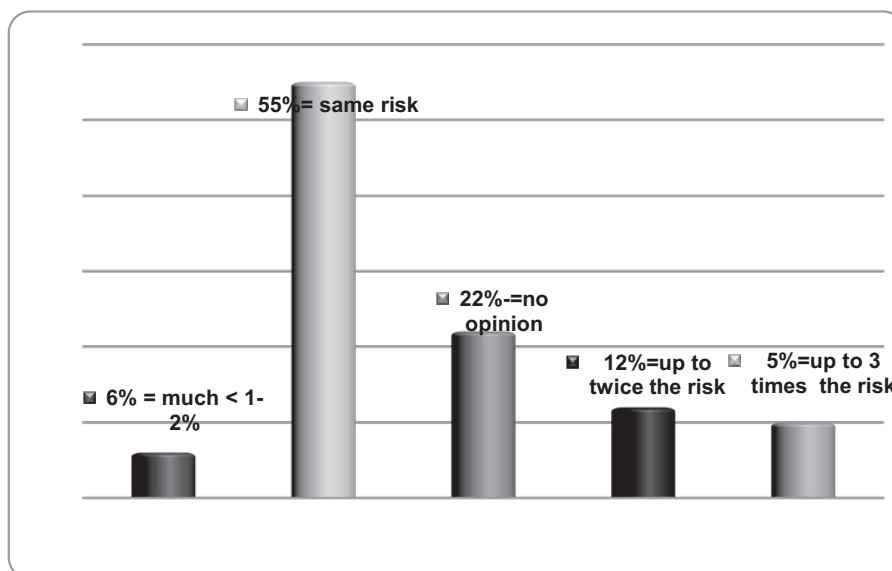


Figure 2. Acceptable level of incisional hernia compared with LC.

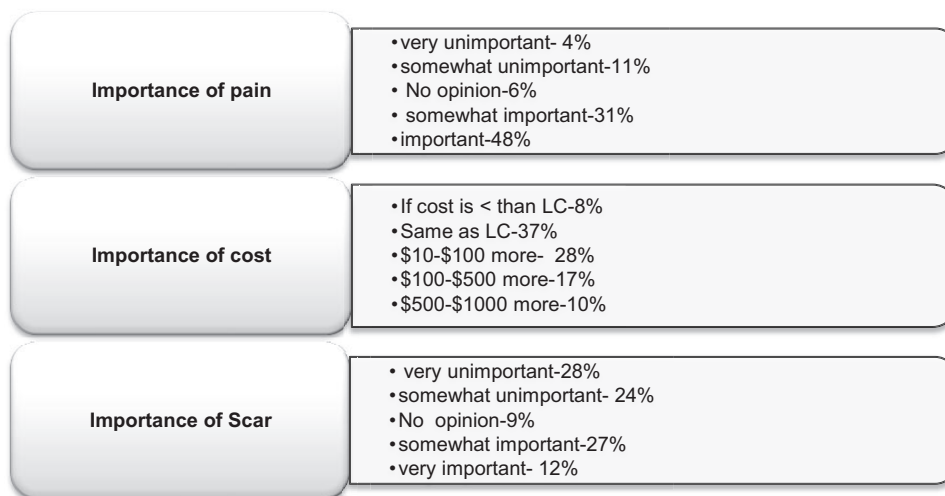


Figure 3. Importance of pain, cost, and scar in choosing SILC.

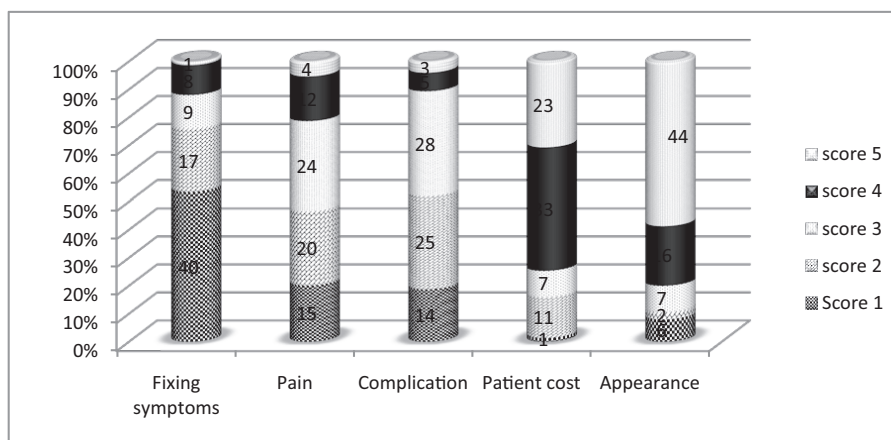


Figure 4. Patient ranking of fixing symptoms, risk of complications, pain, patient cost, and appearance as reasons to choose SILC.

most important factor in choosing SILC over LC. Fifty-two percent of patients in our study considered this the primary reason for choosing SILC. Although this may be a pertinent patient concern, all studies until now have confirmed its feasibility and, by surgical reasoning, it is difficult to explain that SILC will be more or less effective in fixing symptoms than LC because both achieve the primary endpoint (ie, removal of the gallbladder). However, excluding cosmetic benefits that SILC may offer, all other short- and long-term complication rates, differences in pain compared with LC, and other safety concerns are still being addressed.

Another major determinant for patients to favor SILC was its safety. From our study, it appears that the risk of procedure-related complications remains a significant concern for patients and the acceptance of this new tech-

nique will be contingent on its effectiveness in relieving symptoms and evidence of its safety. Similar observations have been noted in a survey of patient perception on natural orifice transluminal endoscopic surgery as a technique for cholecystectomy, in which a decreasing trend of patient preference for natural orifice transluminal endoscopic surgery was observed with increased procedural complications.¹⁸ Although these two observations may not seem an unusual patient expectation for any surgical procedure, they hold significance when the assumption among the proponents of this technique is that lack of significant pain and scarring may make SILC more appealing to patients and perhaps will justify its inclusion in a general surgeon's armamentarium.

Finally, most patients trust their surgeon and would be willing to undergo this procedure if he or she recom-

mends it. Although 61% of patients in our study had never heard about SILC before this survey, if the surgeon recommended it, a vast majority (89%) were willing to undergo this procedure. This makes it all the more imperative for the surgeon to be well aware of the benefits and potential risks of this procedure vis-à-vis LC and provide the patient with accurate information before the surgeon makes his or her recommendation.

This also puts forth a new question on how much more we can improve on traditional LC, which in itself has been well studied over the past 2 decades¹⁹ and has shown patients to have a high level of satisfaction with their cosmetic appearance.²⁰ A recent randomized trial has shown much higher body image and cosmetic scores for SILC patients.²¹ However, despite this cosmesis advantage for SILC, satisfaction scores showed no significant difference between the two groups. In contrast, a report by Canes et al.²² reported that scar satisfaction scores were significantly higher in patients undergoing single-incision laparoscopic donor nephrectomy compared with those undergoing the same procedure by standard laparoscopic approach. Many studies small and large⁴⁻¹⁷ and a recent multi-institutional study²³ have shown the feasibility of SILC; however, larger randomized trials are still awaited to prove its safety. Some of the positive outcomes and advantages of SILC in early studies are likely to be overestimated because of high patient selectivity that occurs when a new surgical technique or modality of treatment is introduced. Once its safety is established, further strength of this new technique would also depend on its reproducibility.

At some point, the published and potential advantages have to match up to the patients' values and expectations, and this is where, we hope, this study will serve as a guide. As previously mentioned, there is an assumption among the proponents of SILC that lack of significant pain and scarring may make SILC more appealing to patients. However, in our study the majority of patients (52%) considered scars as very or somewhat unimportant in their decision making, whereas only 37% considered scars as a somewhat or very important reason for choosing SILC. This is an important observation considering the fact that the majority of these patients (53%) had had one or more previous abdominal surgeries; belonged to a higher socioeconomic status, with 85% of patients having commercial insurance and 77% being college educated; and most were women (85%). The general perception that SILC may be more appealing to younger patients because of lack of external scarring is underscored in our study with nearly 51% of the patients aged <50 years reporting that scars

were somewhat or very important in their decision making whereas only 39% of the college-educated patients reported the same. Although this may be the simplest way to assess patient perception of scars, a complete assessment would require evaluating all the relevant domains that are likely to underlie a patient's perception of scar quality, such as scar esthetics, scar symptoms, scar-related self-consciousness, and satisfaction with scar esthetics/symptoms. There are various validated surveys that are available for this purpose.^{24,25}

In addition, pertinent evidence that future studies need to establish is to identify the cohort of patients for whom this procedure is best suited. A recent systematic review has shown significantly lower complication rates in patients who are younger, that is, with a mean age <45 years.²⁶ This study also showed that acute cholecystitis as an inclusion criterion was a factor for technical failure (success rate, 59.9% vs 93%), although it did not affect the complication rates. With these findings, younger patients in combination with cosmetic requests who have common biliary symptoms due to symptomatic gallstones or biliary dyskinesia may indicate the application of SILC.

Pain has been an important decision-making factor in our study population, in which 79% of patients believed that postoperative pain was somewhat or very important in choosing the SILC technique for cholecystectomy. However, only 20% considered pain as a primary reason for choosing this procedure. This is consistent with the recently reported finding that patients are dissatisfied with larger incisions in LC, such as the umbilical incision, because it is associated with more pain.²⁷ In this study the majority of patients who wished to eliminate one incision preferred to eliminate the umbilical incision (63%) for the same reason. Therefore, it is not very clear whether patients would accept an approach that entails increasing the size of incision that they report as the most painful port site. If pain is indeed proportional to the level of incisional trauma, SILC should yield a lesser degree of pain. A recent randomized controlled trial has established significantly reduced abdominal pain in an SILC group compared with an LC group,²⁸ and total pain was found to be nonexistent in the SILC group after 24 hours. All the patients in this study received preincisional wound infiltration with local anesthetic and instillation of 150 mg of ropivacaine intraperitoneally at the end of the procedure. Interestingly, another randomized trial did not notice any significant difference in pain or requirement for analgesics postoperatively.²⁹ However, this study showed a shorter hospital stay, shorter wound length, and better cosmetic outcome in SILC patients. A systematic review comparing

single-incision and conventional laparoscopic groups showed that of 10 studies comparing pain, 7 reported no difference between the 2 groups and 3 reported lower visual analog scale scores in the single-incision group.³⁰ Moreover, in the same article, among the 10 studies that included postoperative analgesic requirement, 9 reported no significant difference between the groups and 1 study showed a significantly lower postoperative analgesic requirement in the SILC group compared with the LC group.

In our study cost did not appear to be such a deciding factor in choosing SILC. Only one patient considered this to be the primary reason for choosing the procedure. Although 35% of patients were willing to undergo this procedure if the cost to the hospital or insurance company was the same as that of LC, 38% would undergo it if the cost was up to \$100 to \$1000 more than that of LC and 13% would have this procedure performed at any cost if it was paid by the insurance company or the hospital. If some patients are willing to pay more for this procedure with no or minimal benefits, should these techniques be considered “boutique” and be offered to those who want it? Here, we would like to emphasize the responsibility of surgeons to not increase the overall cost of health care. The overall cost of SILC or other single-incision procedures may seem unpredictable at this stage because, over time, the introduction of complex articulating instruments may increase the cost or an increased volume of these procedures may bring down the cost because of economies of scale. Recent studies have shown no significant difference in cost between these two procedures, and this perhaps can be attributed to the use of similar instruments for both procedures.³¹

Although SILC is still evolving, this study shows that patients perceive SILC favorably as a potential technique for cholecystectomy, with 50% of patients noting that they were somewhat or very interested in SILC. This preference for SILC diminished remarkably if the incidence of complications was greater than that with conventional LC. Patients expressed a willingness to accept that SILC must be safe if their surgeon recommended it, and thus the patients would be willing to undergo the new procedure. A critical view of safety is one of the safe dissection principles that is being followed in LC, and a recent study has shown that this can be achieved in almost all cases of SILC.³² It is of note that a majority of patients in our study were college educated and had commercial insurance and, therefore, were a privileged group; however, they still blindly trusted their surgeon in making a decision for them. Those patients from different or lower socioeconomic backgrounds are likely to trust and rely on their

surgeon's decision much more because their educational background may not help them to make a well-informed choice. In addition, the inpatients may care less about such a technique because they are likely to be in more pain and distress compared with their outpatient counterparts.

There are several limitations to this study. First, only those patients who were undergoing LC or those who were considered for LC were enrolled in this study, thereby introducing potential selection bias. Second, the survey was conducted in a hospital where most patients are from a higher socioeconomic status and may not represent the ideal cohort; therefore these findings cannot necessarily be extrapolated to other hospitals where the patient population may be different. Third, the concept of single-incision surgery was evaluated only in the setting of cholecystectomy. Therefore patient perceptions and preferences for other surgical interventions using the single-incision approach are unknown. Fourth, the patient perceptions may change in the future with more favorable evidence being available from larger studies on SILC and patients becoming increasingly aware of this technique.

Any new innovation in surgery will succeed only if proves to be safe, reproducible, and cost-effective, among several other factors, and if this can be done for SILC, then it certainly will replace conventional LC as an established form of care for gallbladder problems. Longer-term studies will be required to show no increase in incisional hernia rates, and larger well-designed randomized studies are needed for assessment of the pain difference. In addition, the cost difference between the two procedures needs to be minimal. Further studies are also required to identify the patients who are most suited for SILC.

The aforementioned available evidence—such as shorter hospital stay, reduced or equal pain compared with LC, no increased risk of complications, the ability to obtain a critical view of safety in almost all patients, and the better cosmetic outcome that a smaller scar will provide—may justify a surgeon's recommendation for the SILC procedure in a select group of patients, provided that a lesser degree of long-term complications such as incisional hernia is well established. Further evaluation of its safety is only a matter of time.

Given the favorable perception of patients toward SILC, refinements in procedural techniques leading to definite advantages over conventional LC will be crucial to success. Pain is an important concern among patients, but scarring is not as important as it was initially thought to be.

Most patients would not accept an increased complication risk or increased personal cost for the new technique.

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APPENDIX 1

What Does a Gallbladder Do?

The gallbladder stores bile, which is made continuously by the liver. When you eat, the gallbladder squeezes (contracts) and releases bile into a duct (tube) that drains into the intestines so that the bile can mix with food and help break down fats to be absorbed (**Figure 5**).

Why Would My Gallbladder Need to Be Removed?

Your doctor may recommend that you have your gallbladder removed. Sometimes, the bile forms stones, and when the gallbladder contracts, the stones prevent the bile from emptying. This causes pressure to build up in the gallbladder, and that causes pain. In other cases, the gallbladder cannot empty, even when there are no stones. This also causes pain. There are other situations in which the gallbladder may be causing symptoms that can be relieved by removing the gallbladder. Your doctor will talk to you

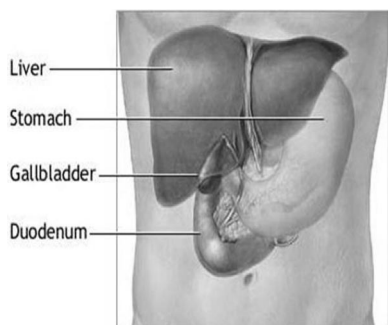


Figure 5. Location of the gallbladder.

about your symptoms and any tests that may be used to make the decision to remove the gallbladder.

How Is the Gallbladder Removed?

Laparoscopic cholecystectomy is the medical term for removing the gallbladder with minimally invasive (small-incision) surgery. Small incisions (cuts) are made, and the abdomen is filled with gas to create space for the surgeon to see and work. A camera and instruments are passed through the small incisions so that the surgeon can see and use the instruments to remove the gallbladder. Typically, a 1-inch incision is made at the belly button, and 2 or 3 additional 5-mm incisions (about the length of a pencil eraser) are made under the ribcage on the right side (**Figure 6**).

What Are the Risks of Gallbladder Surgery?

Gallbladder surgery is one of the most commonly performed surgeries in America, and the overall risk of complications (problems) is low—<3% (3 of 100 people) in most studies. Please talk to your doctor about

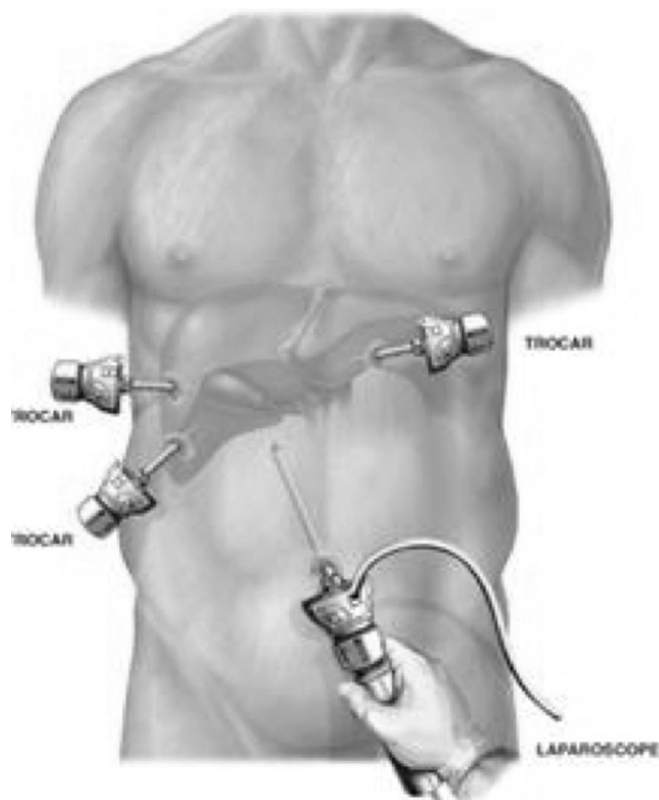


Figure 6. Instrument placement for traditional gallbladder surgery.

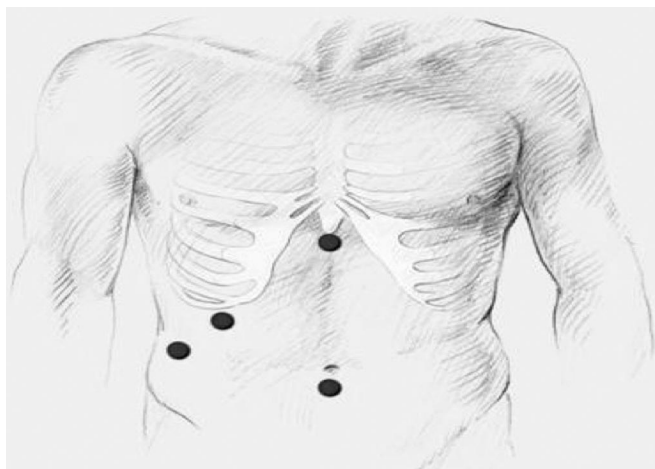


Figure 7. Locations of incisions in traditional laparoscopic cholecystectomy.

your risk of problems with surgery because every patient is different. One possible complication is injury to the common bile duct, which is the tube that the gallbladder duct drains into and that connects the liver to the intestines. This happens in 1% to 2% (1 or 2 of 100 people) of surgeries in studies. If this happens, there could be a need for additional surgery or procedures. Another possible problem is an incisional hernia, which is when the incision (usually at the belly button) does not heal properly and there is a bulge on the abdomen. This is often fixed by additional surgery.

What Is Single-Incision Laparoscopic Surgery?

Single-incision laparoscopic surgery is a new form of small-incision surgery in which a single 1-inch incision, most often near the belly button, is used for the camera

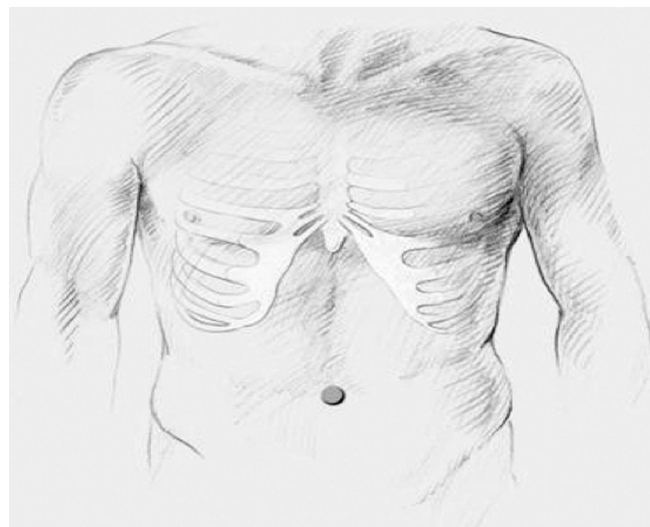


Figure 8. Locations of incision in Single incision cholecystectomy.

and instruments. The theory behind this, which is not yet proven, is that (1) fewer scars look better, (2) the amount of pain after surgery might be less, and (3) the recovery time might be less. What we also do not know is the exact cost difference or the risk of problems compared with traditional laparoscopic surgery. Your surgeon has had special training and experience in both types of gallbladder surgery. If it is recommended that you should have your gallbladder removed, your surgeon will talk with you about whether traditional or single-incision laparoscopic gallbladder surgery would be right for you.

Figures 7 and 8 show the location of incisions with traditional laparoscopic surgery and single-incision laparoscopic surgery.

APPENDIX 2

1. Had you heard of single-incision laparoscopic surgery (SILS) before today?

Yes	No
<input type="radio"/>	<input type="radio"/>

2. If your surgeon recommends that you have your gallbladder removed, how would feel about having this procedure done through a single incision?

Very opposed	Somewhat opposed	No opinion	Somewhat interested	Very interested
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

3. How do you feel about having this procedure knowing that the long-term results are unknown?

Very concerned	A little bit concerned	No opinion	Somewhat interested	Very interested
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. The risk of complications (problems) with traditional laparoscopic gallbladder surgery is <3% (<3 patients out of every 100 have a problem with surgery). The risk of single-incision surgery compared with traditional laparoscopic surgery is not known for certain. What level of risk would you be willing to accept in order to agree to have a single-incision procedure?

Only if the risk is less (much <3%)	Only if the risk is the same (<3%)	No opinion	Up to twice the risk (3%–6%)	Up to 3 times the risk (up to 10%)
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5. How important is the appearance of scars and having fewer scars in your decision to choose single-incision surgery? (Please circle your answer.)

Very unimportant	Somewhat unimportant	No opinion	Somewhat important	Very important
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6. The amount of pain after single-incision surgery may be less than traditional laparoscopic surgery. How important is the possibility of less pain in choosing single-incision surgery? (Please circle your answer.)

Very unimportant	Somewhat unimportant	No opinion	Somewhat important	Very important
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. After reading about incisional hernia after gallbladder surgery, what level of hernia risk would you be willing to accept in order to agree to have a single-incision procedure? (Please circle your answer.)

Only if the risk is less (much <1%–2%)	Only if the risk is the same (<1%–2%)	No opinion	Up to twice the risk (2%–4%)	Up to 3 times the risk (up to 6%)
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. Would you be interested in this new technique if the total cost of surgery to you is higher? (Please circle your answer.)

Only if the cost is less	Only if the cost is exactly the same	I would be willing to pay \$10–\$100 more	I would be willing to pay \$100–\$500 more	I would be willing to pay \$500–\$1000 more
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9. Would you be interested in this new technique if the total cost of surgery paid by your insurance company or the hospital is higher? (Please circle your answer.)

Only if the cost is less	Only if the cost is exactly the same	If the cost is \$100-\$1000 more	If the cost is \$1000-\$5000 more	I would want it at any cost
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. Please rank the following factors from 1 to 5, with 1 being the most important and 5 being the least important to you in considering whether to have single-incision surgery:

Pain	Appearance	Fixing symptoms	My cost	Risk of complication
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