The postoperative changes in pulmonary function improve gradually but are still demonstrable in most patients 5 to 7 days after surgery.[8,15] These changes become clinically significant when they contribute to pathologic conditions such as atelectasis, hypoxemia, and pneumonia.

The location and type of abdominal incision has been shown repeatedly to play a role in postoperative ventilatory impairment.[9,16-18] Laparoscopic cholecystectomy requires minimal muscle disruption and produces less postoperative pain. Because of these factors, it has been postulated that postoperative pulmonary dysfunction would be diminished. These benefits may be offset, however, by longer operating and anesthetic time required for laparoscopic cholecystectomy as well as pulmonary problems associated with the pneumoperitoneum performed during the procedure. The current study addressed this question in 26 patients. The three pulmonary functions tested (FVC, FEV-1, and FEF 25%–75%) all demonstrated approximately 20% to 25% better function in the patients undergoing laparoscopic cholecystectomy compared to the patients undergoing open cholecystectomy. These differences were present despite longer anesthetic and operative times for the laparoscopic cholecystectomy group. The physiologic alterations associated with upper abdominal surgery are reduced significantly with the laparoscopic technique. The advantages demonstrated by pulmonary function testing should translate clinically into better gas exchange, improved functional residual capacity, and better lung volume. This improvement in pulmonary function may translate into a lower incidence of respiratory complications.

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DISCUSSIONS

DR. HENRY LAWS (Birmingham, Alabama): In Dr. DeBakey's elegant presidential address he emphasized the two major advances that have made surgery as we know it possible: anesthesia in the United States and antisepsis in Europe. I would like to go a little further with this.

The major advances in the latter half of the 20th century, in my judgment, include the development of the pump oxygenator, intravenous nutrition, fiberoptics, video control operations, and transplantation.

I was privileged to hear Drs. Rhoads, Dudrich, Vars, and Wilmore present their paper on intravenous nutrition at this meeting at this hotel in 1968. Video-controlled surgery is changing and will dramatically alter surgery as we know it, not just cholecystectomy.

I would like to comment primarily on paper number 32, and I would like to thank Drs. Roberts and Frazee for sending me a copy of their manuscript.

The authors report a simple but crisp study of a major parameter of postoperative change, that of pulmonary function. Dr. Roberts and colleagues found, as have others, that significant features of pulmonary function are decreased by approximately 50% in the immediate postoperative period by subcostal incision. They have demonstrated that laparoscopic cholecystectomy does impair function significantly less than does open cholecystectomy.

As a matter of fact, the decrease was only about 25% with laparoscopic cholecystectomy, as opposed to 50% with open cholecystectomy.

I have several questions for these authors. Your time of operation with laparoscopic cholecystectomy was a little longer. Now that you have more experience with that operation, does it equal that of open cholecystectomy?

You note in your manuscript that you use a four-portal technique. We use a five-portal McKernan technique, one for the light source, two for each hand of the surgeon, and one for each hand of the assistant. Do you use two ports for the surgeon or two ports for the assistant?

Have you now studied more patients with pre-existing pulmonary dysfunction as opposed to those with relatively normal pulmonary function and determined the amount of additional impairment by open as opposed to laparoscopic cholecystectomy?

Considering patients with COPD, do you intend to change the criteria you might use to proffer operation, that is, by the laparoscope as opposed to the open operation that you were doing last year?

It pleased me to note that you used the open technique for your initial entry. Because 85% of our patients have had a previous abdominal operation, indeed, several have had at least two previous laparoscopic procedures, we think that should be done in every instance. Is that what you do?

DR. RICHARD C. FRAZEE (Closing discussion): It is rare that an advance in a surgical procedure produces such a dramatic improvement in postoperative recovery as we have seen with laparoscopic cholecystectomy. I am impressed with the similarities between our study and the subsequent two studies and many of the discussants.

I would like to address some of the questions specific to our study and then some of the other questions addressed to the other papers, about which we differ slightly with the other authors.

Dr. Laws you asked about our time of operation. Indeed it has decreased with further experience. This procedure is very learner dependent. The more experience you gain with the procedure, the easier and more facile you become with the instruments. And, in fact, our average operating time for cholecystectomy alone now averages between 45 and 60 minutes. Including operative cholangiography, the time increases by an additional 20 minutes.

You asked about our four-trochar technique. This is a technique we began from the beginning, involving a periumbilical cutdown procedure. The three additional trochars are placed in the subcostal position.

The scope is inserted through the periumbilical position and usually is operated by a medical student at our institution because we are a teaching institution. The remaining three trochars are shared between the operating surgeon and his assistant. One is used for liver retraction, a second for retraction of the gallbladder, and a third for the actual dissection. The operating surgeon operates the dissecting trochar independently while the other two are held by the assistant.

You asked if our criteria for patient selection has changed, and indeed it has. And this has come about by instruction of our internal medicine colleagues. By presenting our data to them, we are now seeing patients who had not been referred for surgery on the basis of pulmonary function. We are now seeing patients with borderline pulmonary function who are considered a relative contraindication to general surgery now coming for laparoscopic surgery and doing quite well.

Dr. Meyers your series is very impressive, but I am concerned by the number of common bile duct injuries in your series. We have now performed close to 200 laparoscopic cholecystectomies with no common duct injuries, and I think there is no reason that with adequate training and caution in this procedure the experience with common duct injury with a laparoscopic procedure should be no higher than with open cholecystectomy.

Dr. Voyles you posed several questions regarding cost containment and I applaud you for those. We fall into your category of the group of surgeons who started with electrocautery and have not abandoned that. When establishing this procedure at our institution, we thought we wanted to make it as similar to the open procedure as we could, rather than trying to learn new techniques. So we started initially with the electrocautery for dissection and have found no indication to change that procedure.

I would question one of the benefits of the disposable trochars that we have found, namely that the seal that is available for down-sizing the trochar from a 10-mm trochar to a 5-mm trochar allows less loss of pneumoperitoneum during dissection. This may be one of the advantages of the disposable trochars.

You talked about the use of routine operative cholangiography. Again this was something we wanted to make similar to our experience with open cholecystectomy. There are a number of series that have shown equal results practicing selective cholangiography as opposed to routine cholangiography, and we have taken this stance in our laparoscopic patients as well.

We do not think operative cholangiography is necessary to prevent common bile duct injury or to identify anatomy. Much as in the open procedure, the anatomy should be identified by direct visualization rather than cholangiography.

Dr. Wilson we took a similar approach to your institution in that all six of our general surgeons have subsequently become trained and accredited in the laparoscopic procedure. We frequently assist one another in the more difficult cases, and this combined effort has improved our results.

Dr. Chavez your comments about a mini-laparotomy were shared by one of my partners. He was convinced that through the use of a small right upper quadrant incision that a postoperative recovery would be no different than with a laparoscopic procedure. I am pleased to say he has now been converted to an advocate of laparoscopic cholecystectomy.

Dr. Thompson I agree that the indications for laparoscopic surgery will continue to expand. And right now I am afraid we fall into phase 1 of your different phases. We are still in the enthusiastic phase. I hope we do not fall into the subsequent phase 5.