



Trends in
Medical Research

ISSN 1819-3587



Academic
Journals Inc.

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For Some, Laparoscopic Technique Not Always Better

If skin is the body's fortress against germ invaders, shouldn't minimally invasive surgeries -- operations guided by camera probes, conducted entirely within the abdomen -- carry less risk for serious infection than procedures that slice the same cavity wide open?

New research published in the December *Annals of Surgery* is challenging that assumption -- at least for a subset of patients. Researchers from the University of Rochester Medical Center (URMC) analyzed thousands of appendectomies (appendix removals) and found that, for a small group, the danger of deep abdominal infections was markedly less if the old-fashioned, open surgical approach was used.

"Our study corroborates a common theme in medicine: one size does not fit all," said study author John Monson, M.D., F.A.C.S., Chief of the Division of Colorectal Surgery at URMC. "While the data suggest that the laparoscopic approach is still best for most patients, it might not be best for all."

U.S. surgeons perform more than a quarter million appendectomies annually, most of them laparoscopically -- that is, inflating the abdomen with air, and using a popcorn-kernel-sized camera to pilot surgical instruments through tiny, centimeter-long holes in the skin.

"Since laparoscopy first came into vogue the early 90s, it's gone mainstream -- mostly because its advantages are so obvious to the patient," Monson said. "The cuts through the skin are extremely small. There's less visible scarring and postoperative pain; patients have short hospital stays and return to work sooner."

But for a small group of patients undergoing appendix removal, the study found that these perks come with a cost -- greater risk for serious infection. But why? Why would a laparoscopic approach -- which seems closed-off and sterile by design -- carry a bigger risk for deep infection?

"We think it comes down to balance. It's not just about how much a procedure exposes the body to potential infection -

- it's also about how easily that procedure allows you to mitigate infection risk," Monson said. "Consider the open approach. Admittedly there's more chance of exposure to microbes -- the wound is wide open. But there's also more opportunity to sterilize, since you can meticulously clean the operating space before closing it."

The laparoscopic approach, on the other hand, is much more ginger.

"There's less exposure to the outside environment, but there's also less opportunity to disinfect the organ space," he said. "The philosophy is to be delicate as possible, perform the surgery, then get out."

If a deep infection takes root, it's expensive to treat -- to the tune of \$50,000, and that figure doesn't begin to account for unrealized income due to missed work (potentially three to six months) while hospitalized, not to mention incalculable costs like distress to families.

"Compare this to an uncomplicated laparoscopic appendectomy -- after which patients return to work in a week and a half -- you see how devastating a deep infection can be," Monson said.

Some earlier analyses have implicated a connection between laparoscopic surgery and risk for infection in the organ space, but even meta-analyses (studies of studies) had relatively small sample sizes -- too small for surgeons to draw definitive recommendations.

"This larger study afforded us that opportunity," Monson said. "By tapping the National Surgical Quality Improvement Program database, we were able to analyze almost 40,000 appendectomies performed between 2005 and 2008."

The study also begins to paint a picture of the type of

patients who might fare better with an open procedure. Poring over the data, the team noticed trends -- factors that might pre-dispose some patients to being at higher risk for a serious infection. For instance, presenting at the hospital with a high white blood cell count (which signals that the body is already fighting infection); being male (perhaps because men "stomach" pain longer, and wait to go to the Emergency Department until their condition is more advanced); having diabetes; simply being older; or being a smoker (chemicals in cigarettes have a detrimental impact on wound healing -- and, smoking tends to be a marker for other unhealthy habits, such as excessive alcohol consumption).

"We found that, for a small group 'high-risk' patients -- those who have several risk-elevating factors working against them at the same time -- the risk of a deep infection is about 8.9 percent with an open surgery. But that risk jumped to 12.3 percent when the appendix was removed laparoscopically."

For most other (low-risk) patients, the type of surgery had little bearing on their chance of developing a deep infection (though risk did rise slightly -- from 0.3 to 0.4 percent -- when choosing a laparoscopy over an open procedure).

"I think the data is pretty clear: for a select cohort of folks needing their appendix removed, we would be wise to consider an open procedure," Monson said. "This is what good medicine is about -- tailoring our approach based on the patient. It's about being willing to adapt."

In addition to Monson, paper co-authors from URM's Division of Colorectal Surgery included Fergal Fleming, M.D.; Michael Kim, M.D.; Rabih Salloum, M.D.; together with Susan Messing and Doug Gunzler from the Department of Biostatistics and Computational Biology.

Fergal J. Fleming, Michael J. Kim, Susan Messing, Doug Gunzler, Rabih Salloum, John R. Monson. Balancing the Risk of Postoperative Surgical Infections. *Annals of Surgery*, 2010; 252 (6): 895 DOI: 10.1097/SLA.0b013e3181f194fe