

Laparoscopic versus open repair: a superior approach to inguinal herniorrhaphy?

SM Kavic

Abstract

Introduction

With a history dating back as far as ancient Egyptian culture, inguinal hernia repair is now one of the most commonly performed general surgical procedures in practice. The introduction of a laparoscopic technique has sparked a debate in the literature over the superiority of this method versus open repair. In this article, we examine the advantages and disadvantages of these two approaches in inguinal hernia repair.

Conclusion

Since evidence in the literature does not point to either the laparoscopic or open approaches the clear superior procedure, surgeon preference and circumstantial influences will probably continue to dictate the approach employed in inguinal hernia repair.

Introduction

Dating back to the ancient Egyptian cultures, the surgical history of inguinal hernias has paralleled the evolution in anatomical understanding and development of the techniques of general surgery. As evidenced by a description on the famous Eberspapyrus in 1550 B.C. as 'a swelling of the coverings of his abdomen, an illness which I will treat [by] heating it to imprison it in his belly,' early inguinal hernia repairs employed rudimentary techniques. These techniques often involved testicular excision and wounds that were left open to granulate,

translating into unacceptably high mortality rates¹.

Anatomical understanding of inguinal canal anatomy increased through the work of Camper, Scarpa, Cooper, Hasselbach and Hunter. Still, it was not until the late nineteenth century, when Edoardo Bassini proposed his first successful reconstruction of the inguinal floor that surgical techniques started rapidly evolving. Then, in the late twentieth century the tension-free repair, introduced by Irving Lichtenstein, caused a dramatic drop in recurrence rates and became the procedure of choice². However, the introduction of a laparoscopic technique by Ralf Ger in the early 1990s sparked a new debate over the best method of inguinal hernia repair¹.

Today, inguinal hernia repair is one of the most commonly performed general surgical procedures in the United States, accounting for 10%–15% of all operations³. Inguinal herniorrhaphy accounts for approximately 800,000 cases annually, which amounts to more than 40 billion dollars in healthcare expenditure⁴. These numbers are largely attributed to the high incidence of the disease, which carries a lifetime risk of approximately 27% for men and 3% for women⁵. Considering the socio-economic impact of inguinal hernia repair, we discuss the advantages and disadvantages of laparoscopic repair versus open repair^{6,7}.

Discussion

Hernia recurrences

Recurrence is arguably the most important indicator of the success of a hernia procedure. Hernia recurrences after surgical repair may occur in 15% of the cases or more⁸.

The frequency of hernia recurrence depends on a number of factors including the type of hernia repair initially performed, the co-morbidities of the patient and the length of time from the original hernia repair.

The largest reviews of inguinal hernia repairs suggest no apparent difference in recurrence between laparoscopic and open mesh methods of hernia repair^{9–11}. In a 2003 *Cochrane Database Systematic Review*, McCormack et al. reported 86 recurrences amongst 3138 patients who underwent laparoscopic repair and 109 amongst 3504 patients who underwent open repair ($p = 0.16$)¹². A separate meta-analysis published in the *British Journal of Surgery* in 2000 reported similar findings in that overall recurrences did not differ between the laparoscopic and open groups¹³.

There is, however, some evidence in the literature demonstrating increased recurrences with laparoscopic repair. In 2004, Neumayer et al. found in a randomised, controlled study that laparoscopic repair resulted in significantly more recurrences at 2 years (10.1% vs. 4.9%) and was associated with more complications (39% vs. 33.4%) including more life-threatening complications (1.1% vs. 0.1%)⁸. There may be a component of experience involved, as surgeons who have performed a high volume of hernia operations appear to have better results. In another study published in the *Lancet*, all seven hernia recurrences occurred in the laparoscopic group while there were no recurrences in the open repair group (1.9% vs. 0.0%, $p = 0.017$)¹⁴. In addition, a 2003 meta-analysis comparing laparoscopic and open repair demonstrated a trend

Corresponding author
Email: SKavic@smail.umaryland.edu

Residency in General Surgery, University of Maryland School of Medicine, Baltimore, MD, USA

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toward more short-term recurrences with laparoscopic repair although the results were not statistically significant¹⁵. When treating recurrent hernias, there may be a difference. In one review, laparoscopic repair of inguinal hernias was found to have a similar recurrence to open repair (10.0% vs. 14.1%)⁸. Thus, although there is no clear consensus in the literature, there may be a marginal benefit in terms of recurrence for open versus laparoscopic surgery.

Post-operative pain

Post-operative pain is another important outcome to consider when choosing between laparoscopic and open repair of inguinal hernias. Laparoscopic repair has been associated with less post-operative pain than open repair. A 2003 *Cochrane Database Systematic Review* demonstrated less persisting pain (overall 290/2101 vs. 459/2399, $p < 0.0001$), and less persisting numbness (overall 102/1419 vs. 217/1624, $p < 0.0001$) in the laparoscopic groups¹². Similarly, another meta-analysis study from the *EU Hernia Trialists Collaboration* reported decreased post-operative pain with the employment of laparoscopic methods¹³.

Chronic Pain

When making the decision for open or laparoscopic inguinal hernia repair, differentiating between the chronic pain associated with each method is another important consideration¹⁶. A meta-analysis published in the *British Journal of Surgery* in 2010 used chronic pain as a primary outcome and found no significant difference between the laparoscopic and open cohorts¹⁷. However, these results differ from many other reports including the 2003 *Cochrane Database Systematic Review*, which reported less persisting pain (overall 290/2101 versus 459/2399, $p < 0.0001$) in the laparoscopic groups.

Similar results were reported by Eklund et al. in 2010. A comparison

of open and laparoscopic (totally extra-peritoneal patch) repair found that 5 years post-operatively, 1.9% of patients who had undergone laparoscopic repair continued to report moderate or severe pain compared with 3.5% of those in the open repair group¹⁸. Bignell et al. reported a similar higher incidence in chronic groin pain in open versus laparoscopic inguinal hernia repair. However, the decrease in chronic groin pain with laparoscopic repair reported in this study did not translate into a significant improvement in the quality of life¹⁹.

Return to work

Another variable that is used as a primary outcome in numerous studies comparing laparoscopic and open techniques is return to work. There is a general consensus in the literature that patients who undergo laparoscopic inguinal hernia repair return to work and normal activities more rapidly than those who undergo open repair²⁰⁻²². A quicker return to work and resumption of normal activity is associated with an earlier discharge from the hospital and fewer post-operative complications, both of which are associated with laparoscopic hernia repair. Liem et al. reported that patients who underwent laparoscopic repair resumed normal daily activity 4 days earlier (6 days vs. 10 days; $p < 0.001$), returned to work 7 days earlier (14 days vs. 21 days; $p < 0.001$) and resumed athletic activities 12 days earlier (24 days vs. 36 days; $p < 0.001$) than those who had open repair. Thus, individual consideration of a patient's work situation can play a role in the decision for laparoscopic or open inguinal hernia repair.

Operation Length and Technical Difficulty

Considering the goal of improving patient care, it would follow that respective outcomes would drive the decision between open and laparoscopic inguinal hernia repair.

Although outcomes may be the primary consideration, it is still important to consider the factors that impact the efficiency of each procedure including the operation length, the technical difficulty, the experience required, the procedure cost and the reimbursement associated with each procedure. These factors can determine the feasibility of each procedure considering the available resources at an institution.

With regard to operation length, most evidence in the literature points to a shorter operation duration with open repair^{23,24}. The 2003 *Cochrane Database Systematic Review* demonstrated that the duration of operation was longer in the laparoscopic groups (weighted mean difference 14.81 min; $p < 0.001$). A meta-analysis in the *British Journal of Surgery* described a similar increase of 15.2 min with laparoscopic inguinal hernia repair ($p < 0.001$)¹⁵. The difference in the duration of the operation can be partly attributed to operative complications, which although uncommon for both methods, were more frequent in the laparoscopic group for visceral (overall 8/2315 vs. 1/2599) and vascular (overall 7/2498 vs. 5/2758) injuries¹².

The laparoscopic approach to inguinal hernia repair is also associated with a steeper learning curve probably due to the increased complexity and technical difficulty of the surgery. Surgeons who had performed more than 250 laparoscopic repairs had half the rate of recurrence of surgeons who had performed fewer repairs. In comparison, for the simpler open repairs there was no association of experience with decreased recurrences²⁵.

Financial Considerations

When comparing the cost of laparoscopic repair and open repair of inguinal hernias, it is difficult to assess the true cost of each procedure. Although a number of studies have pointed to higher proce-

dure-related disposable costs for laparoscopic repair, there seems to be a higher reimbursement for laparoscopic procedures²⁶⁻²⁸. Furthermore, in their economic evaluation of the two procedures, Khajanchee et al. found that the majority of the difference in direct costs between the two procedures was sensitive to cost-containment measures²⁹. Considering this sensitivity to cost-containment measures, the financial implications on the decision between laparoscopic and open repair probably depends very much on the institutional policies and procedures. However, in general, evidence in the literature indicates that laparoscopic repair is more profitable for hospitals; however, more costly to the payers due to the higher reimbursement in coincidence with only a marginal difference in cost.

Conclusion

Inguinal hernia repair is one of the most frequently performed general surgery procedures. Because of the large socioeconomic impact of inguinal hernia repairs, it is important for the surgeons to consider the most advantageous approach in each given situation. Currently, both open and laparoscopic repairs are employed in the repair of inguinal hernias and confer various advantages and disadvantages.

Evidence in the literature does not point to either of these approaches as the clear superior procedure. Most randomised studies comparing laparoscopy to open repair have confirmed that the laparoscopic approach is associated with a marginal increased rate of recurrence, lengthier operation with a steeper learning curve, increased cost, reduced post-operative pain and an earlier return to work when compared with open repair. Because the evidence is somewhat equivocal, it is likely that surgeon's preference will continue to dictate the approach employed in hernia repair for the foreseeable future.

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