

Canadian Association of General Surgeons and American College of Surgeons Evidence Based Reviews in Surgery. 17

The timing of elective colectomy in diverticulitis: a decision analysis

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CAGS Evidence Based Reviews in Surgery

The term "evidence-based medicine" was first coined by Sackett and colleagues as "the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients."¹ The key to practising evidence-based medicine is applying the best current knowledge to decisions in individual patients. Medical knowledge is continually and rapidly expanding, and it is impossible for an individual clinician to read all the medical literature. For clinicians to practise evidence-based medicine, they must have the skills to read and interpret the medical literature so that they can determine the validity, reliability, credibility and utility of individual articles. These skills are known as critical appraisal skills. Generally, critical appraisal requires that the clinician have some knowledge of biostatistics, clinical epidemiology, decision analysis and economics, as well as clinical knowledge.

In October 2005, the American College of Surgeons joined with the Canadian Association of General Surgeons to sponsor a program entitled "Evidence Based Reviews in Surgery (EBRS)," which is supported by an educational grant from ETHICON and ETHICON ENDO SURGERY, both units of Johnson & Johnson Medical Products, a division of Johnson & Johnson, and ETHICON INC. and ETHICON ENDO-SURGERY, INC. divisions of Johnson & Johnson Inc. The primary objective of this initiative is to help practising surgeons improve their critical appraisal skills. During the academic year, 8 clinical articles are chosen for review and discussion. They are selected not only for their clinical relevance to general surgeons but also because they cover a spectrum of issues important to surgeons; for example, causation or risk factors for disease, natural history or prognosis of disease, how to quantify disease (measurement issues), diagnostic tests and the early diagnosis of disease, and the effectiveness of treatment. A methodological article is supplied that guides the reader in critical appraisal of the clinical article. Both methodological and clinical reviews of the article are performed by experts in the relevant areas and posted on the EBRS Web site. As well, a listserv discussion is held where participants can discuss the monthly article. Members of the Canadian Association of General Surgeons and the American College of Surgeons can access Evidence Based Reviews in Surgery through the Canadian Association of General Surgeons Web site (www.cags-accg.ca) or the American College of Surgeons Web site (www.facs.org). All journal articles and reviews are available electronically through the EBRS Web site. We also have a library of past articles and reviews that can be accessed at any time. Surgeons who participate in the monthly packages can obtain Royal College of Physicians and Surgeons of Canada Maintenance of Certification credits and/or continuing medical education credits for the current article only by reading the monthly articles, participating in the listserv discussion, completing the monthly online evaluation and answering the online multiple choice questionnaire. For further information about EBRS, the reader is directed to the CAGS or ACS Web site or should email the administrator, Marg McKenzie, at mmckenzie@mtsinai.on.ca.

In addition to making the reviews available through the CAGS and ACS Web sites, 4 of the reviews are published in condensed versions in the *Canadian Journal of Surgery* and 4 in the *Journal of the American College of Surgery* each year. We hope readers will find EBRS useful in improving their critical appraisal skills and also in keeping abreast of new developments in general surgery. Comments regarding EBRS may also be directed to mmckenzie@mtsinai.on.ca.

Reference

1. Evidence-Based Medicine Working Group. Evidence-based medicine. *JAMA* 1992;268:2420-5.

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Selected article

Salem L, Veenstra D, Sullivan SD, et al. The timing of elective colectomy in diverticulitis: a decision analysis. *J Am Coll Surg* 2004;199(6):904-12.

Abstract

Question: Is an elective colectomy after the first episode of diverticulitis in patients under 50 years, or after the second episode in patients over 50 years, preferable to a strategy of expectant management until after the fourth episode? **Design:** A Markov model was used to determine the lifetime risks of death and colostomy, quality of life and costs associated with elective colectomy after the first or second episode of diverticulitis compared with a strategy of expectant management until after the fourth episode of diverticulitis.

Base case: Patients aged 35 years and 50 years who had recovered from a nonsurgically treated episode of diverticulitis. **Treatment alternatives:** Elective colectomy after the first, second, third or fourth episode of diverticulitis. **Outcomes considered:** The number of colostomies and deaths for each of the strategies for both cohorts. **Sources of estimates for probabilities and utilities:** Baseline probabilities were derived from the literature, as well as from a population-based cohort of 25 000 patients with diverticulitis whose data were recorded in a statewide hospital discharge database in Washington state. The utilities were derived from the few available studies related to colorectal diseases.

Results: Performing colectomy after the fourth episode of diverticulitis rather than after the second episode in patients over the age of 50 years resulted in 0.5% fewer deaths and 0.7% fewer colostomies. In younger patients, performing colectomy after the fourth episode compared with the first episode resulted in 0.1% fewer deaths and 2% fewer

colostomies. **Sensitivity analysis:** One-way sensitivity analysis was performed across all variables. Two-way sensitivity analysis (meaning that 2 variables were varied) was also performed. The risk of death and risk of colostomy after elective surgery and the risk of colostomy as an emergency operation were major determinants of which strategy was superior.

Conclusion: This study demonstrates that expectant management is associated with lower rates of death and colostomy compared with a strategy of elective prophylactic colectomy.

Commentary

Although diverticulitis is a common disease, there are relatively few data from high-quality studies on the natural history of diverticular disease, and no published randomized controlled trials have assessed the value of elective colectomy. Nevertheless, it is common practice to recommend elective colectomy after 2 episodes of diverticulitis in older individuals and after 1 episode in younger individuals. This decision analysis is timely, because it is reasonable to reconsider this dictum. Whereas acute diverticulitis, especially perforated diverticulitis, was once associated with extremely high morbidity and mortality rates, with the advent of new imaging modalities and the availability of percutaneous drainage and antibiotics, the risk of serious complications and death is rare. On the other hand, the disutility of elective surgery has decreased with the introduction of minimally invasive techniques.

Decision analysis is often useful in situations where there is more than one treatment alternative and no data from randomized controlled trials to assist in decision-making. The process of decision analysis explicitly and quantitatively considers both the risks and benefits of all treatment alternatives. In this particular model, the base case considered were patients aged 35 years or 50 years who had

recovered from a nonsurgically treated episode of diverticulitis. Four different strategies were considered: elective colectomy after the first, second, third or fourth episodes of diverticulitis. Seventeen different health states were considered: recurrent diverticulitis treated medically or surgically, and if the latter, performed either electively or emergently and with or without a stoma. With each strategy, individuals could recover or die. To determine the probability of each outcome, the authors state that they performed a comprehensive review of the literature and used population-based hospital discharge data from Washington state. One of the poorer aspects of this study is that utilities were not derived directly from individuals with diverticular disease but were derived from limited studies of other similar cohorts of patients. Thus, an assumption was made that individuals with recurrent episodes of diverticulitis are in perfect health between episodes, but this may not be correct. They may have chronic symptoms attributable to the diverticular disease. The utility for postoperative status at 6 months was assumed to be 0.7, but that may not be true if individuals have elective surgery, especially if surgery is performed laparoscopically. Because sensitivity analyses were not performed by varying the utilities, one cannot be certain that the results of the decision analysis would not be altered by different utilities.

On the basis of these assumptions, the authors found that a strategy of surgery after the fourth episode of diverticulitis is preferred. This would result in 0.5% fewer deaths and 0.7% fewer colostomies in individuals over 50 years and 0.1% fewer deaths and 2% fewer colostomies in younger individuals.

Although decision analysis is often used to assist in decision-making when evidence from randomized controlled trials is not available, a decision analysis is limited by the validity of the data used in the analysis.

This decision analysis is limited by the fact that most of the data came from retrospective case series. Data concerning the frequency and severity of outpatient-treated episodes of diverticulitis are not available, nor is it known whether quality of life was impaired between episodes of diverticulitis. Because many patients may be treated as outpatients, this may represent a high proportion of patients with diverticulitis whose data are not captured in the data sources used by the authors. Furthermore, some of these episodes may have been severe or complicated even though they were treated outside the hospital.

The authors also failed to consider the impact of laparoscopy, which has become the preferred method for resection of diverticulitis. Furthermore, they limited the surgical options to resection with anastomosis or resection with the Hartmann procedure, but there are other surgical possibilities.

The generalizability of this decision analysis may also be limited, because the results are not applicable to patients with diverticulitis complicated by stricture, fistula, chronic abdominal pain and bleeding. In addition, it may not be pertinent to patients who were treated success-

fully using percutaneous drainage without surgery for diverticular abscess and localized perforation. Similarly, the results are not applicable to immunocompromised patients with recurring episodes of diverticulitis.

Although this study has limitations, it should cause surgeons to reconsider current guidelines recommending elective surgery after 1 or 2 episodes. Furthermore, the surgical community should be encouraged to perform clinical trials to provide better evidence upon which to base treatment decisions.

Competing interests: None declared.

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