

Predicting the Risk of Anastomotic Leakage in Left-sided Colorectal Surgery Using a Colon Leakage Score

Jan Willem T. Dekker, M.D.,^{*,1} Gerrit Jan Liefers, M.D., Ph.D.,^{*} Johan CA de Mol van Otterloo, M.D., Ph.D.,[†] Hein Putter, Ph.D.,[‡] and Rob A. E. M. Tollenaar, M.D., Ph.D.^{*}

^{*}Department of Surgery, Leiden University Medical Center, The Netherlands; [†]Department of Surgery, Medical Center Haaglanden, The Netherlands; and [‡]Department of Medical Statistics, Leiden University Medical Center, The Netherlands

Submitted for publication July 1, 2010,

Background. Anastomotic leakage following colorectal surgery still occurs all too frequently, and this complication is difficult to predict. A nonfunctional stoma may reduce the risk of clinically relevant leaks but is overtreatment for most patients. More accurate assessments of the risk of anastomotic leakage would be very helpful in tailoring treatment in colorectal surgery. Therefore, a Colon Leakage Score (CLS) was developed and tested.

Material and Methods. The CLS was developed based on information from the literature and expert opinions. It was tested in a retrospective cohort of consecutive patients undergoing left-sided colorectal surgery with primary anastomosis in a teaching hospital in The Netherlands.

Results. In the test cohort, 10 of 121 patients who were not treated with a nonfunctional stoma experienced anastomotic leakage. The mean CLS in the leakage group was 16 versus eight in the group that did not have a leak ($P < 0.01$). Using receiver-operating characteristics, the area under the curve (AUC) showed that the CLS was a good predictor (AUC = 0.95, CI 0.89–1.00) of anastomotic leakage. Furthermore, logistic regression analysis with CLS as a predictor for anastomotic leakage showed an odds ratio of 1.74 (95% CI 1.32–2.28, $P < 0.01$).

Conclusions. The CLS can predict the risk of anastomotic leakage following left-sided colorectal surgery. After further validation, this score may help the surgeon make a more individualized, safer decision regarding whether to perform an anastomosis or make a (nonfunctional) stoma. © 2011 Elsevier Inc. All rights reserved.

Key Words: colorectal; anastomosis; anastomotic leakage; risk score; prediction.

INTRODUCTION

Anastomotic leakage after colorectal surgery is a major and potentially life-threatening complication. Unfortunately, it still occurs all too frequently. The incidence rate, especially after low anterior resections, has been reported to be as high as 15% to 20% in some series [1, 2].

Over the years, many studies have identified risk factors for anastomotic leakage [1–48].

However, to date, it is not possible to predict the likelihood of leakage in an individual patient. Few of the risk factors are conditionally independent, so combining these factors is methodologically unsound. In addition, multiple regression analysis does not seem to offer the solution. In studies with less than 10 cases of anastomotic leakage per variable entered into the model, this technique lacks the required sample size and regression coefficients, such that the results are likely to be imprecise [49]. Judging by the plethora of risk factors identified in the literature, anastomotic leakage has multiple overlapping etiologies. Therefore, studies that use multiple regression analysis are not useful if they only identify a small number of independent risk factors. Combining the odds ratios for these risk factors with odds ratios for risk factors identified in other studies is methodologically hazardous. Therefore, the clinical decision about whether to perform a colonic anastomosis or a stoma remains difficult.

Clinical risk assessment for anastomotic leakage by the operating surgeon has a low predictive value and underestimates leakage risk [50]. There has been a recent trend to create more (nonfunctional) stomas to

¹ To whom correspondence and reprint requests should be addressed at Department of Surgery, Leiden University Medical Center, Albinushof 2a P.O. Box 9600, 2300 RC Leiden, The Netherlands. E-mail: j.w.t.dekker@lumc.nl.