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Utility of colon leakage score in left-sided colorectal surgery

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ABSTRACT

Background: The aim of the study was to evaluate the clinical utility of the colon leakage score (CLS) in predicting the risk of anastomotic leakage (AL) after left-sided colorectal surgery.

Materials and methods: This investigation was designed as a retrospective study of 304 patients who underwent left-sided colorectal surgery. The patients were classified into two groups as those who developed AL and those who did not develop AL, and the CLSs of the two groups were compared. The predictive value and the cutoff value of the CLS were assessed by receiver operating characteristic and logistic regression analysis.

Results: A significant difference was noted in the mean CLSs of the groups with and without AL ($P < 0.001$). The values of the area under the receiver operating characteristic curve (0.965; confidence interval, 0.913–1.00) and the odds ratio (2.9; confidence interval, 1.59–4.83; $P < 0.001$) indicated that CLS was a good predictor of AL. A CLS of 11 was found to be the best cutoff value, with a sensitivity and specificity of 84.6% and 87.2%, respectively.

Conclusions: Our findings indicate that CLS can effectively predict the risk of AL after left-sided colorectal surgery and that a CLS of 11 can be used as a cutoff value for the risk level.

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Introduction

Anastomotic leakage (AL) is a common complication of colorectal resection despite many advances in the technical and technological aspects of surgery. The prevalence of AL, particularly caused by left-sided colorectal resection, has been reported to be as high as 15%–20% [1]. A protective defunctioning stoma is recommended for patients at a high risk of

developing AL. However, the process of creating a defunctioning stoma is associated with serious complications, which necessitate additional surgeries and compromise the patient's quality of life. Therefore, it is important that the decision regarding the creation of a defunctioning stoma be made after a thorough assessment of the risk of AL [1,2].

Studies conducted over the last decade have identified the following intraoperative factors as being associated with a high

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risk of developing AL: age, gender, body mass index, American Society of Anesthesiologists (ASA) grade, anatomic location of the anastomosis, smoking, and alcohol consumption [3,4].

The conventional scoring systems used for predicting operative morbidity and mortality after colorectal surgery include the following: Colorectal-Physiological and Operative Severity Score for the enumeration of Mortality and Morbidity, Cleveland Clinic Foundation Colorectal Cancer Model, and American College of Surgeons National Surgical Quality Improvement Program scoring system [5–7]. Although all these assessment tools enable the evaluation of the risk of surgery and facilitate preoperative and postoperative planning, none of them specifically predict the incidence of AL.

Another scoring system, the colon leakage score (CLS), was proposed by Dekker *et al.* in 2011, specifically for the assessment of the risk of AL [8]. This study was aimed at validating the CLS in the evaluation of the risk of AL in a large group of patients undergoing left-sided colorectal resection. Chinese populations have shown an increase in the incidence of colorectal cancer over the last few decades; therefore, it is necessary to develop and implement a validated system to assist surgeons in predicting the risk for anastomotic leak and assessing the need for a protective defunctioning stoma. Because Chinese and Western populations exhibit fundamental differences in their physical constitution, the colon leakage scoring system must be validated further in Chinese cohorts before its use to the clinical settings in China. The present study aims to address this issue by investigating a large cohort of Chinese patients in a retrospective manner to test the applicability of CLS in our patients. Our results confirmed that CLS can predict the incidence of AL in Chinese patients with high sensitivity and specificity.

Materials and methods

Study protocol

This study was designed as a single-center retrospective investigation of the data of all colorectal cancer patients who underwent left-sided colorectal surgery and one-stage anastomosis at our hospital between May 2011 and June 2014. Left-sided colorectal surgery was defined by left hemicolectomy, sigmoid resection, or rectal resection. This study design was reviewed and approved by the Ethics Committee of Hainan General Hospital, and informed consent was obtained from each patient as per the requirements of the Institutional Review Board.

Patients

The CLS was calculated from data obtained from the medical records of the patients. The inclusion criteria were history of preoperative biopsy confirming the diagnosis of colorectal cancer and resection of colorectal cancer with primary intestinal anastomosis. Patients were excluded if they met the following criteria: history of recurrent disease, laparoscopic surgery, or abdominoperineal resection, or nonavailability of the clinical data required for determining the CLS. Patients with colonic and rectal anastomoses were considered as a

single group. The study population comprised 304 patients; 73 of these patients underwent left hemicolectomy, 97 underwent sigmoidectomy, and 134 underwent resection. The patients included 173 men and 131 women aged between 36 and 86 y (median age, 63 y). All the surgical and medical treatments for the patients were administered by the same group of physicians who performed the surgery, including three experienced surgeons and six residents. The clinical data required for determining the CLS (Table 1) [8] were obtained from the medical records of the patients.

AL was diagnosed if any of the following criteria were met: (1) drainage of the intestinal contents *via* a catheter tube; (2)

Table 1 – Colon leakage scoring system [8].

	Score
Age (y)	
<60	0
60–69	1
70–79	2
≥80	4
Gender	
Female	0
Male	1
American Society of Anesthesiologists	
I	0
II	1
III	3
IV	6
Body mass index	
19–24	0
25–30	1
>30/<19, or weight loss (>5 kg/6 mo)	3
Intoxication	
None	0
Smoking	1
Alcohol (>3 units/d)	1
Steroids (present use, excluding inhalers)	4
Neoadjuvant therapy	
None	0
Radiotherapy	1
Chemoradiation	2
Emergency surgery	
None	0
Bleeding	2
Obstruction	3
Perforation	4
Distance between anastomosis and anal verge (cm)	
>10	0
5–10	3
<5	6
Additional procedures	
No	0
Yes	1
Blood loss (mL) and blood transfusion	
<500	0
500–1000	1
1001–2000	3
>2000	6
Duration of operation (h:min)	
<2:00	0
2:00–2:59	1
3:00–3:59	2
≥4:00	4

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