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Risk stratification for surgical outcomes in older colorectal cancer patients using ISAR-HP and G8 screening tools

Esteban T.D. Souwer [a,*], Norbert M. Verweij [b], Frederiek van den Bos [a], Esther Bastiaannet [c,d], Rob M.E. Slangen [e], Willem H. Steup [f], Marije E. Hamaker [b], Johanna E.A. Portielje [a,d]

[a] Department of Internal Medicine, Haga Hospital, The Hague, The Netherlands
[b] Department of Geriatric Medicine, Diakonessenhuis, Utrecht, The Netherlands
[c] Department of Surgery, Leiden University Medical Centre, Leiden, The Netherlands
[d] Department of Medical Oncology, Leiden University Medical Centre, Leiden, The Netherlands
[e] Department of Gastroenterology, Haga Hospital, The Hague, The Netherlands
[f] Department of Surgery, Haga Hospital, The Hague, The Netherlands

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ABSTRACT

Background: Older patients are at risk for adverse outcomes after surgical treatment of cancer. Identifying patients at risk could affect treatment decisions and prevent functional decline. Screening tools are available to select patients for Geriatric Assessment. Until now their predictive value for adverse outcomes in older colorectal cancer patients has not been investigated.

Objective: To study the predictive value of the Geriatric 8 (G8) and Identification of Seniors at Risk for Hospitalized Patients (ISAR-HP) screening tools for adverse outcomes after elective colorectal surgery in patients older than 70 years. Primary outcomes were 30-day complication rates, secondary outcomes were the length of hospital stay and six-month mortality.

Study Design and Methods: Multicentre cohort study from two hospitals in the Netherlands. Frail was defined as a G8 ≤14 and/or ISAR-HP ≥2. Odds ratio (OR) is given with 95% CI.

Results: Overall, 139 patients (52%) out of 268 patients were included; 32 patients (23%) were ISAR-HP-frail, 68 (50%) were G8-frail, 20 were frail on both screening tools. Median age was 77.7 years. ISAR-HP frail patients were at risk for 30-day complications OR 2.4 (CI 1.1–5.4, p = 0.03), readmission OR 3.4 (1.1–11.0), cardiopulmonary complications OR 5.9 (1.6–22.6), longer hospital stay (10.3 versus 8.9 day) and six-months mortality OR 4.9 (1.1–23.4). When ISAR-HP and G8 were combined OR increased for readmission, 30-day and six-months mortality. G8 alone had no predictive value.

Conclusions: ISAR-HP-frail patients are at risk for adverse outcomes after colorectal surgery. ISAR-HP combined with G8 has the strongest predictive value for complications and mortality.

Key Points: Patients screening frail on ISAR-HP are at increased risk for morbidity and mortality. Screening results of G8 alone was not predictive for postoperative outcomes. Predictive value increased when G8 and ISAR-HP were combined.

1. Introduction

In the Netherlands, more than 13,000 patients are diagnosed with colorectal cancer every year [1]. Colorectal cancer is predominantly a disease of the elderly as 60% of patients are over 70 years of age at time of diagnosis and the number of older patients in the next two decades is expected to increase by another 40% [2].

Older patients are a heterogeneous group with a great variety in comorbidity, physiological reserves, geriatric impairments and functionality [3,4]. As a result of these differences, benefit from treatment can differ and the elderly are at risk for adverse health outcomes after major stressors like emergency department visits, hospitalization, cancer and its treatment [5,6]. Selecting optimal treatment for older patients is challenging as age, cognitive functioning, physical functioning and comorbidities are related to adverse outcomes and death [7–10]. The International Society of Geriatric Oncology (SIOG) recommends assessment of patient's physiological reserve using a geriatric assessment (GA) [11]. A GA can detect health issues and functional problems that are often missed in a regular oncological workup while they are associated with poor oncological outcomes [12]. With an increasing number of older patients diagnosed with cancer, screening methods have been developed to identify those at risk for adverse

* Corresponding author at: Department of Internal Medicine, Haga Hospital, PO Box 40551, 2504 LN The Hague, The Netherlands.
E-mail address: e.souwer@hagaziekenhuis.nl (E.T.D. Souwer).

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health outcomes and who may benefit from a comprehensive geriatric evaluation and interventions. At present, several screening methods are proposed in the SIOG guideline to select patients for subsequent GA [13]. The screening questionnaire Geriatric 8 (G8) proved to have the highest sensitivity compared to the TRST 1+, GFI and VES-13 screening tools [14] Unfortunately, specificity and positive predictive value of the G8 are low, resulting in high numbers of unnecessary GA and low predictive value for outcomes. Therefore, a GA is still considered the golden standard for identifying frail patients and predicting adverse outcomes [14].

In 2012 the Identification of Seniors At Risk-Hospitalized Patients (ISAR-HP) was developed to select patients that are at risk for functional decline both during and after hospital admission [15]. It was validated in adults ≥65 years of age [15,16].

From 2015 onward hospitals in the Netherlands are required by The Dutch Health Care Inspectorate to screen older colorectal cancer patients for vulnerability (patients with urgent of emergency surgery are excluded). Both the G8 and the ISAR-HP may be used for this purpose [17].

The objective of this study was to assess the predictive value of the G8 and ISAR-HP for adverse outcomes after colorectal cancer surgery in elderly patients aged 70 years and older with stage I-III colorectal cancer. Outcomes of interest were postoperative complications, rates of readmissions, early death (30-days) and six-month mortality. Analysis of the best performing screening tool would give insight into patient's characteristics that are associated with these adverse outcomes.

2. Methods

2.1. Study Design

We conducted a cohort study using a prospectively collected database and electronic hospital records. Data was collected from two teaching hospitals in the Netherlands: the Haga Hospital in The Hague and the Diakonessenhuis in Utrecht. The prospectively collected database consisted of data from the Dutch Surgical Colorectal Audit (DSCA) that is also used for quality purposes and collects data from all Dutch patients who had surgery for colorectal carcinoma [18].

2.2. Patient Selection

We identified all patients aged >70 years, who had surgical treatment for colorectal cancer between May 1st 2014 and August 1st 2016. Patients with non-elective surgery, Transanal Endoscopic Microsurgery (TEM), metastatic disease (stage IV) and patients with another synchronous cancer were excluded. The primary outcomes of interest were 30-day complication rates, readmission rates and 30-day mortality. Secondary outcomes were the length of hospital stay and six-month mortality.

2.3. Frailty Assessment

In both hospitals, the ISAR-HP and G8 frailty screening questionnaires were part of the workup for older patients with the diagnosis of colorectal cancer. Both screening tools were performed by qualified nurses as part of the diagnostic workup prior to surgery. The G8 questionnaire consists of eight items with the total score ranging from zero to seventeen. It contains questions about food intake, weight loss, mobility, self-evaluation of health status, neuropsychological problems, body mass index (BMI), polypharmacy and age [19]. Patients with a score of >14 were regarded as 'fit' (G8-fit). Patients with a score of ≤14 were regarded as potentially 'frail' (G8–frail). The ISAR-HP consists of four questions about the need for assistance in instrumental activities of daily living (iADL), traveling, use of a walking device and about education. Scores range from 0 to 2 points with a maximum total score of 5. Patients with a score of <2 were regarded as 'fit' (ISAR-HP-fit). A cut-off score of ≥2 is defined as abnormal; these patients were regarded as potentially 'frail' (ISAR-HP-frail). Please see Appendix A and B in the supplementary data for more detailed information.

2.4. Data Collection

Data retrieved from the DSCA database included the following patient information: age, body mass index (BMI; kg/m^2), Charlson Comorbidity Index (CCI) [10], American Society of Anaesthesiologist (ASA) score [20], tumor location, preoperative tumor complications, tumor stage (TNM 5th edition), (neo)adjuvant treatment (radiotherapy/chemoradiation or chemotherapy) and type of resection (classified as open or laparoscopic resection). Moreover, surgical and non-surgical complications are defined as complications within 30 days of surgery. Surgical complications that needed reintervention are being registered separately and include anastomotic leakage. Non-surgical complications are registered as 1) cardiac, 2) pulmonary, 3) neurological, 4) thromboembolic, 5) infectious and 6) 'other' complications that occurred after surgery. A patient having 2 pulmonary and 2 infectious complications post surgery is registered as 1 pulmonary complication and 1 infectious complication. Additionally all re-interventions, length of hospital stay, 30-day readmissions and 30-day mortality are entered. Data entry in this database is done by a qualified data-entry manager or nurse. From electronic hospital records, the following data was extracted from the day of admission prior to surgery: Katz Index of Independence in Activities of Daily Living (KATZ-6) [21] with a cut-off ≥2 considered as activities of daily living dependent, the use of a walking device, reported falls within the 6 months before surgery, impaired malnutrition screening scores from the Short Nutritional Assessment Questionnaire (SNAQ; cut-off ≥2) [22] or Malnutrition Universal Screening Tool (MUST; cut-off ≥1) [23] and self reported cognitive impairment. In addition a delirium was registered as complication separately when it was recorded in the electronic hospital record as such by the treating or consulting physician. When applicable, the cause of death was also extracted. Through a linkage with the Municipal Personal Records Database, the exact date of death was retrieved and six-month mortality (182-days) was calculated from the date of surgery to time of death. Follow-up of all patients was at least 183 days. The regional ethics committee and institutional review board of both hospitals approved this study.

2.5. Statistical Analysis

Patients were classified as 'screened' if a G8 and/or ISAR-HP screening was performed prior to surgery. We performed descriptive analysis of patient's characteristics for both screened and non-screened patients and for the best performing screening tool. Normally distributed variables are presented as a mean with standard deviation (SD) and for non-normal distributed as a median with the interquartile range (IQR, 25th–75th percentile). The chi-square test (χ^2) was used to compare ordinal variables and the Mann–Whitney U test or unpaired T test for continues variables. Odds ratio (OR) was used as a measure for the association between ISAR-HP and G8 screening tool and primary and secondary outcomes. An OR is expressed with a 95% confidence interval. A p value ≤0.05 was considered statistically significant. All statistical analyses were performed using SPSS version 17.0 (SPSS, Inc., Chicago, IL, USA).

3. Results

A total of 268 patients aged >70 years, with colorectal cancer were identified. After exclusion of patients with emergency surgery (n = 37), Transanal Endoscopic Microsurgery (n = 4), stage IV disease (n = 7) and synchronous cancer at time of diagnosis (n = 6), a total of 214 patients were included. Of the latter, 139 patients (65%)

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