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Value of geriatric screening and assessment in predicting postoperative complications in patients older than 70 years undergoing surgery for colorectal cancer

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ABSTRACT

Objectives: This study examines the association between geriatric screening and geriatric assessment (GA) and the risk of 30-day postoperative complications (30d-POCs) in older patients undergoing surgery for colorectal cancer (CRC).
Materials and Methods: Patients were identified from a prospectively collected database (2009–2015). All patients underwent geriatric screening with the G8 screening tool and the Flemish version of the Triage Risk Screening Tool (fTRST). The patients with an abnormal G8 score (G8 ≤ 14) received a GA, including living situation, basic and instrumental activities of daily living (ADL and I-ADL), falls, fatigue, cognition, depression, nutrition, comorbidities, and polypharmacy. 30d-POCs were retrospectively collected from the medical records and classified into Clavien-Dindo severity grades. The primary endpoint was the occurrence of Clavien-Dindo grade 2 and above (CD ≥ 2) 30d-POCs. To identify predictive variables, logistic regression analyses were used.
Results: 190 patients, aged ≥70 years, were included. Seventy-eight (41.1%) had CD ≥ 2 30d-POCs, and the 30-day mortality was 1.6%. In univariable logistic regressions, the following variables were associated with CD ≥ 2 30d-POCs ($P_{Wald} < 0.05$): age, G8, ECOG-performance status (ECOG-PS), tumor location, and surgical approach. Age and surgical approach independently predicted 30d-POCs. In the G8 ≤ 14 patients (receiving a complete GA, n = 115), ADL was the only GA variable associated with CD ≥ 2 30d-POCs.
Conclusion: In this study examining the predictive value of geriatric screening and GA in predicting CD ≥ 2 30d-POCs, the G8 screening tool was associated in univariable analysis, but did not remain in multivariable analysis. In the G8 ≤ 14 group receiving GA, ADL was the only predictive GA variable.

1. Introduction

Colorectal cancer (CRC) is the third most commonly diagnosed cancer in the world [1]. It is the second leading cause of cancer in women, after breast cancer, and the third in men, after lung and prostate cancer [2]. Overall, CRC accounts for almost 10% of all new cancer diagnoses [1–3]. The highest incidence rates are in Australia, New Zealand, Canada, the United States (US), and parts of Europe [1]. Almost 60% of new cases occur in people aged 65 or older [4].

In older patients, elective colorectal surgery is generally safe; however, postoperative morbidity and mortality are higher in the older compared to the younger age groups [5–10]. Traditional preoperative risk stratification (e.g. American Society of Anesthesiologists (ASA) score, Lee score) focuses on general health status or on organ specific compromise, whereas older patients may have problems and risk factors not captured by these risk scores. In geriatric medicine, the usual method to evaluate an older patient's general condition and risk of adverse outcomes is the evidence-based process of comprehensive geriatric assessment (CGA). More than considering age alone, the CGA helps to differentiate between 'fit' and 'frail' older adults. The CGA is a systematic approach aimed to assess functional status, comorbidity,

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polypharmacy, nutrition, cognition, psychosocial, and general health status in older patients in order to develop a coordinated and integrated plan for treatment and follow-up [11–13]. Geriatric interventions and follow-up guided by a geriatric assessment (GA) might have positive effects on morbidity, functional status, mental status, length of stay (LOS), discharge destination, and mortality [14–16].

Because administering a GA is time-consuming, consensus guidelines from the National Comprehensive Cancer Network (NCCN) [17], the European Organization for Research and Treatment of Cancer (EORTC) [18], and the International Society of Geriatric Oncology (SIOG) [19] consider a 'two-step approach' as a reasonable strategy. This approach starts with geriatric screening, a brief assessment to identify frail patients in need of further evaluation, followed by a more extensive GA in the patients identified as frail. Examples of screening tools are the Flemish version of the Triage Risk Screening Tool (fTRST) and the G8 [19–20].

Several studies have attempted to identify pre-surgical risk factors for adverse postoperative outcomes in older patients with CRC by analyzing geriatric screening/GA results [21–29]; only one study investigated a screening tool [25]. Components of the GA appear to predict postoperative morbidity and mortality, LOS, readmission, and discharge destination in older patients with colorectal or other cancers undergoing surgery [21,23,28,30–32]. Hopefully, this will help us to develop risk stratification tools that identify frail older patients with an increased risk of postoperative morbidity.

The primary objective of this study was to examine the association between geriatric screening/GA-components and the risk of 30-day postoperative complications (30d-POCs) in older patients undergoing surgery for colorectal cancer (CRC). Furthermore, the diagnostic characteristics of the geriatric screening tools used (fTRST and G8) were evaluated.

2. Materials and Methods

2.1. Data Collection Procedures and Inclusion and Exclusion Criteria

The study population was derived from three subsequent, prospective, observational, multicenter cohort studies between October 2009 and February 2015 [11,13,33–34]. The original studies evaluated the implementation of geriatric screening and GA in older patients with cancer. Patients (≥70 years of age) with various tumor types presenting for a treatment decision were approached for inclusion by a trained health care worker. The health care worker performed the assessment, leading to a consult-report in the electronic medical record (screening and GA results and geriatric recommendations based on the GA results). The original studies observed the relevance of the GA and the influence of the GA on treatment decisions, analyzed the given recommendations in order to standardize them, and observed the adherence to the geriatric recommendations.

The present study consists of a sub-cohort of patients, planned for CRC surgery in the University Hospitals of Leuven (UHL). Consecutive patients were included based on their age, but for logistical reasons (different tumor types visiting on various locations in the hospital and two persons performing assessments in UHL), not all eligible patients could be entered in the study. For inclusion in this study, the geriatric screening/assessment had to reflect the patients' preoperative status. To reduce the risk of bias, patients receiving neo-adjuvant therapy were excluded because of the presumed influence on the GA results following these therapies. All colorectal surgical procedures were included, except for transanal or endoscopic approaches. Procedures were either open or laparoscopic, or converted from laparoscopic to open. From October 2009 until July 2011 all patients received geriatric screening and GA, and from August 2011 until February 2015, a 'two-step approach' was implemented and only patients who had an abnormal result on the geriatric screening (a G8 score ≤ 14/17) received GA. For this reason, only GA results for the group with an abnormal score on the G8 screening tool (considered as 'non-fit') can be considered for analysis. The 30d-POCs, mortality, and other additional outcome parameters were collected retrospectively from the medical records (by KF, JC). Missing mortality data were obtained from the national mortality registry. The study was approved by the University Hospitals of Leuven Medical Ethics Committee (S51814, S51815, S54598).

2.2. Variables

The existing database contains the following variables: gender and age, tumor location and tumor stage, date of diagnosis, the chosen therapy, the date of hospitalization, operation and discharge date, comorbidity by means of the Charlson comorbidity index (CCI) [35–36], the number of regular medications per day, Eastern Cooperative Oncology Group Performance Status (ECOG-PS) [37], and the results of the geriatric screening and GA.

Two geriatric screening tools were performed: the fTRST [38–39] and the G8 [40]. The GA included a description of the social situation, Activities of Daily Living scale (ADL) [41], Instrumental Activities of Daily Living scale (I-ADL) [42], fall history and fatigue (Mobility-Tiredness Test (Mob-T, 2009–2012) [43] or Visual Analogue Scale (VAS, 2012–2015) [44]), and polypharmacy (≥5 medications) [45]. To assess nutritional, cognitive, and emotional status, the Mini Nutritional Assessment Short Form (MNA-SF) [46], a Mini Mental State Examination (MMSE) [47], and the 15 item Geriatric Depression Scale (GDS-15) [48] were used.

In addition, the following data were retrieved from the medical records: the American Society of Anesthesiologists (ASA) grading scale [49], the type of surgery that was performed (right hemicolectomy (RHC), left hemicolectomy (LHC), high anterior resection (AR), total colectomy with ileorectal anastomosis (IRA), abdominoperineal excision of rectum (APER), Hartmann procedure (HP), total mesorectal excision (TME), palliative procedure, combinations of surgical procedures), the surgical approach (laparoscopic/open/converted), the postoperative LOS (defined as the number of postoperative days spent in the hospital until discharge or until transfer to a rehabilitation unit), the number of unplanned readmissions (defined as an unplanned hospital admission for any problem related to the initial colorectal operation within 30 days of surgery), the postoperative in-hospital mortality (between the operation and the discharge date), the surgical mortality (between the operation date and day 30), and the 1-year mortality (death within the first postoperative year).

The primary outcome of this additional study was the occurrence of Clavien-Dindo grade 2 and above (CD ≥ 2) 30d-POCs. Complications during the postoperative hospital stay (not present prior to surgery) and during unplanned readmissions within 30 days of surgery were recorded and graded into severity grades based on the morbidity scale developed by Clavien-Dindo [50]. Besides screening the discharge letters and reports of consulting physicians, the patients' records were reviewed to confirm or to uncover 30d-POCs that were not mentioned in the discharge letters.

2.3. Statistical Analysis

Dichotomized outcome variables were created for 30-day postoperative morbidity according to Clavien-Dindo: 'severe' complications (grade 2 or higher) versus 'no/minor' complications (grade 0 and 1).

In the whole group (n = 190), univariable logistic regression was used to assess the association between these outcomes and the potentially predictive factors. A stepwise multivariable logistic regression was conducted on the univariable significant covariates. Firth correction was applied when appropriate. The Wald P-value (P), Odds Ratio (OR), and 95% Confidence Interval (CI) are reported.

In the G8 ≤ 14 patients, the subgroup that received a geriatric assessment (n = 115), univariable logistic regressions were used to assess the associations between these outcomes and the potentially predictive factors. In addition to the 'whole-group' covariates, the GA covariates were analyzed. A multivariable logistic regression was further conducted as described above.