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ORIGINAL ARTICLE

Older age impacts on survival outcome in patients receiving curative surgery for solid cancer

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Summary *Background:* Given the global increase in aging populations and cancer incidence, understanding the influence of age on postoperative outcome after cancer surgery is imperative. This study aimed to evaluate the impact of age on survival outcome in solid cancer patients receiving curative surgery.
Methods: A total of 37,288 patients receiving curative surgeries for solid cancers between 2007 and 2012 at four affiliated Chang Gung Memorial Hospital were included in the study. All patients were categorized into age groups by decades for survival analysis.
Results: The percentages of patient populations aged <40 years, 40–49 years, 50–59 years, 60–69 years, 70–79 years, and ≥80 years were 9.7%, 17.7%, 27.8%, 22.1%, 16.9%, and 5.7%, respectively. The median follow-up period was 38.9 months (range, 22.8–60.4 months) and the overall, cancer-specific, and noncancer-specific mortality rates were 26.0%, 17.6%, and 8.5%, respectively. The overall mortality rate of patients in different age groups were 18.5%, 21.1%, 22.0%, 25.3%, 35.3%, and 49.0%, respectively. Compared to patients aged <40 years, more significant decrease in long-term survival were observed in aging patients. Multivariate analysis showed higher postoperative short-term mortality rates in patients older than 70 years, and the adjusted odds ratio of mortality risk ranged from 1.47 to 1.74 and 2.26 to 3.03 in patients aged 70–79 years and ≥80 years, respectively, compared to those aged <40 years.

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Conclusion: Aging was a negative prognostic factor of survival outcome in solid cancer patients receiving curative surgery. After adjustment of other clinicopathologic factors, the influence of age on survival outcome was less apparent in the elderly.

1. Introduction

Cancer-related mortality has been reported as the leading cause of death in Taiwan since the National Registry of Death database became available in 1981.[1,2] The numbers of newly diagnosed cancer and cancer-related deaths increased annually, accounting for 25% of total deaths in Taiwan in 2014.[1,2] Radical resection is the most common curative modality for localized cancers. However, surgery may result in substantial morbidity and mortality in cancer patients, especially those who are medically unfit or frail.[3–8] Prevalence of frailty, multiple comorbidities, and decline of functional reserve often increase with age. Therefore, an increase in postoperative complications, mortality, length of hospital stay, and intensive care unit admissions was observed in oncogeriatric patients.[9] The difference in the severity of postoperative complications experienced by younger and older patients became more distinct with increasing age difference.[8–10]

However, age is neither the only nor the most reliable predictor for outcome after cancer surgery because it can be affected by various factors, including physical performance, comorbidities, or organ reserve.[11–13] Overtreatment of the oncogeriatric patients can cause higher postoperative mortality if their age-related frailty is neglected. By contrast, undertreatment may lead to suboptimal prognosis in elderly patients. Owing to the unfamiliarity of health professionals with oncogeriatric patient care,[14] or lack of concern regarding their tolerance to treatment,[15] several studies have reported that older patients are less likely to be offered standard cancer treatment.[16] The high risk of postoperative mortality for aging patients should be weighed against the potential benefits, in order to determine their eligibility for surgery that may assist in the decision-making process as well as the design of alternative treatment options.[17]

Given the global increase in aging populations and cancer incidence, it is imperative to clinically understand the influence of age on postoperative outcome after cancer surgery. The aim of this study was to evaluate the impact of age on long-term and short-term outcome in patients undergoing curative surgery for solid cancer.

2. Materials and methods

2.1. Patient selection

A total of 37,288 patients who underwent operations for solid cancers between January 2007 and December 2012 at four hospitals affiliated with the Chang Gung Memorial Hospital (CGMH) system (the Linkou, Keelung, Chiayi, and Kaohsiung branches of the CGMH) were included in this study. All patients with either pathologically or radiographically diagnosed malignancies underwent radical resection of their primary cancers with a curative intent. Patients who underwent palliative resection or bypass surgery and patients with nonmelanoma skin cancers or superficial urinary bladder cancers were excluded. All patients were stratified into age groups by decades for survival analysis. This study was approved by the Institutional Review Boards of all the CGMH branches in compliance with the Helsinki Declaration (1996).

2.2. Data collection

The administrative and clinical data collected prior to the surgery included patient demographics, American Society of Anesthesiologist physical status (ASA score), and the Charlson Comorbidity Index (CCI). Patient demographics including age, sex, Eastern Cooperative Oncology Group performance status (ECOG scale), admission mode (elective or emergency), cancer history, preexisting comorbidities, anatomic location of the cancer, histological grade, and clinical tumor stage were recorded by primary care clinicians preoperatively using a prospectively formulated electronic data form. This form was introduced by the institutional cancer center in 2006 with the intent to improve quality of care for cancer patients following the implementation of the Cancer Prevention and Treatment Act in Taiwan. Data were maintained, and completeness and accuracy were ensured, by individual multidisciplinary teams and well-trained cancer center personnel. Tumor stage was recorded as localized, regional, advanced, and unclassified in compliance with the Surveillance, Epidemiology, and End Results summary staging program.[18] ASA scores were determined through preanesthesia evaluation, whereas CCIs were calculated using tabulated electronic record forms in compliance with the International Classification of Diseases (Ninth Revision) coding.[19] A modified CCI excluding the scores for patient age and cancer type was used in this study. Patients with a diagnosis of synchronic tumors or those receiving multiple surgeries for their primary tumors within the study period were assessed starting from the date of surgery for the first tumor or the first surgery, respectively. All included patients were followed until death or June 30, 2014. Overall survival, cancer-specific survival, and noncancer-specific survival were determined from the time of surgery until the date last known to be alive, date of death due to current cancer, or date of death due to any cause of death other than cancer, respectively. Patients with a history of cancer and who had

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