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How could we identify the 'old' patient in gastric cancer surgery? A single centre cohort study

Leonardo Solaini*, Silvia Ministrini, Arianna Coniglio, Sara Cavallari, Beatrice Molteni, Gian Luca Baiocchi, Nazario Portolani, Guido Alberto Massimo Tiberio

Surgical Clinic, Department of Experimental and Clinical Sciences, University of Brescia, 25123 Brescia, Italy

HIGHLIGHTS

- There is still no consensus on the definition of "the elderly" in gastric cancer surgery.
- Each institutions should identify the "elderly patient" on a local scale.
- Medical complications are significantly linked to the variable age.
- At our institutions age > 75 and ASA > 2 identified the elderly at risk in gastric surgery.
- Albumin < 2.95 was found a predictor of mortality.

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ABSTRACT

Purpose: To analyze the population submitted to gastric cancer surgery in our Institution in order to find those characteristics which could help in the identification of the elderly high-risk patient.
Methods: In a cohort of 263 patients (>65 y) we selectively investigated the risk factors for medical and surgical complications and postoperative mortality, focusing on the variable "age". All the significant variables were used to find predictors of complications with Clavien-Dindo>2.
Results: Age>75 (AUC 0.61; 95% 0.55–0.67, p = 0.003) and ASA score >2 (AUC 0.60; 95% CI 0.54–0.67, p = 0.01) were significantly associated with an increased risk of medical complications. Operative time >330 min (OR 1.00; 95% CI 1.00–1.01; p = 0.0001- AUC 0.62, 95% CI 0.56–0.68, p = 0.01) was the only significant predictor of surgical complications. In-hospital mortality (6/263 patients) was significantly associated with preoperative albumin ≤2.95 g/dl (OR 0.15; 95% CI 0.04–0.93, p = 0.041 – AUC 0.74 95% CI 0.68–0.80; p = 0.003) and additional procedures (OR 7.05; 1.23–40.32, p = 0.03). Stepwise multivariate analysis showed that albumin ≤2.95 g/dl (OR 3.43; 95% CI 1.06–11.13 p = 0.033), ASA>2 (OR 9.51; 95% CI 1.23–72.97; p = 0.042) and additional resections (OR 3.39; 95% CI 1.36–8.45; p = 0.045) were independent risk factors for complications Clavien Dindo >2.
Conclusions: Our work demonstrated that, in our institution, 75 years of age could identify the elderly in gastric surgery as those patients were at higher risk of medical complications. ASA >2, preoperative serum albumin ≤2.95 g/dl and the need of additional procedures could increase the risk of severe postoperative adverse events.

1. Introduction

The peak incidence for gastric carcinoma is reported to be between the eighth and the ninth decade [1]. In developed countries improvements in socio-economic conditions and advances in preventive medicine have led to an increased lifespan and, thus, to an increased number of elderly patients potentially eligible for major surgical procedure for gastric cancer. However, there is still debate in the medical literature about whether considering a patient too elderly to be treated as per guidelines or simply to withstand gastric surgery. Several authors have tried to address this question comparing the outcomes between an older and a younger population using different age cut-offs [2–9]. This has produced

* Corresponding author. Surgical Clinic, Department of Experimental and Clinical Sciences, University of Brescia, Pl.e Spedali Civili 1, 25123 Brescia, Italy.
E-mail addresses: leonardosolaini@gmail.com, lsolaini@unibs.it (L. Solaini).

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conflicting results [2–6,8,9], difficult to interpret and to translate into clinical practice. It must also be underlined that the definition of "elderly" could differ among various geographical regions: in fact, a patient in his eighth decade of life could have characteristics more similar to patients of the previous or subsequent decade according to biological and environmental factors. Furthermore, infrastructural variables, such as health system and hospital quality, may play important roles in the characterization of the elderly patient.

For these reasons we consider that, as a first step, the "elderly high risk patient" for gastric cancer surgery should probably be identified on a local scale.

In this paper we analyze our catchment area population submitted to gastric surgery for cancer in order to find those characteristics which could help in the identification of the elderly high-risk patient.

2. Methods

2.1. Patients and definitions

From a prospectively collected gastric cancer database we performed a retrospective analysis of all patients submitted to total/subtotal gastrectomy for gastric cancer from January 2000 to October 2015. This was performed in a tertiary university institution in order to understand those factors which could identify the high-risk elderly patients.

According to the definition of an elderly person in western countries suggested by the World Health Organization (WHO) [10] we included in our analysis only patients who were 65 or older at the time of the operation. Patients who had type I or II tumor according to the Siewert and Stein classification [11] and those who had palliative procedures, laparoscopic gastrectomy or gastrectomy plus intraperitoneal chemohyperthermia were excluded from the study.

Information about the patients' pre-existing medical comorbidities was used to calculate the Charlson Comorbidity Index (CCI) [12]. In-hospital mortality was defined as death occurring during the hospital stay. A postoperative complication was defined as any adverse event during the hospital stay.

Postoperative complications were classified according to the Clavien-Dindo system [13]. Medical complications were defined as those which did not occur in the surgical site and they included: respiratory, cardiovascular, renal and neurological disorders, and postoperative anemia defined as the need of postoperative transfusion without signs of surgical site hemorrhage. Surgical complications were defined as those related to the surgical procedure. Postoperative ileus was identified whenever a change in the postoperative oral intake protocol was recorded (prolonged fasting, positioning/re-positioning of naso-jejunal tube); pancreatic fistula was defined according to Bassi et al. [14]. The final pathologic stage was defined according to the 7th edition of the UICC/TNM classification [15].

2.2. Preoperative work-up, operative procedure and postoperative management

Each patient underwent multidisciplinary assessment before surgery. In all cases pre-operative work-up included: esophagogastroduodenoscopy and staging computed tomographic (CT) scan. Positron emission tomography/CT scan, magnetic resonance imaging and diagnostic laparoscopy were performed only in selected cases.

Broad spectrum prophylactic antibiotic cover was given at induction of anesthesia according to hospital protocol.

A mechanical standard Roux-en-Y esophagojejunostomy using a 25-mm circular stapling device was used to restore intestinal continuity in total gastrectomy. In subtotal gastrectomies gastrojejunostomy was handsewn.

D2 lymphadectomy was the standard procedure; D1α/β dissections were performed in cases of early gastric cancer.

All patients were given low molecular weight heparin subcutaneously from the day of operation once daily until discharge.

A naso-jejunal tube (NJ tube) was inserted during the procedure and was removed by the 3rd postoperative day after subtotal gastrectomy. NJ tube was not used in total gastrectomies.

2.3. Statistical analysis

The chi-square test was used to analyze the differences among categorical data while Mann-Whitney U-test was used to compare continuous variables.

Sex, age, American Society of Anesthesiologists (ASA) grade, Body Mass Index (BMI), CCI, neoadjuvant chemotherapy, preoperative laboratory values (full blood count, albumin, creatinine, urea), pT and pN stage, intraoperative variables (type of procedure, type of lymphadenectomy, operative time, splenectomy and other additional procedures), number of lymph nodes harvested were analyzed to assess whether they could have had an impact on the development of postoperative complications.

Continuous variables were presented as median and interquartile range (IQR). Logistic regression models were used in order to identify the factors related to postoperative complications (overall, medical and surgical) and mortality. Odds ratio (OR) and 95% confidence interval (95% CI) were calculated when required.

Continuous variables which were found statistically significant at logistic regression analysis were transformed to categorical variables. The appropriate cut-off and area under the curve (AUC) values were found using receiver operating characteristic (ROC) curves. Only significant variables (if continuous variable, only after their conversion to categorical) were used in the multivariate analysis in order to find predictors of complications with a Clavien-Dindo grade above 2.

A p value of <0.05 was considered statistically significant. Statistical analysis was performed with MedCalc version 10.2.0.0.

3. Results

Patient' characteristics and tumor-related variables are shown in Table 1 while operative and postoperative variables are reported in Table 2. Splenectomy was performed in 1.2% (2/156) of cases during subtotal gastrectomy and in 20.5% (22/107) of cases during total gastrectomy ($p < 0.001$). Additional resections or procedures (non-splenectomy) were more common during total gastrectomy than subtotal gastrectomy (31 vs 20 cases $p = 0.01$). Twelve patients had total gastrectomy plus splenectomy and additional resections.

Median operative time was 325 min (IQR 299-385) for total gastrectomy and 330 (IQR 276-340) for subtotal gastrectomy. Operative time was longer when an additional procedure was required than in gastrectomy alone (median 362, IQR 315-420 vs 300 IQR 275-330; $p < 0.0001$).

3.1. Analysis of postoperative morbidity

Overall postoperative morbidity was 41.1% (108/263 patients). As shown in Table 3 the majority of complications (85/108) were grade 1 or 2 according to the Clavien Dindo classification. The postoperative complication rate was 41.7% (65/156) after subtotal gastrectomy and 40.2% (43/107) after total gastrectomy ($p = 0.94$).

As shown in Fig. 1 there was a significant trend toward higher