ARCHIVOS DE BRONCONEUMOLOGIA

Original Article

Morbidity and Mortality in Octogenarians With Lung Cancer Undergoing Pneumonectomy☆

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A B S T R A C T

Objective: Evaluate the restrictiveness of selection criteria for lung resection in lung cancer patients over 80 years of age compared to those applied in younger patients. Compare and analyze 30-day mortality and postoperative complications in both groups of patients.
Methods: Case-controlled retrospective analysis.
Study population: Consecutive patients undergoing elective anatomical lung resection. Population was divided into octogenarians (cases) and younger patients (controls). Variables determining surgical risk (BMI, FEV1%, postoperative FEV1%, FEV1/FVC, DLCO and pneumonectomy rate) were compared using either Wilcoxon or Chi-squared tests. Thirty-day mortality and morbidity odds ratio were calculated. A logistic regression model with bootstrap resampling was constructed, including postoperative complications as dependent variable and age and post-operative FEV1% as independent variables. Data were retrieved from a prospective database.
Results: No statistically significant differences were found in BMI (*P*=.40), FEV1% (*P*=.41), postoperative FEV1% (*P*=.23), FEV1/FVC (*P*=.23), DLCO (*P*=.76) and pneumonectomy rate (*P*=.90). Case mortality was 1.85% and control mortality was 1.26% (OR: 1.48). Cardiorespiratory complications occurred in 12.80% of younger subjects and in 13.21% of patients aged 80 years or older. (OR: 1.03). In the logistic regression, only FEV1% was related to postoperative complications (*P*<.005).
Conclusion: Selection criteria for octogenarians are similar to those applied in the rest of the population. Advanced age is not a factor for increased 30-day mortality or postoperative morbidity.

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Morbimortalidad de la resección pulmonar en pacientes octogenarios con cáncer de pulmón

R E S U M E N

Objetivo: Valorar si los criterios de selección para resección pulmonar por cáncer son más estrictos en pacientes octogenarios que en el resto de la población. Comparar la mortalidad a 30 días y la morbilidad posquirúrgica en los 2 grupos.
Método: Análisis retrospectivo de casos y controles. La población se ha dividido en pacientes octogenarios (casos) o de menor edad (controles). Se han comparado las variables determinantes del riesgo quirúrgico (IMC, FEV1%, FEV1ppo%, FEV1/FVC, DLCO y tasa de neumonectomías) mediante la prueba de Wilcoxon o la prueba de Chi.[2] Se han calculado las *odds ratio* en tablas 2 × 2. Además, se ha construido un modelo de regresión logística con remuestreo, introduciendo como variable dependiente la presencia de complicaciones y como variables independientes edad y FEV1ppo%. La información se recuperó de una base de datos prospectiva.

Resultados: No se encontraron diferencias significativas en cuanto a IMC (p=0,40), FEV1% (p=0,41), FEV1ppo% (p=0,23), FEV1/FVC (p=0,23), DLCO (p=0,76) ni porcentaje de neumonectomías (p=0,90) entre los 2 grupos de pacientes. La mortalidad en los casos fue 1,85% y en los controles 1,26% (OR: 1,48). La prevalencia de complicaciones cardiorrespiratorias fue 12,80% en menores de 80 años y de 13,21% entre los octogenarios (OR: 1,03). En la regresión logística solo el FEV1% se relacionó con la aparición de complicaciones (p<0,005).

Conclusión: Los criterios de selección de pacientes octogenarios son similares a los del resto de la población estudiada. Tener 80 o más años no se asocia con la mortalidad de la resección pulmonar a 30 días ni con la morbilidad analizada.

Introduction

Although lung cancer can be detected at any age, the number of diagnoses in patients over the age of 80 is growing.[1] In the literature, this population has been associated with a higher incidence of postoperative complications and greater mortality.[2] In studies in which the outcomes of anatomic resection in the elderly were similar to those obtained in younger patients, authors have attributed this similarity to more restrictive patient screening.[3] In this study, we analyzed our population of octogenarian patients undergoing lung resection, evaluating 30-day mortality and morbidity. Finally, the characteristics of this population were compared with those of younger patients to determine if outcomes were related to more restrictive preoperative screening in octogenarians.

Method

Design

Retrospective case-controlled study.

Study Population

Patients consecutively scheduled for anatomic lung resection (protocolized segmentectomy, lobectomy, bilobectomy or pneumonectomy) due to lung cancer between January 2002 and December 2013 were included. Data were entered in a prospective database using two-pass verification as quality control. A total of 928 cases were analyzed.

Patient Screening Criteria

Before surgery, all patients underwent the same tests: physical examination, complete blood count and serum biochemistry, electrocardiogram, chest X-ray, computed tomography (CT) of the chest and abdomen, and bronchoscopy. PET–CT was performed in all patients included since 2007. Invasive mediastinal staging (by mediastinoscopy or endobronchial ultrasound since 2009) was performed if mediastinal lymphadenopathies >1 cm were seen on CT and if the mediastinal PET was positive. All patients performed lung function tests, including DLCO since 2009–this test was not routinely requested before then. Patients with suspected coronary disease or ECG suggestive of coronary changes were evaluated with ergometry or stress echocardiogram.

All patients were selected for surgery on the basis of absence of other comorbidities more severe than lung cancer and predicted postoperative FEV1>30% greater than predicted FEV1 for their age, sex and height, and after the case had been individually discussed by a multidisciplinary committee.

Perioperative Procedures

Perioperative management of all study patients was the same, and has been described in detail in earlier publications.[4] The surgical approach in all cases was muscle-sparing posterior thoracotomy, or either video-assisted or non-video-assisted axillary thoracotomy. The same group of anesthetists and thoracic surgeons were responsible for all anesthetic and surgical procedures, respectively. Antibiotic prophylaxis consisted of a single dose of 1500 mg cefuroxime that could be repeated if surgery was prolonged. Patients were extubated before they left the operating room, and after a few hours in the reanimation unit were transferred to the thoracic surgery ward. Bupivacaine and fentanyl were administered as postoperative analgesia via a thoracic epidural catheter for the first 3 days, followed by oral ibuprofen and paracetamol.

Nursing care and physiotherapy were the same for all patients.

Variables Analyzed

Independent variables included were age (as a binary variable: older or younger than 80 years), body mass index (BMI), FEV1%, predictive postoperative FEV1% based on the number of non-obstructed lung segments to be removed (ppoFEV1%), FEV1/FVC ratio, DLCO, and pneumonectomy rate. Dependent variables were postoperative cardiorespiratory complications (defined in previous studies[4]; in short, postoperative onset arrhythmia, nosocomial pneumonia and postoperative atelectasis) and mortality at 30 days or at any time before hospital discharge.

Data Analysis

The population was divided into 2 groups: octogenarians at time of intervention (cases) and patients younger than 80 (controls). Surgical risk variables were compared using the Wilcoxon test for continuous variables and the Chi-squared test for pneumonectomy rate. To evaluate the association between age group and 30-day mortality or morbidity, the odds ratio and the 95% confidence interval were calculated from 2 × 2 tables. A logistic regression model with bootstrap resampling was constructed with 50 replicates, including age and ppoFEV1% as independent variables, and postoperative complications, including intraoperative death, as the dependent variable. Data were analyzed using Stata SE 12.1 software (StataCorp, TX, USA).

Results

Between January 2002 and December 2013, a total of 928 anatomic lung resections were performed for lung cancer (36 segmentectomies, 736 lobectomies, 64 bilobectomies and 92 pneumonectomies). Of these, 875 were performed in patients younger than 80 years and 53 in patients aged 80 years or more. The median age of the octogenarian group was 80 years (range: 80–86). With