Original Article

The Impact of Body Mass Index Dynamics on Survival of Patients With Advanced Pancreatic Cancer Receiving Chemotherapy

Younak Choi, MD, Tae-Yong Kim, MD, Kyung-hun Lee, MD, Sae-Won Han, MD, PhD, Do-Youn Oh, MD, PhD, Seock-Ah Im, MD, PhD, Tae-You Kim, MD, PhD, and Yung-Jue Bang, MD, PhD

Department of Internal Medicine (Y.C., T.-Yon.K., K.-h.L., S.-W.H., D.-Y.O., S.-A.I., T.-You.K., Y.-J.B.), Seoul National University Hospital; and Cancer Research Institute (K.-h.L., S.-W.H., D.-Y.O., S.-A.I., T.-You.K., Y.-J.B.), Seoul National University College of Medicine, Seoul, Republic of Korea

Abstract

Context. High body mass index (BMI) is linked to an increased risk of developing pancreatic cancer (PC). However, in patients with advanced PC (APC), especially those receiving palliative chemotherapy, the impact of BMI on survival has not been investigated fully.

Objectives. To assess changes in BMI during the course of APC and their impact on patient survival, specifically for those receiving palliative chemotherapy.

Methods. Consecutive patients with APC, all of whom were treated with palliative chemotherapy, were enrolled during 2003–2010. Clinical characteristics and prognoses were analyzed.

Results. A total of 425 patients participated (median age, 60.1 years). At diagnosis of APC, patients' BMI distribution of patients was as follow: <18.5 (45, 10.6%); 18.5–19.9 (67, 15.8%); 20.0–22.4 (156, 36.7%); 22.5–24.9 (107, 25.2%); 25.0–29.9 (49, 11.5%); and ≥30.0 (1, 0.2%). Median overall survival (OS) was 8.1 months (95% confidence interval 7.2, 9.1). Precancer BMI and baseline BMI (at diagnosis) had no impact on OS. Weight loss at diagnosis (precancer weight minus weight at diagnosis) and weight loss during first-line chemotherapy (both stipulated as BMI change ≥1) were associated with shortened OS (hazard ratio, 1.300; $P = 0.012$ and hazard ratio, 1.367; $P = 0.010$, respectively).

Conclusion. In patients with APC undergoing palliative chemotherapy, decreases in BMI at APC diagnosis and during chemotherapy are more hazardous for OS than precancer BMI or baseline BMI (at diagnosis) as absolute values. Further studies are needed to validate this finding and investigate strategies to maintain BMI during chemotherapy in this setting. J Pain Symptom Manage 2014;48:13–25. © *2014 U.S. Cancer Pain Relief Committee. Published by Elsevier Inc. All rights reserved.*

Address correspondence to: Do-Youn Oh, MD, PhD, Department of Internal Medicine, Seoul National University Hospital, 101 Daehang-ro, Jongno-gu, Seoul, 110-744, Republic of Korea. E-mail: ohdoyoun@snu.ac.kr

Accepted for publication: August 13, 2013.

0885-3924/$ - see front matter
http://dx.doi.org/10.1016/j.jpainsymman.2013.08.017

Key Words
Body mass index, obesity, advanced pancreatic cancer, prognosis, survival, chemotherapy

Introduction

According to 2008 data from the World Health Organization (WHO), pancreatic cancer (PC) ranks tenth among cancer-related deaths worldwide, but it is the fifth or sixth leading cause of death in Western countries.[1] Because of the absence of early symptoms and the lack of effective tests for early detection, more than 80% of patients with PC have unresectable cancer at the time of diagnosis.[2] With palliative therapy, the median overall survival (OS) for unresectable PC is less than one year.[3] Even in patients who are eligible for surgery, recurrence of PC is common in a majority of cases, resulting in an OS of less than two years.[4]

Obesity is also increasing worldwide as a major public health problem. According to the WHO report, more than 1.4 billion adults 20 years of age and older were overweight in 2008, and of these overweight adults, more than 200 million men and 300 million women were obese.[5]

The influence of obesity on the development of PC is well established. Many epidemiologic studies indicate that high body mass index (BMI) confers a greater risk of PC, as opposed to normal BMI,[6–10] and several meta-analyses suggest that the risk of PC in the general population is in direct proportion to BMI.[11–14]

Despite this solid link between obesity and development of PC, the impact of obesity on the prognosis of patients with PC has been controversial. A retrospective review of 475 patients with both resectable and unresectable PC showed a lower survival rate in obese patients compared with those of normal weight, albeit without statistical significance (hazard ratio [HR], 1.62; 95% confidence interval, [95% CI] 0.76–3.44).[15] In patients undergoing curative resection for early-stage PC, the impact of obesity has varied. At least two studies have shown no effect of obesity on OS in this setting.[16,17] However, another report cites increased BMI (especially BMI >35) as a poor prognostic factor, correlating with diminished survival in the surgical treatment of PC,[18] whereas the opposite was true in a study in which 795 patients underwent pancreaticoduodenectomy for PC. In the latter, five-year survival rates for patients who were obese or overweight at the time of surgery were better (22.2% and 22.1%, respectively) than those of normal-to-low weight patients (15.4%, $P < 0.01$).[19] Different rates of death, relapse, operation-related death, and cancer-related death across the aforementioned studies of patients with PC who underwent resection might contribute to inconsistent results.

To the best of our knowledge, little is known regarding the influence of BMI on OS with unresectable advanced PC (APC), although this state constitutes the majority of patients with PC. Furthermore, as rates of obesity continue to increase, more patients diagnosed with APC will expectedly display high BMIs. Still, the impact of obesity at a precancer (healthy) time point or of BMI at the time of diagnosis and any fluctuations in BMI during the course of APC has yet to be investigated in terms of OS. Such research is vital in a world prone to obesity. In this study, we monitored changes in BMI during the course of APC to assess its impact on the survival of patients, specifically those receiving palliative chemotherapy.

Methods

Patients

We consecutively enrolled patients with histologically confirmed pancreatic adenocarcinoma who were all treated with gemcitabine-based palliative chemotherapy at Seoul National University Hospital during 2003–2010. Patients receiving palliative chemotherapy for other double primary advanced malignancies ($n = 11$) were excluded. Patient medical records were reviewed retrospectively. Date of diagnosis was defined as the date that a diagnosis of locally advanced PC (LAPC) or metastatic/recurrent PC (MPC) was rendered. Other parameters, including age at diagnosis, Eastern Cooperative Oncology Group performance status (ECOG PS), diabetes mellitus (DM) status, cigarette smoking, and alcohol history were recorded.