Role of Chest CT in Patients with Negative Chest X-Rays Referred for Hepatic Colorectal Metastases

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Background: Hepatic resection is the standard treatment for hepatic colorectal metastases. The lung represents the next most likely site, after the liver, of metastatic disease. Computed tomography (CT) of the chest is more sensitive than is chest x-ray in detecting metastatic lung lesions. However, the usefulness of chest CT in the evaluation of patients before hepatic resection remains uncertain.

Methods: One hundred consecutive patients with negative chest x-rays and potentially resectable hepatic colorectal metastases underwent chest CT. Patients with CT findings suggestive of metastatic disease were subjected to thoracotomy or video-assisted thoracic surgery (VATS) before laparotomy and attempted hepatic resection. The operative findings and clinical course were analyzed.

Results: Eleven of 100 patients had a positive chest CT. Four of these 11 patients had malignant lesions of the lung (three metastatic colorectal cancers and one primary lung cancer). There was no difference in median total hospital stay (8.5 days [range 7 to 13 days] vs. 8.0 days [range 3 to 49 days]), number of perioperative deaths (0 vs. 2 deaths), or long-term outcome between those patients with a positive chest CT undergoing thoracotomy/VATS and those patients with a negative chest CT. Overall, chest CT provided a positive yield of 4% and a positive predictive value of 36% for the detection of malignant lesions of the lung.

Conclusions: Chest CT only minimally improved detection of malignant lesions of the lung over chest x-ray. Thoracotomy/VATS and wedge resection of lung nodules did not adversely affect outcome. The low positive yield and low positive predictive value of chest CT in the setting of a negative chest x-ray places in question the usefulness of routinely performing chest CT as part of the extent-of-disease work-up before hepatic resection.

Key Words: Hepatic metastases—Colorectal—Computed tomography—Pulmonary metastases.
selecting patients for resection of colorectal cancer metastasized to the liver. The lungs represent the most common extraabdominal site of metastases from colorectal cancer, but are rarely the only site of metastatic disease. Therefore, radiographic evaluation of the chest plays an important role in patient selection. Traditionally, conventional chest x-ray has been used to detect pulmonary nodules. More recently, whole lung tomography has been shown to detect pulmonary metastases undetected by conventional chest x-ray. During the past 15 to 20 years, computed tomography (CT) of the thorax has been shown to be more sensitive than either conventional chest x-ray or whole lung tomography in detecting metastatic lung lesions in patients with extrahepatic metastatic colorectal cancer to the liver remains uncertain. The purpose of the present study was to evaluate the routine use of chest CT as part of the extent-of-disease work-up in this clinical setting.

MATERIALS AND METHODS

Between May 1995 and August 1996, 100 consecutive patients evaluated by the Hepatobiliary Surgical Service at Memorial Sloan-Kettering Cancer Center with potentially resectable metastatic colorectal cancer to the liver and a negative chest x-ray (in both posterior-anterior and lateral projections) were identified by chart review. As standard of care at that time, all 100 patients also underwent chest CT as part of their extent-of-disease work-up. Patients with a negative chest CT were designated as group A. Patients with chest CT findings suggestive of pulmonary metastases were designated as group B. All patients in group B were subjected to thoracotomy or video-assisted thoracic surgery (VATS) before laparotomy and attempted hepatic resection. Thoracotomy or VATS was performed within 6 weeks of the chest CT being obtained. Resectability and the decision to proceed with hepatic resection were determined either at thoracotomy/VATS or at the time of laparotomy. Patients in group A were subdivided into groups of patients undergoing hepatic resection (group A1) and patients determined to be unresectable (group A2). Likewise, patients in group B were divided into subgroups of patients undergoing hepatic resection (group B1) and patients determined to be unresectable (group B2). Unresectability at thoracotomy/VATS was defined as the presence of multiple, previously unrecognized pulmonary metastases that could not be completely resected and maintain an adequate pulmonary reserve. Unresectability at time of laparotomy was defined as the presence of intraabdominal, extrabiliary metastatic disease (i.e., nodal or peritoneal metastases) or the presence of extensive bilobar hepatic metastases that would not allow salvage of at least two segments of the liver.

The following parameters were recorded and analyzed: demographics (i.e., number of patients, median age, male:female ratio); CT/thoracotomy/VATS findings; resectability of liver metastases; perioperative outcome (i.e., total hospital stay, perioperative deaths); and long-term outcome (i.e., follow-up interval, recurrences, time to recurrence, disease status). Total hospital stay for patients with a negative chest CT was defined as the number of days each patient was hospitalized for laparotomy/hepatic resection. Total hospital stay for patients with a positive chest CT was defined as the sum of the number of days each patient was hospitalized for both laparotomy/hepatic resection and thoracotomy/VATS, whether these procedures were performed during a single or separate admissions to the hospital. Perioperative death was defined as death occurring within 30 days of the operation or during the same hospitalization. Data are expressed as median values (range). Age of patients, total hospital stay, follow-up interval, and time to recurrence were analyzed by Student’s t-test. Perioperative deaths and recurrences were analyzed by Fisher’s exact test.

RESULTS

Demographics

There were 89 patients in group A and 11 patients in group B. The median age for group A was 63 years (range 31 to 81 years), as compared to 62 years (range 39 to 81 years) for group B (P = .92). The male:female ratio for group A was 1.0:1.0 (45 males:44 females), as compared to 4.5:1 (9 males:2 females) for group B.

Thoracotomy/VATS Findings

Patients in group B were subjected to thoracotomy or VATS and wedge resection of lung nodules before hepatic resection was contemplated (Table 1). Four of these 11 patients were found to have malignant lesions of the lungs. On pathologic examination, malignant lesions of the lungs ranged in size from 0.5 cm to 1.8 cm. Metastatic adenocarcinoma of colorectal origin was found in three of these four patients. One patient had a 0.7-cm deposit of metastatic adenocarcinoma in the right upper lobe (RUL). A second patient had 0.8-cm and 1.8-cm deposits of metastatic adenocarcinoma in the right middle lobe (RML) and a 0.8-cm deposit of metastatic...