Hepatic Abnormalities Identified on Abdominal Computed Tomography at Diagnosis of Uveal Melanoma

Eric G. Feinstein, BS; Brian P. Marr, MD; Corinne B. Winston, MD; David H. Abramson, MD

Objective: To determine the prevalence of hepatic abnormalities identified during abdominal computed tomography (CT) performed within 1 month of the diagnosis of primary uveal melanoma.

Methods: Retrospective review of CT reports generated within 1 month following diagnosis of uveal melanoma in 91 patients at Memorial Sloan-Kettering Cancer Center, New York, New York, from 2004 to 2009.

Results: Of 198 patients reviewed, 91 (46%) had a CT scan within 1 month of uveal melanoma diagnosis; 1 or more hepatic abnormalities were identified in 50 of these patients (55%). Abnormalities included 38 focal (13 solitary, 25 multiple) and 15 diffuse (11 partial, 4 complete) lesions. Six patients had hepatic lesions suspected to be metastatic melanoma, but this was confirmed in only 3. Lesions suspected to be metastases were more likely multiple than solitary ($P = .03$). Thirty-nine patients had other lesions, most commonly lesions that were too small to be characterized, a fatty liver, and hepatic cysts. Lesions in 3 of 50 patients with abnormalities could not be classified. Neither the protocol (triphasic vs nontriphasic) nor the center where the scan was performed (Sloan-Kettering vs other) was significantly related to the likelihood of identifying hepatic abnormalities in a given patient ($P = .46$ and $P = .1$, respectively).

Conclusion: Although hepatic abnormalities were frequently identified in patients who underwent CT within 1 month of uveal melanoma diagnosis, metastatic disease was confirmed only in the setting of multiple lesions in only a minority of patients.


It is recommended that patients with newly diagnosed primary uveal melanoma be evaluated for extraocular metastasis, as 20% to 25% of patients with primary uveal melanoma develop systemic disease within 5 years.1,2 In the Collaborative Ocular Melanoma Study, it was noted that less than 1% of patients with combined (large and medium) uveal melanoma tumors had abnormal liver function test results, and 2.5% had abnormal chest radiographic results.3 In addition, these tests have been found to have a high specificity but low sensitivity and are not an effective or reliable way to screen for metastasis.4 The sensitivity and specificity for patients in the Collaborative Ocular Melanoma Study who had abnormal liver function test results before diagnosis of metastasis were 14.7% and 92.3%, respectively.3 Chest radiography had a sensitivity and specificity of 1.8% and 100%, respectively.3

Uveal melanoma most often metastasizes hematogenously to the liver.1,2,6,7-13 The finding of distant metastases in patients with enucleated uveal melanoma who lack any local tumor recurrence suggests that micrometastases occur prior to diagnosis.14,15 Identification of a reliable liver screening test is warranted because the initial site of metastasis is the liver in 46% of patients,13 and 71.4% to 93% of patients eventually develop hepatic metastases during the course of their disease.2,10,11,13 In response to the Collaborative Ocular Melanoma Study findings that discounted the use of liver function tests and chest radiography as screening tools for metastases, we began screening our patients with preoperative computed tomographic (CT) scans.

Computed tomographic scans are often used to stage malignancy and monitor therapeutic progress.16-20 The coincidental detection of nonmalignant hepatic abnormalities on CT scans is one obstacle that has been encountered in the use of CT as a screening tool for metastatic disease. For example, a nonmalignant lesion is found in 13% to 35% of patients with breast cancer, depending on the size of the lesion.20,21 When we began routine screening, we noted that many of the CT scans had abnormalities.
Studies have suggested that the triphasic protocol may be more useful when screening for hepatic metastases.\textsuperscript{32,33} This protocol evaluates the liver in 3 different phases (unenhanced, hepatic arterial, and portal venous) to help identify a wide variety of abnormalities. The unenhanced images provide more consistent lesion measurement; hepatic arterial images help detect hypervascular lesions; and the portal venous images are better at identifying hypovascular malignancies.\textsuperscript{32-36} For most CT scans, imaging collimations are usually between 5 and 8 mm, though this depends on the institution doing the study and the size of the liver.\textsuperscript{32,34-36}

The present study is a retrospective review of the initial CT findings in patients with recently diagnosed primary uveal melanoma at Memorial Sloan-Kettering Cancer Center. The purpose of the study is to help document the prevalence and type of hepatic abnormalities detected at the initial CT scan (not to assess the sensitivity, specificity, or accuracy of CT) to provide guidance for practicing physicians in terms of what results they can expect from an initial abdominal CT scan in a patient with uveal melanoma.

The medical records of 198 patients referred to Memorial Sloan-Kettering Cancer Center with uveal melanoma diagnoses from 2004 to 2009 were reviewed to identify those who underwent an abdominal CT scan within 1 month of diagnosis. Pregnant patients and those who had a CT scan more than 1 month after receiving their diagnosis were excluded. The electronic medical records were searched for the patient’s age at diagnosis, sex, the time between diagnosis and initial CT scan, the center where the CT scan was performed (Memorial Sloan-Kettering Cancer Center vs other), and the type of CT protocol (triphasic vs nontriphasic).

Based on the original radiology reports, the CT scan results were classified into 1 of the following 4 groups: normal-appearing liver, hepatic abnormality detected (but not attributable to metastatic melanoma), questionable metastasis (unable to classify), and suspicious for metastatic disease. Subsequent imaging reports (if available) were also reviewed when initial CT scans could not be classified. If the scan was suspicious for metastatic disease, a biopsy was performed whenever possible, and the pathology and cytology reports were also reviewed. Of the 6 lesions suspected of being metastatic disease, only 4 had biopsies because one patient refused the procedure and another patient’s lesion was evaluated with further imaging studies rather than biopsy for reasons unknown to the authors. Lesions were classified as either focal (solitary or multiple) or diffuse (partial or complete). A $t$ test ($df = 1$) was performed to determine whether or not any statistically significant relationship existed between the finding of hepatic abnormalities on the CT scan and the type of CT protocol used or the particular center where the scan was administered. Owing to the small sample of patients with CT scans containing lesions suspected of being metastatic, a binomial proportion test was carried out to determine whether or not suspicious lesions were significantly more likely to be multiple or solitary. This retrospective analysis was performed with Memorial Sloan-Kettering Cancer Center institutional review board approval.

Of the 198 patients who received a diagnosis of uveal melanoma at our institution from 2004 to 2009, 91 (46\%) underwent CT examination of the abdomen within 1 month. The 91 patients (49 men and 42 women) had a mean age of 60 years at initial diagnosis (median, 61 years; range, 18-84 years) and a mean latency from diagnosis of uveal melanoma to initial CT examination of 8 days (range, $\sim$8 to 31 days).

Forty-one (45\%) of the patients’ initial CT scans were classified as normal and 50 (55\%) had an abnormality detected. The distribution for each of the groups and their respective subgroups are shown in Figure 1. Three of

![Figure 1](https://archopht.jamanetwork.com/)

**Figure 1.** Flow diagram shows results of retrospective review of computed tomography (CT) scan reports at Memorial Sloan-Kettering Cancer Center, New York, New York, from 2004 to 2009. TSTC indicates lesions too small to be characterized.
the 91 patients (3.3%) had confirmed hepatic metastasis. Of the abnormal CT scans, there were both focal (13 solitary and 25 multiple) and diffuse (11 partial and 4 complete) lesions. Neither the CT protocol (triphasic or nontriphasic) nor the location (Memorial Sloan-Kettering Cancer Center or other) of the CT scan showed a significant difference between normal and abnormal readings ($P = .46$ and $P = .1$, respectively). For reports classified as suspicious for metastasis, lesions were significantly more likely to be multiple than solitary ($P = .03$).

**COMMENT**

Previous studies have shown that the frequent finding of incidental, benign lesions confounds the use of abdominal CT as a screening tool for metastatic disease. In 1 study, benign hepatic tumors and other abnormalities were found in 52% of men between the ages of 35 and 69 years at autopsy, with the number of lesions increasing with age. Jones et al reported that 17% of patients had hepatic lesions that were 15 mm or smaller, and most of these patients had a concurrent extrahepatic malignant tumor. In 2 breast cancer studies, initial CT scan detected hepatic lesions 10 mm or smaller in 13% of patients and 15 mm or smaller in 35%. Another breast cancer study reported that hepatic lesions 15 mm or smaller were identified on initial CT in 30% of patients with no definite liver metastasis. Because these studies only documented small lesions, the percentage of patients with any type of hepatic abnormality is estimated to be even greater.

The current study reports that the prevalence of benign findings on abdominal CT similarly complicates screen-
ing for hepatic metastasis in patients with recent diagnoses of uveal melanoma. Computed tomography commonly detects a variety of benign hepatic abnormalities, including cysts, lesions that are too small to characterize, hemangiomas, and a fatty liver. The current retrospective review identified lesions that were too small to be characterized, fatty livers, and hypoattenuating cysts as the 3 most common benign abnormalities found in the setting of uveal melanoma (Figure 2). Although hepatic abnormalities were identified in 55% of patients with uveal melanoma, only 3.3% were confirmed to be metastatic melanomas. It is important to acknowledge the possibility that the lesions classified at the initial CT as too small to characterize may have been metastatic melanomas that went undetected. Therefore, the 3.3% value may underestimate the incidence of metastatic disease in these patients. A future study reviewing follow-up CT reports for these patients would help clarify our findings.

Although triphasic CT is often preferred over standard CT for detecting and characterizing hepatic lesions, in the current study, the incidence and pattern of nonneoplastic lesions detected were not significantly related to the CT protocol used or the center where the scan was performed and reviewed. While our results suggest that neither the technique nor the location of the scan influenced the detection of hepatic abnormalities, only a rigorous, randomized prospective study could validate this observation.

Studies have shown that the likelihood of detecting a malignancy on an abdominal CT scan increases with the number of lesions identified. The results of the current study provide further support for this finding. Patients with multiple lesions, rather than 1, were significantly more likely to have lesions suspected of being metastatic melanoma (P = .03). Although the identification of multiple lesions on a CT scan does not, in and of itself, indicate a diagnosis of metastatic disease, the finding is significant in that it increases the likelihood that a particular patient has a metastatic lesion and it should raise a physician's clinical index of suspicion. These results may help physicians who wish to provide guidance to their patients in terms of what resection of a CT scan following a diagnosis of uveal melanoma.

Submitted for Publication: August 13, 2009; final revision received November 17, 2009; accepted November 19, 2009.

Correspondence: David H. Abramson, MD, Ophthalmic Oncology Service, Memorial Sloan-Kettering Cancer Center, 70 E 66th St, New York, NY 10065 (abramso@mskcc.org).

Financial Disclosure: None reported.

Funding/Support: This study was partly supported by The Fund for Ophthalmic Knowledge Inc.

REFERENCES


Be sure to visit the Archives of Ophthalmology Web site (http://www.archophthalmol.com) and try your hand at our Clinical Challenge Interactive Quiz. We invite visitors to make a diagnosis based on selected information from a case report or other feature scheduled to be published in the following month’s print edition of the Archives. The first visitor to e-mail our Web editors with the correct answer will be recognized in the print journal and on our Web site and will also be able to choose one of the following books published by AMA Press: Clinical Eye Atlas, Clinical Retina, or Users’ Guides to the Medical Literature.