CASE REPORT

Case Report

Bone Tumor of the Scapula in a Patient Undergoing Liver Transplantation

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Abstract

Background De novo malignancies are serious complications in the late postoperative period after liver transplantation. The most common de novo tumors are skin malignancies, posttransplantation lymphoproliferative disorder, tumors of the head and neck, and Kaposi's sarcoma. Such posttransplant de novo malignancies are apparently rarely found in bone.

Case Description We describe a patient with a low-grade, aggressive fibrous histiocytoma of the scapula. The patient had undergone liver transplantation 6 years earlier. En bloc resection of the tumor and limb salvage was performed. At the 2-year followup the patient had no signs of local recurrence or metastatic spread; the patient had a Musculoskeletal Tumor Society (MSTS) score of 87.

Literature Review A literature review suggests the main predisposing factors to such malignancies are immunosuppression and its length of use. According to the literature, tumors apparently are rare in bone after liver transplantation, with no clearly documented cases. However, in the presence of such a finding, our study might be the first clearly documented case study of this kind of bone tumor.

Clinical Relevance We describe a patient with a bone tumor after liver transplantation. Our literature review suggests liver transplantation and long-term immunosuppression played a role in this patient's tumor.

Introduction

De novo malignancies are a serious complication in the late postoperative period after liver transplantation. The probabilities of a de novo neoplasm increase from 13% at 5 years to 26% at 8 years after liver transplantation [18], a percentage that is higher than that in a healthy age-matched population [2, 4, 12]. The common de novo tumors were skin malignancies, posttransplantation lymphoproliferative disorder, tumors of the head and neck, and Kaposi's sarcoma. Bone involvement is rare and difficult to diagnose. We found only one report of documented bone sarcoma after liver transplantation [17], although there were no additional data or analysis of this patient. We report the case of a patient with a low-grade, aggressive fibrous histiocytoma of the scapula that had been treated 6 years earlier by liver transplantation.

Case Report

A 38-year-old man presented to us with right shoulder pain of 1-month duration. He had undergone successful

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living-donor orthotopic liver transplantation 6 years previously for hepatocellular carcinoma. There was no history of trauma. The patient denied fever, chills, weight loss, and systemic symptoms and received immunosuppressive therapy based on tacrolimus combined with steroids. His family history was unremarkable and without hypertension, diabetes mellitus, or dyslipidemia. On physical examination there were no overlying skin changes and no visible masses. The patient had tenderness in the acromial–glenoid region of the right shoulder. Active ROM was limited to 70° abduction and 50° forward flexion. Passive ROM was normal. The neurovascular examination of the involved extremity was normal, and there was no lymphadenopathy. Laboratory tests, including complete blood cell count, serum chemistries, and erythrocyte sedimentation rate, were within normal limits.

Plain radiography and CT (Fig. 1) revealed an osteolytic lesion involving the right acromial–glenoid complex with pathologic fracture. A positron emission tomography (PET)–CT scan revealed increased focal uptake to the right scapula with central photopenia (Fig. 2). There was no evidence of disease elsewhere by PET-CT.

We performed a CT-guided posterior needle biopsy because of the concern of malignancy and the difficulty in accessing the lesion. Biopsy suggested intermediate-grade fibrous histiocytoma (Fig. 3). Once the final tissue diagnosis was available, en bloc resection of the tumor and surrounding tissues and limb salvage were performed (Fig. 4). A combined anterior and posterior approach was used (utilitarian shoulder girdle incision). A total scapular prosthesis with cemented humeral component was used for limb salvage (Fig. 5). Intraoperative pathology consultation indicated negative margins.

Fig. 1 An axial CT scan shows an osteolytic lesion involving the right acromial–glenoid complex with a pathologic fracture.

The resected tumor tissue was processed for routine histology and immunohistochemical stains. Histologic examination showed the tumor consisted of a mixture of spindle cells admixed with diffuse multinucleated giant cells, bone cells, and osteoblasts, the trabecular bone was invaded, and a few atypical mitoses and mild nuclear atypia were observed. Immunohistochemistry results

Fig. 2 The positron emission tomography–CT scan revealed increased focal uptake to the right scapula and without evidence of disease elsewhere.

Fig. 3 Histologic examination of the large-bore needle biopsy specimen showed the tumor consisted of a mixture of spindle cells admixed with diffuse multinucleated giant cells, bone cells, and osteoblasts, and invaded (black arrow) the trabecular bone (Stain, hematoxylin and eosin; original magnification, $\times 200$).

Fig. 4 The resected scapula is shown in this photograph.

Fig. 5 A frontal radiograph shows the total scapular prosthesis.

were: vimentin (++), CD68 (+), CD34 (+), smooth muscle actin (+), CK (–), desmin (–), S-100(–), HepPar1 (–), and CD57 (–). The histologic features and staining profiles were consistent with low-grade, aggressive fibrous histiocytoma (Fig. 6). Considering the tumor was Grade 1, chemotherapy and radiotherapy were not administered. Twenty-four months after resection, there was no sign of local recurrence or metastatic dissemination. The patient was pain-free and with normal hand and elbow function. The MSTS functional score was 87.

Fig. 6 The photomicrograph shows the tumor consisted of a mixture of spindle cells (blue arrow) admixed with diffuse multinucleated giant cells (black arrow), bone cells, and osteoblasts. A few atypical mitoses and mild nuclear atypia were observed (Stain, hematoxylin and eosin; original magnification, $\times 400$).

Discussion

De novo neoplasia is a frequent complication in liver transplant recipients and occurs in 4.7% to 15.7% of patients [16]. It is also one of the most frequent causes of death in long-term survivors, accounting for 25% of the deaths among patients who have survived more than 3 years after orthotopic liver transplant. [10]. Skin malignancies [1], posttransplantation lymphoproliferative disorder [8], tumors of the head and neck [11], and Kaposi's sarcoma [19] all have been reported as de novo tumors after liver transplantation. Haagsma et al. [4] studied 528 patients who underwent orthotopic liver transplantation, 98 of whom had cancer develop, among which 25% were skin malignancies. Sixty-seven patients had at least one noncutaneous malignancy for an overall incidence of 12.7%, 18% had posttransplant lymphoproliferative disease, 14% had lung cancer, 4% had Kaposi's sarcoma, 7% had genitourinary malignancies, and 17% had oropharyngeal or laryngeal cancer. Watt et al. [17] also analyzed 798 adults in a multiple-center study (Mayo Clinic, University of Nebraska, and University of California at San Francisco), who received transplants; 171 adult patients had 271 de novo malignancies develop; 147 were skin-related, 29 were hematologic, and 95 were solid organ cancers. Only one malignancy was found in bone and there was no further description of that patient.

The main risk factor of de novo neoplasia has been attributed to the lifelong immunosuppression that recipients of orthotopic liver transplantation must endure after the transplant [3]. It is biologically plausible immunosuppression could predispose patients to de novo malignancy after orthotopic liver transplantation. Immunosuppression from any cause (genetic, AIDS, or drug-induced) is associated with a higher incidence of malignancy than that for

immunocompetent individuals. One retrospective study suggested a dose-dependent relationship of immunosuppressive agents to the occurrence of de novo malignancy [2]. Direct carcinogenic effect of immunosuppressive medications and cyclosporine-induced cancer cell progression also has been suggested [5].

De novo malignancies in solid organ transplantation appear to have an aggressive pattern with 62% being high grade and 40% being metastatic at the time of a primary diagnosis. The recurrence rate is 30% and the 5-year survival rate is 25% [6, 9, 14, 15]. The increased aggressiveness of de novo malignancies after liver transplantation also is believed to be the result of depression of the immune system, viral and opportunistic infections, genetic predisposition, and possibly immunosuppression. The most important triggering factor for the development of de novo malignancies is probably long-term exposure to immunosuppressive agents [1, 11]. Other risk factors for the development of de novo malignancies such as Epstein-Barr virus seronegativity (for lymphoma), ulcerative colitis (for colorectal cancer), sun radiation (for skin cancer), and smoking (for lung, head and neck, and urological cancer) were not found in our patient [3]. The absence of such risk factors suggests the possibility that immunosuppression could have caused the sarcoma in our patient.

Sapisochin et al. [13] suggested de novo malignancies should be treated aggressively in the same way and following the same guidelines as for tumors occurring in patients who are not immunosuppressed. They found patients who received surgical treatment for de novo malignancies had better survival. Approximately 95% of patients with sarcomas of the shoulder girdle can be treated by limb-sparing resection without recurrence [7]. We therefore performed en bloc resection of the tumor in our patient.

Although the occurrence of a bone tumor after liver transplantation was reported in one series [17], we describe the case of a patient with such a tumor in detail. Our finding also suggests the possibility of an aggressive fibrous histiocytoma after liver transplantation with chronic immunosuppression. Aggressive en bloc resection achieved short-term local control in our patient.

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