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Relapsed primary extraskeletal osteosarcoma of liver: A case report and review of literature

Di QY *et al*. Primary ESOS of liver

Abstract

BACKGROUND

Extraskeletal osteosarcoma (ESOS) is a highly malignant osteosarcoma that occurs in extraskeletal tissues. It often affects the soft tissues of the limbs. ESOS is classified as primary or secondary. Here, we report a case of primary hepatic osteosarcoma in a 76-year-old male patient, which is very rare.

CASE SUMMARY

Here, we report a case of primary hepatic osteosarcoma in a 76-year-old male patient. The patient had a giant cystic-solid mass in the right hepatic lobe that was evident on ultrasound and computed tomography. Postoperative pathology and immunohistochemistry of the mass, which was surgically removed, suggested fibroblastic osteosarcoma. Hepatic osteosarcoma reoccurred 48 d after surgery, resulting in significant compression and narrowing of the hepatic segment of the inferior vena cava. Consequently, the patient underwent stent implantation in the inferior vena cava and transcatheter arterial chemoembolization. Unfortunately, the patient died of multiple organ failure postoperatively.

CONCLUSION

ESOS is a rare mesenchymal tumor with a short course and a high likelihood of metastasis and recurrence. The combination of surgical resection and chemotherapy may be the best treatment.

Key Words: Extraskeletal osteosarcoma; Hepatic; Primary; Relapsed; Case report

Di QY, Long XD, Jing N, Chen ZH, Mao ZQ. Relapsed primary extraskeletal osteosarcoma of liver: A case report and review of literature. *World J Clin Cases* 2022; In press

Core Tip: Hepatic osteosarcoma is a rare mesenchymal tumor with a short duration and a high likelihood of metastasis and recurrence and is difficult to distinguish from other tumors by imaging. If hepatic osteosarcoma is suspected, a biopsy and surgery should be performed as soon as possible.

INTRODUCTION

Extraskeletal osteosarcoma (ESOS) is a highly malignant osteosarcoma that occurs in extraosseous tissues. It is characterized by a low incidence, invasive growth, a high likelihood of metastasis and recurrence, and a poor prognosis[1]. ESOS often involves the soft tissues of the limbs. Few reports of ESOS occurring in organs are available, and relevant publications are mostly case reports[2,3]. The pathogenesis of ESOS is still unclear. The imaging manifestations of hepatic osteosarcoma are not specific, and its diagnosis depends on pathology and immunochemistry. The treatment of ESOS mainly relies on the combination of surgery, radiotherapy, and chemotherapy.

CASE PRESENTATION

Chief complaints

A 76-year-old male was readmitted to the hospital on September 14, 2020, due to abdominal distension and pain.

History of present illness

The patient had a history of resection of malignancy and had undergone surgery for right hemihepatectomy more than a month prior; however, the patient's symptoms improved until significant abdominal distension developed a week ago.

History of past illness

On July 20, 2020, the patient was admitted to the hospital due to aggravation of existing abdominal pain and discomfort. Abdominal color Doppler ultrasound suggested a giant mixed echogenic mass in the right hepatic lobe, and color Doppler flow imaging

revealed a small number of blood flow signals in and around the mixed echogenic mass (Figure 1). Computed tomography (CT) indicated liver enlargement and a giant cystic-solid mass in the right hepatic lobe, and an enhanced scan showed mild to moderate enhancement of the solid component of the mass (Figure 2). On July 21, 2020, a hospital-wide general consultation was held. After analyzing the patient's imaging data, laboratory findings, and physical signs, doctors concluded that the large intrahepatic mass was malignant and that a mesenchymal origin was probable; furthermore, the patient was in a hypercoagulable state, and blood clots may occur during or after surgery. Ultimately, doctors who participated in the consultation believed that surgical resection and chemotherapy constituted the best treatment for patients, as did the patient and his family. On July 28, 2020, the patient underwent right hemihepatectomy. During the operation, a cystic-solid mass was observed in the section of the liver next to the liver capsule. The cystic fluid was already lost, and the grayish-red and grayish-yellow solid areas of the tumor were soft with a cut-fish-like surface (Figures 3). A rapid intraoperative pathology examination suggested mesenchymal sarcoma. Immunohistochemistry yielded the following results: CK (pan) (-), EMA (-), CD34 (-), S-100 (-), SMA (scattered -), STAT6 (-), Ki67 (+, 30%), SATB2 (partially weak +), p16 (-), CD163 (scattered +), CD68 (scattered +), CD56 (-), desmin (-), and H-Cald (-). Postoperative pathology and immunohistochemistry suggested fibroblastic osteosarcoma (Figures 4 and 5). The patient received capecitabine monotherapy and was discharged on August 30, 2020.

Personal and family history

The patient denied any family history of malignant tumors.

Physical examination

The abdominal muscles of the upper abdomen were slightly tense, tenderness was noted in the right upper quadrant, and percussion pain was evident in the liver area;

the abdominal mass was not touched, and an old scar measuring approximately 14 mm long was visible in the right upper quadrant.

Laboratory examinations

Laboratory tests indicated that inflammatory indicators were elevated, and cancer antigen 125 was slightly increased, suggesting poor liver and coagulation functions. In addition, alpha-fetoprotein was 7.86 ng/mL, a hepatitis B virus (HBV) surface antigen test and hepatitis C antibodies were negative, and HBV-DNA was < 1.00E + 02 IU/mL.

Imaging examinations

Whole-abdomen nonenhanced and contrast-enhanced CT examinations indicated that the residual liver parenchyma had a patchy lesion with mixed attenuation and apparently uneven enhancement near the inferior vena cava and that the hepatic segment of the inferior vena cava was significantly compressed and narrowed (Figure 6), suggesting tumor recurrence.

FINAL DIAGNOSIS

Given the patient's medical history, the final diagnosis was ESOS recurrence.

TREATMENT

Considering that the patient had inferior vena cava compression, stenosis, and a large amount of ascites, inferior vena cava stent implantation and transcatheter arterial chemoembolization were carried out on September 22, 2020.

OUTCOME AND FOLLOW-UP

The patient died on September 29, 2020, due to multiorgan failure after surgery.

DISCUSSION

ESOS is a highly malignant osteosarcoma that occurs in extraosseous tissues. This tumor was first reported in 1941 by Wilson[5]. Its incidence is low, and it occurs primarily in elderly adults. The average age of patients with ESOS is 47.5 to 61 years. ESOS accounts for 1% of all soft tissue sarcomas and 4% of osteogenic osteosarcomas[6]. ESOS is characterized by invasive growth, a high likelihood of metastasis and recurrence, and a poor prognosis[1]. The initial clinical symptom is usually a painless mass[7]. ESOS often involves the soft tissues of the limbs. Few reports of ESOS occurring in organs are available, and most publications are case reports[2,3]. This study reports a primary osteosarcoma occurring on the liver, which is very rare, and only 13 articles were found in the literature search[2,8-19]. Of these patients, ten cases occurred in men, and three occurred in women. Five of the patients had underlying liver cirrhosis. Sumiyoshi and Niho[9] proposed possible tumorigenesis in mesenchymal tissue that proliferates in cirrhosis. However, in our case, the patient had no history of liver cirrhosis or chronic HBV and hepatitis C infection.

The pathogenesis of ESOS is still unclear. Two theories on the pathogenesis of ESOS have been proposed[20]: (1) The tissue residual theory: Residual mesenchymal components from the embryonic development stage form bone and osteosarcomas; and (2) The metaplasia theory: Interstitial fibroblasts in muscle tissues are converted into osteoblasts and chondroblasts in response to internal or external stimuli and then evolve into osteosarcoma. Currently, most scholars support the metaplasia theory. According to their origin, ESOS are classified as primary or secondary ESOS[4]. Primary ESOS occurs in extraskeletal organs and soft tissues and does not attach to the bone or periosteum. No primary ESOS is of bone origin. In contrast, secondary ESOS is mostly metastases from an osteosarcoma of bone origin to the extraskeletal organs and soft tissues or is secondary to certain primary diseases, such as myositis ossificans. In this report, except for the cystic-solid mass in the liver, no evidence of primary tumors or primary bone lesions was found. Therefore, osteosarcomatous foci in other parts of the body were excluded.

Although imaging examinations can help identify lesions, the imaging findings of hepatic osteosarcoma are nonspecific and not different from those of a variety of tumor-like lesions; consequently, hepatic osteosarcoma is difficult to accurately diagnose preoperatively. In this study, the hepatic osteosarcoma manifested as a cystic-solid mass. The histology of hepatic osteosarcoma is similar to that of skeletal osteosarcoma. Although the direct production of osteoid components by osteosarcoma cells has significant diagnostic value, it has no specificity[21]. Pathologists diagnose ESOS based on the appearance of osteoid matrix and osteoblastic-like tumor cells, the differentiation of tumors without fat cells, myogenic or neurogenic properties, and the absence of dedifferentiated or highly differentiated liposarcoma components at specimen crossover and microscopy[22,23]. In this study, immunohistochemistry suggested SATB2 (partially weak+). Special AT-rich sequence-binding (SATB2) is a nuclear matrix-associated protein. SATB2 expression has tissue and stage specificity, and SATB2 is specifically expressed in glandular cells of the lower digestive tract and osteoblasts of bone tumors, which can be used as a marker for differential diagnosis[19]. This case is morphologically consistent with mesenchymal-derived sarcoma, with tumor cells producing a bone-like stroma, combined with positive immunohistochemical SATB2, which is consistent with the diagnosis of osteosarcoma. Therefore, the diagnosis of hepatic osteosarcoma still relies on pathology and immunochemistry.

At present, the treatment of ESOS mainly relies on the combination of surgery, radiotherapy, and chemotherapy. Radical surgery is considered to reduce local recurrence of ESOS but has no obvious inhibitory effect on the distant metastasis of tumors. As adjuvant therapies for ESOS, radiotherapy and chemotherapy are helpful for improving the tumor resection rate and reducing local recurrence and distant metastasis. Since osteosarcoma is a malignant tumor, ESOS has a short course, rapid progression, a high local recurrence rate, and a high risk of distant metastasis[2]. Lee *et al*[20] reported that the 5-year survival rate of a group of patients diagnosed with ESOS was only 37% and that most of them died within 2 to 3 years after the initial diagnosis. Studies have demonstrated that distant metastasis, large tumors (≥ 10 cm), tumors of

the axial skeleton, and advanced age are poor prognostic factors for ESOS, while radiotherapy and chemotherapy have no significant correlation with mortality[25-28]. The patient described in this study was 76 years old. He had a large intrahepatic tumor measuring 17-18 cm. After surgical resection, he underwent chemotherapy. However, local recurrence occurred within a short time after surgery, and the disease progressed rapidly. The patient died within 3 mo after symptom onset. Among the 13 primary hepatic osteosarcoma cases in the literature, most patients died within 2 to 4 mo after initial diagnosis[8-19], but one article reported no tumors within 3 years of surgical resection and adjuvant chemotherapy[17]. At present, the treatment methods for hepatic osteosarcoma are similar to those used for other soft tissue sarcomas. Because this disease is rare, no evidence-based treatment plan has been established to date. Surgical resection combined with adjuvant chemoradiotherapy seems to be the best treatment option[24,25,28-30].

CONCLUSION

Hepatic osteosarcoma is a rare mesenchymal tumor with a short course and a high likelihood of metastasis and recurrence and is difficult to distinguish from other tumors by imaging. Its diagnosis still relies on pathological and immunochemical examinations. Compared with simple surgery or chemotherapy, the combination of surgical resection and chemotherapy may be the best treatment for the disease, which can slow disease progression, reduce the recurrence frequency, and prolong patient survival.

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