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Laparoscopic treatment of inflammatory myofibroblastic tumor in liver: A case report

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Abstract

BACKGROUND

Inflammatory myofibroblastic tumor in liver (IMTL) is a rare borderline mesenchymal tumor. Neither clinical symptoms nor laboratory tests have absolute specificity for the diagnosis of IMTL, and imaging also lacks obvious specificity. Although there are sporadic reports of recurrence after surgical treatment, surgical resection is the mainstay of treatment.

CASE SUMMARY

A 29-year-old man complained of general weakness, slight discomfort in the upper abdomen，with a history of upper respiratory tract infection before admission for a week. Plain and enhanced upper abdominal magnetic resonance imaging (MRI) showed a mass of liver segments II and III (48 mm × 53 mm). He was treated by laparoscopic left lateral segmentectomy. Postoperative pathological examination with hematoxylineosin (HE) staining suggested that the mass in liver segments II and III was IMTL. During 21 mo' postoperative follow-up, no obvious residual or recurrent lesions were observed.

CONCLUSION

There is a risk of malignant degeneration in IMTL, therefore it is generally accepted that the diagnosis and treatment are still early. Currently, as the mainstay therapeutic modality, complete resection of the tumor is recommended. The principal choice in treatment of patients with IMTL is laparoscopic left lateral segmentectomy.

Key Words: Inflammatory myofibroblastic tumor; Hepatectomy; Laparoscopy; Liver; Case report

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Core Tip: Inflammatory myofibroblastic tumor (IMT) is a rare borderline mesenchymal tumor with myofibroblastic proliferation and the varying amount of inflammatory cells that can occur in lung, stomach, intestine, gallbladder and nervous system. Herein, we present a rare case of IMT in liver (IMTL) and its treatment with laparoscopic left lateral segmentectomy. This case we present is a rare, difficult to diagnose and treat IMTL, which was unresponsive to the pharmacological treatment. This case highlights the ultimate importance of that surgery for IMTL located to liver segments II and III should be performed. Laparoscopic treatment of IMTL is effective and minimally invasive.

INTRODUCTION

Inflammatory myofibroblastic tumor (IMT) was first found in the lungs[1] and then in the stomach, intestine, gallbladder and nervous system. The first case of IMT in liver (IMTL) was found by Pack and Baker in 1953[2]. The World Health Organization (WHO) defined IMTL in 2021, according to its pathological characteristics, as a borderline stromal tumor infiltrated by plasma cells and lymphocytes that is often composed of spindle-shaped differentiated myofibroblasts[3]. IMTL can occur in children and young adults[4,5], but it is more common in young adults. The average age of onset is about 37 years[6,7]. IMTL is a rare disease. Since Li *et al*[8] reported this kind of cases in China in 1989, few other cases have been reported. Its clinical manifestations and imaging features are not specific. These factors increase the difficulty of clinical diagnosis and misdiagnosis rate of the disease. Currently, complete resection of the tumor, followed by pathological diagnosis of tissue specimens is recommended as the mainstay

therapeutic modality[9]. Although there are sporadic reports of recurrence after surgical treatment[6], most patients have a good prognosis without recurrence or obvious complications. The following is a case report of a 29-year-old male patient with IMTL. He was treated by laparoscopic left lateral segmentectomy and the postoperative diagnosis was IMTL through the pathological diagnosis. During 21 mo' postoperative follow-up, no obvious abnormalities were observed.

CASE PRESENTATION

Chief complaints

A 29-year-old man was complained of general weakness, slight discomfort in the upper abdomen, and there was no obvious tenderness and mass in the abdomen on the physical exam.

History of present illness

No symptoms related to the hepatic mass were found, and no related treatment or management had been performed.

History of past illness

He had a history of upper respiratory tract infection for a week before admission. He denied a history of other diseases, trauma or surgery.

Personal and family history

There was no abnormality in his medical history, such as surgical trauma, allergy, personal history and family history, and the history of hepatitis.

Physical examination

The physical examination of the patient's abdomen revealed no abnormalities. The patient had a flat abdomen with no pigmentation of the abdominal skin. The patient had no abdominal tenderness or rebound pain, and no palpable abdominal mass.

Laboratory examinations

Some laboratory tests after admission are as follows. Blood routine: White blood cell (WBC) (13.58 × 10^9/L, normal range: 3.5-9.5), platelet (PLT) (568 × 10^9/L, normal range: 125-350) and C reactive protein (CRP) (115.6 mg/L, normal range: 0-10). Tumor markers: Alpha-fetoprotein (AFP) (1.21 ng/mL, normal range: 0.89-8.78), abnormal-prothrombin (APT) (19.31 mAU/mL, normal range: 11.12-32.01), carcinoembryonic antigen (CEA) (3.81 ng/mL, normal range: 0-5), carbohydrate antigen 125 (CA125) (16.60 U/L, normal range: 0-35), carbohydrate antigen 19-9 (CA19-9) (3.94 U/L, normal range: 0-43). Hepatitis virology test was negative. The result of IgG (13.20 g/L, normal range: 7.0-16.0) was normal.

Imaging examinations

Abdominal ultrasound (Figure 1A) showed that the liver capsule was intact, and a low-echo area of 67 mm × 64 mm could be seen in segments II and III of the liver. Plain and enhanced upper abdominal magnetic resonance imaging (MRI) showed that the T1-weighted imaging of liver segments II and III (48 mm × 53 mm) was low, and T2-weighted imaging revealed medium and high signal shadows. The boundary was clear and smooth. The lesions in the enhanced arterial phase were significantly enhanced. Some signals in the lesions in the venous phase were reduced, and showed uneven enhancement after delay. There was obvious patchy enhancement in the liver at the edge of the lesions in the arterial phase. The enhanced signal decreased slightly (Figure 1B-F). Abdominal ultrasound showed a low-echo area of 67 mm × 64mm in segments II and III of the liver.

FINAL DIAGNOSIS

To evaluate further the nature of the mass, liver biopsy was performed under ultrasound guidance. The results (Figure 2) showed that the mass was composed of inflammatory cells, myofibroblasts, spindle cells and plasma cells. Routine HE staining

and immunohistochemistry (IHC) showed that there was no obvious monoclonal proliferation of cells and suggested IMTL, with the following manifestations: anaplastic lymphoma kinase (ALK): D5F3 +/Neg-, endomysial antibody (EMA) partial +, CD20 Lymphocytes partial +, CD79 α lymphocytes partial +, CD38 plasma cells +, interferon regulator 4 (IRF4) partial +, CD3 Lymphocytes partial +, CD5 Lymphocytes partial +, CD43+, CD138 plasma cells +, κ partial +, λ partial +, Desmin-, Vimentin +, and Ki-67 +.

TREATMENT

Preoperative treatment of the patient's disease using prednisone acetate was found to be ineffective. After symptomatic treatment, the patient's fatigue improved slightly, and MRI showed no significant changes in the tumor. Laparoscopic left lateral segmentectomy was performed under general anesthesia. During the operation, a nodular bulge with a diameter of about 5 cm was seen on the visceral surface of liver segments II and III (Figure 3). The operation lasted 3 h and 30 min, and the intraoperative-blood-loss was 500 mL. During the operation, the pringle maneuver (Clamping the hepatoduodenal ligament) was performed 3 times, at intervals of 10 min, each time lasting 15 min.

Postoperative pathological examination with HE staining suggested that the mass in liver segments II and III was IMTL. The size of the tumor was 6.5 cm × 6.2 cm × 5.0 cm, without a capsule, and showed expansive and invasive growth. The patient's CRP level on postoperative day one was 96.9 mg/L. Immunohistochemistry showed that tumor cells were smooth muscle actin (SMA) +, Vimentin +, ALK +/-, Desmin -, CD68+ and CD163+ in tissue cells, blood vessels CD34+, plasma cells CD38+, CD138+, κ +, λ + and Ki-67+ (Figure 4).

Postoperative diagnosis was IMTL.

OUTCOME AND FOLLOW-UP

The patient recovered well and was discharged 7 d after surgery. During 21 mo' postoperative follow-up, no obvious abnormalities were observed in blood routine

examination (CRP: 0.499 mg/L), liver function, tumor markers and abnormal-prothrombin. Abdominal MRI showed postoperative changes without residual or recurrent lesions. The follow-up is continuing. At present, the patient is generally in good condition, and there is no obvious tumor recurrence or metastasis.

DISCUSSION

The most common site of IMT is the lungs. The incidence of diseases outside the lung and in the liver is about 8%[10]. IMTL is a rare borderline tumor[11]. In recent years, IMTL has been simply divided into lymphoplasmacytic type and fibrous histiocytic type[12]. The lymphoplasmacytic type is defined as a large number of lymphoplasmacytes and eosinophils infiltrating around the hilar region. The fibrous histiocytic type is characterized by mass formation in the liver parenchyma or inflammation of yellow granuloma, and some refer to macrophage and neutrophil infiltration. The pathological diagnosis of this patient was inflammatory fibrous proliferative tumor like lesions in segments II and III of the liver, with a large amount of plasma cell infiltration, which roughly accorded with the lymphoplasmacytic type. The most standard classification is to divide IMTL into three types: I: Mucinous vasculitis; II: Fibrous tissue spindle cell type; and III collagen fiber type[13]. In the present case, the tumor was accompanied by plasma cell and inflammatory cell infiltration, which is consistent with type II. Histological or pathological typing of IMTL is helpful in determining the type of IMTL, and plays an important role in identifying the risk factors of tumorigenesis and early pathological diagnosis of the disease. At the same time, ALK expression is found in about 50% of IMTL patients, and IMTL is more likely to occur in tissues with positive ALK expression. That means that in IMTL, ALK-negative tumors have higher malignancy, invasive ability and metastatic rate than ALK-positive tumors have.

The etiology and risk factors of IMTL are unclear. At present, the following factors are considered to be related to IMTL. (1) Infection: Infection with *Escherichia coli*, Staphylococcus and some Gram-positive bacteria can cause the release of inflammatory mediators, gradually resulting in fibrous tissue lesions, and eventually forming IMTL[14];

(2) Traumas: Some traumas and surgery may cause inflammatory reactions and then formation of IMTL; (3) Transformation: Some low-grade fibrous nodules or fibrous components with inflammatory cell infiltration may be transformed into IMTL[15]; (4) Autoimmunity: It was reported that plasma cells that are IgG positive in the tumor foci, especially IgG4, are increased in IMTL patients[10,16]. Research on the relationship between IMTL and IgG4 is being carried out[17]; and (5) Gene: it has been found that ALK is associated with IMTL, but the exact relationship between them has not been reported[18].

The present patient is a young man with a history of upper respiratory tract infection before admission, which further indicates that IMTL might be related to infection. Clinical symptoms in IMTL patients included abdominal pain and even jaundice[19]. Some patients have fever, abdominal pain and other combined symptoms[20], but about 20% of patients are asymptomatic[21]. The admission examination did not show increased IgG, indicating that it was unhelpful for diagnosis. Laboratory examination may reveal inflammatory indicators, such as increased WBC count, CRP and erythrocyte sedimentation rate (ESR) while the liver function-related enzymes and the tumor markers generally have no obvious abnormalities[6]. The tumor markers in this patient were normal, and WBC count, CRP was increased. Neither clinical symptoms nor laboratory tests have absolute specificity for the diagnosis of IMTL, thus increasing the difficulty to the choice of diagnosis. Computed tomography (CT), MRI, ultrasound and even positron emission tomography/CT (PET-CT) can assist in diagnosis[22], but imaging also lacks obvious specificity. Contrast-enhanced ultrasound (CEUS) showed a variety of echoes in the arterial, portal and delayed phases. There are different manifestations in the case of hyperechogenicity in the three phases, such as overall uniform hyperechogenicity, edge encapsulated hyperechogenicity or thin line ring hyperechogenicity[23]. The CT findings of IMTL generally show low-density shadows, but uniform or uneven enhancement, and peripheral and central enhancement can also appear. Similarly, in MRI, the signal of IMTL in T1 is lower than that in surrounding normal liver tissue, and the signal in T2 is equal or higher, without obvious specificity.

Because there is no obvious specificity in clinical manifestations, laboratory and imaging examination, IMTL is difficult to diagnose and determine the treatment. At present, antibiotics, nonsteroidal anti-inflammatory drugs and corticosteroids can be used for treatment of IMTL[24,25], but the best treatment regimen has not been determined. Some researchers have suggested that in case of abnormal liver function, surgical resection should be performed as soon as possible[26]. In addition, there is a risk of malignant degeneration[27], therefore it is generally accepted that the preferred treatment is still early surgical resection, which has a satisfactory outcome and good prognosis. Considering that there are a few reports of postoperative recurrence[6], regular follow-up in case of the disease recurrence or related complications is necessary.

CONCLUSION

There is a risk of malignant degeneration in IMTL, therefore it is generally accepted that the diagnosis and treatment are still early. Currently, as the mainstay therapeutic modality, complete resection of the tumor is recommended. Laparoscopic left lateral segmentectomy should be regard as principal choice in treatment of patients with IMTL.

Figure Legends

Figure 1 Abdominal ultrasound and magnetic resonance imaging findings (tumors were marked by the asterisk). A: Abdominal ultrasound showed that the liver capsule was intact, and a low-echo area of 67 mm × 64 mm could be seen in segments II and III of the liver; B and C: Plain and enhanced upper abdominal magnetic resonance imaging (MRI) showed that the T1-weighted imaging (B) of liver segments II and III (48 mm × 53 mm) was low, and T2-weighted imaging (C) revealed medium and high signal shadows; D: There was obvious patchy enhancement in the liver at the edge of the lesions in the arterial phase; E and F: Some signals in the lesions in the venous phase (E) were reduced, and in the balanced phase (F), the enhanced signal decreased slightly.

Figure 2 Microscopic examination results of liver biopsy under ultrasound guidance. A: Routine HE staining showed that there was no obvious monoclonal proliferation of cells (× 100), and immunohistochemistry (IHC) showed that the mass was composed of lymphocytes, myofibroblasts, spindle cells and plasma cells; B: At higher magnification (× 400), HE staining was more obvious; C and D: ALK- D5F3 (C) and Ki-67 (D) IHC of spindle cells were positive for spindle cells (× 400).

Figure 3 Intraoperative photographs. A: A nodular bulge with a diameter of about 5 cm (arrow) was seen on the visceral surface of liver segments II and III; B: The tumor was completely removed after partial hepatectomy.

Figure 4 Imagings and immunohistochemistry examinations of the surgical specimens. A: The maximum diameter of the inflammatory myofibroblastic tumor in liver nodule was 6.5 cm. Yellow-white granulation-like tissue was seen in the sections, and the parenchyma was hard; B: HE staining after surgery showed fibroblast proliferation and abundant plasma cell and lymphocyte infiltration in the stroma; C: IHC (× 400) was positive for SMA; D and E: Spindle cells (× 400) were also positive for CD38 (D) and CD138 (E); F: Tumor cells showed a positive cytoplasmic reaction with ALK IHC (× 400).

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