



Left epigastric isolated tumor fed by the inferior phrenic artery diagnosed as ectopic hepatocellular carcinoma: A case report

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Abstract

BACKGROUND

Hepatocellular carcinoma (HCC) is one of the most frequent cancers and the main cause of cancer-related death worldwide. Ectopic HCC, an extremely rare type of HCC, exhibits a wide range of clinical signs and radiographic features, making preoperative identification challenging.

CASE SUMMARY

A 47-year-old man underwent routine abdominal color ultrasonography, which identified an asymptomatic tumor in the left upper abdomen. The patient had no history of hepatitis, did not drink alcohol, and had no family history of cancer. Abdominal contrast-enhanced computed tomography (CT) revealed a heterogeneously enhanced lesion between the spleen and stomach that had invaded the diaphragm, with blood supplied by the left inferior phrenic artery. The patient underwent laparoscopic surgery, and HCC was identified by postoperative pathology. Additionally, specific immunohistochemical staining was performed to assess the molecular biological characteristics of the HCC. The patient underwent two rounds of hepatic arterial interventional chemotherapy after surgery. Abdominal plain and enhanced magnetic resonance imaging and lung CT 3 mo postoperatively revealed no signs of local recurrence or distant

metastasis.

CONCLUSION

This asymptomatic ectopic HCC case described achieved an excellent result due to early detection, radical resection, and systematic surveillance.

Key Words: Ectopic hepatocellular carcinoma; Left subphrenic tumor; Isolated tumor; Diaphragmatic involvement; Inferior phrenic artery; Case report

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Core Tip: Ectopic hepatocellular carcinoma (HCC) is relatively rare, and there is no acknowledged diagnostic or treatment standard for this type of tumor. Here, we describe a 47-year-old man with diaphragmatic invasion caused by a heterogeneously enhanced lesion between his spleen and stomach that was eventually diagnosed as HCC. We thoroughly describe the patient's information, course of treatment, and excellent curative result.

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INTRODUCTION

Hepatocellular carcinoma (HCC) is one of the most prevalent cancers and a major contributor to the global mortality rate due to cancer[1]. HCC has a dismal prognosis, with a relative 5-year survival rate of only approximately 18%[2]. Ectopic HCC is an entity of HCC that has no connection to the mother liver and is an extremely rare condition and poses a significant diagnostic challenge before surgery. Ectopic liver tissue, which has an incidence of 0.23% to 0.7%, is hypothesized to be the main source of ectopic HCC[3]. We describe a man with an isolated mass in his left upper abdomen that ultimately proved to be HCC.

CASE PRESENTATION

Chief complaints

A 47-year-old male patient was referred to our hospital due for a routine medical examination more than 1 mo ago, which revealed an asymptomatic tumor in the left upper abdomen.

History of present illness

The asymptomatic tumor was suspected to be a gastrointestinal stromal tumor during routine abdominal color ultrasonography.

History of past illness

The patient had no medical history, no history of viral hepatitis, and no history of smoking or consuming alcohol.

Personal and family history

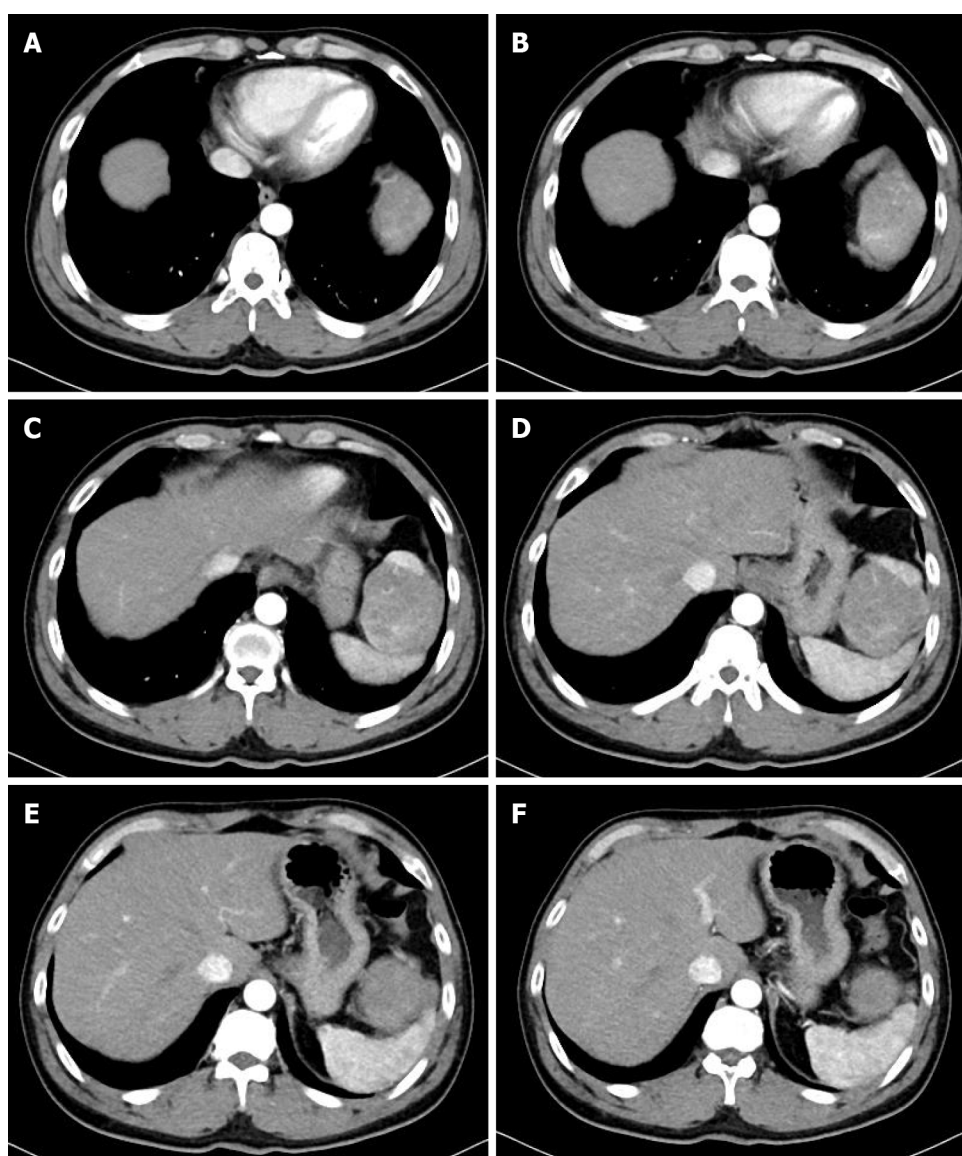
There was no history of malignancy in the family.

Physical examination

Physical examination revealed no obvious mass or tenderness. Bowel sounds were within an acceptable range, while rectal palpation and ascites examinations were negative.

Laboratory examinations

On laboratory examination, the only specific abnormality was an elevated α -fetoprotein (AFP) concentration (194.38 ng/mL). The results of other laboratory tests, namely hemoglobin, gamma glutamyl transferase, alkaline phosphatase, anti-hepatitis C virus, hepatitis B virus (HBV) surface antigen, carcinoembryonic antigen, and cancer antigen 19-9, were within normal limits.



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Figure 1 Abdominal enhanced computed tomography showing a tumor with heterogeneous enhancement. A: Diaphragmatic parietal level; B: Bottom heart level; C: Upper pole level of spleen; D: Esophageal hiatus level; E: Spleen hilar level; F: Lower pole level of tumor (Arterial phase).

Imaging examinations

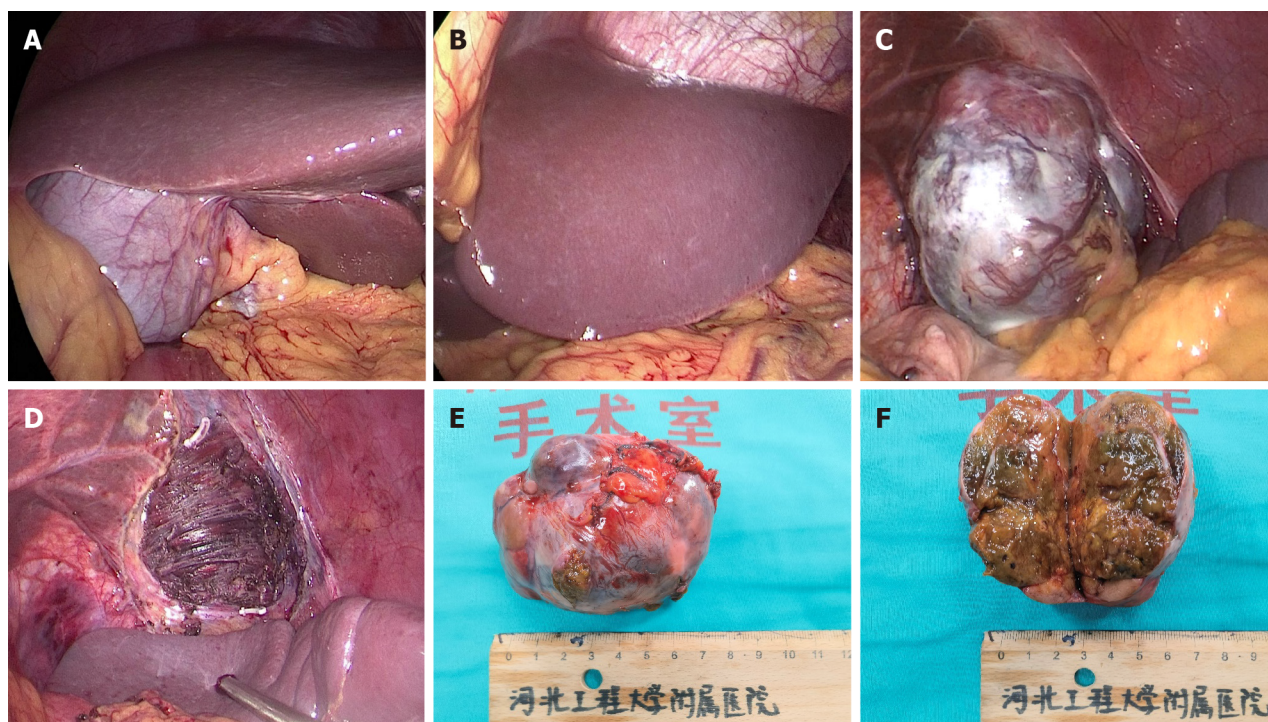
Abdominal ultrasonography revealed a heterogeneous mass measuring approximately 6 cm × 9 cm between the spleen and stomach. Contrast-enhanced computed tomography (CT) showed that the shape and size of the liver were normal, the edges were smooth, the proportion of each lobe was balanced, and no obvious abnormal density shadows were identifiable in the liver parenchyma. A soft tissue mass was observed in the splenic and gastric spaces, with a CT value of 48 HU and size of 6.3 cm × 9.3 cm. Enhanced CT showed uneven enhancement (Figure 1). CT values during the arterial, portal, and extended stages were 71-125 HU, 82-112 HU, and 72-85 HU, respectively (Supplementary Figure 1). The tumor feeding artery originated from the left inferior phrenic artery.

FINAL DIAGNOSIS

An ectopic HCC with diaphragmatic involvement was eventually diagnosed.

TREATMENT

The tumor was located in the left subdiaphragm, which was a challenge to access with open surgical techniques. Therefore, we performed laparoscopic surgery. During the operation, no ascites was found, and the liver was normal in



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Figure 2 Operative findings and gross view of the surgical specimen. A: The right liver lobe; B: The left liver lobe; C: The tumor with capsule formation and diaphragm invasion; D: Diaphragmatic wound after tumor resection; E: Macroscopic images of the tumor; F: Cross-sectional images of the tumor.



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Figure 3 Hepatic arteriography showing no microscopic tumors in the liver.

size, color, and consistency. A tumor with an intact envelope was found between the greater curvature of the stomach and the spleen. It was not related to the hepatic parenchyma and had invaded the diaphragm (Figure 2). We removed part of the diaphragm to ensure that the tumor was entirely resected as the tumor had direct diaphragmatic involvement. Preventive hepatic arterial infusion chemotherapy (HAIC) was administered to the patient twice, 1 mo apart. The potential for intrahepatic microneoplasms, such as micrometastases or a microprimary tumor with metastasis to the left upper abdomen, was ruled out by hepatic arteriography (Figure 3).

OUTCOME AND FOLLOW-UP

Regular monitoring and follow-up were performed after surgery as advised during a multidisciplinary team meeting that examined AFP (Figure 4), lung and skull CT scan, and liver magnetic resonance imaging (Figure 5).

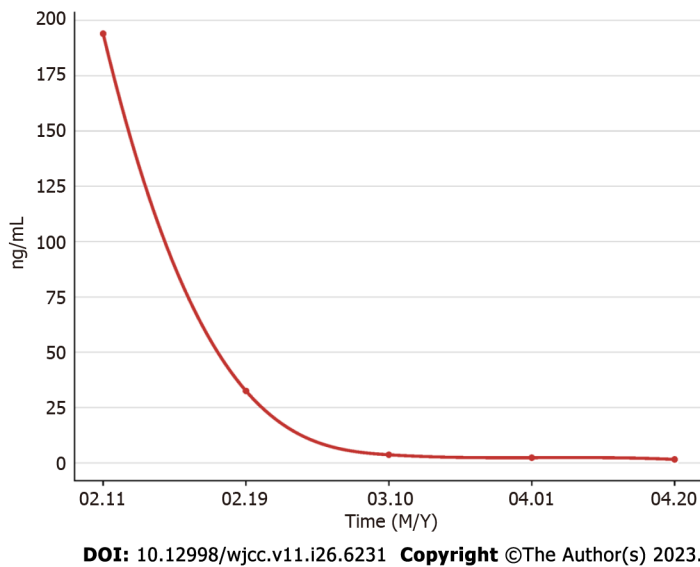


Figure 4 The patient's α -fetoprotein levels over time.

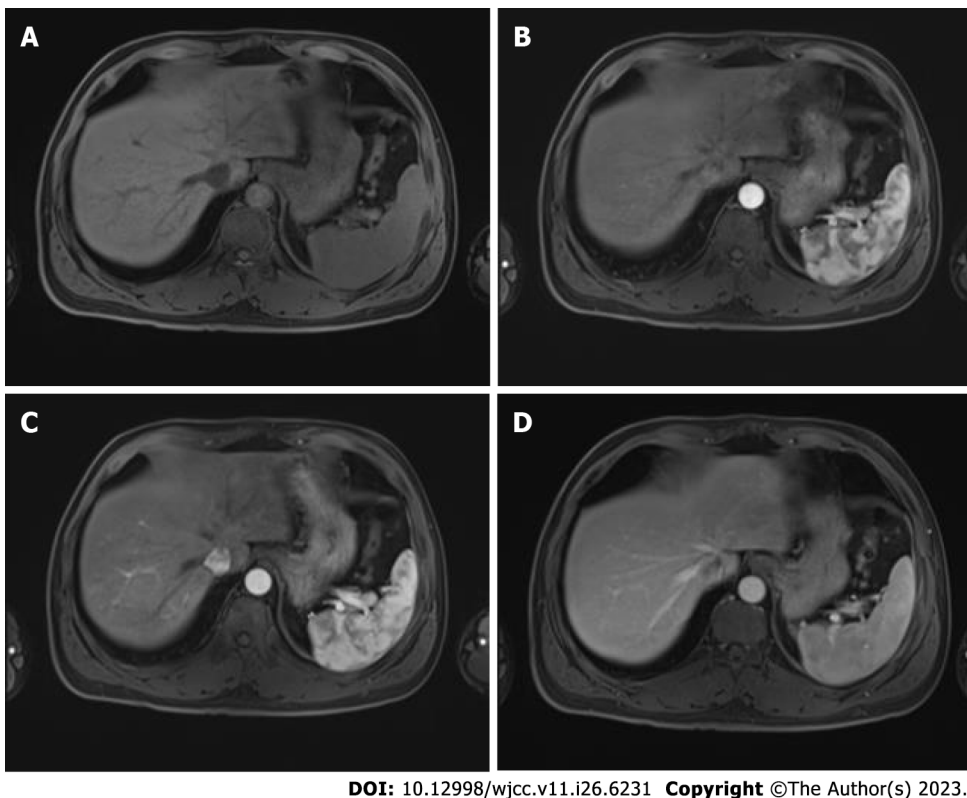
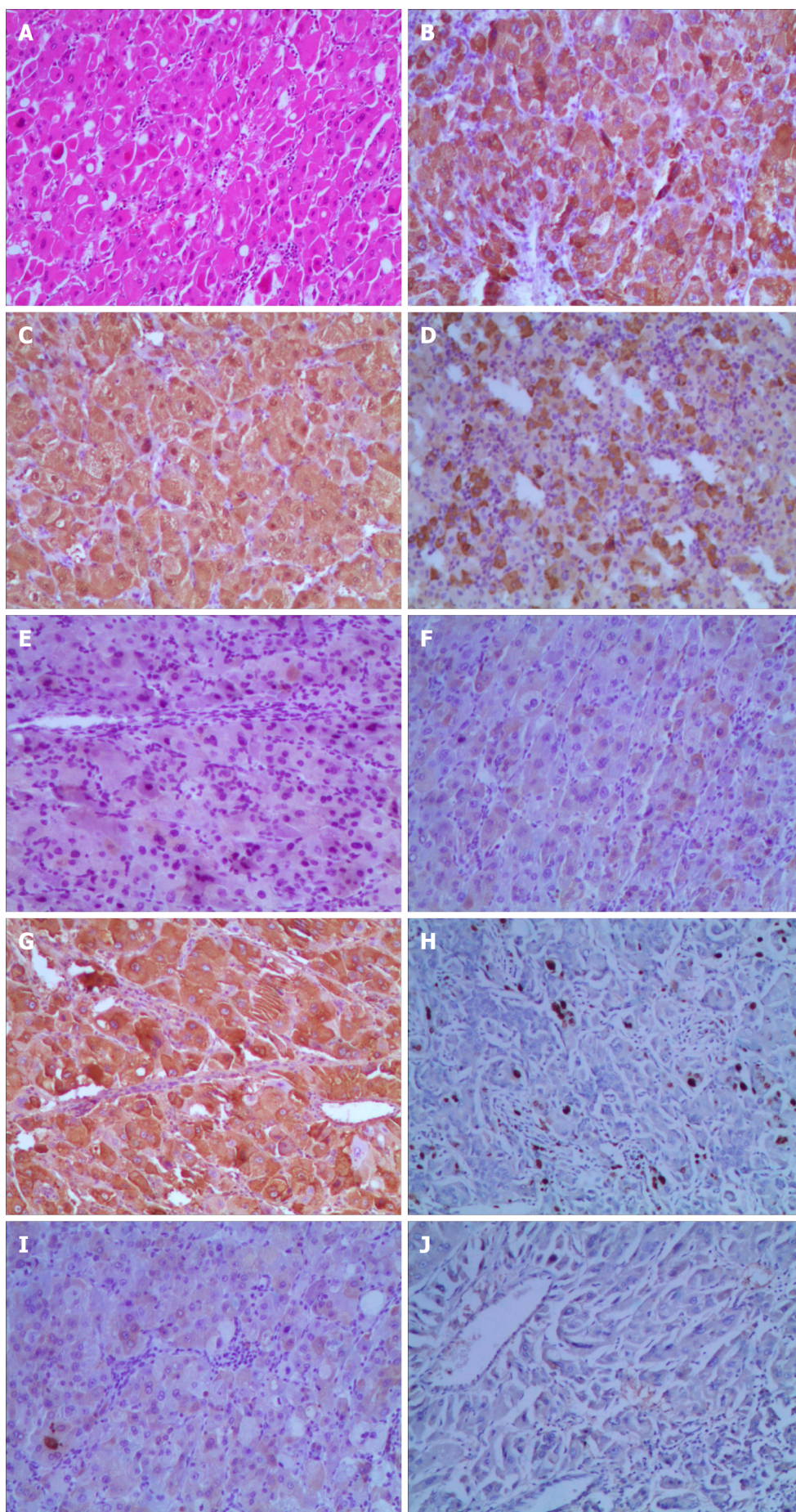
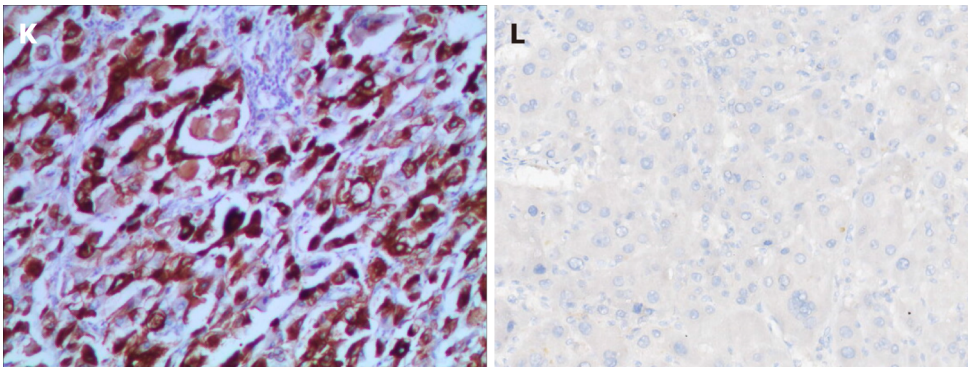


Figure 5 Postoperative enhanced magnetic resonance imaging of the upper abdomen. A: Plain phase; B: Arterial phase; C: Portal phase; D: Extended phase.

Hematoxylin and eosin staining, and immunohistochemistry were used to thoroughly assess the tumor type and its immunological markers (Figure 6). Capsule formation is related to better tumor cell differentiation and tumor biological characteristics compared with no capsule formation, and the pathology results of this patient suggested a well-to-moderately differentiated adenocarcinoma. Immunohistochemical study revealed the following: Hepatocyte antigen (+), arginase-1 (+), AFP (+), inhibin- α (-), cytokeratin (CK) (+/-), GPC-3 (+), Ki-67 (hot regions: 5%), CK19 (-), CK8/18 (-), and hepatocyte paraffin-1 (+). To determine whether the patient could benefit from immunotherapy, we also performed programmed death-ligand 1 testing. However, the results were negative. Consequently, intensive postoperative immunotherapy was not administered.





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Figure 6 Microscopic findings of the tumor. A: Hematoxylin and eosin (HE)-stained slide (HE, $\times 40$); B: Hepatocyte antigen (+); C: Arginase-1 (+); D: α -fetoprotein (+); E: Inhibin- α (-); F: Cytokeratin (CK) (-); G: Glypican-3 (+); H: Ki-67 (hot regions: 5%) (+); I: CK19 (-); J: CK8/18 (-); K: Hepatocyte paraffin-1 (+); L: Programmed death-ligand 1 (-).

DISCUSSION

HCC is a common malignancy of the digestive system with high morbidity and mortality worldwide. However, only 27 cases of ectopic HCC have been reported as of 2022[4]. The risk factors for ectopic HCC are unrelated to those for typical HCC (such as chronic viral hepatitis B and C; alcohol abuse or alcoholic steatohepatitis; and nonalcoholic fatty liver disease or nonalcoholic steatohepatitis). Ectopic HCC may be caused by problems with biliary drainage, insufficient arterial blood flow, and insufficient venous drainage[3,5]. Prolonged exposure to these carcinogenic factors promotes carcinogenesis. In the present case, the patient had no substantial coexisting conditions or HCC risk factors, and the mother liver was not cirrhotic. The most common extra-hepatic feeding artery of HCC was found to be the inferior phrenic artery (IPA)[6]. Our patient presented with an isolated mass in the left upper abdomen, invaded the diaphragm and fed by the left IPA.

Owing to the distinct features of ectopic HCC, patients present with a wide spectrum of clinical signs and radiological presentations, which makes it challenging to obtain a preoperative diagnosis[7]. In the case described herein, the isolated tumor with no connection to the liver and supplied by diaphragmatic arteries, made preoperative diagnosis challenging. Anatomically, part of ectopic HCC shows a significantly better overall survival than that for HCC in the orthotopic liver due to encapsulation and the possibility of wide resection margins with less vascular invasion[8]. Our patient had well-to-moderately differentiated histological characteristics, with a low Ki-67 labeling index, which may indicate a highly favorable overall survival compared with other histological subtypes.

Some HCCs can attach to and potentially infiltrate nearby tissues, such as the diaphragm, which presents therapeutic difficulty. During the preoperative examination, whether the diaphragm is actually invaded by HCC is difficult to identify; therefore, a postoperative pathological diagnosis or intraoperative frozen pathology is necessary to evaluate whether the diaphragm has been invaded or is just showing diaphragmatic fibrous adhesion[9]. As there is a risk of tumor rupture, tumor spread, and bleeding when the diaphragm is separated from a tumor that has gross diaphragmatic involvement, the grossly involved section of the diaphragm must be excised to ensure radical cure[10]. However, whether diaphragmatic excision is necessary and beneficial for individuals with subclinical adhesion and a smooth, intact tumor capsule is debatable. In the present case, part of the diaphragm was resected to ensure radical resection without postoperative complications. However, extrapolating general implications from a single instance might be challenging.

Laparoscopic techniques are widely used and well recognized by the majority of liver surgeons owing to reduced patient stress and rapid postoperative recovery[11]. However, the use of these techniques in HCC with diaphragmatic involvement has not been widely reported[12]. We have found that this approach is reliable and efficient, helps reduce surgical complexity and operation time, and enhances surgical safety; however, high-quality clinical trials are required.

Surgery is the first option for ectopic HCC patients who can be cured. However, some ectopic HCC patients may experience a recurrence following surgery. Liu *et al*[4] reported that four of the six ectopic HCC recurrence cases were in the mother's liver. It is advised that HAIC was a potential option for preventing early recurrence even though no lesion was seen in the mother liver during the initial therapy[4,13]. Despite the lack of a sufficient and significant amount of high-quality research assistance, we conducted prophylactic HAIC twice with the full knowledge and strong request of the patient and his family due to the high expectations of the patient.

With advanced-stage HCC, comprehensive postoperative care is required, including preventive transcatheter arterial chemoembolization, anti-HBV therapy, immunotherapy, and targeted therapy. Close, frequent monitoring and follow-up are also necessary following surgery, as with resection or radiofrequency ablation of recurring foci[5]. In the present case, we performed two sessions of prophylactic HAIC. To date, there has been no evidence of recurrence.

CONCLUSION

We report a patient with an isolated tumor between the spleen and the stomach that was diagnosed as ectopic HCC. Excellent curative results were obtained following treatment.

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FOOTNOTES

Author contributions: Huang QP contributed to conceptualization; Liu HB and Zhao LH conducted the immunohistochemical staining and drafted the original manuscript; Zhang YJ contributed to patient follow-up and monitoring; Li ZF contributed to interpretation of the results and visualization; Zhang YJ and Li L contributed to reviewing the manuscript and editing; Li L and Huang QP completed the operation; All of the authors have critically reviewed the manuscript and approved the final version; Liu HB and Zhao LH contributed equally to this paper and should be identified as co-first authors.

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