

World Journal of *Gastrointestinal Oncology*

World J Gastrointest Oncol 2023 July 15; 15(7): 1105-1316



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ABOUT COVER

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The primary aim of *World Journal of Gastrointestinal Oncology* (*WJGO*, *World J Gastrointest Oncol*) is to provide scholars and readers from various fields of gastrointestinal oncology with a platform to publish high-quality basic and clinical research articles and communicate their research findings online.

WJGO mainly publishes articles reporting research results and findings obtained in the field of gastrointestinal oncology and covering a wide range of topics including liver cell adenoma, gastric neoplasms, appendiceal neoplasms, biliary tract neoplasms, hepatocellular carcinoma, pancreatic carcinoma, cecal neoplasms, colonic neoplasms, colorectal neoplasms, duodenal neoplasms, esophageal neoplasms, gallbladder neoplasms, *etc.*

INDEXING/ABSTRACTING

The *WJGO* is now abstracted and indexed in PubMed, PubMed Central, Science Citation Index Expanded (SCIE, also known as SciSearch®), Journal Citation Reports/Science Edition, Scopus, Reference Citation Analysis, China National Knowledge Infrastructure, China Science and Technology Journal Database, and Superstar Journals Database. The 2023 edition of Journal Citation Reports® cites the 2022 impact factor (IF) for *WJGO* as 3.0; IF without journal self cites: 2.9; 5-year IF: 3.0; Journal Citation Indicator: 0.49; Ranking: 157 among 241 journals in oncology; Quartile category: Q3; Ranking: 58 among 93 journals in gastroenterology and hepatology; and Quartile category: Q3. The *WJGO*'s CiteScore for 2022 is 4.1 and Scopus CiteScore rank 2022: Gastroenterology is 71/149; Oncology is 197/366.

RESPONSIBLE EDITORS FOR THIS ISSUE

Production Editor: *Xiang-Di Zhang*; Production Department Director: *Xiang Li*; Editorial Office Director: *Jia-Ru Fan*.

NAME OF JOURNAL

World Journal of Gastrointestinal Oncology

ISSN

ISSN 1948-5204 (online)

LAUNCH DATE

February 15, 2009

FREQUENCY

Monthly

EDITORS-IN-CHIEF

Monjur Ahmed, Florin Burada

EDITORIAL BOARD MEMBERS

<https://www.wjgnet.com/1948-5204/editorialboard.htm>

PUBLICATION DATE

July 15, 2023

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INSTRUCTIONS TO AUTHORS

<https://www.wjgnet.com/bpg/gerinfo/204>

GUIDELINES FOR ETHICS DOCUMENTS

<https://www.wjgnet.com/bpg/GerInfo/287>

GUIDELINES FOR NON-NATIVE SPEAKERS OF ENGLISH

<https://www.wjgnet.com/bpg/gerinfo/240>

PUBLICATION ETHICS

<https://www.wjgnet.com/bpg/GerInfo/288>

PUBLICATION MISCONDUCT

<https://www.wjgnet.com/bpg/gerinfo/208>

ARTICLE PROCESSING CHARGE

<https://www.wjgnet.com/bpg/gerinfo/242>

STEPS FOR SUBMITTING MANUSCRIPTS

<https://www.wjgnet.com/bpg/GerInfo/239>

ONLINE SUBMISSION

<https://www.f6publishing.com>

Treatment of *Candida albicans* liver abscess complicated with COVID-19 after liver metastasis ablation: A case report

Wen Hu, Xi Lin, Meng Qian, Tao-Ming Du, Xi Lan

Specialty type: Infectious diseases

Provenance and peer review:

Unsolicited article; Externally peer reviewed.

Peer-review model: Single blind

Peer-review report's scientific quality classification

Grade A (Excellent): 0

Grade B (Very good): B

Grade C (Good): C, C

Grade D (Fair): 0

Grade E (Poor): 0

P-Reviewer: Sudhamshu KC, Nepal; Meena DS, India

Received: April 15, 2023

Peer-review started: April 15, 2023

First decision: May 4, 2023

Revised: May 14, 2023

Accepted: May 26, 2023

Article in press: May 26, 2023

Published online: July 15, 2023



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Abstract

BACKGROUND

Liver interventional surgery is a relatively safe and minimally invasive surgery. However, for patients who have undergone Whipple surgery, the probability of developing a liver abscess after liver interventional surgery is very high. Fungal liver abscess has a high mortality rate, especially when complicated with malignant tumors, diabetes, coronavirus disease 2019 (COVID-19) and other complications. Fungal liver abscess is rare, and there are no guidelines or expert consensus on the course of antifungal therapy.

CASE SUMMARY

A 54-year-old woman with pancreatic head cancer received albumin-bound paclitaxel in combination with gemcitabine chemotherapy after laparoscopic pancreaticoduodenectomy. Liver metastasis was found 1 mo after completion of 8 cycles of chemotherapy, followed by ablation of the liver metastasis. After half a month of liver metastasis ablation, the patient experienced fever after chemotherapy and was diagnosed with liver abscess complicated with COVID-19 by contrast-enhanced abdominal computed tomography and real-time polymerase chain reaction detection. The results of pus culture showed *Candida albicans*, which was sensitive to fluconazole. The patient underwent percutaneous catheter drainage, antifungal therapy with fluconazole, and antiviral therapy with azvudine. During antifungal therapy, the patient showed a significant increase in liver enzyme levels and was discharged after liver protection therapy. Oral fluconazole was continued for 1 wk outside the hospital, and fluconazole was used for a total of 5 wk. The patient recovered well and received 4 cycles of fluorouracil, leucovorin, oxaliplatin, and irinotecan after 2 mo of antifungal

therapy.

CONCLUSION

Effective treatment of *Candida albicans* liver abscess requires early detection, percutaneous catheter drainage, and 5 wk of antifungal therapy. Meanwhile, complications such as COVID-19 should be actively managed and nutritional support should be provided.

Key Words: Fungal; Liver abscess; COVID-19; Liver metastasis ablation; Pancreatic head cancer; Case report

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Core Tip: Fungal liver abscess is rare and has a high mortality rate, especially when combined with malignant tumor, diabetes, coronavirus disease 2019 (COVID-19), and other complications, which increase the difficulty of treatment. However, there are no guidelines or expert consensus on the course of antifungal drugs. We present a rare case of *Candida albicans* liver abscess complicated with COVID-19 after ablation of liver metastasis from pancreatic head cancer. The patient was successfully cured after percutaneous catheter drainage, antifungal therapy, therapeutic management of comorbidities and nutritional support.

Citation: Hu W, Lin X, Qian M, Du TM, Lan X. Treatment of *Candida albicans* liver abscess complicated with COVID-19 after liver metastasis ablation: A case report. *World J Gastrointest Oncol* 2023; 15(7): 1311-1316

URL: <https://www.wjgnet.com/1948-5204/full/v15/i7/1311.htm>

DOI: <https://dx.doi.org/10.4251/wjgo.v15.i7.1311>

INTRODUCTION

The incidence of liver abscess after liver intervention is very high in patients who have undergone Whipple surgery. Despite aggressive and appropriate treatment, the mortality rate for liver abscess remains high, particularly when combined with coronavirus disease 2019 (COVID-19). Fungal liver abscess is rare, and there are no guidelines or expert consensus on the timing of antifungal drug use for this condition. In this report, we present a rare case of *Candida albicans* liver abscess complicated by COVID-19 after liver metastasis ablation for pancreatic head cancer. The patient was treated with percutaneous catheter drainage, antifungal therapy, therapeutic management of comorbidities and nutritional support.

CASE PRESENTATION

Chief complaints

A 54-year-old woman was diagnosed with pancreatic head cancer for 8 mo and had liver metastasis ablation for 2 wk.

History of present illness

Eight months ago, the patient was hospitalized for sprained right wrist. It was unexpected to discover that she had pancreatic head cancer and diabetes. She subsequently underwent laparoscopic pancreaticoduodenectomy, and histopathologic results revealed pancreatic adenocarcinoma with mucinous adenomas (about 5%-10% of which were signet ring cell carcinomas), G3/poorly differentiated, and invasion of nerves and lymphatic vessels. Following surgery, she completed 8 cycles of chemotherapy with albumin-bound paclitaxel and gemcitabine. One month after completing chemotherapy, contrast-enhanced abdominal computed tomography (CT) revealed liver metastasis in the right lobe, with a maximum cross-section of approximately 2.0 cm × 1.9 cm. Two weeks ago, the patient underwent CT-guided ablation of liver metastasis and was discharged after receiving treatment for infection prevention and liver protection. The patient had no discomfort and was admitted to the hospital for chemotherapy.

History of past illness

The patient sprained her right wrist more than 8 mo ago, and she had no other known medical conditions.

Personal and family history

Her father died of an unknown type of cancer at the age 49.

Physical examination

The patient's vital signs were stable, and her skin and sclera showed no signs of yellowing. The abdomen was flat and

soft, and the right lower abdomen was tender and percussive.

Laboratory examinations

Blood routine, renal function, coagulation, carcinoembryonic antigen, and carbohydrate antigen (CA) 19-9 results were all within the normal range. However, some laboratory results were abnormal, including C-reactive protein, 4.62 mg/L (normal range: < 4 mg/L); alanine aminotransferase, 50 IU/L (normal range: 7-40 IU/L); aspartate aminotransferase, 45 IU/L (normal range: 13-35 IU/L); CA125, 62.8 U/mL (normal range: ≤ 25 ng/mL) (Table 1). Real-time polymerase linked reaction (RT-PCR) indicated positive nucleic acid of novel coronavirus, and pus culture revealed *Candida albicans*, which was sensitive to fluconazole.

Imaging examinations

Chest CT examination indicated viral pneumonia, and contrast-enhanced abdominal CT revealed a liver abscess with a maximum cross-section of 6.9 cm × 6.0 cm, accompanied by fluid and gas (Figure 1A).

FINAL DIAGNOSIS

The patient was diagnosed as *Candida albicans* liver abscess, COVID-19, and Stage IV pancreatic head cancer.

TREATMENT

The patient was admitted to the hospital on December 14, 2022, for chemotherapy with fluorouracil, leucovorin, oxaliplatin, and irinotecan (FOLFOXIRI) regimen. On December 17, 2022, the patient developed a fever with a body temperature as high as 39.6 °C. Blood tests showed an increased white blood cell count, neutrophil percentage, C-reactive protein (CRP) and procalcitonin (PCT). Liver function indicated that the aminotransferase value was doubled (Table 1). Chest CT showed no abnormalities. Acute bronchitis was considered in combination with the patient's cough. Given that the patient was a chemotherapy patient with advanced malignant tumor complicated with diabetes mellitus and a weakened immune system, she was given cefoperazone sulbactam sodium (3 g *i.v.* q12h), continued liver protection, immune enhancement, nutritional support, and other treatments. After 3 d of antibiotic use, the patient's temperature still peaked at 39.6 °C, and her RT-PCR indicated COVID-19, while chest CT examination indicated viral pneumonia. She was treated with azvudine tablets (5 mg *po* qd). In addition, the patient experienced vomiting, poor appetite, and right upper abdominal pain. Contrast-enhanced abdominal CT showed a liver abscess with a maximum cross-section of 6.9 cm × 6.0 cm, accompanied by fluid and gas (Figure 1A). On January 20, 2022, the patient underwent CT-guided percutaneous catheter drainage for hepatic abscess. The pus was brown and turbid with flocculent substance and it was sent for microbial culture. The antibiotic was upgraded to Meropenem (1 g *i.v.* q8h). On December 22, 2022, the patient's blood routine showed a very low white blood cell count of $1.24 \times 10^9/L$, a platelet count of $49 \times 10^9/L$, and CRP and PCT were still significantly elevated, while liver function was basically normal (Table 1). To improve both the white blood cell and platelet counts, the patient was injected with recombinant human granulocyte stimulating factor plus recombinant human thrombopoietin. On December 25, 2022, pus culture revealed *Candida albicans*, which was sensitive to fluconazole. Then the patient was treated with fluconazole injection (0.4 g *i.v.* qd, double the first dose). With the use of fluconazole, the patient's symptoms and signs gradually improved. On December 29, 2022, contrast-enhanced abdominal CT showed no gas or fluid in the abscess space (Figure 1B). The patient had no pus coming out of the drain, and the drain was removed. On January 14, 2023, the patient's laboratory results showed normal blood routine, slightly elevated CRP and PCT, and significantly elevated aminotransferase (Table 1). The significant elevated aminotransferases were considered a side effect of fluconazole, but fluconazole had to be continued, so liver protection therapy was strengthened. On January 20, 2023, the patient had no discomfort such as fever or abdominal pain, and her routine blood, CRP, PCT, and liver function were basically normal (Table 1). At this time, the patient received intravenous fluconazole for 4 wk and continued to take oral fluconazole (0.45 g *po* qd) and hepatoprotective drugs for 1 wk after discharge. In total, the antifungal course lasted for 5 wk.

OUTCOME AND FOLLOW-UP

The patient recovered well and received 4 cycles of FOLFOXIRI chemotherapy after 2 mo of antifungal therapy. The patient's routine blood, liver function, kidney function, and coagulation were normal, tumor markers decreased, and contrast-enhanced abdominal CT did not indicate liver tissue absence, cavity, or gas any longer (Figure 1C).

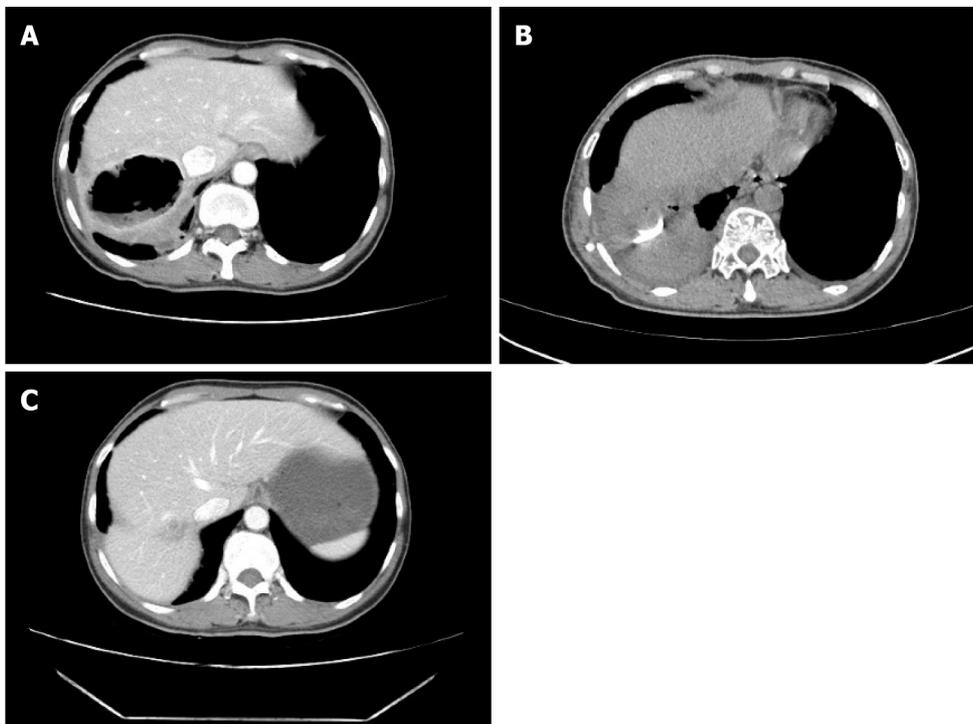
DISCUSSION

The pancreas is made up of acinar cells that secrete digestive enzymes, ductal cells that secrete bicarbonate, central acinar cells that act as a transition zone between acinar and ductal cells, endocrine islets that secrete hormones, and relatively

Table 1 Laboratory test results

Date	White blood cell count, × 10 ⁹ /L	Neutrophil percentage, %	Hemoglobin, g/L	Platelet count, × 10 ⁹ /L	hs-CRP, mg/L	PCT, ng/mL	ALT, IU/L	AST, IU/L	GGT, IU/L
2022.12.14	6.35	66.9	123	410	4.62	0.13	50	45	35
2022.12.17	16.97	96.5	138	235	73.08	3.10	96	80	68
2022.12.19	8.22	93.2	112	122	169.78	-	-	-	-
2022.12.22	1.24	72.0	95	49	76.13	0.89	24	27	60
2022.12.28	18.81	88.8	98	212	74.18	0.19	35	47	41
2023.01.14	8.85	68.4	126	323	32.94	0.46	258	316	167
2023.01.20	3.86	56.2	110	224	-	-	47	39	78

Normal values of laboratory tests (routine blood test): White blood cell count: 3.5-9.5 × 10⁹/L; neutrophil percentage: 40%-75%; hemoglobin: 115-150 g/L; platelet count: 125-350 × 10⁹/L; hypersensitive C-reactive protein: < 4 mg/L; procalcitonin: < 0.05 ng/mL; alanine aminotransferase: 7-40 IU/L; aspartate aminotransferase: 13-35 IU/L; γ-glutamyltransferase: 7-45 IU/L. ALT: Alanine aminotransferase; AST: Aspartate aminotransferase; GGT: γ-glutamyltransferase; hs-CRP: Hypersensitive C-reactive protein; PCT: Procalcitonin.



DOI: 10.4251/wjgo.v15.i7.1311 Copyright ©The Author(s) 2023.

Figure 1 Contrast-enhanced abdominal computed tomography. A: Contrast-enhanced abdominal computed tomography (CT) on December 19, 2022 showed liver abscess, with a maximum section of 6.9 cm × 6.0 cm, accompanied by fluid and gas; B: Contrast-enhanced abdominal CT on December 29, 2022 showed a cavity shadow in the right posterior lobe of the liver, and a drainage tube shadow was seen inside the cavity. The cavity was smaller than before, and no gas-liquid level was observed; C: Contrast-enhanced abdominal CT on March 27, 2023 showed the filling of solid components in the primary cavity of the right posterior lobe of the liver, and the enhancement of the cavity wall was relatively uniform.

inactive stellate cells. Cancer occurs when abnormal DNA mutations in the pancreas cause pancreatic cells to grow and divide uncontrollably[1]. Risk factors for early hepatic metastasis of pancreatic cancer include age over 70 years, lymph node metastasis, adenocarcinoma or neuroendocrine carcinoma, large tumor size, poor differentiation, no surgery, no chemotherapy. Pancreatic cancer is one of the most aggressive and fatal malignancies[2].

The treatment of hepatic metastasis of pancreatic cancer includes chemotherapy, radiotherapy, and surgery. Ablation is one of the most effective and minimally invasive techniques for the treatment of liver tumors, with a low complication rate. Compared with chemotherapy alone, ablation combined with chemotherapy can further prolong the survival period of patients. However, in some rare cases, complications such as liver abscess, bronchobiliary fistula, hollow visceral perforation, diaphragmatic perforation, and hernia may occur[3,4]. The clinical symptoms of hepatic abscess are nons-

pecific, including abdominal pain, fever, nausea, and poor appetite. Routine blood and liver function tests are abnormal, but the extent of the abnormality depends on the pathogen, extent, and site of the abscess. The diagnosis of liver abscess needs to be confirmed by ultrasound, CT, or magnetic resonance imaging (MRI), especially the differentiation between liver abscess and liver metastasis[5-7]. The incidence of liver abscess in ablation patients was 0.1% to 0.7%, while the incidence of liver abscess was significantly increased in patients with enterobiliary anastomosis[8]. The incidence of liver abscess after liver intervention in patients who had undergone Whipple surgery was up to 86%. This was closely related to the fact that pathogenic bacteria can directly enter the biliary tract system and led to the formation of an abscess. The pathogens of liver abscesses were mostly bacteria, partly parasites, and rarely fungi[9]. Patients with liver abscesses had a high mortality rate, which was as high as 75%-80% in the early 20th century. Now the mortality rate for patients with liver abscesses has decreased significantly, but it is still close to 15%. Factors that increase the risk of death in patients with liver abscess include advanced age, malignancy, diabetes, abscess > 5 cm, low immunity, multiple organ failure, PPI use, and cirrhosis, *etc*[8]. When patients with liver abscess are complicated by COVID-19, the mortality is still as high as 55% even after early drainage and antibiotic treatment[10,11]. This is linked to severe sepsis caused by COVID-19, which reduces mitochondrial efficiency and leads to respiratory chain dysfunction[12]. The prognosis of patients with hepatic abscess is closely related to appropriate treatment. Liver abscesses that are smaller than 3 cm to 5 cm, especially when they are multiple, can be treated with antibiotics alone without drainage, although there is no general consensus on this. It has been reported that the cure rate of liver abscess < 3 cm with antibiotics alone is 100%, while the cure rate of liver abscess < 5 cm is about 80%. It is not clear to know the duration of antibiotic use, usually between 2 wk and 6 wk. Surgical drainage in combination with antibiotics is usually necessary if the patient has failed medication, has an abscess greater than 5 cm, or has other causes. If conservative treatment fails, patients may even need a hepatectomy[9].

Fungal liver abscess cases are rare, especially for patients with pancreatic head cancer, diabetes, bone marrow transplantation after chemotherapy, or COVID-19. There are no guidelines or expert consensus on the course of antifungal therapy to guide clinical treatment. For patients with *Candida albicans*, liver abscess complicated with various underlying diseases such as malignant tumor and diabetes, continuous antifungal therapy for 5 wk is effective. In the early stage, the efficacy can be judged according to the patient having no fever, abdominal pain has disappeared and leukocyte, CRP, PCT has decreased. It can also be combined with ultrasound, CT, or MRI to judge the treatment effect. However, the use of antifungal drugs for a long course should make the physician wary of liver function damage and other side effects while liver function and kidney function should be monitored.

CONCLUSION

The incidence of liver abscess after liver intervention is very high in patients who have undergone Whipple surgery. Effective treatment of *Candida albicans* liver abscess requires early detection, percutaneous catheter drainage, and antifungal therapy for 5 wk. Meanwhile, complications such as COVID-19 should be actively dealt with, and nutritional support should be provided.

ACKNOWLEDGEMENTS

Grammar consulting and writing assistance were kindly provided by Ying Liu and Tao Qin.

FOOTNOTES

Author contributions: Hu W contributed to the writing of the original draft; Qian M and Lin X were involved in editing the manuscript; Du TM participated in manuscript editing and provided computed tomography images; Lan X participated in manuscript writing and review.

Informed consent statement: Informed written consent was obtained from the patient for publication of this report and any accompanying images.

Conflict-of-interest statement: The authors declare that they have no conflict of interest to disclose.

CARE Checklist (2016) statement: The authors have read the CARE Checklist (2016), and the manuscript was prepared and revised according to the CARE Checklist (2016).

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Country/Territory of origin: China

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S-Editor: Chen YL

L-Editor: Filipodia

P-Editor: Chen YL

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