

World Journal of *Clinical Cases*

World J Clin Cases 2021 April 6; 9(10): 2160-2418



Contents

Thrice Monthly Volume 9 Number 10 April 6, 2021

MINIREVIEWS

- 2160** Tertiary peritonitis: A disease that should not be ignored
Marques HS, Araújo GRL, da Silva FAF, de Brito BB, Versiani PVD, Caires JS, Milet TC, de Melo FF
- 2170** SARS-CoV-2, surgeons and surgical masks
Khalil MI, Banik GR, Mansoor S, Alqahtani AS, Rashid H

ORIGINAL ARTICLE

Case Control Study

- 2181** Igaratimod promotes transformation of mononuclear macrophages in elderly patients with rheumatoid arthritis by nuclear factor- κ B pathway
Liu S, Song LP, Li RB, Feng LH, Zhu H

Retrospective Study

- 2192** Factors associated with overall survival in early gastric cancer patients who underwent additional surgery after endoscopic submucosal dissection
Zheng Z, Bu FD, Chen H, Yin J, Xu R, Cai J, Zhang J, Yao HW, Zhang ZT
- 2205** Epidemiological and clinical characteristics of 65 hospitalized patients with COVID-19 in Liaoning, China
Zhang W, Ban Y, Wu YH, Liu JY, Li XH, Wu H, Li H, Chen R, Yu XX, Zheng R
- 2218** Comprehensive clinicopathologic characteristics of intraabdominal neurogenic tumors: Single institution experience
Simsek C, Uner M, Ozkara F, Akman O, Akyol A, Kav T, Sokmensuer C, Gedikoglu G
- 2228** Distribution and drug resistance of pathogens in burn patients in China from 2006 to 2019
Chen H, Yang L, Cheng L, Hu XH, Shen YM

Observational Study

- 2238** Impact of simethicone on bowel cleansing during colonoscopy in Chinese patients
Zhang H, Liu J, Ma SL, Huang ML, Fan Y, Song M, Yang J, Zhang XX, Song QL, Gong J, Huang PX, Zhang H

Prospective Study

- 2247** Effect of suspension training on neuromuscular function, postural control, and knee kinematics in anterior cruciate ligament reconstruction patients
Huang DD, Chen LH, Yu Z, Chen QJ, Lai JN, Li HH, Liu G

CASE REPORT

- 2259** Turner syndrome with positive SRY gene and non-classical congenital adrenal hyperplasia: A case report
He MN, Zhao SC, Li JM, Tong LL, Fan XZ, Xue YM, Lin XH, Cao Y

- 2268** Mechanical thrombectomy for acute occlusion of the posterior inferior cerebellar artery: A case report
Zhang HB, Wang P, Wang Y, Wang JH, Li Z, Li R
- 2274** Bilateral retrocorneal hyaline scrolls secondary to asymptomatic congenital syphilis: A case report
Jin YQ, Hu YP, Dai Q, Wu SQ
- 2281** Recurrent undifferentiated embryonal sarcoma of the liver in adult patient treated by pembrolizumab: A case report
Yu XH, Huang J, Ge NJ, Yang YF, Zhao JY
- 2289** Adult onset type 2 familial hemophagocytic lymphohistiocytosis with *PRF1* c.65delC/c.163C>T compound heterozygous mutations: A case report
Liu XY, Nie YB, Chen XJ, Gao XH, Zhai LJ, Min FL
- 2296** Salvage of vascular graft infections *via* vacuum sealing drainage and rectus femoris muscle flap transposition: A case report
Zhang P, Tao FL, Li QH, Zhou DS, Liu FX
- 2302** Innovative chest wall reconstruction with a locking plate and cement spacer after radical resection of chondrosarcoma in the sternum: A case report
Lin CW, Ho TY, Yeh CW, Chen HT, Chiang IP, Fong YC
- 2312** Changes in sleep parameters following biomimetic oral appliance therapy: A case report
Singh GD, Kherani S
- 2320** Bone remodeling in sigmoid sinus diverticulum after stenting for transverse sinus stenosis in pulsatile tinnitus: A case report
Qiu XY, Zhao PF, Ding HY, Li XS, Lv H, Yang ZH, Gong SS, Jin L, Wang ZC
- 2326** Prolonged use of bedaquiline in two patients with pulmonary extensively drug-resistant tuberculosis: Two case reports
Gao JT, Xie L, Ma LP, Shu W, Zhang LJ, Ning YJ, Xie SH, Liu YH, Gao MQ
- 2334** Low-grade mucinous appendiceal neoplasm mimicking an ovarian lesion: A case report and review of literature
Borges AL, Reis-de-Carvalho C, Chorão M, Pereira H, Djokovic D
- 2344** Granulomatosis with polyangiitis presenting as high fever with diffuse alveolar hemorrhage and otitis media: A case report
Li XJ, Yang L, Yan XF, Zhan CT, Liu JH
- 2352** Primary intramedullary melanoma of lumbar spinal cord: A case report
Sun LD, Chu X, Xu L, Fan XZ, Qian Y, Zuo DM
- 2357** Proliferative glomerulonephritis with monoclonal immunoglobulin G deposits in a young woman: A case report
Xu ZG, Li WL, Wang X, Zhang SY, Zhang YW, Wei X, Li CD, Zeng P, Luan SD

- 2367** *Nocardia cyriacigeorgica* infection in a patient with pulmonary sequestration: A case report
Lin J, Wu XM, Peng MF
- 2373** Long-term control of melanoma brain metastases with co-occurring intracranial infection and involuntary drug reduction during COVID-19 pandemic: A case report
Wang Y, Lian B, Cui CL
- 2380** Solitary bone plasmacytoma of the upper cervical spine: A case report
Li RJ, Li XF, Jiang WM
- 2386** Two-stage transcrestal sinus floor elevation-insight into replantation: Six case reports
Lin ZZ, Xu DQ, Ye ZY, Wang GG, Ding X
- 2394** Programmed cell death protein-1 inhibitor combined with chimeric antigen receptor T cells in the treatment of relapsed refractory non-Hodgkin lymphoma: A case report
Niu ZY, Sun L, Wen SP, Song ZR, Xing L, Wang Y, Li JQ, Zhang XJ, Wang FX
- 2400** Pancreatic cancer secondary to intraductal papillary mucinous neoplasm with collision between gastric cancer and B-cell lymphoma: A case report
Ma YH, Yamaguchi T, Yasumura T, Kuno T, Kobayashi S, Yoshida T, Ishida T, Ishida Y, Takaoka S, Fan JL, Enomoto N
- 2409** Acquired haemophilia in patients with malignant disease: A case report
Krašek V, Kotnik A, Zavrtanik H, Klen J, Zver S

ABOUT COVER

Editorial Board Member of *World Journal of Clinical Cases*, Deb Sanjay Nag, Senior Consultant, Department of Anaesthesiology, Tata Main Hospital, C-Road (West), Bistupur, Jamshedpur 831 001, India. ds.nag@tatasteel.com

AIMS AND SCOPE

The primary aim of *World Journal of Clinical Cases* (WJCC, *World J Clin Cases*) is to provide scholars and readers from various fields of clinical medicine with a platform to publish high-quality clinical research articles and communicate their research findings online.

WJCC mainly publishes articles reporting research results and findings obtained in the field of clinical medicine and covering a wide range of topics, including case control studies, retrospective cohort studies, retrospective studies, clinical trials studies, observational studies, prospective studies, randomized controlled trials, randomized clinical trials, systematic reviews, meta-analysis, and case reports.

INDEXING/ABSTRACTING

The WJCC is now indexed in Science Citation Index Expanded (also known as SciSearch®), Journal Citation Reports/Science Edition, Scopus, PubMed, and PubMed Central. The 2020 Edition of Journal Citation Reports® cites the 2019 impact factor (IF) for WJCC as 1.013; IF without journal self cites: 0.991; Ranking: 120 among 165 journals in medicine, general and internal; and Quartile category: Q3. The WJCC's CiteScore for 2019 is 0.3 and Scopus CiteScore rank 2019: General Medicine is 394/529.

RESPONSIBLE EDITORS FOR THIS ISSUE

Production Editor: Yan-Xia Xing; **Production Department Director:** Yun-Xiaoqian Wu; **Editorial Office Director:** Jin-Li Wang.

NAME OF JOURNAL

World Journal of Clinical Cases

ISSN

ISSN 2307-8960 (online)

LAUNCH DATE

April 16, 2013

FREQUENCY

Thrice Monthly

EDITORS-IN-CHIEF

Dennis A Bloomfield, Sandro Vento, Bao-Gan Peng

EDITORIAL BOARD MEMBERS

<https://www.wjgnet.com/2307-8960/editorialboard.htm>

PUBLICATION DATE

April 6, 2021

COPYRIGHT

© 2021 Baishideng Publishing Group Inc

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>



Recurrent undifferentiated embryonal sarcoma of the liver in adult patient treated by pembrolizumab: A case report

Xiao-He Yu, Jian Huang, Nai-Jian Ge, Ye-Fa Yang, Jin-Yan Zhao

ORCID number: Xiao-He Yu 0000-0001-6955-9468; Jian Huang 0000-0002-0301-1093; Nai-Jian Ge 0000-0002-1959-4270; Ye-Fa Yang 0000-0003-0731-2894; Jin-Yan Zhao 0000-0002-6403-5857.

Author contributions: Yu XH and Huang J were the patient's interventional radiologists, reviewed the literature and contributed to manuscript drafting; Ge NJ reviewed the literature and contributed to manuscript drafting; Zhao JY performed next generation sequencing and immunohistological analyses and interpretation and contributed to manuscript drafting; Yang YF made the treatment plan and contributed to manuscript drafting; Zhao JY and Yang YF were responsible for the revision of the manuscript for important intellectual content; All authors issued final approval for the version to be submitted.

Supported by National Natural Science Foundation of China, No. 31971249.

Informed consent statement: Written informed consent was obtained from the patient for publication of this case report.

Conflict-of-interest statement: The authors declared that they have no conflicts of interest regarding this

Xiao-He Yu, Jian Huang, Nai-Jian Ge, Ye-Fa Yang, Department of Radioactive Intervention, Eastern Hepatobiliary Surgery Hospital, The Second Military Medical University, Shanghai 200438, China

Xiao-He Yu, Zhongshan Hospital Qingpu Branch, Fudan University, Shanghai 200092, China

Jin-Yan Zhao, Department of Laboratory Medicine, Shanghai General Hospital, Shanghai Jiao Tong University School of Medicine, Shanghai 200080, China

Corresponding author: Jin-Yan Zhao, MD, Attending Doctor, Department of Laboratory Medicine, Shanghai General Hospital, Shanghai Jiao Tong University School of Medicine, No. 85 Wujin Road, Shanghai 200080, China. jingy1213@163.com

Abstract

BACKGROUND

Undifferentiated embryonal sarcoma of the liver (UESL) is a neoplasm that rarely develops in adults. The main treatments for UESL are upfront gross total surgical resection and adjuvant multiagent chemotherapy. Here, we report a case of recurrent UESL in an adult treated with pembrolizumab and discuss a method to identify proper candidates for antibody of programmed cell death protein 1 (anti-PD-1) treatment.

CASE SUMMARY

A 69-year-old woman was admitted for abdominal pain that developed for 1 wk. Computed tomography showed a 16 cm mass in the right lobe of the liver. Right hemihepatectomy and lymphadenectomy were performed, and histological diagnosis was UESL. Six months later, the patient suffered from painless obstructive jaundice, and positron emission tomography-computed tomography revealed multiple metastases. Then, percutaneous transhepatic cholangial drainage was applied to reduce jaundice, and radiofrequency ablation was used to control the lesion near the hepatic hilum. However, the patient suffered from a serious fever caused by the tumor. The patient received treatment with pembrolizumab, and the prescribed dosage was 2 mg/kg every 3 wk. After the seventh dose, positron emission tomography-computed tomography revealed that the multiple metastases had nearly disappeared. Radiologic exam was used to evaluate the disease state, and no new lesions were found. Next-generation sequencing and immunohistology were applied to determine the reason why the patient had such a favorable response to pembrolizumab. Tumor mutation burden, microsatellite instability, and programmed death ligand 1 expression can

work.

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).

Open-Access: This article is an open-access article that was selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in accordance with the Creative Commons Attribution NonCommercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>

Manuscript source: Unsolicited manuscript

Specialty type: Medicine, research and experimental

Country/Territory of origin: China

Peer-review report's scientific quality classification

Grade A (Excellent): 0
Grade B (Very good): B
Grade C (Good): 0
Grade D (Fair): 0
Grade E (Poor): 0

Received: September 20, 2020

Peer-review started: September 20, 2020

First decision: October 17, 2020

Revised: December 30, 2020

Accepted: January 25, 2021

Article in press: January 25, 2021

Published online: April 6, 2021

P-Reviewer: Kurokawa T

S-Editor: Gao CC

L-Editor: Filipodia

P-Editor: Li X



be combined to predict the effect of PD-1 antibodies. When every one of these biomarkers are detected in a tumor patient, the patient may be a proper candidate for PD-1 antibodies.

CONCLUSION

Anti-PD-1 treatment for tumors needs further research to identify indications and proper biomarkers.

Key Words: Undifferentiated embryonal sarcoma of the liver; Pembrolizumab; Programmed cell death protein 1; Tumor mutation burden; Immunohistology; Case report

©The Author(s) 2021. Published by Baishideng Publishing Group Inc. All rights reserved.

Core Tip: Undifferentiated embryonal sarcoma of the liver is a neoplasm rarely diagnosed in adults, which was mainly treated by resection and adjuvant multiagent chemotherapy. Immunotherapy, such as antibody of programmed cell death protein 1, has not been reported to be used to treat this disease. Here we reported a recurrent undifferentiated embryonal sarcoma of the liver case in an adult that was treated by pembrolizumab and discussed the way to find the proper candidates for antibody of programmed cell death protein 1 treatment.

Citation: Yu XH, Huang J, Ge NJ, Yang YF, Zhao JY. Recurrent undifferentiated embryonal sarcoma of the liver in adult patient treated by pembrolizumab: A case report. *World J Clin Cases* 2021; 9(10): 2281-2288

URL: <https://www.wjgnet.com/2307-8960/full/v9/i10/2281.htm>

DOI: <https://dx.doi.org/10.12998/wjcc.v9.i10.2281>

INTRODUCTION

Undifferentiated embryonal sarcoma of the liver (UESL) is a mesenchymal tumor that was first described in 1978^[1]. UESL is an aggressive pediatric tumor that is classically diagnosed in adolescents and rarely diagnosed in adults^[2]. The main treatments for UESL are upfront gross total surgical resection and adjuvant multiagent chemotherapy, which have led to improved long-term survival^[3]. However, immunotherapy, such as programmed cell death protein 1 (anti-PD-1) antibodies, has not been reported to be used to treat this disease. Here, we report a case of recurrent UESL in an adult treated with pembrolizumab (Keytruda, Merck Sharp & Dohme Ltd) and discuss a method to identify proper candidates for anti-PD-1 treatment.

CASE PRESENTATION

Chief complaints

A 69-year-old woman was admitted for abdominal pain that developed for 1 wk (Figure 1).

History of present illness

Right hemihepatectomy and lymphadenectomy were performed in Oct 2016.

History of past illness

She had no history of a previously diagnosed malignancy.

Physical examination

No abnormalities.

Laboratory examinations

Serum levels of tumor markers (carcinoembryonic antigen, CA-19-9, alpha-fetoprotein and prostate-specific antigen) were all within normal limits, and she was negative for

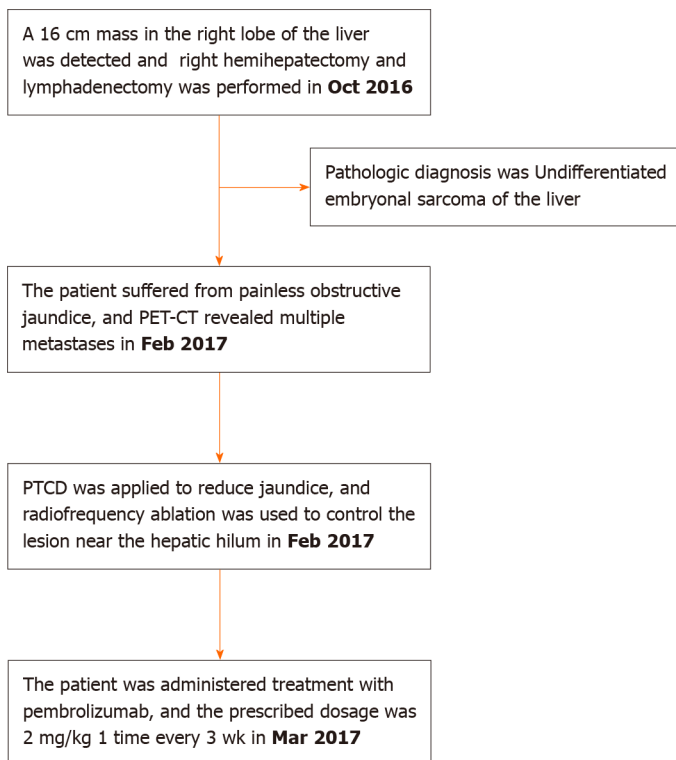


Figure 1 Timeline of the case. PET-CT: Positron emission tomography-computed tomography; PTCO: Percutaneous transhepatic cholangial drainage.

hepatic viral markers (hepatitis B surface antigen and anti-hepatitis C virus).

Imaging examinations

Abdominal contrast-enhanced computed tomography (CT) showed a 16 cm mass in the right lobe of the liver, and positron emission tomography-CT showed radioactive concentration of 18F-fluorodeoxyglucose on the tumor rim with no radioactive concentration in other areas of the body (Figure 2).

FINAL DIAGNOSIS

The histological report showed a solitary 16.0 cm × 12.5 cm × 10.5 cm well-defined and encapsulated tumor. Tumor cells were found in some dilated lymph vessels. The immunohistological stain was positive for vimentin, S-100 protein, A1AT, LCA, CD68 and Ki67. The staining for CD20, CD45R0, CK, CAM5.2, smooth muscle actin, CK8/18, CK20, CK19, villin, AFP, HSA, HMB45, A103, TTF-1, CA125, caldesmon, MyoD1, CD34, CD21 and CD57 demonstrated negative findings. The diagnosis of UESL was made using the examinations mentioned above.

TREATMENT

Six months after surgery, the patient suffered from painless obstructive jaundice. Liver ultrasonography revealed a new lesion near the hepatic hilum and intrahepatic bile duct dilation. Then, positron emission tomography-CT revealed multiple metastases located in the liver, mediastinum and peritoneum (Figure 3). Next, percutaneous transhepatic cholangial drainage and stenting were applied to reduce jaundice. After that, radiofrequency ablation with intraductal chilled saline perfusion to prevent bile duct injury through percutaneous transhepatic cholangial drainage was used to control the lesion near the hepatic hilum^[4]. However, the patient suffered from a serious fever caused by the tumor. Due to the fever, the patient became asthenic and was afraid to undergo chemotherapy or targeted therapy. Therefore, the patient was received pembrolizumab for treatment, and the prescribed dosage was 2 mg/kg once every 3 wk.

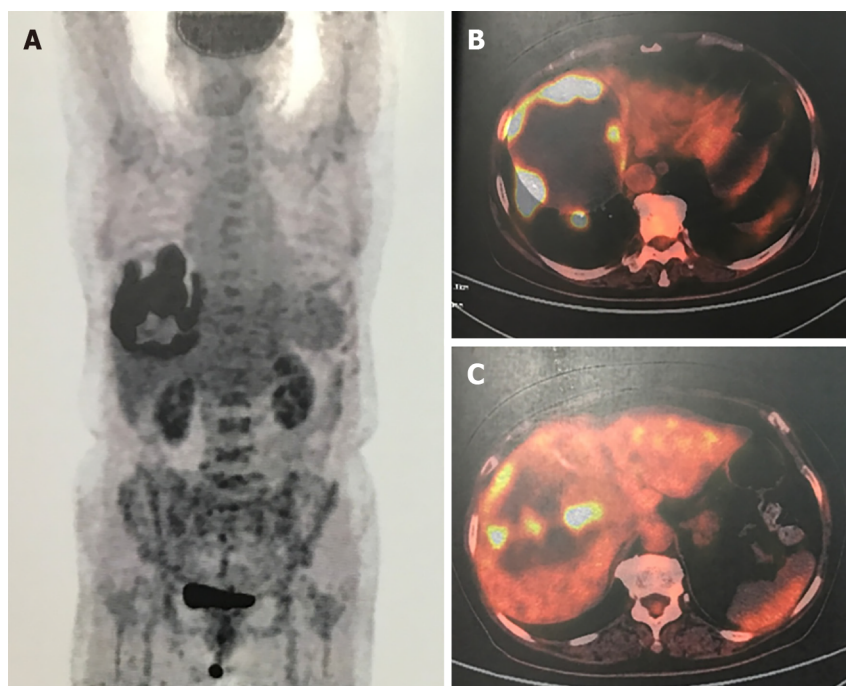


Figure 2 Positron emission tomography-computed tomography. A-C: Radioactive concentration of ^{18}F -fluorodeoxyglucose on the tumor rim, and no radioactive concentration was observed in other areas of the body.

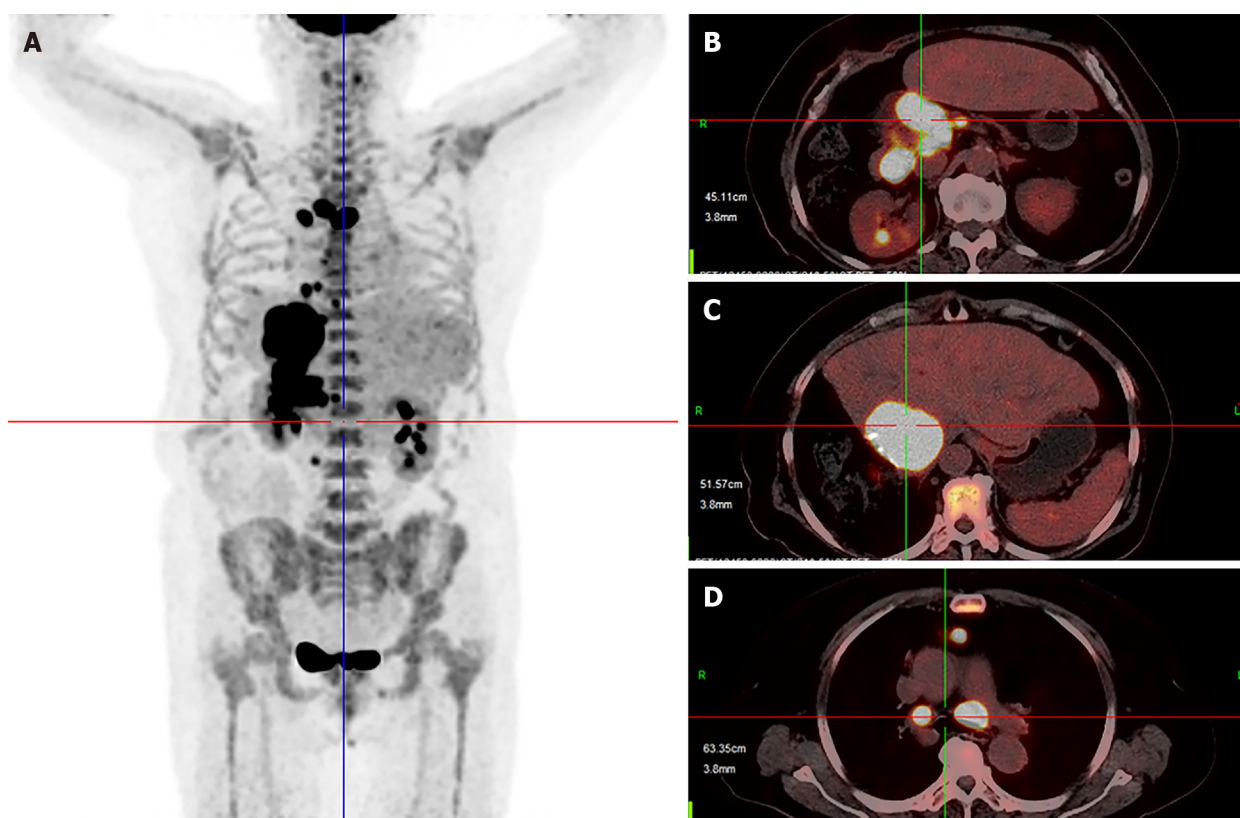


Figure 3 Positron emission tomography-computed tomography. A-D: Multiple metastases located in the liver, mediastinum and peritoneum.

OUTCOME AND FOLLOW-UP

Two days after the first dose, the fever was relieved. After the seventh dose, new positron emission tomography-CT was conducted revealing that the multiple metastases had nearly disappeared (Figure 4). The patient received six more doses of pembrolizumab. Every 6 mo, chest CT and abdominal contrast-enhanced CT were

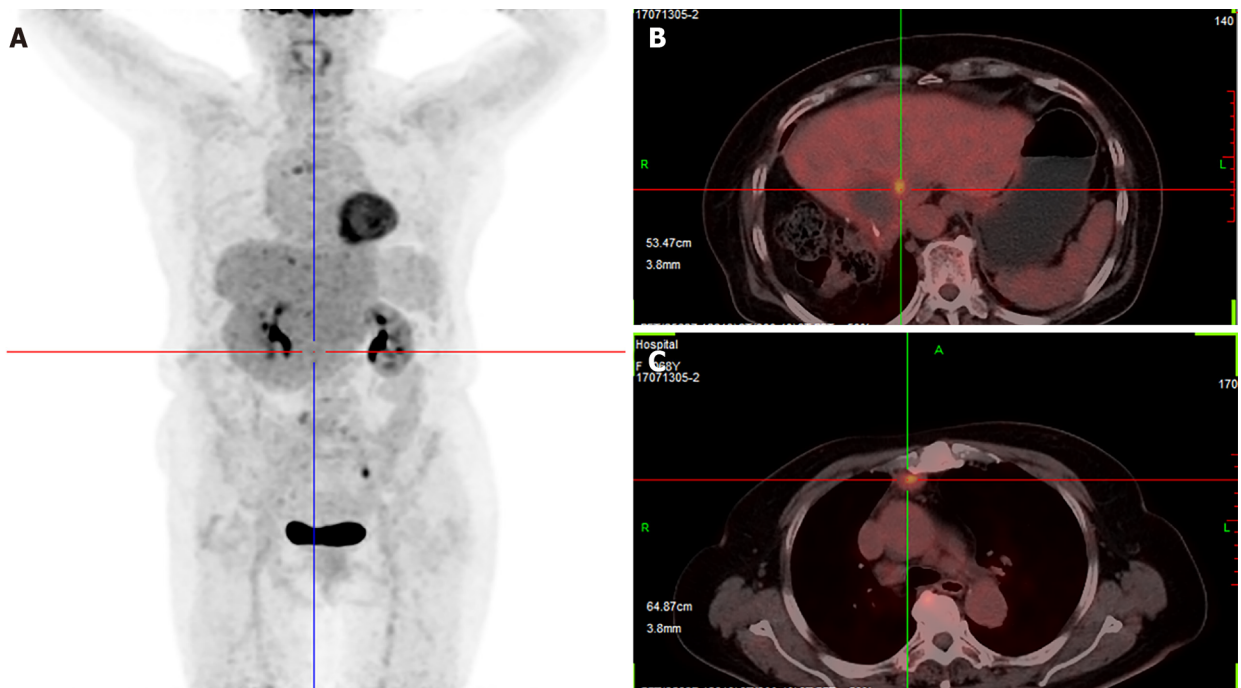


Figure 4 Positron emission tomography-computed tomography. A-C: Multiple metastases had nearly disappeared.

used to evaluate the disease state, and no new lesions were found. To determine the reason why the patient had such a favorable response to pembrolizumab, biopsy and peripheral blood were used for next-generation sequencing (NGS). NGS revealed *PTK2* gene amplification, *FGF10* gene amplification and *USP34/XPO1* gene rearrangement. The tumor mutation burden (TMB) was 3.2 muts/Mb (< 75%), and the tumor showed microsatellite stability. There was no strong association between the favorable response and NGS result, as previously reported^[6]. Then, further immunohistological staining of CD68, CD8 and CD4 were used to detect macrophage and T cell distribution in the tumor, and immunohistological staining of programmed death ligand 1 (PD-L1) was used to detect the expression of PD-L1 in the tumor cell. Immunohistological staining showed that there was high expression of CD8, low expression of CD4 and little expression of CD68 in the tumor, and up to 90% of tumor cells expressed PD-L1 (Figure 5).

DISCUSSION

Anti-PD-1 treatment, as a new immunotherapy, has the advantages of few side effects, limited pain and long-lasting effects^[6]. Therefore, an increasing number of researchers have attempted to use anti-PD-1 to treat multiple types of tumors^[7,8]. For the first time in this case, pembrolizumab was used to treat UESL, and the result was encouraging. Pembrolizumab may be a new method to treat UESL.

In our case, radiofrequency ablation was applied to control the lesion near the hepatic hilum. Although ablation does not provide a cure, it may assist pembrolizumab in destroying tumor cells. Local ablation can destroy tumor cells, and then tumor antigens are released into the microenvironment and blood. Recent research has revealed that immunotherapy combined with local treatment can prolong the survival time of liver cancer^[9]. Other research has revealed that local treatment, such as radiotherapy, can release antigenic peptides from tumors, cause the activation and migration of dendritic cells and enhance antigen presentation by dendritic cells leading to enhanced antitumor T-cell recognition and activity^[10].

We were curious why the patient had a good response to pembrolizumab and wanted to determine how other appropriate candidates for anti-PD-1 treatment could be identified. In our case, biopsy and peripheral blood were used to perform NGS. However, the gene mutations found in this patient were not associated with a favorable response to pembrolizumab. High TMB and microsatellite instability in tumors are associated with a favorable response to pembrolizumab, and the Food and Drug Administration has authorized pembrolizumab to be used to treat multiple types

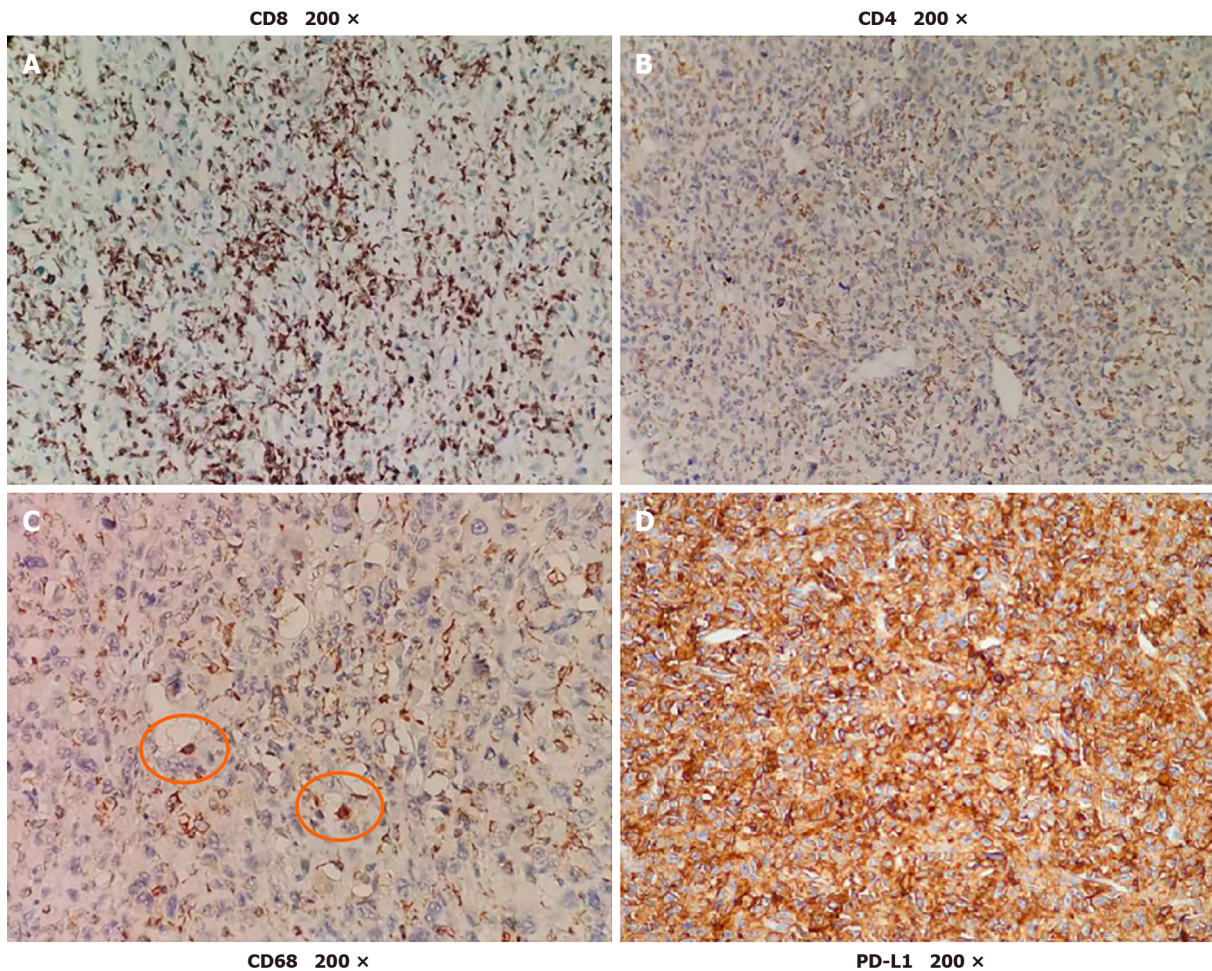


Figure 5 Immunohistological staining. A-D: There was high expression of CD8, low expression of CD4 and little expression of CD68 in the tumor. Up to 90% of tumor cells expressed programmed death ligand 1 (PD-L1).

of tumors with high TMB and microsatellite instability^[11]. However, in this case, NGS showed that the tumor had low TMB and microsatellite stability, which was contradictory to other responsive tumors^[5]. Therefore, low TMB and microsatellite stability were not contraindications for anti-PD-1 treatment.

Then, immunohistological staining showed that up to 90% of the tumor cells expressed PD-L1. This may be the reason why the patient had a favorable response to pembrolizumab. Many researchers have found that PD-L1 is expressed in many types of tumors, and high-level expression of PD-L1 is always associated with poor tumor prognosis^[12]. In some types of tumors, such as lung cancer, high-level expression of PD-L1 is associated with a good response to anti-PD-1 treatment^[13]. However, in other types of tumors, the expression of PD-L1 is not associated with responses to anti-PD-1 treatment^[14]. Defining the high-level expression of PD-L1 is also controversial^[15]. Moreover, the location of PD-L1 expression also needs further research^[16]. Therefore, PD-L1 expression, as a biomarker for predicting the effect of PD-1 antibodies, also needs further research.

In our opinion, TMB, microsatellite instability and PD-L1 expression can be combined to predict the effect of PD-1 antibodies. When every one of these biomarkers is detected in a tumor patient, the patient may be a proper candidate for PD-1 antibodies. However, anti-PD-1, as a new treatment for tumors, needs further research to identify the indications and proper biomarkers.

CONCLUSION

We reported a case of recurrent UESL in an adult patient treated with pembrolizumab, and UESL had a nearly complete response to pembrolizumab. Immunohistological staining of PD-L1 was highlighted and corresponded to the effect of pembrolizumab.

Therefore, PD-L1 expression may be combined with TMB and microsatellite instability to predict the effect of PD-1 antibody treatment.

REFERENCES

- 1 **Stocker JT**, Ishak KG. Undifferentiated (embryonal) sarcoma of the liver: report of 31 cases. *Cancer* 1978; **42**: 336-348 [PMID: 208754 DOI: 10.1002/1097-0142(197807)42:1<336::aid-cnrcr2820420151>3.0.co;2-v]
- 2 **Esteban SG**, Emilio CU, Emmanuel AF, Oscar SJ, Paulina CE, Angel MM. Undifferentiated embryonal sarcoma of the liver in adult patient: A report of two cases. *Ann Hepatobiliary Pancreat Surg* 2018; **22**: 269-273 [PMID: 30215049 DOI: 10.14701/ahbps.2018.22.3.269]
- 3 **Techavichit P**, Masand PM, Himes RW, Abbas R, Goss JA, Vasudevan SA, Finegold MJ, Heczey A. Undifferentiated Embryonal Sarcoma of the Liver (UESL): A Single-Center Experience and Review of the Literature. *J Pediatr Hematol Oncol* 2016; **38**: 261-268 [PMID: 26925712 DOI: 10.1097/MPH.0000000000000529]
- 4 **Ohnishi T**, Yasuda I, Nishigaki Y, Hayashi H, Otsuji K, Mukai T, Enya M, Omar S, Soehendra N, Tomita E, Moriwaki H. Intraductal chilled saline perfusion to prevent bile duct injury during percutaneous radiofrequency ablation for hepatocellular carcinoma. *J Gastroenterol Hepatol* 2008; **23**: e410-e415 [PMID: 17683503 DOI: 10.1111/j.1440-1746.2007.05091.x]
- 5 **Le DT**, Durham JN, Smith KN, Wang H, Bartlett BR, Aulakh LK, Lu S, Kemberling H, Wilt C, Luber BS, Wong F, Azad NS, Rucki AA, Laheru D, Donehower R, Zaheer A, Fisher GA, Crocenzi TS, Lee JJ, Greten TF, Duffy AG, Ciombor KK, Eyring AD, Lam BH, Joe A, Kang SP, Holdhoff M, Danilova L, Cope L, Meyer C, Zhou S, Goldberg RM, Armstrong DK, Bever KM, Fader AN, Taube J, Housseau F, Spetzler D, Xiao N, Pardoll DM, Papadopoulos N, Kinzler KW, Eshleman JR, Vogelstein B, Anders RA, Diaz LA Jr. Mismatch repair deficiency predicts response of solid tumors to PD-1 blockade. *Science* 2017; **357**: 409-413 [PMID: 28596308 DOI: 10.1126/science.aan6733]
- 6 **Topalian SL**, Hodi FS, Brahmer JR, Gettinger SN, Smith DC, McDermott DF, Powderly JD, Carvajal RD, Sosman JA, Atkins MB, Leming PD, Spigel DR, Antonia SJ, Horn L, Drake CG, Pardoll DM, Chen L, Sharfman WH, Anders RA, Taube JM, McMiller TL, Xu H, Korman AJ, Jure-Kunkel M, Agrawal S, McDonald D, Kollia GD, Gupta A, Wigginton JM, Sznol M. Safety, activity, and immune correlates of anti-PD-1 antibody in cancer. *N Engl J Med* 2012; **366**: 2443-2454 [PMID: 22658127 DOI: 10.1056/NEJMoa1200690]
- 7 **Mehnert JM**, Varga A, Brose MS, Aggarwal RR, Lin CC, Prawira A, de Braud F, Tamura K, Doi T, Piha-Paul SA, Gilbert J, Saraf S, Thanigaimani P, Cheng JD, Keam B. Safety and antitumor activity of the anti-PD-1 antibody pembrolizumab in patients with advanced, PD-L1-positive papillary or follicular thyroid cancer. *BMC Cancer* 2019; **19**: 196 [PMID: 30832606 DOI: 10.1186/s12885-019-5380-3]
- 8 **Plimack ER**, Bellmunt J, Gupta S, Berger R, Chow LQ, Juco J, Lunceford J, Saraf S, Perini RF, O'Donnell PH. Safety and activity of pembrolizumab in patients with locally advanced or metastatic urothelial cancer (KEYNOTE-012): a non-randomised, open-label, phase 1b study. *Lancet Oncol* 2017; **18**: 212-220 [PMID: 28081914 DOI: 10.1016/S1470-2045(17)30007-4]
- 9 **Duffy AG**, Ulahannan SV, Makorova-Rusher O, Rahma O, Wedemeyer H, Pratt D, Davis JL, Hughes MS, Heller T, ElGindi M, Uppala A, Korangy F, Kleiner DE, Figg WD, Venzon D, Steinberg SM, Venkatesan AM, Krishnasamy V, Abi-Jaoudeh N, Levy E, Wood BJ, Greten TF. Tremelimumab in combination with ablation in patients with advanced hepatocellular carcinoma. *J Hepatol* 2017; **66**: 545-551 [PMID: 27816492 DOI: 10.1016/j.jhep.2016.10.029]
- 10 **Shaverdian N**, Lisberg AE, Bornazyan K, Veruttipong D, Goldman JW, Formenti SC, Garon EB, Lee P. Previous radiotherapy and the clinical activity and toxicity of pembrolizumab in the treatment of non-small-cell lung cancer: a secondary analysis of the KEYNOTE-001 phase 1 trial. *Lancet Oncol* 2017; **18**: 895-903 [PMID: 28551359 DOI: 10.1016/S1470-2045(17)30380-7]
- 11 **Freshwater T**, Kondic A, Ahamadi M, Li CH, de Greef R, de Alwis D, Stone JA. Evaluation of dosing strategy for pembrolizumab for oncology indications. *J Immunother Cancer* 2017; **5**: 43 [PMID: 28515943 DOI: 10.1186/s40425-017-0242-5]
- 12 **Wang X**, Bao Z, Zhang X, Li F, Lai T, Cao C, Chen Z, Li W, Shen H, Ying S. Effectiveness and safety of PD-1/PD-L1 inhibitors in the treatment of solid tumors: a systematic review and meta-analysis. *Oncotarget* 2017; **8**: 59901-59914 [PMID: 28938692 DOI: 10.18632/oncotarget.18316]
- 13 **Horn L**, Spigel DR, Vokes EE, Holgado E, Ready N, Steins M, Poddubskaya E, Borghaei H, Felip E, Paz-Ares L, Pluzanski A, Reckamp KL, Burgio MA, Kohlhaeufel M, Waterhouse D, Barlesi F, Antonia S, Arrieta O, Fayette J, Crinò L, Rizvi N, Reck M, Hellmann MD, Geese WJ, Li A, Blackwood-Chirchir A, Healey D, Brahmer J, Eberhardt WEE. Nivolumab Versus Docetaxel in Previously Treated Patients With Advanced Non-Small-Cell Lung Cancer: Two-Year Outcomes From Two Randomized, Open-Label, Phase III Trials (CheckMate 017 and CheckMate 057). *J Clin Oncol* 2017; **35**: 3924-3933 [PMID: 29023213 DOI: 10.1200/JCO.2017.74.3062]
- 14 **Spaas M**, Lievens Y. Is the Combination of Immunotherapy and Radiotherapy in Non-small Cell Lung Cancer a Feasible and Effective Approach? *Front Med (Lausanne)* 2019; **6**: 244 [PMID: 31788476 DOI: 10.3389/fmed.2019.00244]
- 15 **Jing W**, Wang S, Ding X, Guo H, Li J, Wang H, Kong L, Yu J, Zhu H. High level of programmed

- death ligand 1 (PD-L1) predicts longer survival in patients with resectable small cell lung cancer. *Int J Clin Exp Pathol* 2018; **11**: 2675-2682 [PMID: [31938382](#)]
- 16 **Taube JM**, Klein A, Brahmer JR, Xu H, Pan X, Kim JH, Chen L, Pardoll DM, Topalian SL, Anders RA. Association of PD-1, PD-1 ligands, and other features of the tumor immune microenvironment with response to anti-PD-1 therapy. *Clin Cancer Res* 2014; **20**: 5064-5074 [PMID: [24714771](#) DOI: [10.1158/1078-0432.CCR-13-3271](#)]



Published by **Baishideng Publishing Group Inc**
7041 Koll Center Parkway, Suite 160, Pleasanton, CA 94566, USA

Telephone: +1-925-3991568

E-mail: bpgoffice@wjgnet.com

Help Desk: <https://www.f6publishing.com/helpdesk>

<https://www.wjgnet.com>

