

World Journal of *Clinical Cases*

World J Clin Cases 2020 January 26; 8(2): 245-486



MINIREVIEWS

- 245 Awareness during emergence from anesthesia: Features and future research directions
Cascella M, Bimonte S, Amruthraj NJ

ORIGINAL ARTICLE**Case Control Study**

- 255 Risk factors for adverse cardiac events in adults with fulminant myocarditis during hospitalization
Kang TD, Ren YL, Zhao H, Ning SQ, Liu WX

Retrospective Study

- 264 Malignant tumors associated with Peutz-Jeghers syndrome: Five cases from a single surgical unit
Zheng Z, Xu R, Yin J, Cai J, Chen GY, Zhang J, Zhang ZT

Observational Study

- 276 Pathogens causing diarrhoea among Bangladeshi children with malignancy: Results from two pilot studies
Karim S, Begum F, Islam A, Tarafdar MA, Begum M, Islam MJ, Malik B, Ahsan MS, Khatami A, Rashid H
- 284 One-year rotational relapse frequency following conventional circumferential supracrestal fiberotomy
Al-Jasser R, Al-Jewair T, Al-Rasheed A

SYSTEMATIC REVIEW

- 294 LINX® reflux management system to bridge the “treatment gap” in gastroesophageal reflux disease: A systematic review of 35 studies
Schizas D, Mastoraki A, Papoutsis E, Giannakoulis VG, Kanavidis P, Tsilimigras D, Ntourakis D, Lyros O, Liakakos T, Moris D

CASE REPORT

- 306 Recurrent lymphoma presenting as painless, chronic intussusception: A case report
Giroux P, Collier A, Nowicki M
- 313 Role of a wireless surface electromyography in dystonic gait in functional movement disorders: A case report
Oh MK, Kim HS, Jang YJ, Lee CH
- 318 Cervicogenic exophthalmos: Possible etiology and pathogenesis
Wu CM, Liao HE, Hsu SW, Lan SJ
- 325 Catheter ablation of premature ventricular complexes associated with false tendons: A case report
Yang YB, Li XF, Guo TT, Jia YH, Liu J, Tang M, Fang PH, Zhang S

- 331 *OFD1* mutation induced renal failure and polycystic kidney disease in a pair of childhood male twins in China
Zhang HW, Su BG, Yao Y
- 337 Japanese encephalitis following liver transplantation: A rare case report
Qi ZL, Sun LY, Bai J, Zhuang HZ, Duan ML
- 343 Malignant solitary fibrous tumor of the pancreas with systemic metastasis: A case report and review of the literature
Geng H, Ye Y, Jin Y, Li BZ, Yu YQ, Feng YY, Li JT
- 353 Esophageal bronchogenic cyst excised by endoscopic submucosal tunnel dissection: A case report
Zhang FM, Chen HT, Ning LG, Xu Y, Xu GQ
- 362 Mesh repair of sacrococcygeal hernia *via* a combined laparoscopic and sacrococcygeal approach: A case report
Dong YQ, Liu LJ, Fu Z, Chen SM
- 370 Durable response to pulsatile icotinib for central nervous system metastases from *EGFR*-mutated non-small cell lung cancer: A case report
Li HY, Xie Y, Yu TT, Lin YJ, Yin ZY
- 377 Argon-helium cryoablation for thoracic vertebrae with metastasis of hepatocellular carcinoma-related hepatitis B: A case report
Tan YW, Ye Y, Sun L
- 382 Brainstem folding in an influenza child with Dandy-Walker variant
Li SY, Li PQ, Xiao WQ, Liu HS, Yang SD
- 390 Irreversible electroporation for liver metastasis from pancreatic cancer: A case report
Ma YY, Shi JJ, Chen JB, Xu KC, Niu LZ
- 398 Cryoablation for liver metastasis from solid pseudopapillary tumor of the pancreas: A case report
Ma YY, Chen JB, Shi JJ, Niu LZ, Xu KC
- 404 Goodpasture syndrome and hemorrhage after renal biopsy: A case report
Li WL, Wang X, Zhang SY, Xu ZG, Zhang YW, Wei X, Li CD, Zeng P, Luan SD
- 410 Eye metastasis in lung adenocarcinoma mimicking anterior scleritis: A case report
Chen HF, Wang WX, Li XF, Wu LX, Zhu YC, Du KQ, Xu CW
- 415 Myocarditis presenting as typical acute myocardial infarction: A case report and review of the literature
Hou YM, Han PX, Wu X, Lin JR, Zheng F, Lin L, Xu R

- 425 Excellent response of severe aplastic anemia to treatment of gut inflammation: A case report and review of the literature
Zhao XC, Zhao L, Sun XY, Xu ZS, Ju B, Meng FJ, Zhao HG
- 436 Spontaneous regression of stage III neuroblastoma: A case report
Liu J, Wu XW, Hao XW, Duan YH, Wu LL, Zhao J, Zhou XJ, Zhu CZ, Wei B, Dong Q
- 444 Efficacy of comprehensive rehabilitation therapy for checkrein deformity: A case report
Feng XJ, Jiang Y, Wu JX, Zhou Y
- 451 Analysis of pathogenetic process of fungal rhinosinusitis: Report of two cases
Wang LL, Chen FJ, Yang LS, Li JE
- 464 Utility of multiple endoscopic techniques in differential diagnosis of gallbladder adenomyomatosis from gallbladder malignancy with bile duct invasion: A case report
Wen LJ, Chen JH, Chen YJ, Liu K
- 471 Transorbital nonmissile penetrating brain injury: Report of two cases
Xue H, Zhang WT, Wang GM, Shi L, Zhang YM, Yang HF
- 479 Multiple organ dysfunction and rhabdomyolysis associated with moonwort poisoning: Report of four cases
Li F, Chen AB, Duan YC, Liao R, Xu YW, Tao LL

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INDEXING/ABSTRACTING

The *WJCC* is now indexed in PubMed, PubMed Central, Science Citation Index Expanded (also known as SciSearch®), and Journal Citation Reports/Science Edition. The 2019 Edition of Journal Citation Reports cites the 2018 impact factor for *WJCC* as 1.153 (5-year impact factor: N/A), ranking *WJCC* as 99 among 160 journals in Medicine, General and Internal (quartile in category Q3).

RESPONSIBLE EDITORS FOR THIS ISSUE

Responsible Electronic Editor: *Ji-Hong Liu*
 Proofing Production Department Director: *Xiang Li*

NAME OF JOURNAL
World Journal of Clinical Cases

ISSN
 ISSN 2307-8960 (online)

LAUNCH DATE
 April 16, 2013

FREQUENCY
 Semimonthly

EDITORS-IN-CHIEF
 Dennis A Bloomfield, Bao-Gan Peng, Sandro Vento

EDITORIAL BOARD MEMBERS
<https://www.wjnet.com/2307-8960/editorialboard.htm>

EDITORIAL OFFICE
 Jin-Lei Wang, Director

PUBLICATION DATE
 January 26, 2020

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

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

ARTICLE PROCESSING CHARGE
<https://www.wjnet.com/bpg/gerinfo/242>

STEPS FOR SUBMITTING MANUSCRIPTS
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ONLINE SUBMISSION
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Argon-helium cryoablation for thoracic vertebrae with metastasis of hepatocellular carcinoma-related hepatitis B: A case report

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Author contributions: Tan YW and Ye Y contributed equally to this work; Tan YW and Ye Y designed the research; L. Sun collected and analyzed the data, and drafted the manuscript; Tan YW and Ye Y wrote and revised the manuscript; all authors have read and approved the final version to be published.

Informed consent statement: Informed consent was obtained from the patient.

Conflict-of-interest statement: All authors have no conflict of interest related to the manuscript.

CARE Checklist (2016) statement: We are committed to writing in CARE Checklist (2016) format.

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Manuscript source: Unsolicited manuscript

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Abstract

BACKGROUND

Spinal metastasis of hepatocellular carcinoma (HCC) is rare, with an extremely poor prognosis and results in severe pain. Argon-helium cryotherapy is a local ablation method for HCC.

CASE SUMMARY

A 54-year-old man was diagnosed with HCC related to hepatitis B one year ago and underwent surgical tumor resection and tenofovir antiviral treatment. However, a new lesion developed on the right liver after 1 mo. Transarterial chemoembolization was performed four times. One month ago, the patient developed back pain, and metastasis on the 11th thoracic vertebra was detected. Argon-helium cryoablation was performed to treat the right occupancy and metastatic lesion, which immediately alleviated the pain and prolonged survival.

CONCLUSION

The use of argon-helium cryoablation for thoracic vertebrae with metastasis of HCC achieved favorable results.

Key words: Cryoablation; Metastasis; Hepatocellular carcinoma; Hepatitis B; Case report

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Core tip: A 54-year-old man was diagnosed with hepatocellular carcinoma related to hepatitis B one year ago and underwent surgical tumor resection and tenofovir antiviral treatment. However, a new lesion developed on the right liver after 1 mo. Transarterial chemoembolization was performed four times. One month ago, the patient developed back pain, and metastasis on the 11th thoracic vertebra was detected. Argon-helium cryoablation was performed to treat the right occupancy and metastatic lesion, which immediately alleviated the pain and prolonged survival.

Received: November 19, 2019
Peer-review started: November 19, 2019
First decision: November 21, 2019
Revised: November 22, 2019
Accepted: November 30, 2019
Article in press: November 30, 2019
Published online: January 26, 2020

P-Reviewer: Slomiany BL
S-Editor: Gong ZM
L-Editor: Webster JR
E-Editor: Qi LL



Citation: Tan YW, Ye Y, Sun L. Argon-helium cryoablation for thoracic vertebrae with metastasis of hepatocellular carcinoma-related hepatitis B: A case report. *World J Clin Cases* 2020; 8(2): 377-381

URL: <https://www.wjgnet.com/2307-8960/full/v8/i2/377.htm>

DOI: <https://dx.doi.org/10.12998/wjcc.v8.i2.377>

INTRODUCTION

In China, there are still 70 million patients with chronic hepatitis B infection^[1], which is the main cause of 80% of hepatocellular carcinoma (HCC) cases; furthermore, > 70% of HCC cases will lose the chance of curative treatment with physicians' diagnosis^[2]. HCC can metastasize to other organs or tissues through blood, lymph, and direct dissemination and local diffusion. Of these cases, 90% metastasized to the lung, and bone metastases of HCC were also common, with an incidence ranging from 3% to 16.2%^[3,4]. Common sites of bone metastasis are the vertebrae, ribs, and sternum. Spinal metastasis of HCC is rare, with an incidence of 0.2%–2.2%. HCC with bone metastasis has an extremely poor prognosis with a median survival of 1-2 mo, and results in severe pain^[5]. Argon-helium cryotherapy is a local ablation method for HCC^[6]. We recently used this method to treat a patient with advanced HCC metastasis to the thoracic spine and achieved good clinical efficacy.

CASE PRESENTATION

Chief complaints

A 54-year-old man was admitted to our hospital complaining of persistent back pain for 1 mo and with a 1-year history of HCC.

History of present illness

One year ago, the patient was found to have a 43 mm × 35 mm occupancy lesion in the left lateral lobe of the liver by enhanced CT. Considering the possibility of HCC which was confirmed by pathology, the patient underwent resection. After 1 mo, the patient was found to have an occupancy lesion in the right lateral lobe of the liver. Transarterial chemoembolization (TACE) was performed four times, and radiotherapy was conducted twice successively. The patient had back pain for 1 mo. CT reexamination showed that the space-occupying lesion in the soft tissue around the left 11th thoracic vertebra was involved in the bone metastases of HCC. Sorafenib was administered for 4 mo.

Medical history

The patient had a history of chronic hepatitis B for > 10 years, but did not receive antiviral treatment. One year ago, oral tenofovir was administered after the liver occupancy lesion was found. HBV DNA level was lower than the lower limit of monitoring value (< 20 IU/mL).

Personal and family history

There was no family aggregation of hepatitis B, no history of blood transfusion and blood product use, no alcohol abuse, and no recent history of hepatotoxic drug use.

Physical examination upon admission

Upon admission, temperature was 36.5°C, and blood pressure was 130/80 mmHg. The skin was dark and gloomy, there was no yellow staining of the skin and sclera, and the patient had liver palms. Several spider nevi were noted in the neck and chest, the abdomen was flat, the abdominal wall veins were exposed, and a vertical surgical scar was observed in the middle and right lower abdomen. The abdomen was soft without tenderness and rebound pain. There was no percussion pain in the liver area. Mobility dullness was negative, and bowel sounds were normal. Leg edema was not observed.

Laboratory examinations

Routine blood test results were as follows: Hemoglobin level, 145.00 g/L; red blood cell count, $4.85 \times 10^{12}/L$; white blood cell count, $2.38 \times 10^9/L$; and platelet count, $78.00 \times 10^9/L$. Biochemical test results were as follows: Total bilirubin, 12.4 $\mu\text{mol}/L$; direct

bilirubin, 6.1 $\mu\text{mol/L}$; total protein, 76.8 g/L; prealbumin, 175.6 mg/L; alanine aminotransferase, 29 U/L; aspartate aminotransferase, 31 U/L; cholesterol, 3.10 mmol/L; glomerular filtration rate, 104.30 mL/min/L; glucose, 5.71 mmol/L; urea, 4.47 mmol/L; creatinine, 66.2 $\mu\text{mol/L}$; uric acid, 377.1 $\mu\text{mol/L}$; creatine kinase isoenzyme, 31 U/L; C-reactive protein, 3.01 mg/L; and alpha fetoprotein, 32.59 ng/mL.

Imaging examinations

On contrast-enhanced CT scan, the local liver parenchyma in the right posterior lobe was displaced inward. The right posterior lobe of the liver exhibited a low-density patchy shadow with a CT value of approximately 40 HU. The density was not uniform, and the boundary was unclear. On the right posterior lobe of the liver, multiple low-density round shadows of different sizes were noted. A few spots of lipiodol were scattered in the shadow. On the left posterior rib 11, the left transverse process of the 11th thoracic vertebra, vertebral arch plate, and bone structure were damaged, and a soft tissue density shadow was noted (Figure 1A).

FINAL DIAGNOSIS

The patient was diagnosed with HCC after hepatectomy and TACE with 11th rib and 11th thoracic vertebra metastases on the left side.

TREATMENT

Preoperatively, the patient received a full explanation of the disease condition and operative plan, and provided written informed consent. Under the guidance of CT, the right liver cancer with 11 thoracic vertebrae metastasis was treated with targeted cryoablation. Two cryoablations were performed on the right hepatic lobe, and one cryoablation on the left 11th lumbar vertebra (Figures 1B and C). Frozen necrosis gas and low-density hypovascular necrotic tissue were noted in the right posterior lobe and around the 11th lumbar spine (Figure 1D).

OUTCOME AND FOLLOW-UP

Postoperatively, back pain immediately improved and was completely relieved. The patient developed fever on the second postoperative day, the highest temperature being 38.8°C. His high temperature decreased to 38.5°C on the third day, was normal on the fourth day and the patient was then discharged.

DISCUSSION

Surgical intervention, including tumor resection and liver transplantation, is currently the first-line treatment for HCC^[7,8], but the indications for operation and liver donor source limit the curative effect of HCC. Local ablation is an effective method for obtaining a curative effect for HCC^[9]. The local ablation methods for HCC mainly include radiofrequency ablation (RFA), microwave ablation, and cryotherapy^[10]. RFA is the representative minimally invasive treatment for HCC^[11].

The argon-helium cryopreservation system is a minimally invasive treatment method that uses the rapid freezing function of argon to inactivate necrosis of tumor tissue. It originated more than a decade ago^[12], but its popularity may be a relative "silent player" due to the limited access to argon and helium. Recently, it has attracted increasing attention as some centers used this technology to treat HCC and obtained favorable results. Wang *et al.*^[13] compared this with RFA in a multicenter randomized controlled trial. They found that argon-helium cryoablation had a better effect on local tumor progression than RFA (1-, 2-, and 3-year local tumor progression rates were 3%, 7% and 7%, respectively, for cryoablation and were 9%, 11%, and 11%, respectively, for RFA). The 3- and 5-year survival rates were similar (54% and 35% *vs* 50% and 34%), and the incidence of major complications was 3.9% and 3.3%, respectively.

Postoperative recurrence of HCC is the main factor in poor prognosis. It is reported that the annual recurrence rate ranges from 51.4% to 61.5% after radical resection of HCC, 43.6% for small HCC (< 5 cm), and higher for local treatment.

In the advanced stage of HCC, multiple organ metastases easily develop. The metastasis pathway can be divided into hematogenous metastasis, lymphatic

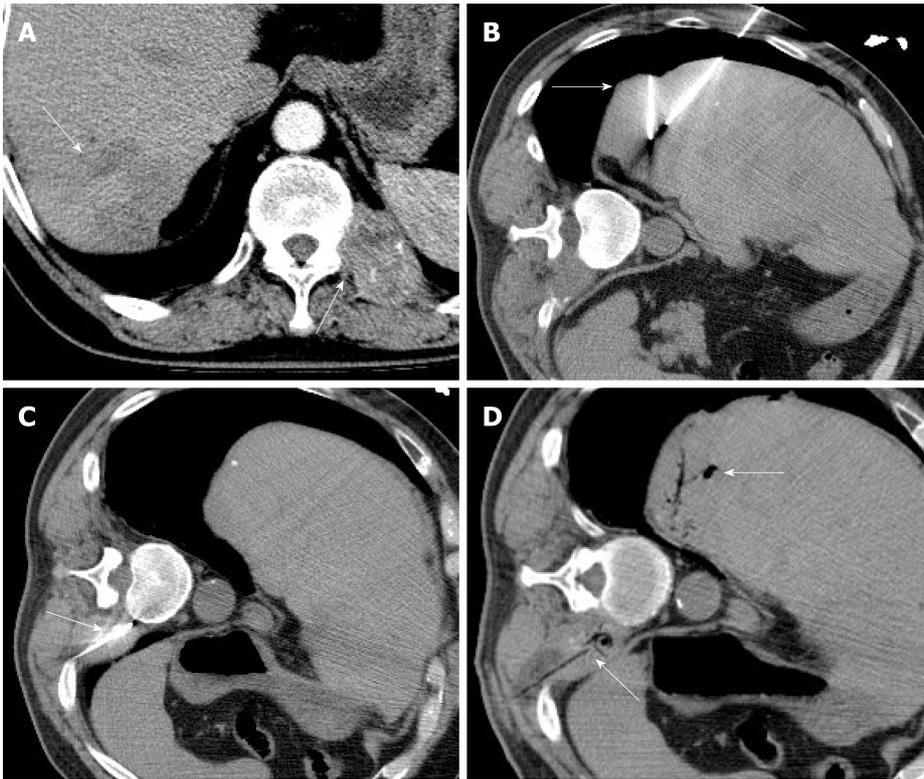


Figure 1 Computed tomography scan of the patient before and after argon-helium cryoablation. A: Multiple low-density round shadows of different sizes were noted (left arrow). Left hepatocellular carcinoma (HCC) metastasis of the 11th thoracic vertebra and vertebral arch plate, and bone structure damage (right arrow) were observed; B: Argon-helium cryoablation of the right posterior lobe of the liver; C: Argon-helium cryoablation of HCC metastases; D: Frozen necrosis gas and low-density hypovascular necrotic tissue were noted in the right posterior lobe (right arrow) and around the 11th lumbar spine (left arrow).

metastasis, and implant metastasis. Bone metastasis is the most common. Research shows that the incidence of metastasis is approximately 10%. The main sites of bone metastasis are the spine, pelvis, ribs, and long bones, and a few cases showed skull metastasis. The 1-year survival rate of liver cancer with bone metastasis is only approximately 20%.

Patients with HCC and bone metastasis often have severe bone pain and inadequate effective treatment. Our patient underwent surgical treatment, TACE, and radiotherapy, but there was no improvement in pain symptoms. The use of cryoablation achieved favorable results.

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