World Journal of Gastrointestinal Surgery

World J Gastrointest Surg 2023 December 27; 15(12): 2674-2961





Published by Baishideng Publishing Group Inc

GS WŰ

World Journal of Gastrointestinal Surgery

Contents

Monthly Volume 15 Number 12 December 27, 2023

REVIEW

2674 Antimicrobial approach of abdominal post-surgical infections Fiore M, Corrente A, Di Franco S, Alfieri A, Pace MC, Martora F, Petrou S, Mauriello C, Leone S

MINIREVIEWS

- 2693 Indocyanine green fluorescence in gastrointestinal surgery: Appraisal of current evidence Kalayarasan R, Chandrasekar M, Sai Krishna P, Shanmugam D
- 2709 Post-cholecystectomy iatrogenic bile duct injuries: Emerging role for endoscopic management Emara MH, Ahmed MH, Radwan MI, Emara EH, Basheer M, Ali A, Elfert AA

ORIGINAL ARTICLE

Case Control Study

2719 Multidisciplinary diagnosis and treatment nutritional support intervention for gastrointestinal tumor radiotherapy: Impact on nutrition and quality of life

Hui L, Zhang YY, Hu XD

Retrospective Cohort Study

2727 Association between the early high level of serum tacrolimus and recurrence of hepatocellular carcinoma in ABO-incompatible liver transplantation

Han JW, Choi JY, Jung ES, Kim JH, Cho HS, Yoo JS, Sung PS, Jang JW, Yoon SK, Choi HJ, You YK

2739 Determining the need for a thoracoscopic approach to treat a giant hiatal hernia when abdominal access is poor

Pérez Lara FJ, Zubizarreta Jimenez R, Prieto-Puga Arjona T, Gutierrez Delgado P, Hernández Carmona JM, Hernández Gonzalez JM, Pitarch Martinez M

2747 Predictive value of Hajibandeh index in determining peritoneal contamination in acute abdomen: A cohort study and meta-analysis

Hajibandeh S, Hajibandeh S, Evans L, Miller B, Waterman J, Ahmad SJ, Hale J, Higgi A, Johnson B, Pearce D, Helmy AH, Naguib N, Maw A

Retrospective Study

- Efficacy of pantoprazole plus perforation repair for peptic ulcer and its effect on the stress response 2757 Leng ZY, Wang JH, Gao L, Shi K, Hua HB
- 2765 Application of electroacupuncture in the prevention of low anterior resection syndrome after rectal cancer surgery

Xu LL, Xiang NJ, Cheng TC, Li YX, Chen P, Jiang ZW, Liu XX



| Conton | World Journal of Gastrointestinal Surgery |
|--------|--|
| Conten | Monthly Volume 15 Number 12 December 27, 2023 |
| 2774 | Effects of remifentanil combined with propofol on hemodynamics and oxidative stress in patients undergoing resection of rectal carcinoma |
| | Huang J, Tian WJ |
| 2783 | Percutaneous microwave ablation and transcatheter arterial chemoembolization for serum tumor markers and prognostics of middle-late primary hepatic carcinoma |
| | Lin ZP, Huang DB, Zou XG, Chen Y, Li XQ, Zhang J |
| 2792 | Novel invagination procedure for pancreaticojejunostomy using double purse string sutures: A technical note |
| | Li J, Niu HY, Meng XK |
| 2799 | Laparoscopic resection and endoscopic submucosal dissection for treating gastric ectopic pancreas |
| | Zheng HD, Huang QY, Hu YH, Ye K, Xu JH |
| 2809 | Prediction of the lymphatic, microvascular, and perineural invasion of pancreatic neuroendocrine tumors using preoperative magnetic resonance imaging |
| | Liu YL, Zhu HB, Chen ML, Sun W, Li XT, Sun YS |
| 2820 | Impact of hepatectomy and postoperative adjuvant transarterial chemoembolization on serum tumor markers and prognosis in intermediate-stage hepatocellular carcinoma |
| | Hu YD, Zhang H, Tan W, Li ZK |
| | Observational Study |
| 2831 | Analysis of nutritional risk, skeletal muscle depletion, and lipid metabolism phenotype in acute radiation enteritis |
| | Ma CY, Zhao J, Qian KY, Xu Z, Xu XT, Zhou JY |
| | Randomized Controlled Trial |
| 2844 | Holistic conditions after colon cancer: A randomized controlled trial of systematic holistic care vs primary care |
| | Wang J, Qiao JH |
| | Basic Study |
| 2855 | Mutational separation and clinical outcomes of <i>TP53</i> and <i>CDH1</i> in gastric cancer |
| | Liu HL, Peng H, Huang CH, Zhou HY, Ge J |
| 2866 | Hepatic vagotomy blunts liver regeneration after hepatectomy by downregulating the expression of interleukin-22 |
| | Zhou H, Xu JL, Huang SX, He Y, He XW, Lu S, Yao B |
| | |
| | META-ANALYSIS |

Recent evidence for subcutaneous drains to prevent surgical site infections after abdominal surgery: A 2879 systematic review and meta-analysis

Ishinuki T, Shinkawa H, Kouzu K, Shinji S, Goda E, Ohyanagi T, Kobayashi M, Kobayashi M, Suzuki K, Kitagawa Y, Yamashita C, Mohri Y, Shimizu J, Uchino M, Haji S, Yoshida M, Ohge H, Mayumi T, Mizuguchi T



| C | World Journal of Gastrointestinal Surgery |
|----------|--|
| Conten | Monthly Volume 15 Number 12 December 27, 2023 |
| 2890 | Prognostic role of serum carcinoembryonic antigen in patients receiving liver resection for colorectal cancer liver metastasis: A meta-analysis |
| | Tang F, Huang CW, Tang ZH, Lu SL, Bai T, Huang Q, Li XZ, Zhang B, Wu FX |
| 2907 | Significance of carcinoembryonic antigen detection in the early diagnosis of colorectal cancer: A systematic review and meta-analysis |
| | Wang R, Wang Q, Li P |
| | CASE REPORT |
| 2919 | Primary repair of esophageal atresia gross type C <i>via</i> thoracoscopic magnetic compression anastomosis: A case report |
| | Zhang HK, Li XQ, Song HX, Liu SQ, Wang FH, Wen J, Xiao M, Yang AP, Duan XF, Gao ZZ, Hu KL, Zhang W, Lv Y, Zhou XH, Cao ZJ |
| 2926 | Portal vein embolization for closure of marked arterioportal shunt of hepatocellular carcinoma to enable radioembolization: A case report |
| | Wang XD, Ge NJ, Yang YF |
| 2932 | Removal of a large rectal polyp with endoscopic submucosal dissection-trans-anal rectoscopic assisted minimally invasive surgery hybrid technique: A case report |
| | Polese L |
| 2938 | Successful treatment of invasive liver abscess syndrome caused by <i>Klebsiella variicola</i> with intracranial infection and septic shock: A case report |
| | Zhang PJ, Lu ZH, Cao LJ, Chen H, Sun Y |
| 2945 | Duodenojejunostomy treatment of groove pancreatitis-induced stenosis and obstruction of the horizontal duodenum: A case report |
| | Zhang Y, Cheng HH, Fan WJ |
| 2954 | Awake robotic liver surgery: A case report |
| | Delvecchio A, Pavone G, Conticchio M, Piacente C, Varvara M, Ferraro V, Stasi M, Casella A, Filippo R, Tedeschi M, Pullano C, Inchingolo R, Delmonte V, Memeo R |
| | |
| | |
| | |



Contents

Monthly Volume 15 Number 12 December 27, 2023

ABOUT COVER

Editorial Board Member of World Journal of Gastrointestinal Surgery, Lapo Bencini, PhD, General Surgery Unit, AOUC, Department of Oncology and Robotics, Careggi University Hospital, Florence 350134, Italy. lapbenc@tin.it

AIMS AND SCOPE

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

WJGS mainly publishes articles reporting research results and findings obtained in the field of gastrointestinal surgery and covering a wide range of topics including biliary tract surgical procedures, biliopancreatic diversion, colectomy, esophagectomy, esophagostomy, pancreas transplantation, and pancreatectomy, etc.

INDEXING/ABSTRACTING

The WJGS is now abstracted and indexed in Science Citation Index Expanded (SCIE, also known as SciSearch®), Current Contents/Clinical Medicine, Journal Citation Reports/Science Edition, PubMed, PubMed Central, Reference Citation Analysis, China Science and Technology Journal Database, and Superstar Journals Database. The 2023 Edition of Journal Citation Reports® cites the 2022 impact factor (IF) for WJGS as 2.0; IF without journal self cites: 1.9; 5-year IF: 2.2; Journal Citation Indicator: 0.52; Ranking: 113 among 212 journals in surgery; Quartile category: Q3; Ranking: 81 among 93 journals in gastroenterology and hepatology; and Quartile category: Q4.

RESPONSIBLE EDITORS FOR THIS ISSUE

Production Editor: Rui-Rui Wu; Production Department Director: Xu Guo; Editorial Office Director: Jia-Ru Fan.

| NAME OF JOURNAL | INSTRUCTIONS TO AUTHORS |
|---|---|
| World Journal of Gastrointestinal Surgery | https://www.wjgnet.com/bpg/gerinfo/204 |
| ISSN | GUIDELINES FOR ETHICS DOCUMENTS |
| ISSN 1948-9366 (online) | https://www.wjgnet.com/bpg/GerInfo/287 |
| LAUNCH DATE | GUIDELINES FOR NON-NATIVE SPEAKERS OF ENGLISH |
| November 30, 2009 | https://www.wjgnet.com/bpg/gerinfo/240 |
| FREQUENCY | PUBLICATION ETHICS |
| Monthly | https://www.wjgnet.com/bpg/GerInfo/288 |
| EDITORS-IN-CHIEF | PUBLICATION MISCONDUCT |
| Peter Schemmer | https://www.wjgnet.com/bpg/gerinfo/208 |
| EDITORIAL BOARD MEMBERS | ARTICLE PROCESSING CHARGE |
| https://www.wjgnet.com/1948-9366/editorialboard.htm | https://www.wjgnet.com/bpg/gerinfo/242 |
| PUBLICATION DATE | STEPS FOR SUBMITTING MANUSCRIPTS |
| December 27, 2023 | https://www.wjgnet.com/bpg/GerInfo/239 |
| COPYRIGHT | ONLINE SUBMISSION |
| © 2023 Baishideng Publishing Group Inc | https://www.f6publishing.com |

© 2023 Baishideng Publishing Group Inc. All rights reserved. 7041 Koll Center Parkway, Suite 160, Pleasanton, CA 94566, USA E-mail: bpgoffice@wjgnet.com https://www.wjgnet.com



S WU

World Journal of Gastrointestinal Surgery

Submit a Manuscript: https://www.f6publishing.com

World J Gastrointest Surg 2023 December 27; 15(12): 2926-2931

DOI: 10.4240/wjgs.v15.i12.2926

ISSN 1948-9366 (online)

CASE REPORT

Portal vein embolization for closure of marked arterioportal shunt of hepatocellular carcinoma to enable radioembolization: A case report

Xiang-Dong Wang, Nai-Jian Ge, Ye-Fa Yang

Specialty type: Gastroenterology and hepatology

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): 0 Grade D (Fair): D Grade E (Poor): 0

P-Reviewer: Baiocchi L, Italy; Giacomelli L, Italy

Received: August 17, 2023 Peer-review started: August 17, 2023 First decision: October 17, 2023 Revised: October 24, 2023 Accepted: December 4, 2023 Article in press: December 4, 2023 Published online: December 27, 2023



Xiang-Dong Wang, Nai-Jian Ge, Ye-Fa Yang, Department of Interventional Radiology, Shanghai Eastern Hepatobiliary Surgery Hospital, Shanghai 200438, China

Corresponding author: Ye-Fa Yang, MD, Chief Doctor, Professor, Department of Interventional Radiology, Shanghai Eastern Hepatobiliary Surgery Hospital, No. 700 Moyu North Road, Shanghai 200438, China. decentofni@163.com

Abstract

BACKGROUND

Marked arterioportal shunt (APS) can be a contraindication for transarterial radioembolization (TARE) because of the risk of radiation-induced liver toxicity or pneumonitis. To date, the best method to close marked APS to reduce intrahepatic shunt (IHS) and hepatopulmonary shunt (HPS) before TARE has not been elucidated.

CASE SUMMARY

This case report describes a novel strategy of embolization of the portal venous outlet to reduce IHS and HPS caused by marked APS before TARE in a patient with advanced hepatocellular carcinoma (HCC). The patient had a significant intratumoral shunt from the tumor artery to the portal vein and had already been suspected based on pre-interventional magnetic resonance angiography, and digital subtraction angiography (DSA) confirmed the shunt. Selective right portal vein embolization (PVE) was performed to close the APS outlet and DSA confirmed complete closure. Technetium-99m macroaggregated albumin was administered and single photon emission computed tomography revealed a low HPS with 8.4%. Successful TARE was subsequently performed. No major procedurerelated complication occurred.

CONCLUSION

Closure of APS with PVE during mapping angiography of advanced-stage HCC to enable reduction of HPS and subsequent TARE is feasible.

Key Words: Portal vein embolization; Arterioportal shunt; Intrahepatic shunt; Hepatopulmonary shunt; Transarterial radioembolization; Case report

©The Author(s) 2023. Published by Baishideng Publishing Group Inc. All rights reserved.

WJGS | https://www.wjgnet.com

Core Tip: Marked arterioportal shunt (APS) can be a contraindication for transarterial radioembolization (TARE) because of the risk of radiation-induced liver toxicity or pneumonitis. In this case report, portal vein embolization was performed, for the first time, to close the APS outlet in a patient with advanced hepatocellular carcinoma. Single photon emission computed tomography revealed a low intrahepatic shunt and hepatopulmonary shunt, and TARE was performed successfully.

Citation: Wang XD, Ge NJ, Yang YF. Portal vein embolization for closure of marked arterioportal shunt of hepatocellular carcinoma to enable radioembolization: A case report. World J Gastrointest Surg 2023; 15(12): 2926-2931 URL: https://www.wjgnet.com/1948-9366/full/v15/i12/2926.htm DOI: https://dx.doi.org/10.4240/wjgs.v15.i12.2926

INTRODUCTION

Surgical resection and liver transplantation are the main curative treatment options for hepatocellular carcinoma (HCC), which ranks as the 5th most common malignancy and the 4th leading cause of cancer-related mortality worldwide[1]. However, most patients do not meet these treatment selection criteria at the time of diagnosis[2]. Transarterial radioembolization (TARE) with yttrium-90 is a mature method for unresectable HCC, because it can deliver high radiation energy selectively targeting the tumor while sparing the surrounding normal parenchyma^[3].

An arterioportal shunt (APS) between a hepatic artery and portal vein is frequently observed in patients with HCC^[4], resulting in potentially life-threatening complications, such as esophageal varicose rupture, refractory ascites, and hepatic encephalopathy [5,6]. It was reported that marked APS of the left, right or main portal vein occurred in 30% of HCC patients^[7]. Marked APS can be a contraindication for TARE because the radioactive microspheres can easily pass through the shunts, potentially resulting in radiation-induced liver toxicity or pneumonitis[8,9].

To date, closure of a marked APS has been carried out with various approaches, including systemic treatment[9], transcatheter arterial occlusion[10,11] and portal vein occlusion balloons[12], before patients undergo transarterial chemoembolization or TARE. However, the optimal therapy has not yet been elucidated, and other new techniques may be necessary to successfully alleviate the intrahepatic shunt (IHS) and hepatopulmonary shunt (HPS) caused by APS. Portal vein embolization (PVE) is a widely used technique for liver regeneration. PVE can completely embolize the outlet of the APS, indicating its potential to reduce IHS and HPS. This report describes PVE for closure of marked APS in a patient with HCC to enable TARE.

CASE PRESENTATION

Chief complaints

A 58-year-old man presented himself with fatigue, poor appetite and weight loss.

History of present illness

The symptoms started 2 mo previously. Ultrasonography detected multifocal hepatic lesions in the left outer lobe and right lobe.

History of past illness

The patient had no medical history previously.

Personal and family history

Nothing in particular.

Physical examination

There are no obvious abnormalities in the physical examination, and the vital signs are within the normal range. No jaundice was observed.

Laboratory examinations

Hepatitis B virus DNA was 2×10^9 IU/mL (< 40); liver function tests were normal; tumor markers were as follows: α fetoprotein 4.1 ng/mL (< 20.0), PIVKA-II 3454 mAU/mL (< 40.0).

Imaging examinations

At admission, abdominal enhanced computed tomography (CT) and magnetic resonance imaging (MRI) showed that most lesions were in the right liver lobe; carcinoma thrombus formation in the main and right portal vein branches; and collateral circulation with spongy degeneration. A marked APS was revealed, and hence, early contrast enhancement of the left portal vein was seen on MRI (Figure 1A).





DOI: 10.4240/wjgs.v15.i12.2926 Copyright ©The Author(s) 2023.

Figure 1 A 58-year-old man with hepatocellular carcinoma and marked arterioportal shunt due to portal vein tumor thrombus. A: Axial magnetic resonance imaging T1 post contrast weighted image showing a large hypervascular mass in the right hepatic lobe (white arrows). Note enhancement of the portal vein (orange arrow) in the arterial phase denoting an underlying arterioportal shunt; B: Digital subtraction angiography showing opacified portal vein (white arrows) during the early arterial phase.

FINAL DIAGNOSIS

The final diagnosis of the presented case was BCLC-C stage HCC.

TREATMENT

The MDT made the treatment plan of combining Y-90 TARE with the anti-PD-1 antibody and the anti-VEGF bevacizumab. Following the decision of MDT, the patient was evaluated for Y-90 TARE. Mapping angiography demonstrated a large hypervascular mass in the right hepatic lobe with the main arterial supply coming from the right hepatic artery, and digital subtraction angiography (DSA) before 99m-technetium-macroaggregated albumin (MAA) injection revealed widespread IHSs to the portal vein in the patient (Figure 1B). Due to the possibility of radiation-induced liver failure and lung injury, the patient was excluded from TARE before closure of the marked APS. After identification of the right portal vein branch responsible for APS, we performed PVE. An EV needle (Hakko, Nagano, Japan) was used to puncture the right portal vein branch under ultrasound guidance. Inserting a 0.035-inch guidewire into the portal vein, then we placed a 5F catheter (Hanaco Medical, Tianjin, China) at the main portal vein for an-giography, which displayed carcinoma thrombus in the main and right portal vein branches, and collateral circulation with spongy degeneration (Figure 2A). The proximal portion of the right portal vein was embolized with interlock microcoils (Tornado, Cook, Bloomington, IN, United States; Azur, Terumo, Somerset, NJ, United States) to prevent ectopic reverse embolization, followed by N-butyl cyanoacrylate (NBCA) (Compont, Beijing, China) embolization of the distal branches. NBCA was mixed with ethiodized oil (Lipiodol; Andre Guerbet, Aulnay-Sous-Bois, France) in a 1:1 ratio. Re-examination using hepatic arteriography revealed that the embolization was effective and the APS was successfully closed (Figure 2B). Finally, the puncture tract of the trans-hepatic PVE was embolized using the mixture of NBCA and lipiodol. Super-selective hepatic arteriography was implemented by canulation of the tumor feeding arteries with a 2.6-F microcatheter (Cook Medical). Cone beam CT with contrast administration through the microcatheter was operated to determine tumor feeding arteries and the correct position of the microcatheter. 99mTc MAA (4.5 mCi) (Xinke, Shanghai, China) was injected through the three tumorfeeding arteries to determine HPS, and single photon emission CT (SPECT)/CT (Symbia T16; Siemens Healthcare, Germany) was performed after 99mTc MAA injection.

OUTCOME AND FOLLOW-UP

SPECT confirmed the absence of a relevant HPS with 8.4% (Figure 3). TARE was carried out successfully in the next week. Referring to the recommendations of the Cardiovascular and Interventional Radiological Society of Europe[13], the patient had no serious adverse event (grades 3-6) in the perioperative period.

DISCUSSION

There has been increased use of TARE in patients with intermediate- to advanced-stage HCC in recent years. Not all





DOI: 10.4240/wjgs.v15.i12.2926 Copyright ©The Author(s) 2023.

Figure 2 Direct portography and hepatic arteriography after portal vein embolization. A: Direct portography revealed carcinoma thrombus formed in the main portal vein (white arrow), and collateral circulation formed with spongy degeneration (orange arrows); B: Hepatic arteriography after portal vein embolization demonstrates non-visualized arterioportal shunt.



DOI: 10.4240/wjgs.v15.i12.2926 Copyright ©The Author(s) 2023.

Figure 3 Planar scintigraphy following injection of 4.5 mCi of technetium-99m macroaggregated albumin into the right hepatic artery after using portal vein embolization to embolize the outlet of the arterioportal shunt. The calculated hepatopulmonary shunt was 8.4%.

patients are candidates for this treatment due to a number of technical and clinical factors that need to be taken into consideration. One is the presence of APS bypass in the tumor capillary bed because TARE can cause liver failure due to extensive radioembolization in nontumorous liver parenchyma, or lung injury due to elevated HPS. Therefore, timely and complete closure of shunts is necessary before TARE for advanced HCC with marked APS.

Systemic antiangiogenic therapy has been described for reduction of IHS and HPS[9,14] caused by APS or arteriovenous shunt. Theysohn et al[14] reported on seven patients with elevated HPS who treated with oral sorafenib for an average of 138 d (ranging from 72-297 d). Four of the patients had significant reduction in their HPS and had successful TARE. The remaining three patients had disease progression and did not survive to undergo TARE. For patients to be treated with systemic antiangiogenic drug to relieve high HPS, it is a main challenge to balance the time between treatment and conducting TARE[15]. To reduce the HPS, sufficient time must be given for observing the efficacy of the systemic antiangiogenic therapy regimen. In patients with rapidly growing tumor types, the window of opportunity for TARE treatment may be lost. Standard techniques of transarterial bland embolization or chemoembolization can be used to shut down large arteriovenous and APS[16,17]. Ward et al[17] reported a 29%-69% decrease in HPS in five patients receiving embolization procedures. However, excessive transarterial embolization may theoretically lead to unsatisfactory treatment response following TARE due to uneven microsphere distribution. Therefore, the best treatment

Zaishideng® WJGS | https://www.wjgnet.com

strategy to reduce IHS and HPS for HCC complicated with APS remains to be determined.

PVE has been widely used to expand the indications for hepatectomy for HCC in patients with insufficient future liver remnant. In the present case, PVE was applied to reduce IHS and HPS in advanced HCC with marked APS by complete embolization of the corresponding portal veins to prevent Tc-99m MAA or radio-microspheres moving through the APS. In our case, marked APS was shown by initial DSA. It has been shown that TARE for large IHS and HPS is unsafe, and it is necessary to reduce the therapeutic dose, but the efficacy may be compromised[17]. After we performed PVE using interlock microcoils and NBCA, the APS disappeared, and SPECT after injection of TC99m-MAA showed low uptake in normal liver and lung tissue, which made treatment with TARE viable.

Timely and completely embolization of shunts using PVE to reduce extensive portal vein radioembolization and HPS before TARE may represent a suitable treatment approach for HCC with marked APS. However, this technique remains technically difficult in cases with multiple APSs. In addition, PVE may further exacerbate portal hypertension and lead to gastrointestinal bleeding. Future prospective studies should investigate the safety and efficiency of PVE in pretreatment angiography with Tc-99m MAA mapping.

CONCLUSION

Our clinical observations suggest the feasibility of closure of APS with PVE during mapping angiography for patients with advanced-stage HCC to enable reduction of HPS and subsequent TARE.

ACKNOWLEDGEMENTS

The authors would like to express their deep gratitude to all staff who participated in the endovascular procedures for the study patient.

FOOTNOTES

Author contributions: Wang XD composed and drafted the paper; Ge NJ revised and edited the draft; Yang YF conceptualized, designed, revised, and edited the draft.

Informed consent statement: All study participants, or their legal guardian, provided informed written consent prior to study enrolment. Approval for publishing the study data was obtained from the patient.

Conflict-of-interest statement: All the authors report no relevant conflicts of interest for this article.

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: https://creativecommons.org/Licenses/by-nc/4.0/

Country/Territory of origin: China

ORCID number: Xiang-Dong Wang 0000-0001-8895-7023; Nai-Jian Ge 0009-0009-2602-2105; Ye-Fa Yang 0000-0002-3160-6641.

S-Editor: Wang JJ L-Editor: A P-Editor: Wu RR

REFERENCES

- Chidambaranathan-Reghupaty S, Fisher PB, Sarkar D. Hepatocellular carcinoma (HCC): Epidemiology, etiology and molecular 1 classification. Adv Cancer Res 2021; 149: 1-61 [PMID: 33579421 DOI: 10.1016/bs.acr.2020.10.001]
- 2 Makary MS, Khandpur U, Cloyd JM, Mumtaz K, Dowell JD. Locoregional Therapy Approaches for Hepatocellular Carcinoma: Recent Advances and Management Strategies. Cancers (Basel) 2020; 12 [PMID: 32679897 DOI: 10.3390/cancers12071914]
- Ponziani FR, Santopaolo F, Posa A, Pompili M, Tanzilli A, Maestri M, Pallozzi M, Ibba F, Manfredi R, Gasbarrini A, Iezzi R. SIRT in 2025. 3 Cardiovasc Intervent Radiol 2022; 45: 1622-1633 [PMID: 35941244 DOI: 10.1007/s00270-022-03228-6]
- Wu H, Zhao W, Zhang J, Han J, Liu S. Clinical characteristics of hepatic Arterioportal shunts associated with hepatocellular carcinoma. BMC 4 Gastroenterol 2018; 18: 174 [PMID: 30419830 DOI: 10.1186/s12876-018-0899-3]



- Ratti F, Cipriani F, Paganelli M, Ferla G, Aldrighetti LA. Surgical approach to multifocal hepatocellular carcinoma with portal vein 5 thrombosis and arterioportal shunt leading to portal hypertension and bleeding: a case report. World J Surg Oncol 2012; 10: 34 [PMID: 22330617 DOI: 10.1186/1477-7819-10-34]
- Lencioni R, Llovet JM, Han G, Tak WY, Yang J, Guglielmi A, Paik SW, Reig M, Kim DY, Chau GY, Luca A, Del Arbol LR, Leberre MA, 6 Niu W, Nicholson K, Meinhardt G, Bruix J. Sorafenib or placebo plus TACE with doxorubicin-eluting beads for intermediate stage HCC: The SPACE trial. J Hepatol 2016; 64: 1090-1098 [PMID: 26809111 DOI: 10.1016/j.jhep.2016.01.012]
- Okuda K, Musha H, Yamasaki T, Jinnouchi S, Nagasaki Y, Kubo Y, Shimokawa Y, Nakayama T, Kojiro M, Sakamoto K, Nakashima T. 7 Angiographic demonstration of intrahepatic arterio-portal anastomoses in hepatocellular carcinoma. Radiology 1977; 122: 53-58 [PMID: 186844 DOI: 10.1148/122.1.53]
- Park J, Oh D, Paeng JC, Lee M, Chung JW, Kim HC. Radioembolization for Hepatocellular Carcinoma: The Effects of Arterioportal Shunts 8 on Nontargeted Liver Hypertrophy. J Vasc Interv Radiol 2022; 33: 787-796.e4 [PMID: 35346860 DOI: 10.1016/j.jvir.2022.03.023]
- 9 Balli HT, Aikimbaev K, Burak IG, Pehlivan UA, Piskin FC, Sozutok S. Reduction of Hepatopulmonary and Intrahepatic Shunts after Treatment with Sorafenib in Hepatocellular Carcinoma Patients. Cardiovasc Intervent Radiol 2022; 45: 1842-1847 [PMID: 36175653 DOI: 10.1007/s00270-022-03283-z]
- Hoshiai S, Mori K, Ishiguro T, Konishi T, Uchikawa Y, Fukuda K, Minami M. Balloon-Assisted Chemoembolization Using a Micro-Balloon 10 Catheter Alongside a Microcatheter for a Hepatocellular Carcinoma with a Prominent Arterioportal Shunt: A Case Report. Cardiovasc Intervent Radiol 2017; 40: 625-628 [PMID: 27987001 DOI: 10.1007/s00270-016-1530-z]
- Duan F, Bai Y, Cui L, Li X, Yan J, Zhu H. Transarterial embolization with N-butyl 2-cyanoacrylate for the treatment of arterioportal shunts in 11 patients with hepatocellular carcinoma. J Cancer Res Ther 2017; 13: 631-635 [PMID: 28901305 DOI: 10.4103/jcrt.JCRT_286_17]
- Murata S, Tajima H, Nakazawa K, Onozawa S, Kumita S, Nomura K. Initial experience of transcatheter arterial chemoembolization during 12 portal vein occlusion for unresectable hepatocellular carcinoma with marked arterioportal shunts. Eur Radiol 2009; 19: 2016-2023 [PMID: 19238387 DOI: 10.1007/s00330-009-1349-y]
- Sacks D, McClenny TE, Cardella JF, Lewis CA. Society of Interventional Radiology clinical practice guidelines. J Vasc Interv Radiol 2003; 13 14: S199-S202 [PMID: 14514818 DOI: 10.1097/01.rvi.0000094584.83406.3e]
- Theysohn JM, Schlaak JF, Müller S, Ertle J, Schlosser TW, Bockisch A, Lauenstein TC. Selective internal radiation therapy of hepatocellular 14 carcinoma: potential hepatopulmonary shunt reduction after sorafenib administration. J Vasc Interv Radiol 2012; 23: 949-952 [PMID: 22720895 DOI: 10.1016/j.jvir.2012.04.007]
- Schiro BJ, Amour ES, Harnain C, Gandhi RT. Management of High Hepatopulmonary Shunts in the Setting of Y90 Radioembolization. Tech 15 Vasc Interv Radiol 2019; 22: 58-62 [PMID: 31079711 DOI: 10.1053/j.tvir.2019.02.004]
- McGregor H, Hill M, Kuo P, Woodhead G, Patel M. Same-Day Repeat Hepatopulmonary Shunt Measurement during Planning Angiography 16 for Hepatic Radioembolization. J Vasc Interv Radiol 2020; 31: 1069-1073 [PMID: 32439249 DOI: 10.1016/j.jvir.2020.03.006]
- Ward TJ, Tamrazi A, Lam MG, Louie JD, Kao PN, Shah RP, Kadoch MA, Sze DY. Management of High Hepatopulmonary Shunting in 17 Patients Undergoing Hepatic Radioembolization. J Vasc Interv Radiol 2015; 26: 1751-1760 [PMID: 26525118 DOI: 10.1016/j.jvir.2015.08.027



WJGS | https://www.wjgnet.com



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

