ISSN 1948-5182 (online)

World Journal of *Hepatology*

World J Hepatol 2023 October 27; 15(10): 1084-1169

Published by Baishideng Publishing Group Inc

World Journal of Hepatology

Contents

Monthly Volume 15 Number 10 October 27, 2023

World Journal of Hepatology

Monthly Volume 15 Number 10 October 27, 2023

Contents

ABOUT COVER

Editorial Board Member of *World Journal of Hepatology*, Moinak Sen Sarma, MBBS, MD, Associate Professor, Department of Pediatric Gastroenterology, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow 226014, Uttar Pradesh, India. moinaksen@gmail.com

AIMS AND SCOPE

The primary aim of *World Journal of Hepatology* (*WJH*, *World J Hepatol*) is to provide scholars and readers from various fields of hepatology with a platform to publish high-quality basic and clinical research articles and communicate their research findings online.

WJH mainly publishes articles reporting research results and findings obtained in the field of hepatology and covering a wide range of topics including chronic cholestatic liver diseases, cirrhosis and its complications, clinical alcoholic liver disease, drug induced liver disease autoimmune, fatty liver disease, genetic and pediatric liver diseases, hepatocellular carcinoma, hepatic stellate cells and fibrosis, liver immunology, liver regeneration, hepatic surgery, liver transplantation, biliary tract pathophysiology, non-invasive markers of liver fibrosis, viral hepatitis.

INDEXING/ABSTRACTING

The *WJH* is now abstracted and indexed in PubMed, PubMed Central, Emerging Sources Citation Index (ESCI), Scopus, 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 *WJH* as 2.4.

RESPONSIBLE EDITORS FOR THIS ISSUE

NAME OF JOURNAL
World Journal of Hepatology

ISSN
ISSN 1948-5182 (online)

LAUNCH DATE
October 31, 2009

FREQUENCY
Monthly

PUBLICATION DATE
October 27, 2023

PUBLISHING PARTNER
Department of Infectious Diseases, the Second Affiliated Hospital of Xi'an Jiaotong University

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

POLICY OF CO-AUTHORS
<WebSite>https://www.wjgnet.com/bpg/GerInfo/310</WebSite>

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

PUBLISHING PARTNER's OFFICIAL WEBSITE
http://2yuan.xjtu.edu.cn/Html/Departments/Main/Index_21148.html

E-mail: bpgoffice@wjgnet.com https://www.wjgnet.com

World Journal of Hepatology

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

World J Hepatol 2023 October 27; 15(10): 1164-1169

DOI: 10.4254/wjh.v15.i10.1164

ISSN 1948-5182 (online)

CASE REPORT

Inflammatory pseudotumors in the liver associated with influenza: A case report

Ankoor Patel, Alexander Chen, Alexander T Lalos

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

P-Reviewer: Ataei-Pirkooh A, Iran; Francica G, Italy; Liu K, China

Received: August 14, 2023
Peer-review started: August 14, 2023
First decision: September 11, 2023
Revised: September 18, 2023
Accepted: October 11, 2023
Article in press: October 11, 2023
Published online: October 27, 2023

Ankoor Patel, Alexander Chen, Department of Medicine, Rutgers-Robert Wood Johnson Medical School, New Brunswick, NJ 08901, United States

Alexander T Lalos, Department of Gastroenterology and Hepatology, Rutgers-Robert Wood Johnson Medical School, New Brunswick, NJ 08901, United States

Corresponding author: Ankoor Patel, MD, Doctor, Department of Medicine, Rutgers-Robert Wood Johnson Medical School, No. 125 Paterson Street, New Brunswick, NJ 08901, United States. ahp60@rwjms.rutgers.edu

Abstract

BACKGROUND

Inflammatory pseudotumor (IPT) is a rare and benign lesion that mimics malignancy and can develop in any part of the body. The pathophysiology and etiology of these quasineoplastic lesions remain unclear.

CASE SUMMARY

We report a case of a 65-year-old male who presented with fevers, night sweats, and unintentional weight loss following an influenza infection and was found to have multiple hepatic IPT's following an extensive work up.

CONCLUSION

Our case highlights the importance of considering hepatic IPT's in the differential in a patient who presents with symptoms and imaging findings mimicking malignancy shortly following a viral infection.

Key Words: Inflammatory pseudotumor; Influenza; Malignancy; Liver mass; Case report

Core Tip: Inflammatory pseudotumor (IPT) is a rare and benign lesion that can develop in any part of the body. Although the pathophysiology remain unclear, it is thought to develop in the setting of infection, inflammation, autoimmunity, trauma, *etc.* In this case report, we are the first to highlight the development of IPT in the liver in a patient following a recent influenza infection. Our case report emphasizes the importance of including IPT in the differential in a patient who presents with symptoms and radiologic findings concerning for malignancy shortly after a viral infection, such as Influenza.

Citation: Patel A, Chen A, Lalos AT. Inflammatory pseudotumors in the liver associated with influenza: A case report. *World J Hepatol* 2023; 15(10): 1164-1169
URL: https://www.wjgnet.com/1948-5182/full/v15/i10/1164.htm
DOI: https://dx.doi.org/10.4254/wjh.v15.i10.1164

INTRODUCTION

Inflammatory pseudotumor (IPT) is a rare, mostly benign inflammatory solid tumor containing spindle cells, myofibroblasts, plasma cells, and histiocytes. Although IPT can occur in any age, it typically affects children and young adults. The pathophysiology and etiology of IPT is not fully understood and the diagnosis continues to remain one of exclusion. IPTs often mimic malignancy and can develop in various organs, including the gastrointestinal (GI) tract (*e.g.*, liver). Case reports of IPT involving the GI tract are scarce.

Several hypotheses suggest systemic inflammatory conditions, infection, autoimmune conditions, and trauma/surgical inflammation to be causes of IPT. One case series reported three patients with hepatic IPTs that occurred following either biliary drainage and stent placement or hepatic abscess[1]. Viral infections may contribute to the development of IPTs[2]. A case report of IPT following coronavirus disease 2019 vaccination has been reported[3]. However, there are no cases reporting the development of IPT in the GI tract following influenza. We report a case of a 65-year-old male who we believe developed hepatic IPTs following influenza.

CASE PRESENTATION

Chief complaints

A 65 year old male was referred to our hospital after multiple liver masses were detected on computed tomography (CT) of the abdomen and pelvis.

History of present illness

In March 2023, a 65-year-old male with a history of microcytic anemia due to erosive gastritis, diverticulosis, and diabetes mellitus presented for evaluation of multiple liver masses. He reported high-grade fevers, night sweats, confusion, and unintentional weight loss of 40 pounds weight in a 3-wk timespan that occurred five months prior to presentation in our hepatology clinic.

History of past illness

Patient with a past medical history of microcytic anemia due to erosive gastritis, diverticulosis, and diabetes mellitus.

Personal and family history

Personal and family history is noncontributory.

Physical examination

During the general examination, no abnormalities were detected.

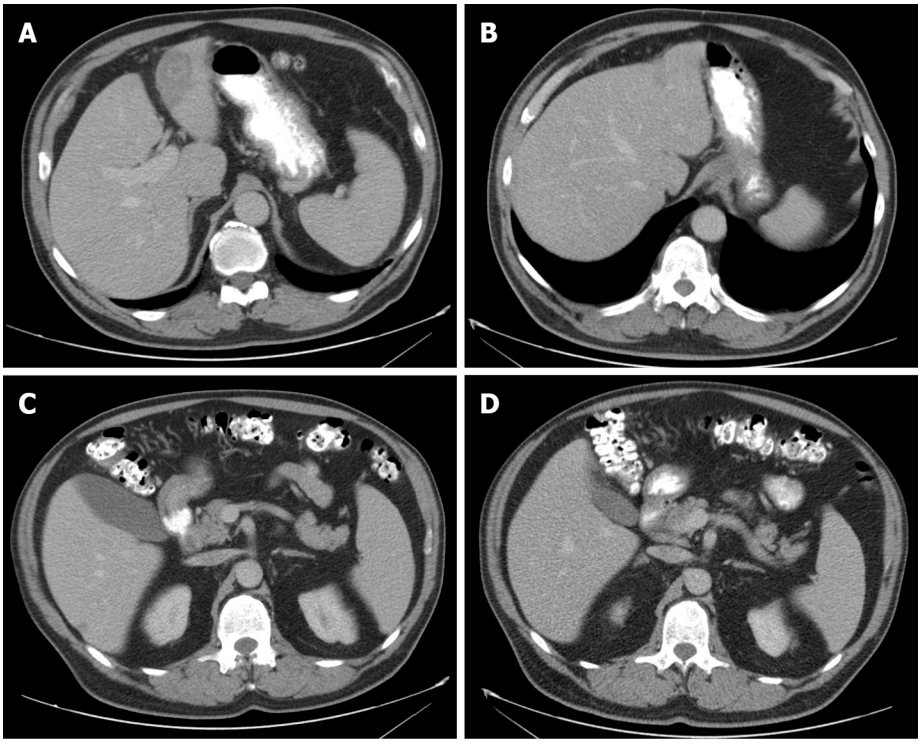
Laboratory examinations

Bloodwork at that time revealed a microcytic anemia of hemoglobin 10.2 g/dL and elevated C-reactive protein (CRP) and erythrocyte sedimentation rate of 191.0 mg/L and > 130 mm/h, respectively. He was initially diagnosed with influenza A *via* PCR of nasal swab.

Alpha-fetoprotein, hepatitis B (core and surface antibody) and C, antinuclear antibody, mitochondrial antibody, actin (smooth muscle) antibody and carcinoembryonic antigen were all negative. IgG antibody titers to hepatitis B surface antibody were low/non-immune. Cancer antigen 19-9 was measured at 42 U/mL (reference range: 0-35 U/mL).

Imaging examinations

A CT scan was performed, which showed heterogeneous left hepatic lobe masses measuring 5.0 cm × 3.0 cm, 4.0 cm × 3.1 cm and 4.1 cm × 3.7 cm as well as a hypodense right hepatic lobe mass measuring 1.1 cm × 1.1 cm (Figure 1). Adenopathy of the periportal, paraceliac, and multiple mediastinal lymph nodes were noted. The patient was referred to oncology for



DOI: 10.4254/wjh.v15.i10.1164

Figure 1 Computed tomography of the Abdomen and Pelvis illustrating the interval changes of the hepatic inflammatory pseudotumor in a span of 3 mo. A: A 5.0 cm × 3.0 cm mildly hypodense hepatic mass on computed tomography (CT) A/P dual phase liver; B: A 1.9 cm × 1.3 cm mildly hypodense hepatic mass (previously 5.0 cm × 3.0 cm) on CT A/P dual phase liver; C: A 1.1 cm × 1.1 cm right hepatic lobe mass on CT A/P dual phase liver; D: Resolution of the 1.1 cm × 1.1 cm right hepatic lobe mass (visualized in C).

presumed metastatic malignancy and underwent a positron emission tomography (PET) scan which showed small focal areas of uptake. However, the overall uptake of the left lobe hepatic masses appeared similar to the remainder of the liver (Figure 2).

Biopsy of the liver masses showed inflammatory cells but no malignant cells, and subsequent core biopsies revealed replacement of multiacinar liver parenchyma by fibrous and myxoid stroma with dense lymphoplasmacellular infiltrate (Figure 3). Trichrome stain highlighted dense fibrosis, CK7 immunostain showed preserved bile ducts, and smooth muscle actin immunostain showed extensive reactivity in the fibrous stroma. Immunostains for IgG4 and ALK1 were negative.

The patient was subsequently referred to hepatology and underwent a repeat CT scan, which showed a decrease in size of the left hepatic lobe masses and resolution of the right hepatic lobe mass. Previously enlarged lymph nodes either decreased in size or remained stable except for a 1.1 cm × 0.9 cm soft tissue density anterior to the left hepatic lobe which was suspicious for a new lymph node. An esophagogastroduodenoscopy and colonoscopy were performed to investigate his microcytic anemia and were significant for erosive gastritis.

FINAL DIAGNOSIS

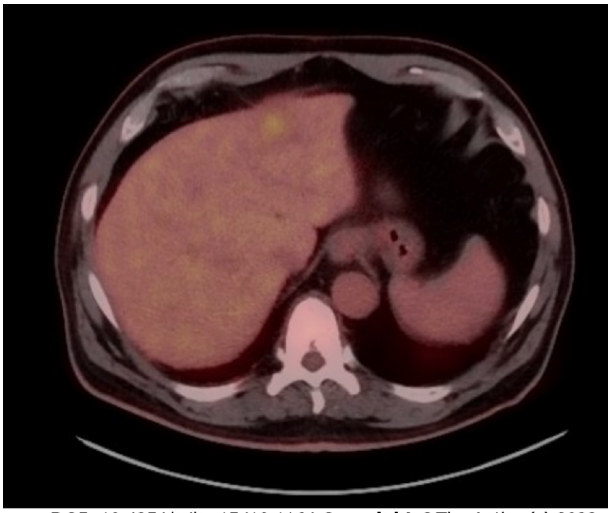
Based on radiologic and histologic examination of the liver masses, the patient was diagnosed with inflammatory pseudotumors of the liver.

TREATMENT

The treatment of hepatic IPTs in our patient was conservative management with supportive care and serial imaging to ensure resolution.

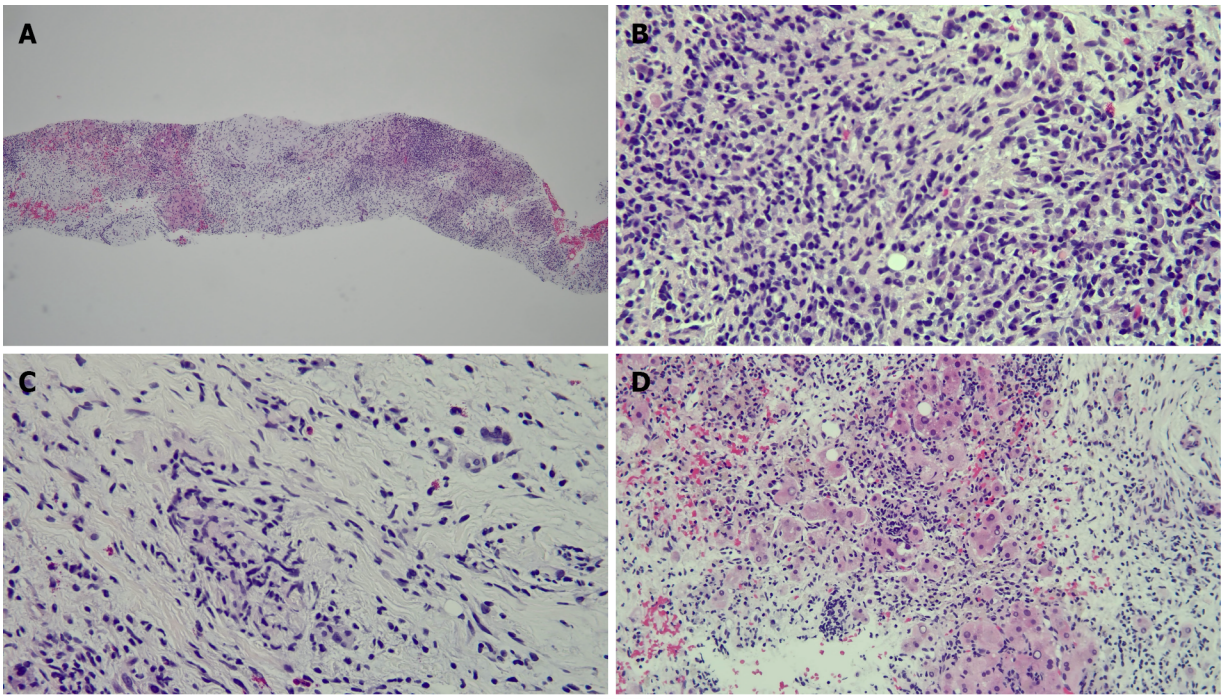
OUTCOME AND FOLLOW-UP

Serial CT imaging showed significant improvement in lymphadenopathy, significant decrease in size of the left hepatic lobe masses, and resolution of the right hepatic lobe mass. Normalization of inflammatory marker (CRP). Patient has



DOI: 10.4254/wjh.v15.i10.1164 **Copyright** ©The Author(s) 2023.

Figure 2 Whole body fluorodeoxyglucose-positron emission tomography/computed tomography illustrating overall uptake of left lobe hepatic masses similar to the remainder of the liver.



DOI: 10.4254/wjh.v15.i10.1164 **Copyright** ©The Author(s) 2023.

Figure 3 Ultrasound-guided fine-needle aspiration of the liver mass visualized on computed tomography. A: Core biopsy of the liver mass; B: Core biopsy showing lymphoplasmacytic infiltrate and absence of malignant cells; C: Core biopsy with replacement of multiacinar liver parenchyma by fibrous and myxoid stroma with dense lymphoplasmacellular infiltrate; D: Core biopsy visualizing benign hepatocytes.

returned to his baseline health and weight.

DISCUSSION

IPT is a benign, rare disease process which mimics malignancy on both clinical and imaging findings. It can present as a solitary mass or multiple masses composed of polymorphous inflammatory cell infiltrate. Although it can occur anywhere in the body and at any age, it is more typically found in the lungs and occurs more commonly in children and young adults. Hepatic IPT is a rare phenomenon first described by Pack and Baker[4] in 1953 and is most frequently seen in men[5,6].

Although the pathophysiology and etiology of hepatic IPT remains unclear, infection and autoimmune disorders are thought to be a few of the causes. Various infectious agents have been hypothesized to play a role in the development of IPTs, such as Mycoplasma and Nocardia in lung, Epstein-Barr virus in the spleen and lymph nodes, mycobacteria in spindle cell tumors, and Actinomycetes in liver pseudotumors[5]. Recently, a patient with human immunodeficiency virus was diagnosed with biopsy-proven, herpes simplex virus-positive pseudotumor in the gastroesophageal junction [7]. Otherwise, IPT's have been associated with autoimmune conditions such as IgG4-related disease. Interleukin 1, a cytokine produced by monocytes and macrophages, contributes to the local and systemic effects of IPT. Although treatment of GI IPT's with surgical resection is usually curative, other reports have shown response to steroids, nonsteroidal anti-inflammatory drugs, and thalidomide. The reported recurrence rate of GI IPT's is between 18% and 40% [8]. If there is recurrence following initial therapy, surgical resection is highly advised. Spontaneous regression and malignant transformation have also been rarely reported.

While diagnosis and differentiation of IPT from other etiologies requires histologic examination of the tissue, radiographic characteristics may be helpful in ascertaining whether there is potential of the tumor to be malignant[9]. CT and magnetic resonance imaging findings are variable which is attributed to the variability in histologic composition[10]. Similarly, contrast enhanced ultrasound was unable to solely differentiate IPT from other hepatic malignancies[11,12]. However, several imaging characteristics have been studied and may help guide diagnostic workup[13,14].

We believe our case is likely a consequence of the inflammatory state caused by influenza. The temporal association with contracting influenza may be coincidental but the patient does not have any other risk factors including recent infections, malignancy, immunosuppression, trauma, or autoimmune conditions. Our diagnosis of IPT is supported by the lack of uptake on PET-CT, the absence of malignant cells on biopsy, the presence of mixed inflammatory infiltrate and fibrosis on cytopathology, and the resolution with anti-viral treatment directed against influenza.

CONCLUSION

Due to the rarity of hepatic IPT's and their features mirroring that of malignancy, our case highlights the importance of including pseudotumor in the differential diagnoses of a new liver mass(es) associated with regional lymphadenopathy following a viral infection, such as Influenza. To date, there have been no reported cases of IPT following influenza and therefore would add to current gaps in knowledge when evaluating patients with masses concerning for malignancy.

FOOTNOTES

Author contributions: Patel A, Chen A, and Lalos A had substantial contributions to the conception and study design, analysis and interpretation of the data, creating figure/tables, drafting manuscript, final approval of manuscript.

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).

Country/Territory of origin: United States

ORCID number: Ankoor Patel 0000-0002-6557-0624; Alexander Chen 0000-0001-9614-6562; Alexander T Lalos 0000-0002-0414-4664.

Corresponding Author's Membership in Professional Societies: American College of Gastroenterology; American Gastroenterological Association; American Association for the Study of Liver Diseases.

S-Editor: Lin C
L-Editor: A
P-Editor: Lin C

REFERENCES

1 **Zhao J**, Olino K, Low LE, Qiu S, Stevenson HL. Hepatic Inflammatory Pseudotumor: An Important Differential Diagnosis in Patients With a History of Previous Biliary Procedures. *ACG Case Rep J* 2019; **6**: e00015 [PMID: 31598534 DOI: 10.14309/crj.0000000000000015]

2 **Zhang Z**, Jin F, Sun L, Wu H, Chen B, Cui Y. Inflammatory pseudotumor of the thymus: A case report and review of the literature. *Oncol Lett* 2014; **7**: 1414-1418 [PMID: 24765147 DOI: 10.3892/ol.2014.1895]

3 **Yucel Gencoglu A**, Mangan MS. Orbital Inflammatory Pseudotumor following mRNA COVID-19 Vaccination. *Ocul Immunol Inflamm* 2023; **31**: 1141-1144 [PMID: 35914301 DOI: 10.1080/09273948.2022.2093757]

4 **Pack GT**, Baker HW. Total right hepatic lobectomy; report of a case. *Ann Surg* 1953; **138**: 253-258 [PMID: 13066016 DOI: 10.1097/00000658-195308000-00012]

5 **Patnana M**, Sevrukov AB, Elsayes KM, Viswanathan C, Lubner M, Menias CO. Inflammatory pseudotumor: the great mimicker. *AJR Am J Roentgenol* 2012; **198**: W217-W227 [PMID: 22358018 DOI: 10.2214/AJR.11.7288]

6 **Park JY**, Choi MS, Lim YS, Park JW, Kim SU, Min YW, Gwak GY, Paik YH, Lee JH, Koh KC, Paik SW, Yoo BC. Clinical features, image findings, and prognosis of inflammatory pseudotumor of the liver: a multicenter experience of 45 cases. *Gut Liver* 2014; **8**: 58-63 [PMID: 24516702 DOI: 10.5009/gnl.2014.8.1.58]

7 **Kripalani S**, Williams J, Joneja U, Bansal P, Spitz F. Herpes Simplex Virus Pseudotumor Masking as Gastric Malignancy. *ACG Case Rep J* 2023; **10**: e00985 [PMID: 36911758 DOI: 10.14309/crj.0000000000000985]

8 **Sanders BM**, West KW, Gingalewski C, Engum S, Davis M, Grosfeld JL. Inflammatory pseudotumor of the alimentary tract: clinical and surgical experience. *J Pediatr Surg* 2001; **36**: 169-173 [PMID: 11150459 DOI: 10.1053/jpsu.2001.20045]

9 **Bian Y**, Jiang H, Zheng J, Shao C, Lu J. Basic Pancreatic Lesions: Radiologic-pathologic Correlation. *J Transl Int Med* 2022; **10**: 18-27 [PMID: 35702187 DOI: 10.2478/jtim-2022-0003]

10 **Kawaguchi T**, Mochizuki K, Kizu T, Miyazaki M, Yakushijin T, Tsutsui S, Morii E, Takehara T. Inflammatory pseudotumor of the liver and spleen diagnosed by percutaneous needle biopsy. *World J Gastroenterol* 2012; **18**: 90-95 [PMID: 22228976 DOI: 10.3748/wjg.v18.i1.90]

11 **Liao M**, Wang C, Zhang B, Jiang Q, Liu J, Liao J. Distinguishing Hepatocellular Carcinoma From Hepatic Inflammatory Pseudotumor Using a Nomogram Based on Contrast-Enhanced Ultrasound. *Front Oncol* 2021; **11**: 737099 [PMID: 34692513 DOI: 10.3389/fonc.2021.737099]

12 **Kong WT**, Wang WP, Shen HY, Xue HY, Liu CR, Huang DQ, Wu M. Hepatic inflammatory pseudotumor mimicking malignancy: the value of differential diagnosis on contrast enhanced ultrasound. *Med Ultrason* 2021; **23**: 15-21 [PMID: 32905565 DOI: 10.11152/mu-2542]

13 **Kong WT**, Wang WP, Cai H, Huang BJ, Ding H, Mao F. The analysis of enhancement pattern of hepatic inflammatory pseudotumor on contrast-enhanced ultrasound. *Abdom Imaging* 2014; **39**: 168-174 [PMID: 24327255 DOI: 10.1007/s00261-013-0051-3]

14 **Möller K**, Stock B, Ignee A, Zadeh ES, De Molo C, Serra C, Jenssen C, Lim A, Görg C, Dong Y, Klinger C, Tana C, Meloni MF, Sparchez Z, Francica G, Dirks K, Hollerweger A, Kinkel H, Weskott HP, Montagut NE, Srivastava D, Dietrich CF. Comments and illustrations of the WFUMB CEUS liver guidelines: Rare focal liver lesions - non-infectious, non-neoplastic. *Med Ultrason* 2023 [PMID: 37369029 DOI: 10.11152/mu-4192]

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