MINIREVIEWS

4734  Inflammatory myofibroblastic tumor of the distal common bile duct: Literature review with focus on pathological examination
  Cordier F, Hoorens A, Ferdinande L, Van Dorpe J, Creytens D

4740  Probiotics and autoprobiotics for treatment of Helicobacter pylori infection
  Baryshnikova NV, Ilina AS, Ermolenko EI, Uspenskiy YP, Suvorov AN

4752  Plant-based diet and its effect on coronary artery disease: A narrative review

ORIGINAL ARTICLE

Clinical and Translational Research

4763  Identification of survival-associated biomarkers based on three datasets by bioinformatics analysis in gastric cancer

4788  High expression of autophagy-related gene EIF4EBP1 could promote tamoxifen resistance and predict poor prognosis in breast cancer

4800  Delineation of fatty acid metabolism in gastric cancer: Therapeutic implications

4814  Mechanical analysis of the femoral neck dynamic intersection system with different nail angles and clinical applications
  Wang Y, Ma JX, Bai HH, Lu B, Sun L, Jin HZ, Ma XL

Retrospective Cohort Study

4824  Development and validation of a predictive model for spinal fracture risk in osteoporosis patients
  Lin XM, Shi ZC

Retrospective Study

4833  Risk prediction model for distinguishing Gram-positive from Gram-negative bacteremia based on age and cytokine levels: A retrospective study
  Zhang W, Chen T, Chen HJ, Chen N, Xing ZX, Fu XY

4843  Sudden death in the southern region of Saudi Arabia: A retrospective study
  Al-Enam AMA, Dajam A, Alrajhi M, Aljaifi W, Al-Shraim M, Helaly AM
## Contents

**World Journal of Clinical Cases**

**Thrice Monthly Volume 11 Number 20 July 16, 2023**

<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>4852</td>
<td>Diagnostic value of preoperative examination for evaluating margin status in breast cancer</td>
<td>Liu P, Zhao Y, Rong DD, Li KF, Wang YJ, Zhao J, Kang H</td>
</tr>
<tr>
<td>4865</td>
<td>Defining the awareness and attitude of the clinicians through pharmacovigilance in Turkey</td>
<td>Aydin OC, Aydin S, Guneysu HZ</td>
</tr>
<tr>
<td>4874</td>
<td>Predictive value of the trans-perineal three-dimensional ultrasound measurement of the pubic arch angle for vaginal delivery</td>
<td>Liang ZW, Gao WL</td>
</tr>
<tr>
<td>4883</td>
<td>Microwave ablation of solitary T1N0M0 papillary thyroid carcinoma: A case report</td>
<td>Dionisio T, Lajut L, Sousa F, Violante L, Sousa P</td>
</tr>
<tr>
<td>4890</td>
<td>Acute spinal subdural haematoma complicating a posterior spinal instrumented fusion for congenital scoliosis: A case report</td>
<td>Michon du Marais G, Tabard-Fougère A, Dayer R</td>
</tr>
<tr>
<td>4903</td>
<td>ABCB4 gene mutation-associated cirrhosis with systemic amyloidosis: A case report</td>
<td>Cheng N, Qin YJ, Zhang Q, Li H</td>
</tr>
<tr>
<td>4912</td>
<td>Metagenomic next-generation sequencing in the diagnosis of neurocysticercosis: A case report</td>
<td>Xu WB, Fu JJ, Yuan XJ, Xian QJ, Zhang LJ, Song PP, You ZQ, Wang CT, Zhao QG, Pang F</td>
</tr>
<tr>
<td>4920</td>
<td>Drug-coated balloons for treating <em>de novo</em> lesions in large coronary vessels: A case report</td>
<td>Zhang QZ, Qin YR, Yin M, Chen XH, Chen L, Liang WY, Wei XQ</td>
</tr>
<tr>
<td>4926</td>
<td>Pretreatment with a modified St. Thomas’ solution in patients with severe upper limb injuries: Four case reports</td>
<td>Sun ZY, Li LY, Xing JX, Tong LC, Li Y</td>
</tr>
<tr>
<td>4932</td>
<td>Unexpected diffuse lung lesions in a patient with pulmonary alveolar proteinosis: A case report</td>
<td>Jian L, Zhao QQ</td>
</tr>
<tr>
<td>4937</td>
<td>Contrast-induced ischemic colitis following coronary angiography: A case report</td>
<td>Qiu H, Li WP</td>
</tr>
<tr>
<td>4944</td>
<td>Posterior pedicle screw fixation combined with local steroid injections for treating axial eosinophilic granulomas and atlantoaxial dislocation: A case report</td>
<td>Tu CQ, Chen ZD, Yao XT, Jiang YJ, Zhang BF, Lin B</td>
</tr>
</tbody>
</table>
Laryngospasm as an uncommon presentation in a patient with anti-N-methyl-D-aspartate receptor encephalitis: A case report

Wang L, Su HJ, Song GJ
ABOUT COVER
Editorial Board Member of World Journal of Clinical Cases, Kengo Moriyama, MD, PhD, Associate Professor, Department of Clinical Health Science, Tokai University School of Medicine, Tokai University Hachioji Hospital, Hachioji 1838, Tokyo, Japan. osaru3moving@gmail.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 abstracted and indexed in Science Citation Index Expanded (SCIE, also known as SciSearch®), Journal Citation Reports/Science Edition, Current Contents®/Clinical Medicine, PubMed, PubMed Central, Reference Citation Analysis, China National Knowledge Infrastructure, China Science and Technology Journal Database, and Superstar Journals Database. The 2023 Edition of Journal Citation Reports® cites the 2022 impact factor (IF) for WJCC as 1.1; IF without journal self cites: 1.1; 5-year IF: 1.3; Journal Citation Indicator: 0.26; Ranking: 133 among 167 journals in medicine, general and internal; and Quartile category: Q4.

RESPONSIBLE EDITORS FOR THIS ISSUE
Production Editor: Hua-Ge Yu; Production Department Director: Xu Guo; Editorial Office Director: Jin-Lei 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
Bao-Gan Peng, Jerzy Tadeusz Chudek, George Kontogeorgos, Maurizio Serati, Ja Hyeon Ku

EDITORIAL BOARD MEMBERS
https://www.wjgnet.com/2307-8960/editorialboard.htm

PUBLICATION DATE
July 16, 2023

COPYRIGHT
© 2023 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
**CASE REPORT**

**ABCB4 gene mutation-associated cirrhosis with systemic amyloidosis: A case report**

Na Cheng, Yu-Jie Qin, Quan Zhang, Hong Li

**BACKGROUND**
Gene mutations in ATP-binding cassette, subfamily B (ABCB4) lead to autosomal recessive disorders. Primary light amyloidosis is a rare and incurable disease. Here, we report a rare case of liver cirrhosis caused by ABCB4 gene mutation combined with primary light amyloidosis.

**CASE SUMMARY**
We report a case of a 25-year-old female who was hospitalized due to recurrent abdominal pain caused by calculous cholecystitis and underwent cholecystectomy. Pathological examination of the liver tissue suggested liver cirrhosis with bile duct injury. Exon analyses of the whole genome from the patient’s peripheral blood revealed the presence of a heterozygous mutation in the ABCB4 gene. Bone marrow biopsy tissues, renal puncture examination, and liver mass spectrometry confirmed the diagnosis of a rare progressive familial intrahepatic cholestasis type 3 with systemic light chain type κ amyloidosis, which resulted in cirrhosis. Ursodeoxycholic acid and the cluster of differentiation 38 monoclonal antibody daretozumab were administered for treatment. Following treatment, the patient demonstrated significant improvement. Urinary protein became negative, peripheral blood-free light chain and urine-free light chain levels returned to normal, and the electrocardiogram showed no abnormalities. Additionally, the patient’s lower limb numbness resolved, and her condition remained stable.

**CONCLUSION**
This report presents the diagnosis and treatment of liver cirrhosis, a rare disease that is easily misdiagnosed or missed.
INTRODUCTION

Multidrug resistance protein (MDR3), encoded by the ABCB4 gene, can transport phospholipids to bile, which plays an important role in normal bile formation. Mutations in ABCB4 can result in bile duct damage and cholestasis. It is an autosomal recessive disorder with clinical indications of gallbladder/intrahepatic bile duct stones and recurrent jaundice, which causes progressive familial intrahepatic cholestasis 3 (PFIC-3). Some patients progress to portal hypertension, liver cirrhosis, or even liver failure. Laboratory examination is characterized by persistent or repeated alkaline phosphatase (ALP) and gamma-glutamyl transpeptidase (GGT) increase[1-2], and ursodeoxycholic acid is the main drug of choice[3].

Primary light chain amyloidosis is an infrequent and untreatable condition. According to previous research, the incidence of this ailment in Europe and America is estimated to be approximately 9-14 individuals per million people per year[4]. The formation of amyloid proteins is attributed to misfolding of the monoclonal immunoglobulin light chain. This protein is deposited in various tissues and organs, leading to deterioration of the tissue structure, organ dysfunction, and gradual advancement. The etiology of this condition is associated with the cytotoxicity of unbound light chain amyloid proteins and gradual deterioration of organ function due to tissue structure degradation[5]. This condition may affect various tissues or organs, including but not limited to the liver, kidney, nerve, heart, and gastrointestinal tract, either successively or concurrently[6-7]. Because of the atypical and intricate symptoms of multiple organs and systems, early diagnosis and therapy are difficult, and the degree of pathological alterations in diverse tissues and organs in most individuals is irreversible at diagnosis.

This study presents a unique example of liver cirrhosis resulting from a mutation in the ABCB4 gene in conjunction with primary light chain amyloidosis. Clinical manifestations of the disease include portal hypertension, recurrent ascites, and jaundice. In addition, intractable proteinuria, peripheral neuropathy, and gradual damage to cardiac function may occur during disease progression. Following an extensive 4-year pursuit of medical intervention, a diagnosis was ultimately established, and the condition improved after treatment with a combination of ursodeoxycholic acid and the cluster of differentiation (CD38) monoclonal antibody daratumumab.

CASE PRESENTATION

Chief complaints
The patient was hospitalized on January 26, 2022, because of abdominal pain, palpitations, and numbness in both lower limbs for a duration of 2 d.

History of present illness
A 25-year-old woman presented with unexplained splenomegaly during a physical examination at 18 years of age. She felt no discomfort so had no further diagnosis and treatment until she was admitted to the hospital in November 2018 because of recurring abdominal pain caused by calculous cholecystitis. We planned to perform cholecystectomy, with preoperative abdominal computed tomography (CT) scan showing splenomegaly and normal liver imaging morphology. Gastroscopy examination indicated esophageal varices and portal hypertensive gastropathy, Blood analyses indicated a significant reduction in platelet count (33 × 10^9/L). This finding was attributed to hypersplenism resulting from splenomegaly. However, no additional investigation was performed via bone marrow puncture. Selective laparoscopic cholecystectomies and splenectomies were performed. Nodular changes were observed on the surface of the liver during surgery and a small amount of liver tissue was obtained for pathological analyses. The postoperative pathological
diagnosis of the liver tissue revealed the presence of liver cirrhosis and bile duct injury (epigastrum CT, gastroscopy, liver and spleen pathological tissue pictures are shown in Figure 1). The results of the laboratory tests for hepatitis B surface antigen (HBSAg), hepatitis C virus (HCV) antibody, ceruloplasmin, iron, ferritin, antinuclear antibody (ANA) antibody spectrum, autoantibody against the liver, antcardiolipin antibody, and antineutrophil were negative. The etiology of liver cirrhosis remained unclear. Because of the apparent elevation of ALP and GGT levels in the liver, ursodeoxycholic acid was administered at a dose of 15 mg/kg/d. In July 2020, positive urinary protein was initially detected, followed by the onset of persistent proteinuria and hypoproteinemia. The patient received medical attention from the nephrology department to exclude the possibility of rheumatism and immune-related ailments. However, the etiology of this condition remained unknown. The patient was hospitalized on January 26, 2022, because of abdominal pain, palpitations, and numbness in both lower limbs for a duration of 2 d.

**History of past illness**

The patient has no history of alcohol consumption, medication, or hepatitis.

**Personal and family history**

The patient refrained from consuming alcohol or any form of drugs. The patient denied any family history of tumors.

**Physical examination**

The results of the physical examination revealed tenderness in the upper abdominal region, along with the presence of ascites and edema in both lower extremities. No apparent jaundice of the skin or sclera was observed, and the nervous system exhibited normal function.

**Laboratory examinations**

Peripheral blood tests indicated a significant increase in GGT and ALP levels, which are indicative of impaired liver function. However, renal function was within normal limits. Additionally, the levels of N-brain natriuretic peptide precursor and troponin were significantly elevated. Routine urine analyses indicated a urinary protein level of 3 + and a 24-h urinary protein level of 744.98 mg/24-h. Following the administration of symptomatic treatment, the patient’s symptoms improved. The etiology of liver cirrhosis, including but not limited to HBSAg, HCV antibody, ceruloplasmin, ANA antibody spectrum, and autoantibodies, yielded negative findings.

**Imaging examinations**

An abnormality was observed on electrocardiography. CT of the upper abdomen revealed ascites attributed to cirrhosis (Figure 2). To investigate the etiology of liver cirrhosis, exons of the entire genome from patients’ peripheral blood were analyzed. These findings revealed the presence of a heterozygous mutation in the ABCB4 c.2318G>T gene (see Figure 3 for the electrocardiography, electromyography, and ABCB4 gene mutation sites). ABCB4 mutations are associated with several clinical manifestations including cholecystolithiasis, bile duct injury, and cholestasis. In some cases, patients may progress to cirrhosis, as evidenced by persistent and significant abnormalities in GGT and ALP liver function tests. However, the development of additional symptoms such as massive proteinuria, abnormal cardiac function indices, and numbness in both lower limbs suggests the presence of other factors that contribute to the development of systemic multiple organ diseases. In light of the patient’s splenomegaly of unknown etiology at the age of 18 years, there was a potential association with hematologic or neoplastic pathologies. Subsequent analyses revealed the presence of hyperplastic anemia on standard bone marrow examination, whereas bone marrow biopsy indicated a significant decrease in hematopoietic tissue proliferation. The serum and urine immunofixation electrophoresis results were negative. Immunohistochemical analyses of hematological tumors (specifically, bone marrow blood) did not detect monoclonal B cells. The results of cardiac ultrasound and cardiac magnetic resonance imaging plus pyrophosphate radionuclide scanning were within normal limits. The positron emission tomography-CT scan yielded negative results for tumor lesions. However, the levels of free κ and λ light chains in serum and urine increased (blood free κ light chain 45.41 mg/L, blood free λ light chain 63.07 mg/L, urine free κ light chain 72.40 mg/L, and urine free λ light chain 65.20 mg/L). Electromyography results indicated a decrease in the conduction velocity of the superficial peroneal nerve. These findings suggested the potential presence of amyloidosis; however, a pathological assessment was required for confirmation. The liver and spleen pathological tissues that were preserved after the 2018 operation, as well as the bone marrow biopsy tissue from the current hospitalization, were subjected to Congo red staining with permission from the patients and their families. The staining findings were uniformly positive. Additionally, further renal puncture examination revealed positive Congo red staining in the pathological tissue, immunohistochemical κ staining positive, λ staining negative. Liver mass spectrometry (MS) analyses also confirmed κ light chain amyloidosis (Figure 4 for histopathological examination of the liver, spleen, kidney, and bone marrow; Figure 5 shows the results of liver MS analyses). Although heart involvement was suspected, the patient and his family refused myocardial biopsy considering the danger, but the diagnosis of primary light chain (κ) amyloidosis was sufficient. At this point, the mystery of splenomegaly with an unknown etiology, persistent cirrhosis, proteinuria, peripheral neuropathy, and cardiac function damage was finally resolved.
ABCB4 gene mutation-associated cirrhosis

Figure 1 Epigastrium enhanced computed tomography, gastroscopy, postoperative spleen appearance, pathological image. A: On November 2018, computed tomography (CT) of upper abdomen enhanced sagittal plane; B: CT enhanced coronal plane of upper abdomen in November 2018; C: Gastroscopy revealed esophageal varices; D: Spleen appearance (27 cm × 16 cm); E: Spleen stained with hematoxylin and eosin (H&E) × 100; F: H&E staining of liver tissue × 100; G: Masson staining of liver tissue (original magnification × 100); H: CK7 staining of liver tissue (original magnification × 100).

Figure 2 Enhanced computed tomography image of epigastrium from May 2019 to February 2022. A: Sagittal plane view; B: Coronal plane view.

**FINAL DIAGNOSIS**

ABCB4 gene mutation-associated cirrhosis with systemic amyloidosis was diagnosed.

**TREATMENT**

Following discharge, the patient adhered to the prescribed ursodeoxycholic acid regimen at a dose of 15 mg/kg/d and treatment with CD38 monoclonal antibody daratumumab (intravenous infusion, 900 mg per administration, administered every other week), and underwent regular monitoring.
OUTCOME AND FOLLOW-UP

Urinary protein levels were negative, whereas the free light chains present in both the peripheral blood and urine returned to a standard level. In addition, electrocardiography showed normal readings. The patient's bilateral lower limb numbness resolved and his clinical status remained stable. The patient is currently undergoing medical treatment and receiving frequent monitoring (Table 1).

DISCUSSION

PFIC-3 is an autosomal recessive hereditary disease caused by mutations in the ABCB4 gene. The incidence rate of this condition is notably low, with an average occurrence of 1 in 500000, and it is predominantly sporadic. Mutation of the ABCB4 gene results in impairment of the MDR3 glycoprotein, which is present in the membrane of the capillary bile duct of hepatocytes. This leads to disruption in the metabolism of bile acids, elevation in the formation of cholesterol stones, damage to the bile duct, and the onset of intrahepatic cholestasis. Laboratory analyses indicated a continual elevation in...
Cheng N et al. ABCB4 gene mutation-associated cirrhosis

Table 1 Results of the laboratory examination

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>WBC as × 10^9 /L</td>
<td>1.14</td>
<td>14.94</td>
<td>10.1</td>
<td>9.6</td>
<td>13.9</td>
<td>9.6</td>
<td>7.8</td>
<td>8.5</td>
<td>3.5-9.5</td>
</tr>
<tr>
<td>Hb in g/L</td>
<td>83</td>
<td>97</td>
<td>96</td>
<td>86</td>
<td>97</td>
<td>91</td>
<td>88</td>
<td>95</td>
<td>115-150</td>
</tr>
<tr>
<td>PLT as × 10^9 /L</td>
<td>33</td>
<td>359</td>
<td>253</td>
<td>316</td>
<td>267</td>
<td>377</td>
<td>361</td>
<td>345</td>
<td>125-350</td>
</tr>
<tr>
<td>ALT in U/L</td>
<td>58.2</td>
<td>33.6</td>
<td>56.1</td>
<td>81.9</td>
<td>66.2</td>
<td>716</td>
<td>42.8</td>
<td>31.6</td>
<td>7-40</td>
</tr>
<tr>
<td>AST in U/L</td>
<td>136.4</td>
<td>108.6</td>
<td>175.8</td>
<td>236.5</td>
<td>315.2</td>
<td>298.3</td>
<td>211.9</td>
<td>125.8</td>
<td>13-35</td>
</tr>
<tr>
<td>TBIL in μmol/L</td>
<td>66.1</td>
<td>179</td>
<td>14.2</td>
<td>46.9</td>
<td>67.2</td>
<td>36.9</td>
<td>33.2</td>
<td>23.04</td>
<td>&lt; 23</td>
</tr>
<tr>
<td>DBIL in μmol/L</td>
<td>47.8</td>
<td>128.6</td>
<td>9</td>
<td>31.85</td>
<td>39.2</td>
<td>26.7</td>
<td>18.39</td>
<td>13.81</td>
<td>≤ 8</td>
</tr>
<tr>
<td>ALB in g/L</td>
<td>35.3</td>
<td>24.6</td>
<td>16.9</td>
<td>25.86</td>
<td>22.71</td>
<td>26.39</td>
<td>25.33</td>
<td>27.58</td>
<td>40-55</td>
</tr>
<tr>
<td>ALP in U/L</td>
<td>501</td>
<td>1174</td>
<td>426</td>
<td>904</td>
<td>887</td>
<td>1160</td>
<td>875</td>
<td>978</td>
<td>35-100</td>
</tr>
<tr>
<td>GGT in U/L</td>
<td>268.26</td>
<td>1367</td>
<td>439.51</td>
<td>387.3</td>
<td>971.19</td>
<td>554</td>
<td>382</td>
<td>542.22</td>
<td>7-45</td>
</tr>
<tr>
<td>ChE in U/L</td>
<td>2796</td>
<td>2301</td>
<td>3958</td>
<td>4623</td>
<td>3112</td>
<td>4728</td>
<td>2738</td>
<td>3288</td>
<td>5000-12000</td>
</tr>
<tr>
<td>CREA in μmol/L</td>
<td>48</td>
<td>49.83</td>
<td>56.87</td>
<td>/</td>
<td>96.6</td>
<td>66</td>
<td>68</td>
<td>46.9</td>
<td>41-73</td>
</tr>
<tr>
<td>NT-proBNP in pg/mL</td>
<td>/</td>
<td>176</td>
<td>238.4</td>
<td>/</td>
<td>3020</td>
<td>475</td>
<td>/</td>
<td>110.9</td>
<td>41.4-153</td>
</tr>
<tr>
<td>cTnT in ng/mL</td>
<td>0.003</td>
<td>0.009</td>
<td>/</td>
<td>/</td>
<td>0.645</td>
<td>0.465</td>
<td>/</td>
<td>0.001</td>
<td>0.0-0.014</td>
</tr>
<tr>
<td>LDH in U/L</td>
<td>136</td>
<td>244</td>
<td>279</td>
<td>426</td>
<td>295</td>
<td>481</td>
<td>364</td>
<td>290</td>
<td>120-250</td>
</tr>
<tr>
<td>uPRO</td>
<td>/</td>
<td>Positive (2 +)</td>
<td>Positive (3 +)</td>
<td>Positive (3 +)</td>
<td>Positive (3 +)</td>
<td>Positive (2 +)</td>
<td>Positive (1 +)</td>
<td>Negative (-)</td>
<td></td>
</tr>
<tr>
<td>uALB in mg/L</td>
<td>/</td>
<td>964</td>
<td>/</td>
<td>/</td>
<td>744.98</td>
<td>/</td>
<td>/</td>
<td>352.17</td>
<td>&lt; 140</td>
</tr>
<tr>
<td>Serum κ light chain in mg/dL</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>1050</td>
<td>1710</td>
<td>689</td>
<td>649</td>
<td>629-1350</td>
</tr>
<tr>
<td>Serum λ light chain in mg/dL</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>537</td>
<td>916</td>
<td>330</td>
<td>249</td>
<td>313-723</td>
</tr>
<tr>
<td>Urinary κ light chain in mg/dL</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>52</td>
<td>72.4</td>
<td>/</td>
<td>4.08</td>
<td>0-1.85</td>
</tr>
<tr>
<td>Urinary λ light chain in mg/dL</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>37.9</td>
<td>62.5</td>
<td>/</td>
<td>&lt; 5</td>
<td>0-5</td>
</tr>
</tbody>
</table>

Drug

UDCA

UDCA + Daratumumab

ALB: Albumin; ALP: Alkaline phosphatase; ALT: Alanine aminotransferase; AST: Aspartate aminotransferase; ChE: Choline; CREA: Creatinine; cTnT: Cardiac troponin T; DBIL: Direct bilirubin; GGT: Gamma-glutamyl transpeptidase; Hb: Hemoglobin; LDH: Lactate dehydrogenase; NT-proBNP: N-terminal pro-B-type natriuretic peptide; PLT: Platelet count; TBIL: Total bilirubin; uALB: Urine albumin; UDCA: Ursodeoxycholic acid; uPRO: Urine protein; WBC: White blood cell.

serum GGT along with hyperbilirubinemia, primarily resulting from an increase in conjugated bilirubin. Histopathological examination of the liver revealed nonspecific alterations, including intrahepatic bile duct damage and hyperplasia of the fibrous tissue. Clinical manifestations of PFIC-3 frequently include gallbladder stones and chronic progressive liver damage. In some cases, affected patients may develop cirrhosis during late childhood or adolescence[1,8]. Currently, the administration of ursodeoxycholic acid is primarily oral in nature, with the aim of competing with primary bile acids for reabsorption in the small intestine. This approach is intended to mitigate the harm caused by cholestasis in liver cells. Liver transplantation is typically required in patients with end-stage liver disease[9].
Figure 4 Congo red staining of the liver, spleen, kidney, and bone marrow, immunohistochemical staining for kidneys, and bone marrow biopsy. A: Congo red staining of liver tissue is 50 ×; B and C: Congo red staining of liver tissue 100 ×; D: 100 × Congo red staining of spleen tissue; E: Congo red staining of kidney tissue 100 ×; F: Renal tissue κ light chain was 100 × positive by immunohistochemistry; G: Bone marrow routine 100 ×; H: Bone marrow routine 200 ×; I: Bone marrow biopsy 100 ×; J: Bone marrow Congo red staining 100 ×.

Figure 5 Mass spectrometry analysis of liver tissue amyloidosis. Note: The relative abundance of Igκ is the highest, suggesting that the type is systemic κ light chain amyloidosis.

Systemic light chain amyloidosis is a rare disease. European and American countries have reported an incidence rate of 8-10 cases per million person-years. The formation of amyloid proteins is attributed to the misfolding of the monoclonal immunoglobulin light chain, leading to its deposition in tissues and organs. This process results in the destruction of...
tissue structure, organ dysfunction, and the onset of progressive disease. This condition is primarily associated with the abnormal proliferation of clonal plasma cells, with a minor proportion linked to lymphoproliferative diseases[10]. The amyloid protein exhibits the following characteristics. According to sources[11,12], hematoxylin and eosin staining appears eosinophilic and homogeneous, whereas Congo red staining displays a brick red color. In addition, the use of a polarization microscope results in apple green birefringence. In general, the biopsy positivity rate for symptomatic organs or tissues is > 95%, whereas that for bone marrow ranges from 50%–65%. Routine recommendations for myocardial biopsy are discouraged because of its high risk[13]. Currently, the gold standard for diagnosis is based on histopathological results and protein MS analyses. According to the types of monoclonal light chain deposition, it is divided into λ light chain type and κ light chain type. In clinic, λ light chain type is the main one, accounting for about 85%, and κ light chain type is rare. Due to the different tissues and organs involved, the clinical manifestations of the disease are diverse, causing great difficulties in early diagnosis and treatment. Most patients have an irreversible function in the involved tissues and organs when they are diagnosed. Autologous peripheral blood stem cell transplantation and targeted plasma cell therapy, such as daratumumab, are the main treatments for amyloidosis.

The co-occurrence of PFIC-3 and systemic amyloidosis in a single patient has not been reported, likely because of the rarity of these diseases. The patient initially presented with an unexplained splenomegaly and cholecystolithiasis. Subsequent diagnostic tests, including liver function analyses, abdominal CT, gastroscopy, and liver histopathology, confirmed the diagnosis of cirrhosis. However, its underlying etiology remains unclear. Subsequently, the state of liver cirrhosis progressively declines, with the involvement of numerous organs including the kidney, peripheral nerves, and heart. A heterozygous variation at the ABCB4 c.2318G>T locus was identified using gene sequencing. Pathological biopsy of the liver tissue revealed bile duct injury, cholestasis, and cirrhosis, which was consistent with the cirrhosis caused by PFIC-3, in conjunction with elevated GGT and ALP levels. However, ailments do not account for the engagement of many bodily systems. Through further detection of Congo red staining in the liver, spleen, kidney, bone marrow, and other tissues of the patient, and MS analyses of liver tissue amyloidosis, Igκ was highly expressed. Finally, it was thoroughly and definitively diagnosed as rare PFIC-3 complicated with systemic light chain κ amyloidosis.

For the treatment of liver cirrhosis related to ABCB4 gene mutations, the early use of ursodeoxycholic acid can improve cholestasis, delay the process of fibrosis, and thus improve prognosis[3]. Antiplasma cell therapy is the core treatment for systemic light chain κ amyloidosis. Daratumumab is a humanized IgG1-κ monoclonal antibody targeting CD38 antigen on the plasma cell surface. Studies have shown that this drug can quickly achieve deep hematological and organ remission with good safety[14,15]. The patient's condition worsened after long-term administration of ursodeoxycholic acid for a long period. After daratumumab treatment, the hematuria light chain decreased noticeably, the urine protein remission with good safety

CONCLUSION

For systemic amyloidosis, which affects multiple tissues and organs throughout the body, the current therapeutic approach involves the use of CD38 monoclonal antibody drug regimens. The administration of anti-plasma cell therapy in the early stages, along with symptomatic treatment, has been found to be beneficial in enhancing clinical symptoms and extending the duration of survival, as per previous research.

ACKNOWLEDGEMENTS

We thank the patient for his contribution to this case report. We thank Dr. Li Hong and Dr. Zhang Quan for their scientific guidance.

FOOTNOTES

**Author contributions:** Cheng N and Qin YJ contributed equally to this work; Li H designed the research study; Cheng N and Qin YJ performed the research; Qin YJ and Zhang Q contributed the analytic tools; Cheng N and Qin YJ analyzed the data and wrote the manuscript; All authors have read and approved the final manuscript.

**Supported by** The Department of Science and Technology of Guizhou Province, No. [2020]1Y299; National Natural Science Foundation of China, No. 82060123; National Health Commission of Guizhou Province, No. gzwjk2019-1-082; Doctor Start Fund of Affiliated
REFERENCES


