

Case Report

Spontaneous diffuse bleeding of the gastrointestinal tract in a patient with light-chain deposition disease

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Abstract: Light-chain deposition disease (LCDD) is a rare condition that is characterized by an excessive nonamyloid deposition of light chains in various tissues, which can lead to organ dysfunction. Generally, the kidney is the most affected organ in LCDD, and liver is the most likely affected site in the digestive system. However, LCDD affecting the gastrointestinal (GI) tract is very rare. Here we first report a case who presented with spontaneous diffuse bleeding in the GI tract, with a final diagnosis of LCDD underlying a primary condition of multiple myeloma. This case demonstrated that LCDD can be a rare cause of spontaneous diffuse hemorrhage in the absence of disseminated intravascular coagulation. A possible differential diagnosis of LCDD should be considered if spontaneous diffuse GI bleeding is encountered at endoscopy, particularly in cases with multiple organs affected. Pathological examinations of light chain deposition in the affected tissues and serum examinations of clonal light chains are indispensable for confirming the diagnosis.

Keywords: Spontaneous diffuse bleeding, gastrointestinal tract, light-chain deposition disease

Introduction

Light-chain deposition disease (LCDD) is a rare condition that is characterized by an excessive nonamyloid deposition of light chains in various tissues, which can lead to organ dysfunction. This condition is usually associated with monoclonal gammopathies of undetermined significance and multiple myeloma (MM) in 17% and 58% of patients, respectively [1, 2]. LCDD can also occur following underlying lymphoproliferative disorders, such as chronic lymphocytic leukemia [1, 2]. Generally, LCDD should be distinguished from immunoglobulin light chain amyloidosis, which is characterized by amyloid fibrils mainly derived from light chains and the typical birefringence in Congo red stain in the affected tissues. Compared with predominant lambda light chains in amyloidosis, deposition of kappa light chains was observed in 80% of patients with LCDD [3, 4]. Generally, the kidney is the most affected organ in LCDD, which presents with predominant proteinuria or renal failure in most patients. Extra-renal involvement is reported in the heart, liver, pancreas, spleen, lungs, thyroid, eye, and central nervous system,

with the liver being the most likely affected site in the digestive system [5-8]. However, LCDD affecting the gastrointestinal (GI) tract is very rare. Here we report a case of a patient who presented with spontaneous diffuse bleeding in the GI tract, with a final diagnosis of LCDD underlying a primary condition of MM.

Case report

A 42-year-old man visited the gastroenterology department of our hospital in April 2016, who presented with a 2-month history of abdominal pain, diarrhea (green, watery stool, four or five episodes per day), and a notable weight loss of 10 kg. His medical history was unremarkable. However, he had a history of eating spicy food a few days before the onset of the initial symptoms. His vital parameters on admission were within the normal range, and physical examination revealed extensive abdominal tenderness, without rebound tenderness. The results of his blood examination showed decreased red blood cell (RBC) count at $2.86 \times 10^{12}/L$, moderate anemia with normal RBC size (hemoglobin, 86 g/L), normal platelet count at $189 \times 10^9/L$,

Spontaneous diffuse GI bleeding in LCDD

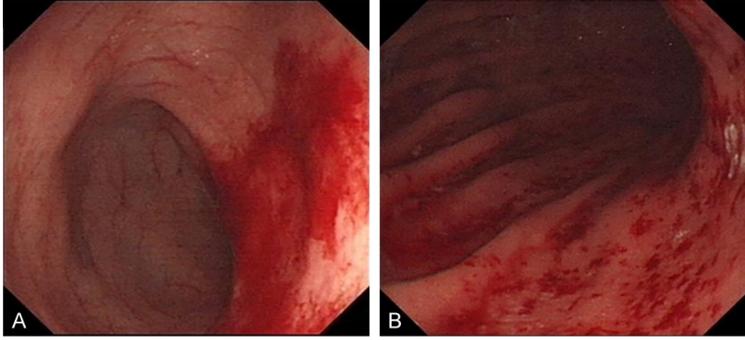


Figure 1. Endoscopy view of the rectum (A) and stomach (B) showing spontaneous diffuse errhysis after air insufflation.

and normal leukocyte count at $4.63 \times 10^9/L$, with percentages of neutrophils, lymphocytes, monocytes, and eosinophils being 73.6%, 19.9%, 6.5%, and 0.0%, respectively. A blood electrolyte test revealed mild hypocalcemia (1.89 mmol/L) and hypokalemia (3.39 mmol/L). A coagulation test revealed moderately prolonged prothrombin time at 15.1 s, international normalized ratio at 1.29, and thrombin time at 22.8 s, decreased fibrinogen at 1.13 g/L, and normal activated partial thromboplastin time. Liver and renal function tests revealed moderate hypoalbuminemia at 27.9 g/L, mild decreased creatinine at 40.0 $\mu\text{mol/L}$ and normal lactate dehydrogenase at 2021 U/L. Urinalysis revealed detectable levels of the urine protein. An immunologic test in serum demonstrated decreased levels of IgG (2.80 g/L), IgA (189 mg/L), IgM (139 mg/L), C3 (0.214 g/L), and C4 (0.111 g/L). With regard to a potential history of eating unclean food, infectious factors were primarily considered and later strictly excluded. All bacterial, fungal, and viral examinations demonstrated negative findings. Inflammatory indicators of the C-reactive protein and erythrocyte sedimentation rate were also within normal ranges, with a slight increase in the procalcitonin level at 0.07 ng/mL. Gastroscopy and colonoscopy revealed a grossly normal appearance of the mucosa at first; however, diffuse errhysis was spontaneously observed in the stomach, duodenum, and colorectum immediately following lumen expansion due to air insufflation under endoscopy (**Figure 1**).

Biopsy results of the rectum and stomach revealed chronic inflammation characterized by the focal infiltration of lymphocytes and plasma cells observed under microscopy (**Figure 2**). To determine the potential reason of spontaneous GI bleeding in the absence of disseminated

intravascular coagulation (DIC), a bone marrow specimen was obtained. Hematoxylin and eosin (H&E) staining showed an excessive infiltration of plasma cells in the bone marrow, and further immunostaining indicated the infiltration of plasmacytoma with a positive expression of CD138 and kappa light chains and a negative expression of lambda light chains (**Figure 2**). Consequently, serum $\beta 2$ -microglobulin level was found to be increased to 4.64

mg/L. Immunofixation detected a monoclonal band of the IgG and kappa light chains in serum, with increased kappa/lambda ratio at 5.05 in a serum-free light chain study. Urinalysis also detected increased kappa light chains at 23.5 g/L, in contrast to the negative lambda light chains. A further immunostaining of the rectal biopsy specimen identified positive kappa and lambda light chains (**Figure 2**). Amyloidosis was excluded because of negative Congo red dry staining in the rectal biopsy specimen. Skeletal radiography identified no osteolytic bone lesions. The abovementioned evidence finally confirmed the diagnosis of light chain deposition disease affecting the GI tract in the setting of multiple myeloma (Durie-Salmon stage IIA) [9]. In addition to the definite involvement of the GI tract, a diagnosis of systematic LCDD affecting the kidney and myocardium was also presumed because of refractory nephrotic syndrome and heart failure with increased myocardial biomarkers (troponin T, 304.3 ng/L; myoglobin, 398.10 ng/mL, and creatine kinase-MB, 9.56 ng/mL). Although the patient was placed on dexamethasone (10 mg/d \times 9 day), thalidomide (50 mg/d \times 6 day and 100 mg/d \times 3 day) and cyclophosphamide (400 mg/d \times 1 day), he subsequently died after his condition gradually deteriorated.

Discussion

In this study, we first reported a patient with LCDD in the GI tract who presented with spontaneous diffuse errhysis at endoscopy. Literature review revealed that GI involvement occurs in some patients with primary or secondary amyloidosis, whereas it is rather rare in patients with LCDD. To the best of our knowledge, all cases with LCDD affecting GI tract

Spontaneous diffuse GI bleeding in LCDD

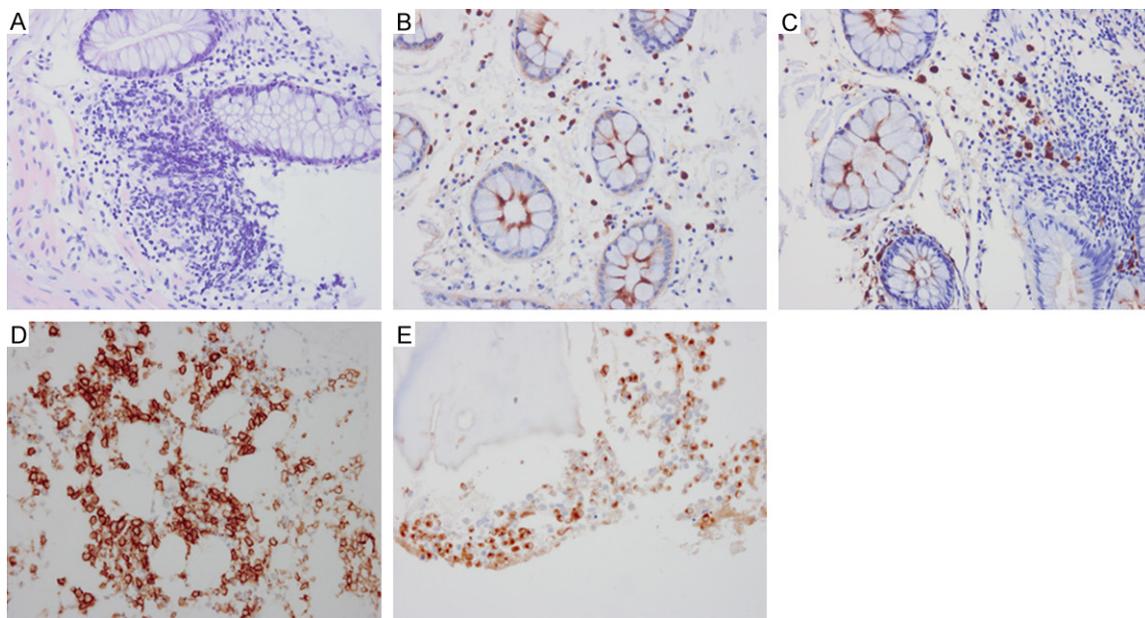


Figure 2. Hematoxylin and eosin (H&E) staining in the rectal biopsy specimen demonstrating chronic inflammation characterized by the focal infiltration of lymphocytes and plasma cells (A) (original magnification, $\times 400$). Immunohistochemical staining of the rectal biopsy specimen expressing both kappa (B) and lambda light chains (C) and that of the bone marrow specimen strongly expressing CD138 (D) and kappa light chains (E) (original magnification, $\times 400$).

Table 1. Summary of literature cases and the current case of LCDD affecting GI tract

Reference	Age/ Gender	GI symptoms	Endoscopic presentations	GI tract involved	Other organs involved	Underlying conditions
Kwon et al. [10]	62/M	No	Chronic gastritis	Stomach	Liver, bone marrow, probably kidney	Chronic HCV infection, HCC
Jen et al. [11]	58/F	No	Punctate erosions in the antrum	Stomach	No	Chronic HCV infection, HCC
Victor et al. [12]	61/M	Diarrhea, vomiting, GERD-like symptoms, weight loss	Gastritis, duodenal inflammation	Stomach, duodenum	Kidney, probably liver and heart	Kidney transplant
Kim et al. [13]	63/M	No	Duodenal polyp	Duodenum	No	No
Our case	42/M	Abdominal pain, diarrhea, weight loss	Spontaneous diffuse GI bleeding	Stomach, duodenum, colorectum	Probably kidney and heart	MM

Abbreviations: M, male; F, female; GI, gastrointestinal; GERD, gastroesophageal reflux disease; HCV, hepatitis C virus; HCC, hepatocellular carcinoma; MM, multiple myeloma.

reported in the literature are summarized in **Table 1**. In 2011, Kwon et al. [10] first reported the case of a patient with asymptomatic LCDD affecting the stomach and liver with underlying chronic hepatitis C virus (HCV) infection and primary hepatocellular carcinoma (HCC). Similar to Kwon et al.'s finding, Jen et al. [11] also identified the case of a patient with asymptomatic LCDD involving the stomach who also had a history of HCV infection and HCC. LCDD with GI involvement can also occur after organ transplant; Victor et al. [12] reported LCDD case with the stomach and duodenum involved in the setting of post-transplantation of the kidney, who

predominantly presented with chronic diarrhea and severe gastroesophageal reflux disease-like symptoms. Other than these three cases of patients with LCDD involving the GI tract, Kim et al. [13] reported a patient with isolated LCDD, which was only limited to the duodenum, with unremarkable medical history, showing a latent clinical course. These limited evidence suggested that LCDD affecting the GI tract can present with common digestive symptoms or can even be asymptomatic as an incidental finding under a regular endoscopic screening. LCDD can also exhibit nonspecific endoscopic appearance, such as erosions, polyps [10-13], or spon-

taneous errhysis, which is an uncommon presentation, like in the present case. This can make the diagnosis of LCDD become a challenge in clinical practice.

Endoscopy has become a routine examination in clinical practice, but it is very rare to encounter spontaneous diffuse errhysis in the normal mucosa of the GI tract. Spontaneous bleeding is commonly caused by abnormal coagulation disorders, such as DIC. However, here we first reported LCDD as a very rare cause for the spontaneous diffuse bleeding in the GI tract. Another issue to be noted is that LCDD can affect more than one organ, thereby causing various symptoms that seem to be unrelated. In such a situation, systemic LCDD, which may explain the seemingly irrelevant symptoms, should be considered and strictly excluded. As mentioned above, LCDD is commonly characterized by a clonal deposition of kappa light chains. However, immunostaining of the rectal biopsy specimen revealed an expression of both kappa and lambda light chains in our case, in contrast to that of the bone marrow specimen revealing an expression of predominant kappa light chains and a detectable monoclonal IgG kappa light chains in serum. Double-light chain deposition of both kappa and lambda light chains in urine has been reported in one patient with MM [14]. Therefore, we speculate that malignant plasma cells in different tissues may be derived from distinct B cells, expressing divergent clones of light chains.

In summary, we first demonstrated that LCDD can be a rare cause of spontaneous diffuse errhysis in the GI tract. LCDD affecting the GI tract can present with common clinical symptoms, and a possible diagnosis of LCDD should be considered if spontaneous diffuse GI bleeding is encountered during endoscopy, particularly in cases with multiple organs affected but in the absence of clear explanations. Pathological examinations of light chain deposition in the affected tissues and serum examinations of clonal light chains are indispensable for confirming the diagnosis.

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Disclosure of conflict of interest

None.

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Spontaneous diffuse GI bleeding in LCDD

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