

Case report

Phlegmonous gastritis developed during chemotherapy for acute lymphoblastic leukemia

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Abstract:

Phlegmonous gastritis (PG) is an uncommon bacterial infection of the gastric wall, that progresses rapidly. The condition is characterized by purulent inflammation, which can spread throughout the entire gastro-intestinal tract and is associated with a high mortality rate. Early diagnosis and prompt antibiotic therapy are essential. We report a case of a 42-year-old female receiving a diagnosis with relapsed Philadelphia chromosome-negative B-cell, acute lymphoblastic leukemia, who developed acute severe epigastric pain and upper gastro-intestinal bleeding during induction chemotherapy. A contrast-enhanced tomography scan of the abdomen showed diffuse and significantly thickened gastric walls without evidence of bowel obstruction or ischemia. The patient subsequently received a diagnosis of PG and was successfully treated with antibiotics. This report focuses on the clinical and imaging findings, as well as the treatment outcomes of this rare disease.

Keywords : ● Phlegmonous gastritis ● Acute lymphoblastic leukemia

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รายงานผู้ป่วย

โรคกระเพาะอาหารอักเสบชนิดเพลกโมนัสที่เกิดขึ้นระหว่างการให้ยาเคมีบำบัด ในผู้ป่วยมะเร็งเม็ดเลือดขาวเฉียบพลันชนิดลิมโฟยด์

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บทคัดย่อ

โรคกระเพาะอาหารอักเสบชนิดเพลกโมนัสคือ การติดเชื้อแบคทีเรียในผนังกระเพาะอาหารซึ่งพบได้ไม่บ่อยแต่มีการดำเนินโรคเร็ว มีลักษณะสำคัญคือ มีอาการอักเสบแบบเป็นหนองที่สามารถพบได้ตลอดทางเดินอาหารและมีอัตราการเสียชีวิตสูง จึงจำเป็นต้องอาศัยการวินิจฉัยที่รวดเร็วและให้รักษาด้วยยาปฏิชีวนะโดยทันที รายงานผู้ป่วยหญิงอายุ 42 ปี ได้รับการวินิจฉัยเป็นมะเร็งเม็ดเลือดขาวเฉียบพลันชนิดลิมโฟยด์ที่กลับเป็นซ้ำ ตรวจโครโมโซมฟีลาเดลเฟียให้ผลลบ มีอาการปวดท้องเฉียบพลันรุนแรงและมีเลือดออกในทางเดินอาหารส่วนบนในระหว่างการรักษายาเคมีบำบัด ตรวจเอกซเรย์คอมพิวเตอร์ช่องท้องพบว่าผนังกระเพาะอาหารมีความหนาผิดปกติโดยไม่มีหลักฐานของการอุดตันหรือภาวะขาดเลือดของลำไส้ ผู้ป่วยได้รับการวินิจฉัยเป็นโรคกระเพาะอาหารอักเสบชนิดเพลกโมนัสและสามารถรักษาได้ผลสำเร็จด้วยยาปฏิชีวนะ รายงานฉบับนี้มุ่งเน้นเรื่องอาการแสดง ผลตรวจทางรังสีวิทยา ตลอดจนผลการรักษาของโรคดังกล่าว

คำสำคัญ : ● โรคกระเพาะอักเสบชนิดเพลกโมนัส ● มะเร็งเม็ดเลือดขาวเฉียบพลันชนิดลิมโฟยด์

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Introduction

Phlegmonous gastritis (PG) is a rare and rapidly progressive condition with a high mortality rate of approximately 40%, even when treated promptly¹⁻². It typically affects individuals between the ages of 30 and 70²⁻⁵ and is characterized by purulent inflammation of the gastric wall, primarily involving the submucosa and muscularis layers, and predominantly infiltrated with neutrophils⁶. The exact pathogenesis remains unknown^{2,4}. Risk factors include alcoholism, mucosal injury, malignancy and immunosuppression^{2,4}. The diagnosis of PG is challenging due to its nonspecific symptoms such as fever, epigastric pain and vomiting. Only a few documented reports indicate PG occurring in conjunction with hematologic malignancies, particularly acute leukemia.

Case presentation

A 42-year-old female with relapsed Philadelphia chromosome-negative B-cell acute lymphoblastic leukemia (B-ALL) underwent multi-agent induction chemotherapy. On the fifth day of treatment, she developed severe epigastric pain with coffee-ground emesis. Her vital signs included a body temperature of 37.0°C, blood pressure of 80/50 mmHg, heart rate of 120 beats/min and respiratory rate of 26 breaths/min. Physical examination revealed significant tenderness with localized guarding at the epigastrium. The laboratory results, shown in Table 1, suggested disseminated intravascular coagulation. Blood cultures for bacteria and fungi were negative. A computed tomography (CT) scan of the abdomen showed diffuse, markedly thickened gastric walls without evidence of bowel obstruction or ischemia (Figure 1).

Table 1 Transition of the laboratory results from days 1 to 14

	Normal range	Day 1	Day 5	Day 10	Day 14
Hb (g/dL)	12-15	9.4	7.4	8.8	7.2
WBC (10 ³ /uL)	4.5-11	17	0.81	0.5	0.75
ANC (10 ³ /uL)	1.8-7.8		0.08	0.02	0.04
Platelet (10 ³ /uL)	150-450	21	10	29	24
PT (sec) /INR	10.2-12.9	11.4/0.99	17.9/1.61	14.5/1.28	
APTT (sec)	19.5-29.9	23	25.9	33.7	
BUN (mg/dL)	7-20	11	23	20	14
Creatinine (mg/dL)	0.5-1	0.81	0.66	0.5	0.52
AST (U/L)	5-35	34	18		
ALT (U/L)	0-40	44	42		
ALP (U/L)	40-120	76	67		
Total bilirubin (mg/dL)	0.2-1.2	0.38	0.68		
Direct bilirubin (mg/dL)	0.0-0.5	0.11	0.21		
Fibrinogen (g/L)	1.7-4		0.42	5.39	
Amylase (U/L)	25-125		66		
Lipase (U/L)	8-78		37		
Lactate (mmol/L)	0.7-2.5	4			

Hb, Hemoglobin; WBC, white blood cells; ANC, absolute neutrophil counts; PT, prothrombin time; INR, international normalized ratio; BUN, blood urea nitrogen; AST, aspartate aminotransferase; ALT, alanine aminotransferase; ALP, alkaline phosphatase

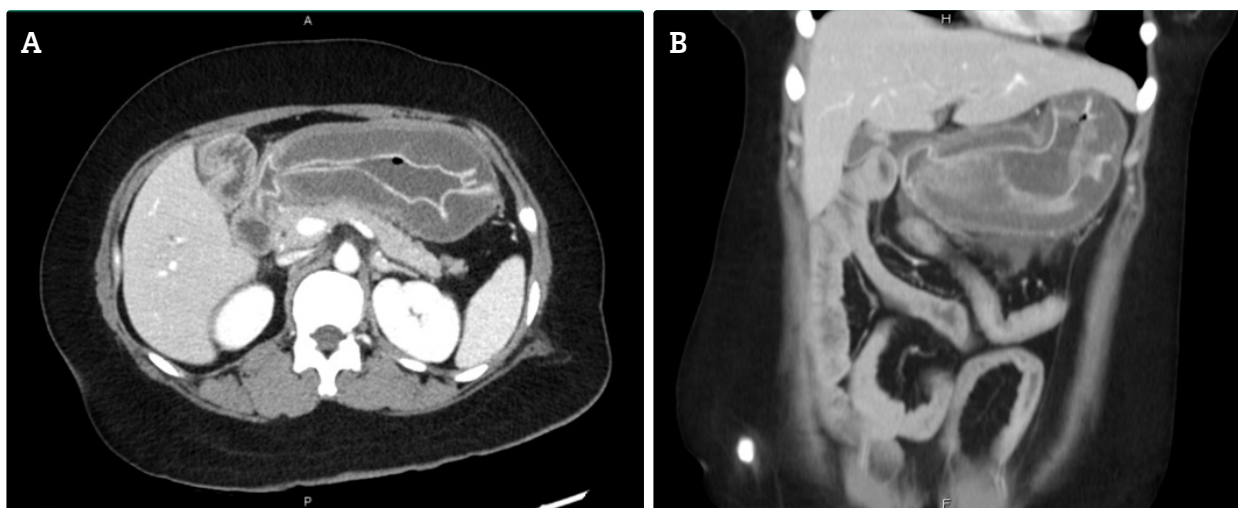


Figure 1 CT whole abdomen on day 5 - Panels A and B show venous phase in axial and coronal views, respectively, demonstrating diffuse markedly gastric wall thickening with mild mucosal hyperenhancement and perigastric fat reticulation.

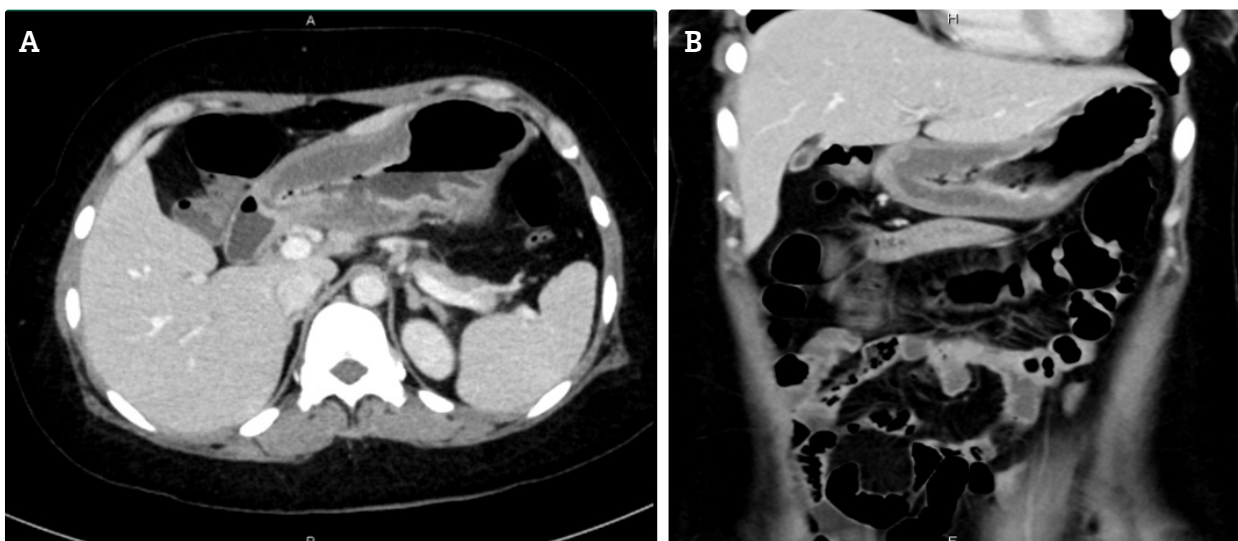


Figure 2 CT whole abdomen on day 14 (9 days after receiving empirical antibiotics) - Panels A and B show the venous phase in axial and coronal views, respectively, demonstrating improvement of diffuse gastritis, now remaining only at the gastric antrum.

The patient was treated with fluid resuscitation, vasopressors, granulocyte-colony stimulating agents and immediate empirical administration of meropenem, vancomycin and micafungin. All chemotherapy agents were discontinued. Upper endoscopy with biopsy was not performed due to concerns about the potential risk of gastro-intestinal perforation.

Nine days later, on day 14, the patient's condition showed gradual clinical improvement. A follow-up CT scan of the whole abdomen indicated a reduction in gastric wall thickening (Figure 2). During discussions

about long term treatment options, the patient chose to decline further chemotherapy.

Discussion

We reported a case of a patient with B-ALL who developed phlegmonous gastritis (PG), characterized by abdominal pain and coffee-ground emesis during the neutropenic phase following induction chemotherapy. We strongly suspected PG as a contrast enhanced CT scan showed significant thickening of the gastric wall. Based on our experience and recommendations from

an infectious disease specialist, we immediately started treatment with carbapenem, vancomycin and echinocandin antibiotics before the causative organism was identified. The initial response to the treatment was effective and the patient's life was saved.

PG is a rare condition first described by Cruveilhier in 1862⁷, with approximately 500 cases reported since then. Although the exact etiology is not completely understood, the primary pathophysiological mechanism appears to involve bacterial invasion of the gastric wall, particularly in the submucosa and muscularis layers⁶. *Streptococcus pyogenes* is responsible for around 70% of cases, with other bacteria such as *Staphylococcus* spp., *Pneumococcus* spp. and *Enterococcus* spp. also identified as potential causes⁴. Risk factors for developing PG include acute leukemia, chemotherapy involving cytotoxic agents and corticosteroids and the neutropenic phase, all of which can compromise the immune system, as seen in our patient.

Patient usually present acute abdominal pain, nausea, vomiting and fever. Authors have described the purulent vomit as pathognomonic although this did not appear in any of the reviewed cases. Due to the nonspecific nature of the symptoms and the patient's condition, which usually makes them unfit for endoscopy and potentially increases the risk of complications such as perforation and bleeding due to pancytopenia resulting from chemotherapy, imaging is key to diagnosis. Contrast enhanced CT findings include diffuse gastric wall thickening with or without circumferential intramural low attenuation surrounded by a peripheral enhancing rim. The intramural low attenuation represents severe inflammation and abscess localized to the submucosa and muscularis layer⁸. Peptic ulcer disease and gastric cancer are the main differential diagnoses⁹. Given that the patient has acute abdominal pain, septic shock and typical imaging findings, acute PG is the most likely diagnosis.

We conducted a literature search using the Pubmed database with the keywords "phlegmonous gastritis" and "leukemia" from 1995 to 2024. There have been seven reports of patients with leukemia developing PG during the neutropenic phase after receiving chemotherapy, which are summarized in Table 2.

Interestingly, *Enterococcus* spp., one of the primary bacteria associated with PG, was found in only two cases. In contrast, *Bacillus*, which is rarely reported as a cause of PG, was detected in three cases. Almost all patients, including our own, had a history of using gastric acid secretion inhibitors and had an absolute neutrophil count below 100/ μ L. Shi et al., raised concern that the use of gastric acid secretion inhibitors might increase bacterial abundance in gastric juice, potentially raising the risk of PG, although evidence was limited¹³.

The standard treatment for PG is not well-established. Starting broad-spectrum antibiotics promptly remains crucial. Miller et al., reported that surgical treatment was superior to medical treatment, with a mortality rate of 18% compared with 100%. However, with advance in antibiotics, the success rate of medical treatment has improved significantly, reducing the mortality rate to 19%⁴. In this case, early recognition and appropriate empirical antibiotics therapy allowed for successful treatment with antibiotics alone.

Conclusion

We reported a case of a patient with B-ALL developing PG during the neutropenic phase of chemotherapy, possibly due to infection. Special attention should be given to patients with hematologic malignancies, particularly those with neutropenia who are using glucocorticoids and/or proton pump inhibitors during chemotherapy. Early recognition and proper management including broad-spectrum antibiotics are crucial for addressing this rare and potentially fatal comorbidity.

Table 2 Clinical Features of Phlegmonous Gastritis after Chemotherapy for Acute Leukemia

No.	Ref.	Age	Sex	Hematological malignancy	WBC/ANC	Pathogen(s)	Histopathologic examination	Gastric acid secretion inhibitor	Outcome
1	Takeuchi et al. ¹⁰	63	M	ATLL	300/unknown	Gram-positive cocci and Gram-negative bacilli ^a	Not executed	H2-RA	Death
2	Iqbal et al. ¹¹	59	F	AML (2 nd relapsed)	< 100/0	Citrobacter freundii/Enterococcus faecalis/Bacillus cereus	Not executed	Unknown	Recovered
3	Inagawa et al. ¹²	34	F	APL with MF	320/20	Enterobacter cloacae/Enterococcus species/MRS	Not executed	PPI	Death
4	Shi et al. ¹³	33	M	ALL	70/unknown	Stenotrophomonas maltophilia	Not executed	PPI	Recovered
5	Saito et al. ¹⁴	55	F	ALL	100/4	Bacillus cereus	Executed	PPI	Recovered
6	Saito et al. ¹⁵	70	F	ALL	100/98	Bacillus cereus	Executed	P-CAB	Recovered
7	Venny et al. ¹⁶	49	F	ALL	Unknown/40	Pseudomonas aeruginosa	Executed	Unknown	Death
8	This case	42	F	ALL (1 st relapsed)	810/80	Not detected ^b	Not executed	PPI	Recovered

^aColonies were confirmed, but bacterial species could not be identified.

^bBlood cultures for bacterial and fungus were taken.

ATLL, adult T-cell leukemia/lymphoma; MF, myelofibrosis; AML, acute myeloid leukemia; APL, acute promyelocytic leukemia; MPAL, mixed-phenotype acute leukemia; ALL, acute lymphocytic leukemia; WBC, white blood cells; ANC, absolute neutrophil counts; MRS, methicillin-resistant Staphylococcus; H2-RA, histamine H2-receptor antagonist; PPI, proton pump inhibitor; PCAB, potassium-competitive acid blocker.

Patient consent statement

No personal identifying information is included in the manuscript, and hence, patient consent was not obtained.

Author contributions

All authors contributed to the drafting and editing of this manuscript.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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