

Phlegmonous Gastritis and Streptococcal Toxic Shock Syndrome: An Almost Lethal Combination

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ABSTRACT

We report a case of phlegmonous gastritis in a 70-year-old woman without any predisposing factors, presenting with high fever, epigastric pain, and vomiting complicated by septic shock and multi-organ failure. The ultrasound and the computed tomography scan showed thickening of the stomach wall. *Streptococcus pyogenes* was isolated in the blood, thereby establishing the diagnosis of streptococcal toxic shock syndrome. An exploratory laparotomy excluded the need for a gastrectomy, and the patient was successfully treated with antibiotics. A short review of phlegmonous gastritis caused by *S. pyogenes* during the last 12 years is also presented.

Keywords: Multi-organ failure, Phlegmonous gastritis, Septic shock, *Streptococcus* group A.

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BACKGROUND

Phlegmonous gastritis is a rare but often lethal suppurative bacterial infection of the stomach. Antibiotic treatment has improved the prognosis but sometimes surgical treatment is necessary for a positive outcome.¹ Most of the cases are caused by streptococci, pneumococci, *Escherichia coli*, *Proteus*, *Haemophilus*, staphylococci, and *Corynebacterium*. Suspecting and diagnosing this rare clinical entity is difficult and late diagnosis compromises survival. Group A *Streptococcus* (GAS) is the cause of severe clinical syndromes including invasive, life-threatening infections. Herein, we report a case of acute phlegmonous gastritis in an elderly woman, progressing to septic shock and multi-organ failure caused by *Streptococcus pyogenes*, successfully treated with antimicrobial agents. A short review of the recent literature about phlegmonous gastritis caused by *S. pyogenes* is also undertaken.

CASE DESCRIPTION

A 70-year-old woman with a history of arterial hypertension and hypothyroidism presented to the emergency department (ED) with diarrhea, weakness, epigastric pain, and vomiting for 4 days. During the last 24 hours, she also presented a high fever (40°C) with rigors. Before her admission into ED, the patient had visited her primary care physician who ordered several laboratory tests including a white blood cell (WBC) count, which was noted to be 3000/mm³, with 44% neutrophils while the rest of the laboratory values were unremarkable.

Physical examination in the ED revealed an epigastric tenderness especially localized to the left subcostal margin, scarce bowel sounds, a blood pressure of 130/75 mm Hg, pulse 110/minute, temperature 39°C, and oxygen saturation of 96% (FiO₂ = 21%). An abdominal ultrasound revealed gastric wall thickening and a computed tomography (CT) scan of the abdomen showed a thickened gastric wall and small hyperdense areas near the gastroesophageal junction (Fig. 1).

Laboratory results in the ED showed a leukocyte count of 2230/mm³ (77% neutrophils), C-reactive protein 193 mg/dL, and total bilirubin 2.14 mg/dL, while the rest was normal. She was

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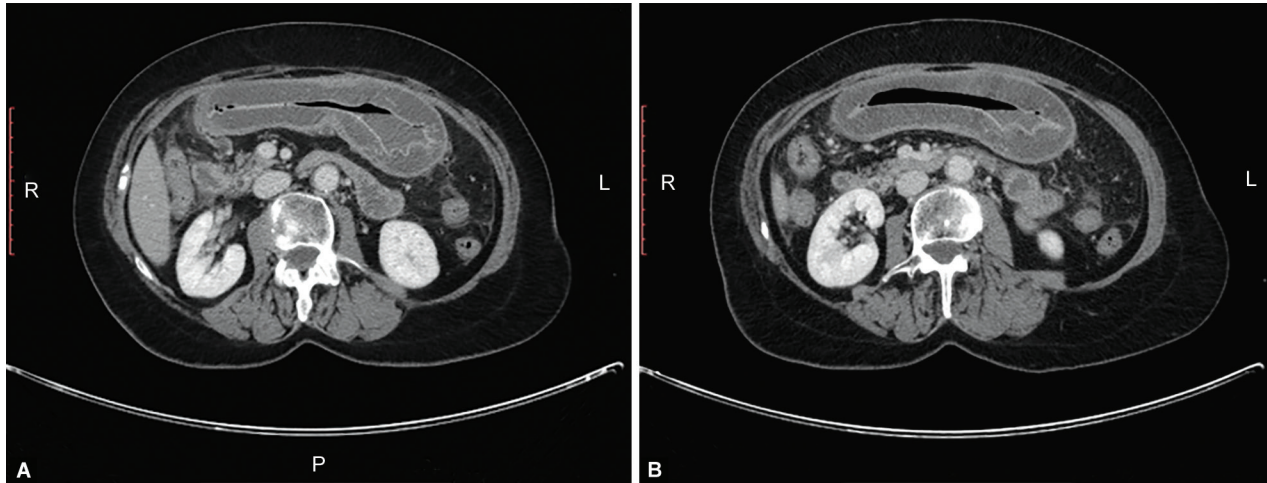
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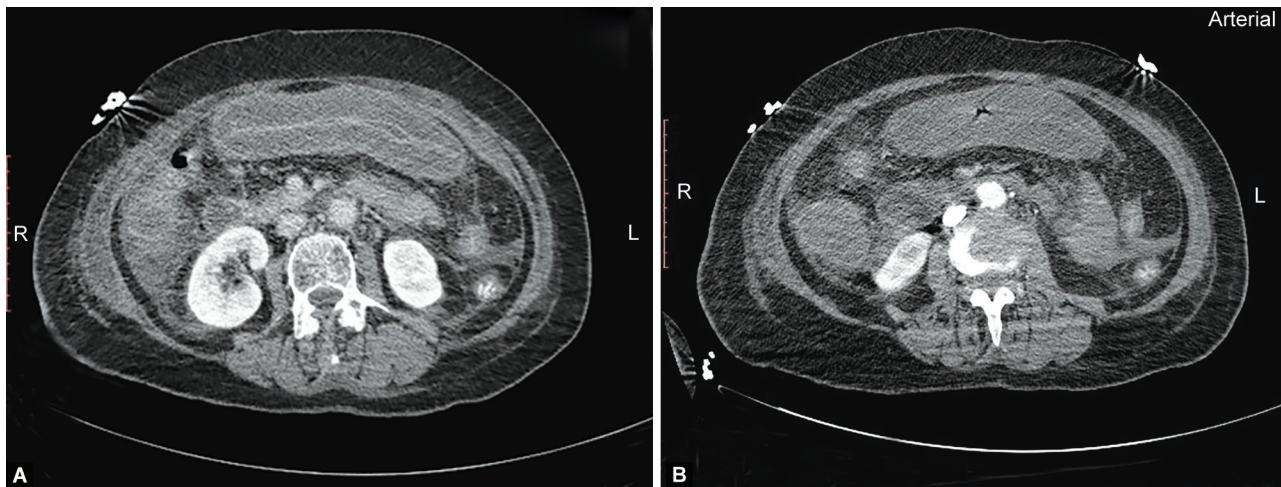
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admitted to the internal medicine department, and empirical treatment was started with piperacillin/tazobactam 4.5 g q.i.d. IV and vancomycin 1 g b.i.d. IV after blood cultures were drawn. The patient's situation quickly deteriorated with diffuse abdominal pain, confusion, hemodynamic instability, reduced level of consciousness, and acute respiratory and renal failure. She was then intubated and transferred to the intensive care unit (ICU) requiring high doses of epinephrine, 200 mg hydrocortisone as septic shock treatment, and continuous renal replacement therapy (CRRT). APACHE II severity score on admission was calculated to be 39 with a SOFA score of 15, while a second CT scan of the abdomen with IV contrast showed an increase in the edema and gastric wall thickening, a large ascitic collection, and a thickening of the colonic wall (Fig. 2). The patient underwent an exploratory laparotomy without, however, any abnormal findings. After her readmission from the operating room, she remained hemodynamically unstable and febrile, requiring mechanical ventilation with a high oxygen mixture and CRRT. The laboratory values in the ED, general ward, and first ICU admission day are demonstrated in Table



Figs 1A and B: Upper sections of the computed tomography scan of the abdomen on the day of admission, showing a thickened gastric wall and small hyperdense areas near the gastroesophageal junction. Small peritoneal fluid collections around the liver are also noticed



Figs 2A and B: The second computed tomography of the abdomen performed with and without the use of intravenous contrast. The edema in the gastric wall was increased while a large ascitic collection and a thickening of the colonic wall are apparent

Table 1: Serum laboratory values of the patient (Emergency, ward, ICU)

	Emergency	Ward	ICU (day 1)
WBC (cells/mL)	2230	1600	5030
HCT	37.60%	38.60%	40%
PLT (mm ³)	135000	91000	129000
INR	1.24	1.5	1.2
BUN (mg/dL)	67.4	107	136
Creatinine (mg/dL)	1.2	2.4	4.5
CRP (mg/L)	193	340	507
PCT (mg/mL)		69	>100
AST (units/mL)	24	59	127
ALT (units/mL)	20	45	76
TBIL/DBIL (mg/dL)	2.14/1.09	1.24/0.52	0.9/0.6
TP/ALB (g/dL)	6.5/3.7	5.3/2.8	5.6/2.8
LDH (units/L)	232	362	461
ALP (units/L)	18	32	23
CK (units/L)	67	55	1139

BUN, blood urea nitrogen; INR, international normalized ratio

1. After pancultures were collected, the empirical therapy was switched to meropenem 2 g t.i.d., gentamicin (6 mg/kg/day), and vancomycin (1 g b.i.d.). One day later, the hemodynamic situation of the patient improved, thus allowing the performance of an esophagogastroduodenoscopy with a biopsy showing diffuse mucosal edema. On the third ICU day, *S. pyogenes* was isolated in the blood culture but not in tissue cultures. Clindamycin and immunoglobulin were added to the therapeutic regimen. During the next few days, the patient's situation slowly improved, with her renal function being restored, and 15 days later, she was finally able to resume a regular diet. At that time, her third CT scan showed a lessening of the edema but because of the generalized myopathy, she was extubated on day 25 and transferred to the general ward 3 days later. Histological examination showed only lesions associated with acute gastritis.

DISCUSSION

We report a case of severe phlegmonous gastritis and multi-organ failure caused by *S. pyogenes* in a 70-year-old female with a positive outcome.

Table 2: Summary of cases of acute phlegmonous gastritis published between 2010 and 2019 and caused by *Streptococcus pyogenes*

Author	Publication		Sex	Age	Outcome	Risk factor	Shock		Gastric resection
	year	Country					MOF (site of isolation)	Surgery	
Kan-no et al. ¹⁴	2007	Japan	M	36	Discharged	None	No (pus)	No	No
Hari Kumar et al. ¹⁵	2007	India	F	70	Death	Gastric lymphoma	Yes (askites)	No	No
Hommel et al. ⁹	2007	France	F	43	Discharged	Pregnancy	No (peritoneal fluid)	Yes	No
Paik et al. ¹⁶	2010	United States	M	45	Discharged	Paranasal surgery	Yes (peritoneal fluid)	Yes	No
Sahnan et al. ¹⁷	2013	UK	F	56	Death	Rheumatoid arthritis and corticosteroids	Yes (pus and blood)	Yes	Yes
Rada-Palomino et al. ¹⁸	2014	Spain	M	62	Discharged	HIV	Yes (tissue and blood)	No	No
Min et al. ⁸	2014	South Korea	F	51	Discharged	None	Yes (pus)	Yes	Yes
Morimoto et al. ¹⁹	2018	Japan	M	77	Death	Diabetes and hypertension	Yes (blood and pus)	No	No
Yang et al. ¹	2018	China	M	47	Discharged	Alcohol	Yes (tissue)	Yes	Yes (total)
Ramphal et al. ²⁰	2018	Netherlands	M	45	Discharged	None	Yes (tissue)	Yes	Yes

First described by Cruveilhier in the early 18th century, acute phlegmonous gastritis is a rare but rapidly progressing and often fatal bacterial infection of the stomach wall affecting both sexes (mostly men) between the ages of 30 and 70, especially over 50 years.^{1,2} Until 1994, 500 cases were described in the literature, most of them in the preantibiotic era.¹ Although most of the cases were caused by hemolytic group A streptococci spp, a variety of bacteria were also implicated, e.g., staphylococci spp., *E. coli*, *Proteus*, *Haemophilus influenzae*, *Clostridia*, and *Actinomyces*.¹⁻⁵ The infection can be local with a focal abscess formation or diffuse.⁶ The inflammation procedure involves mainly the submucosa diffusing into the mucosa and the serous membrane. Typical pathologic findings include infiltration with neutrophils and plasma cells. Since the thickening of the gastric wall is more prominent in the submucosa, biopsy involving only the mucosa may be normal as in our case. Consequently, a negative biopsy cannot exclude the diagnosis.⁷

Although the etiology of the disease is unknown, possible mechanisms include hematogenous bacteria spread or direct invasion through a lesion in the stomach wall.³ Several predisposing factors (either local or general) and underlying situations have been associated with the disease. Local factors include mucosal injury, achlorhydria, gastritis, alcohol use, gastrointestinal malignancies, invasive endoscopic procedures, and gastric lymphoma.⁸⁻¹⁰ General debilitating conditions like age, diabetes mellitus, and alcohol consumption or cases of impaired immune status, such as gastric lymphoma, HIV infection, hematologic malignancies, or connective tissue disorders may contribute to the manifestation of the disease.^{11,12} An association with pregnancy has also been described.⁹ In almost 50% of the cases, no predisposing factors have been identified as in the case of our patient.

Intense epigastric pain is the most frequent symptom followed by guarding, nausea, vomiting sometimes purulent, fever, and chills.³ Abdominal tenderness or generalized guarding may be present. The diagnosis is supported by increased WBC but it is often difficult since the symptoms and signs are not specific. Phlegmonous gastritis is frequently unrecognized while delayed treatment because of the difficult diagnosis might have deleterious effects. CT scan showing thickening of the gastric wall, endoscopic ultrasound, surgery, and histological examination of the gastric mucosa may help establish the diagnosis. Cultures of the gastric fluid may reveal the responsible bacteria. In our patient, the

responsible microorganism was not isolated from the gastric aspirate, possibly because of prior antimicrobial treatment, and the diagnosis was based on the CT findings in conjunction with the positive blood culture.

GAS is one of the most common human pathogens and is the cause of several infections, such as streptococcal pharyngitis and skin infections. Strains producing superantigens are the cause of severe and life-threatening manifestations, such as bacteremia and necrotizing fasciitis, often associated with shock and multi-organ failure. This clinical entity is termed streptococcal toxic shock syndrome (STSS).¹³ The use of nonsteroidal anti-inflammatory drugs in the past, alcoholism, injection drugs, and malignancy predispose to the syndrome. The identification of GAS in the blood in conjunction with shock and multi-organ failure confirmed the diagnosis of STSS in our patient.

Treatment of phlegmonous gastritis may be surgical or conservative. Surgical treatment is necessary for cases presenting with local complications, such as perforation or cases that have evolved to gastric necrosis. Total gastrectomy is sometimes necessary. Mortality varies between 10 and 54% and is higher in the diffuse type of diseases, especially in gangrenous or necrotizing gastritis.⁵ Early initiation of prompt antibiotic therapy is the cornerstone of a positive outcome. In our case, although the diagnosis was established later, early cover with broad-range antimicrobials prevented the evolution to necrotizing gastritis.

Table 2 summarizes cases of acute phlegmonous gastritis published between 2010 and 2019 caused by *S. pyogenes*.^{1,8,9,14-20} In this review, 10 published cases showed: (a) the worldwide distribution of the disease, (b) the manifestation of STSS associated with septic shock and multi-organ failure (8/10), and (c) the high mortality rate associated with the disease (3/10 deaths). In three of the cases, the responsible microorganism was isolated from the blood while gastrectomy was necessary for four patients.

CONCLUSION

Phlegmonous gastritis is a rare and difficult-to-diagnose clinical entity, sometimes demanding partial or total gastrectomy along with the early start of antimicrobial treatment. The presence of multi-organ failure and septic shock may be associated with the isolation of *S. pyogenes* as part of the toxic shock syndrome.

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REFERENCES

- Yang H, Yan Z, Chen J, Xie H, Wang H, Wang Q. Diagnosis and treatment of acute phlegmonous gastritis: a case report. *Medicine (Baltimore)* 2018;97(18):e0629. DOI: 10.1097/MD.00000000000010629.
- O'Toole PA, Morris JA. Acute phlegmonous gastritis. *Postgrad Med J* 1988;64(750):315–316. DOI: 10.1136/pgmj.64.750.315.
- Kobus C, van den Broek JJ, Richir MC. Acute gastric necrosis caused by a β -hemolytic streptococcus infection: a case report and review of the literature. *Acta Chir Belg* 2020;120(1):53–56. DOI: 10.1080/00015458.2018.1500799.
- Yokota T, Yamaki T, Yashima R, Yamada Y, Narushima Y, Kikuchi S, et al. Emergency operation for phlegmonous gastritis. *Ups J Med Sci* 2005;110(3):237–240. DOI: 10.3109/2000-1967-069.
- Kim GY, Ward J, Hennessey B, Peji J, Godell C, Desta H, et al. Phlegmonous gastritis: case report and review. *Gastrointest Endosc* 2005;61(1):168–174. DOI: 10.1016/s0016-5107(04)02217-5.
- Wakayama T, Watanabe H, Ishizaki Y, Okuyama T, Ogata H, Tanigawa K, et al. A case of phlegmonous esophagitis associated with diffuse phlegmonous gastritis. *Am J Gastroenterol* 1994;89(5):804–806. <https://doi.org/10.3348/jksr.2018.79.1.45>
- Hu DC, McGrath KM, Jowell PS, Killenberg PG. Phlegmonous gastritis: successful treatment with antibiotics and resolution documented by EUS. *Gastrointest Endosc* 2000;52(6):793–795. DOI: 10.1067/mge.2000.108926.
- Min SY, Kim YH, Park WS. Acute phlegmonous gastritis complicated by delayed perforation. *World J Gastroenterol* 2014;20(12):3383–3387. DOI: 10.3748/wjg.v20.i12.3383.
- Hommel S, Savoye G, Lorenceau-Savale C, Costaglioli B, Baron F, Le Pessot F, et al. Phlegmonous gastritis in a 32-week pregnant woman managed by conservative surgical treatment and antibiotics. *Dig Dis Sci* 2007;52(4):1042–1046. DOI: 10.1007/s10620-006-9235-9.
- Lee BS, Kim SM, Seong JK, Kim SH, Jeong HY, Lee HY, et al. Phlegmonous gastritis after endoscopic mucosal resection. *Endoscopy* 2005;37(5):490–493. DOI: 10.1055/s-2005-861254.
- Iqbal M, Saleem R, Ahmed S, Jani P, Alvarez S, Tun HW. Successful antimicrobial treatment of phlegmonous gastritis: a case report and literature review. *Case Rep Hematol* 2018;2018:8274732. DOI: 10.1155/2018/8274732.
- Mittleman RE, Suarez RV. Phlegmonous gastritis associated with the acquired immunodeficiency syndrome/pre-acquired immunodeficiency syndrome. *Arch Pathol Lab Med* 1985;109(8):765–767. PMID: 3839379.
- Cunningham MW. Pathogenesis of group A streptococcal infections. *Clin Microbiol Rev* 2000;13(3):470–511. DOI: 10.1128/cmr.13.3.470-511.2000.
- Kan-no Y1, Irisawa A, Takagi T, Shibukawa G, Wakatsuki T, Suzuki E, et al. Endosonographic diagnosis and follow-up of phlegmonous gastritis. *J Clin Ultrasound* 2007;35(9):524–526. DOI: 10.1002/jcu.20333.
- Harikumar R, Pramod K, Pushpa M, Simi K, Arun G. Gastric lymphoma presenting as phlegmonous gastritis. *J Gastrointest Cancer* 2007;38(1):24–27. DOI: 10.1007/s12029-008-9011-5.
- Paik DC, Larson JD, Johnson SA, Sahm K, Shweiki E, Fulda GJ. Phlegmonous gastritis and group A streptococcal toxic shock syndrome in a patient following functional endoscopic sinus surgery. *Surg Infect (Larchmt)* 2010;11(6):545–549. DOI: 10.1089/sur.2009.064.
- Sahnan K, Davis BJ, Bagenal J, Cullen S, Appleton S. Acute gastric necrosis after routine oesophagogastroduodenoscopy with therapeutic argon plasma coagulation. *Ann R Coll Surg Engl* 2013;95(6):e99–e101. DOI: 10.1308/003588413X13629960047515.
- Rada-Palomino A, Muñoz-Duyos A, Pérez-Romero N, Vargas-Pierola H, Puértolas-Rico N, Ruiz-Campos L, et al. Phlegmonous gastritis: a rare entity as a differential diagnostic of an acute abdomen. Description of a case and a bibliographic review. *Rev Esp Enferm Dig* 2014;106(6):418–424. PMID: 25361454.
- Morimoto M, Tamura S, Hayakawa T, Yamanishi H, Nakamoto C, Nakamoto H, et al. Phlegmonous gastritis associated with group A streptococcal toxic shock syndrome. *Intern Med* 2014;53(22):2639–2642. DOI: 10.2169/internalmedicine.53.2741.
- Ramphal W, Mus M, Nuytink HKS, van Heerde MJ, Verduin CM, Gobardhan PD. Sepsis caused by acute phlegmonous gastritis based on a group A Streptococcus. *J Surg Case Rep* 2018;2018(8):rjy188. DOI: 10.1093/jscr/rjy188.