

Prospects of conservative treatment for *Clostridium septicum*–associated aortitis

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ABSTRACT

Clostridium septicum bacteremia is a rare (72 cases reported) aneurysm-inducing disease that has resulted in a 6-month mortality of 100% when treated conservatively. We report the case of a patient who was completely symptom free at 6 months of follow-up but who ultimately died at 8.9 months after aortic rupture. In compliance with the patient's choice, a long-time antibiotic regimen was applied, instead of the surgical approach recommended by our surgical department. The use of an antibiotic regimen represents an option for patients unfit for surgery or as a bridge to surgery for damage control; however, aortic repair represents the only curative approach. Definitive antibiotic treatment is limited to a palliative approach for patients with *C. septicum* aortitis and has been accompanied by 100% 1-year mortality (90-day mortality, 84.2%). (J Vasc Surg Cases Innov Tech 2022;8:227-31.)

Keywords: Abdominal aneurysm; Aortitis; Case report; *Clostridium septicum*; Occult colonic malignancy

Representing 1.3% of clostridial infections, *Clostridium septicum* is a gram-positive anaerobic bacillus.^{1,2} Additionally, *C. septicum* aortitis is associated with occult gastrointestinal malignancies ($\leq 80\%$; 56% of colorectal cancer) and hematologic disorders.^{1,2} Alpha toxin production can lead to gas gangrene building up in the aortic wall and, ultimately, systemic invasion through the bowel mucosa, resulting in fast aneurysm induction accompanied by a high risk of rupture.²⁻⁴ However, few cases have been reported ($n = 72$). When open aortic repair (OAR) is not performed, *C. septicum* aortitis will result in a 100% 6-month mortality rate.² Rupture of the abdominal aorta (77%-94% mortality for outpatients compared with 51.9% in-hospital mortality) is in contrast to a 90-day mortality of $\sim 30\%$ after OAR.^{2,5,6}

In the present study, we have reported the case of a patient with this rare disease surviving >6 months (8.9 months) after conservative treatment. The patient provided written informed consent for the report of her case details and imaging studies. Our report followed the CARE guidelines (Supplementary Fig).⁷

CASE REPORT

A 76-year-old woman with permanent atrial fibrillation, dilated cardiomyopathy, arterial hypertension, chronic obstructive pulmonary disease, and chronic kidney disease had presented with diffuse abdominal pain, fatigue, and a mild fever. Her white blood cell count (15,070 K/ μ L; normal range, 4-10.8 K/ μ L) and C-reactive protein (20.5 mg/dL; normal range, <0.5 mg/dL) were elevated, and contrast-enhanced computed tomography (CT) revealed a slight dilatation of the juxtarenal and infrarenal aorta with circumferential intramural gas present. Thus, empiric intravenous antibiotic treatment was applied (ampicillin/sulbactam, 1 g intravenously every 8 hours), and the patient was hospitalized. She experienced a fast decrease in symptom severity and decline of the inflammatory parameters. However, a blood culture was positive for a gram-positive bacillus that was later identified as *C. septicum*. A literature review revealed a dramatic prognosis for patients for whom aortic surgery was not performed. Furthermore, reevaluating the CT scan revealed a colonic mass with a diameter of 3 cm at the right flexure that was later histologically confirmed as a high-grade intraepithelial neoplasm by colonoscopy. Nevertheless, the interdisciplinary evaluation (preoperative internist statement and geriatric assessment [ie, Barthel index and Mini-Mental State Examination]) estimated the patient to be frail and at increased risk of open abdominal surgery, although echocardiography had revealed good cardiac pump function (ejection fraction, 55%). However, the interdisciplinary vascular board, including vascular surgeons and interventional radiologists, decided against endovascular aortic aneurysm repair (EVAR) accompanied by long-term antibiotic treatment because of the presence of advanced aortic calcification, stenotic visceral arteries, and the juxtarenal anatomic site of the aneurysm with placement of an endovascular stent difficult (Fig 1). OAR would also have been risky owing to the general condition of the patient and insecure suture possibility because of the advanced inflammation state of the arterial wall. Ultimately, it was the patient's and her family's utmost will

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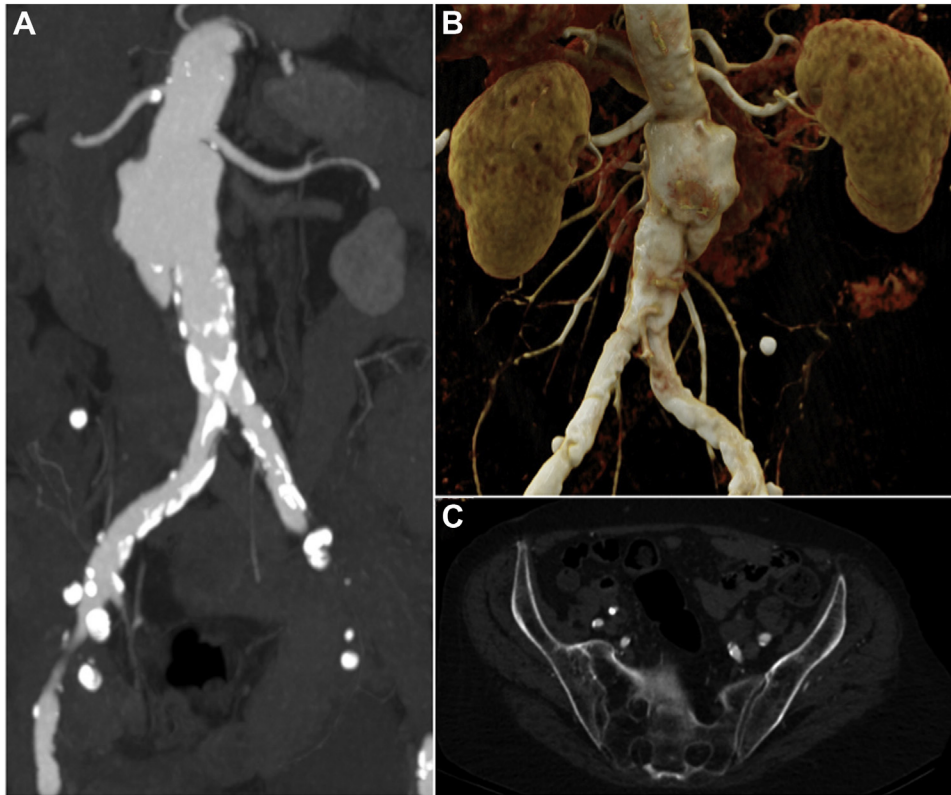


Fig 1. Anatomic characteristics influencing treatment decisions. Maximum intensity projection (A) and cinematic volume rendering technique (B) images of the juxtarenal aneurysm in correlation with the renal arteries. C, Note the highly calcified and stenotic iliac vessels, with the largest diameter of the right and left external iliac artery being 5 mm and 6 mm, respectively.

to try a conservative approach, rejecting the offered intervention possibilities (EVAR and OAR, which were preferred by our vascular board). Thus, long-term broad-spectrum antibiotic treatment with penicillin (amoxicillin/clavulanic acid), 1 g every 12 hours, was administered. The patient recovered quickly and was discharged with an absolute absence of symptoms. Readmission with follow-up CT after 3 months (Fig 2) showed progressive aneurysmatic growth (+12 mm) of the juxtarenal aorta, with a wide penetrating ulcer and dissection of the outermost vessel layers into the calcified aortic wall, with a craniocaudal expansion of 5 cm.

The inflammatory parameters were within the normal range, and the patient had not had any symptoms at 3 months of follow-up. The interdisciplinary and ethical board evaluation rejected an attempt of aortic repair at this stage and agreed to further antibiotic treatment in consensus with the patient and her close family, aware of the imminently fatal end due to rupture. Thus, no further diagnostic or interventional treatment was administered because such treatment was rejected by the patient. The patient did not undergo curative intended colorectal surgery, and the colonic mass was left untouched. However, the patient was in satisfactory condition at the 6-month follow-up and, ultimately, died of rupture after 8.9 months (266 days).

DISCUSSION

Our literature search in August 2021 revealed a total of 72 cases of *C. septicum*–associated aortitis.^{1–23} Thus, the case we have presented is case number 73. Demographically, we found a predisposition for male sex (66.2%), older age (median, 76 years; interquartile range, 67–82 years), gastrointestinal malignancies (52.1%), and diabetes (22.5%). The abdominal aorta was involved in 64.8% of the cases, and 8.5% had thoracoabdominal expansion.

Antibiotic treatment as the only conservative approach was administered to 23 patients compared with 39 patients who had undergone OAR, 5 patients who had undergone EVAR, and 5 patients whose further treatment was not specified.^{14,18,20–23} However, to date, the 6-month mortality was 100% for patients receiving conservative treatment (90-day mortality, 84.2%), in contrast to 43.2% for patients undergoing surgery (90-day mortality, 32.1%).^{2,13,16,17,19,21} Regarding OAR, long-term survival (>1 year) was reached for 25% to 50% of patients.^{2,13,16,17,19,21}

Despite the dramatic benefit of surgical repair, long-term broad-spectrum antibiotic treatment can be offered as a palliative approach or to the rare patient with critical status who are believed will not survive

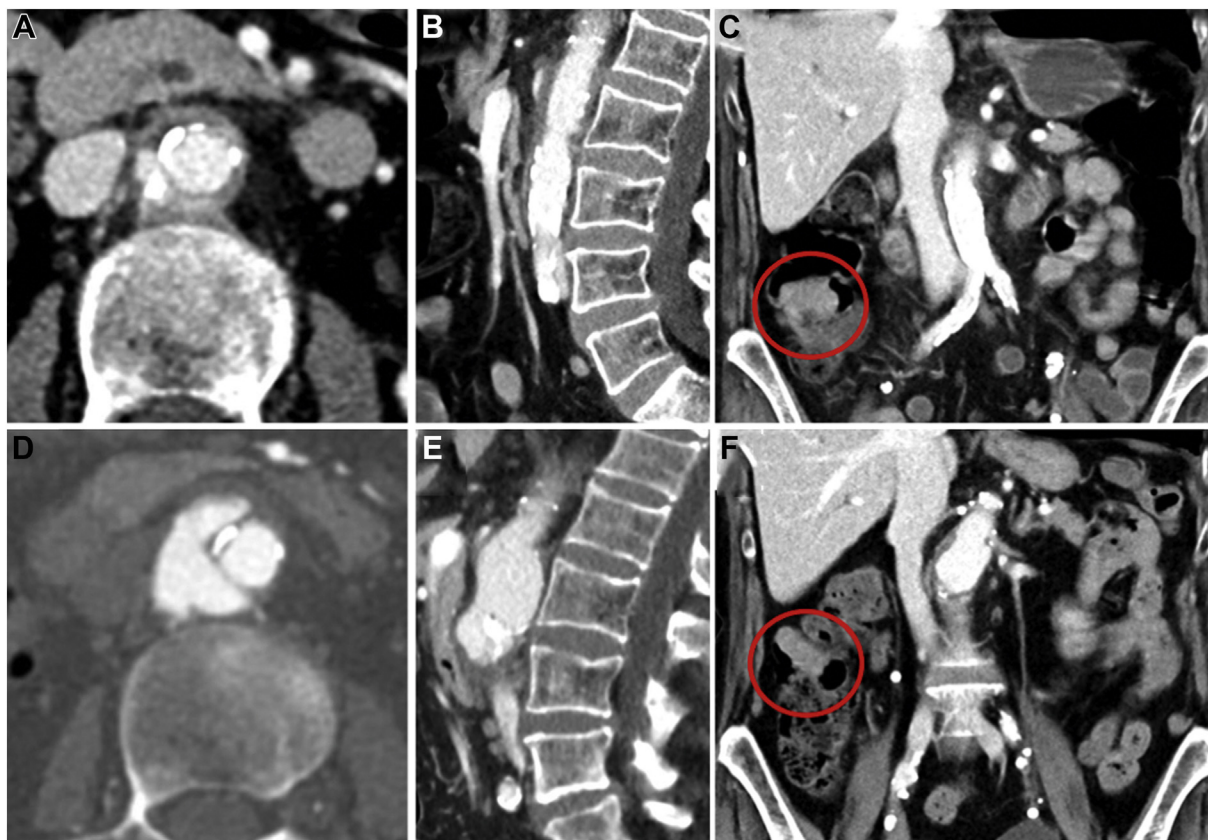


Fig 2. Computed tomography (CT) scans at diagnosis (A-C) and at 3 months of follow-up (D-F). After 3 months of antibiotic treatment, progressive aneurysmatic growth (+12 mm) of the juxtarenal aorta was found with a wide penetrating ulcer and dissection of the outermost vessel layers at a craniocaudal expansion of 5 cm. The tumorous structure in the right colon is highlighted with red circles (C and F).

extensive open abdominal surgery and might be not suitable for an endovascular approach (eg, anatomic situation) at admission as a bridge-to-surgery concept to improve the patient's general status. In addition, for some patients, the feasibility of sufficient vessel anastomosis might be eased by prior antibiotic treatment by minimizing the acute aortic wall inflammation.

Regarding the technical feasibility, our case has revealed several pitfalls in the suitability of a potential curative approach. OAR was considered to have a high probability of resulting in perioperative death because of the patient's general and cardiac condition, which was considered not sufficiently robust enough for aortic repair, with the need for infradiaphragmatic clamping and a high risk of insecure suturing owing to the vulnerable inflammatory aortic wall for proximal anastomosis. However, OAR would have been the treatment of choice for our patient and, therefore, was offered, acknowledging the increased perioperative risk. However, any interventional approach was rejected by the patient. Anatomically, the process was located in the juxtarenal aorta, with expansion from the left renal artery to the inferior mesenteric artery, making sufficient infrarenal

clamping difficult and causing longer ischemic times of the viscera, especially the kidney.

Given this anatomic situation (Fig 1), the potential for EVAR as a salvage regimen would have required a four-fold fenestrated stent, with the need for an additional surgical conduit to access the pelvic area because of the calcified stenosing pelvic axis of both and the chronic dissection membrane of the left common iliac artery. Alternatively, an endobronchial prosthesis with a thoracic proximal landing area could have been used. Nevertheless, EVAR carries a high risk of stent graft infection, making this technique a rather experimental approach for *C. septicum* aortitis. To date, long-term survival (>1 year) after EVAR was achieved for two patients.^{14,18} Future studies are needed to address the use of EVAR as definitive treatment or a bridge to definitive open surgery for *C. septicum* aortitis because no sufficient long-term data are available on this topic.

CONCLUSIONS

OAR should be offered to all patients with *C. septicum* aortitis fit for surgery after a careful interdisciplinary evaluation. EVAR might be a treatment option for selected

patients, although only a few data are available to support this treatment approach for patients with *C. septicum aortitis*. However, it should be the decision of the patient and, if appropriate, the patient's family, with consideration of the potential perioperative morbidity and mortality (90-day mortality, 30%) of high-risk OAR against the possibility of long-term survival (25%-50%). However, severe suffering from symptoms is not expected until death results from aortic rupture, which, to date, has occurred in all patients receiving conservative treatment only within the first year.

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CARE Checklist of Information to include when writing a case report			Reported on Line
Topic	Item	Checklist item description	
Title	1	The diagnosis or intervention of primary focus followed by the words "case report"	p. 1, L 1-2
Key Words	2	2 to 5 key words that identify diagnoses or interventions in this case report, including "case report"	p. 2, L 12-15
Abstract (no references)	3a	Introduction: What is unique about this case and what does it add to the scientific literature?	p. 2, L 4-5
	3b	Main symptoms and/or important clinical findings	X
	3c	The main diagnoses, therapeutic interventions, and outcomes	p. 2, L 4-7
	3d	Conclusion—What is the main "take-away" lesson(s) from this case?	p. 2, L 7-10
Introduction	4	One or two paragraphs summarizing why this case is unique (may include references)	p. 3, L 7-8; p. 3, L 11-12
Patient Information	5a	De-identified patient specific information	p. 3, L 16-18
	5b	Primary concerns and symptoms of the patient	p. 3, L 17-19
	5c	Medical, family, and psycho-social history including relevant genetic information	p. 3, L 16-18
	5d	Relevant past interventions with outcomes	n.a.
Clinical Findings	6	Describe significant physical examination (PE) and important clinical findings.	p. 3, L 18-24
Timeline	7	Historical and current information from this episode of care organized as a timeline	p. 3, L 21-24
Diagnostic Assessment	8a	Diagnostic testing (such as PE, laboratory testing, imaging, surveys).	p. 3, L 18-24
	8b	Diagnostic challenges (such as access to testing, financial, or cultural)	n.a.
	8c	Diagnosis (including other diagnoses considered)	p. 3, L 24
	8d	Prognosis (such as staging in oncology) where applicable	p. 4, L 1; p. 5, L 14-17
Therapeutic Intervention	9a	Types of therapeutic intervention (such as pharmacologic, surgical, preventive, self-care)	p. 3, L 21-22
	9b	Administration of therapeutic intervention (such as dosage, strength, duration)	p. 3, L 21-22
	9c	Changes in therapeutic intervention (with rationale)	p. 4, L 11-17
Follow-up and Outcomes	10a	Clinician and patient-assessed outcomes (if available)	p. 5, L 1-4; X
	10b	Important follow-up diagnostic and other test results	p. 4, L 21-24
	10c	Intervention adherence and tolerability (How was this assessed?)	n.a.
	10d	Adverse and unanticipated events	n.a.
Discussion	11a	A scientific discussion of the strengths AND limitations associated with this case report	p. 5, L 18-23
	11b	Discussion of the relevant medical literature with references.	p. 5, L 12-17
	11c	The scientific rationale for any conclusions (including assessment of possible causes)	p. 5, L 7-17
	11d	The primary "take-away" lessons of this case report (without references) in a one paragraph conclusion	p. 6, L 23-24; p. 7, L 1-3
Patient Perspective	12	The patient should share their perspective in one to two paragraphs on the treatment(s) they received	X
Informed Consent	13	Did the patient give informed consent? Please provide if requested	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>

X | was removed on behalf of the editor of the scientific journal
 n.a. | not applicable

Supplementary Fig. CARE checklist of information to include when writing a case report.