Salmonella Bacteremia Causing Mycotic Pseudoaneurysm of Right Common Iliac Artery Complicated by Septic Caval Thrombosis

Sinduja Sivaramalingam1 Dillibabu Ethiraj2 Sripriya Srinivas1 Srinivasan Kalyanasundaram3 Subha Sundaramoorthy4 Madhu Bashini M.5

1 Department of Radiology, Dr. Rela Institute and Medical Centre, Chennai, Tamil Nadu, India
2 Department of Radio-diagnosis, Vardhman Mahavir Medical College and Safdarjung Hospital, New Delhi, India
3 Department of Radio-Diagnosis, Dr. Rela Institute and Medical Centre, Chennai, Tamil Nadu, India
4 Department of Microbiology, Dr. Rela Institute & Medical Centre, Chennai, Tamil Nadu, India
5 Department of Internal Medicine, Chettinad Hospital, Chennai, Tamil Nadu, India

Address for correspondence Srinivasan Kalyanasundaram, MD, PDCC, EDiR, Department of Radio-Diagnosis, Dr. Rela Institute and Medical Centre, 7 Works Road, Chromepet, Chennai, Tamil Nadu, 600044, India (e-mail: srinivasan.k@relainstitute.com).

Abstract
Mycotic pseudoaneurysm (MPA) is a blind, saccular outpouching of the arterial lumen of infective origin. MPA is a rare life-threatening condition and if not treated early, has a 67% mortality rate due to sepsis and hemorrhage. Major predisposing factors are diabetes mellitus, chronic renal failure, malignancy, steroids, and intravenous drug use. Imaging modalities include Doppler ultrasound, contrast-enhanced computed tomography, and digital subtraction angiography. We report a unique case of Salmonella bacteremia-related MPA of the right common iliac artery complicated by septic inferior vena cava (IVC) thrombosis in a patient with uncontrolled diabetes. Such trans-compartmental involvement of IVC has hitherto not been described in the literature and hence makes for interesting documentation. This case ponders upon the aggressiveness of the invasive nontyphoidal Salmonella infection pathogen and the need for early imaging of suspicious patients to reduce morbidity and mortality.

Keywords
► pseudoaneurysm
► thrombosis
► computed tomography

Introduction
Mycotic pseudoaneurysm (MPA) is a rare life-threatening condition with potential complications like sepsis, aneurysmal rupture, and death.1 Contrast-enhanced computed tomography (CECT) plays a crucial role in its early diagnosis.1 We report a unique case of common iliac artery (CIA) MPA with hitherto undescribed complication of septic inferior vena cava (IVC) thrombosis. This case ponders upon the unusual pathogenesis of IVC thrombus, aggressiveness of the pathogen, and the need for early imaging to reduce morbidity and mortality. We also highlight two specific imaging findings of septic thrombus, namely, “enhancing venous wall sign” and “thrombus with air inclusion sign” not reported in literature till date.
Case History

A 66-year-old male was admitted to our emergency department with recurrent low-grade fever for 20 days in addition to bilateral leg swelling, progressive generalized weakness, and loss of appetite. A known diabetic on oral hypoglycemic drugs, he was initially treated with antibiotics at a primary care hospital. Upon admission, he had mild pyrexia (temperature 100.2°F), tachycardia (102 beats per minute), hypotension (blood pressure of 89/50 mm Hg), and pallor. His initial blood workup showed hemoglobin of 9.4 g/dL, sodium: 122 mmol/L, potassium: 4.3 mmol/L, urea: 84 mg/dL, and creatinine: 1.6 mg/dL. The preliminary ultrasonography was not contributory. The plain CT abdomen showed a large, retroperitoneal collection with air foci at the level of aortic bifurcation and around the proximal common iliac vessels. Erosion of the IVC walls with luminal extension of air foci was evident even on plain CT. The CECT confirmed a large complex MPA arising from the proximal right CIA (RCIA) with a contained leak. The aneurysm and the associated inflammatory changes clearly eroded the adjacent caval walls with significant wall thickening and enhancement—representing phlebitis. A mixture of air and thrombus is seen completely filling and distending the long column of infrarenal IVC—indicating septic thrombosis within (Fig. 1A–D). Paravertebral, psoas muscle abscesses, and early abdominal wall collateral veins were also visualized. Note is made on atherosclerotic plaques in the aorta and common iliac arteries.

Emergency opinion of the vascular surgery team was in favor of open debridement, aneurysm repair, and vascular reconstruction. As the patient refused major surgery, he was managed conservatively with broad-spectrum antibiotics (piperacillin/tazobactam), heparin and insulin. The blood cultures grew *Salmonella enterica*. The postulated pathogenesis is Salmonella bacteremia-induced seeding of the atherosclerotic plaques in CIA causing arteritis and pseudoaneurysm formation. Secondary retroperitoneal suppuration and IVC erosion resulted in iliac arteriocaval fistulization and septic caval thrombosis. The repeat CECT done 2 days later, on account of further hemodynamic deterioration showed (Fig. 2A–C) dramatic interval increase in size of MPA with multiple new daughter blebs suggestive of increase in contained leak. Emergency endovascular stenting of RCIA (Fig. 3A) was done, following which the patient’s condition stabilized and he made a gradual recovery. The check CT during discharge showed disease regression (Fig. 3B).
Caval thrombosis is treated by thrombolysis, thrombectomy, or segmental excision.\textsuperscript{5–7} Advances in surgical and endovascular techniques with concomitant medical therapy have significantly reduced the mortality associated with iNTS infections.

**Conclusion**

In Salmonella bacteremia with hemodynamic instability, early CECT is recommended to rule out MPA and its associated complications. In addition to other novel sites described in literature like cerebral veins and saphenous vein, we add transcompartmental involvement of the IVC with septic thrombophlebitis as one another unique complication.\textsuperscript{8,9}

**Ethical Approval (Animals)**

This article does not contain any studies with animals performed by any of the author(s).

**Ethical Approval**

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

**Informed Consent**

Informed consent was obtained from individual participant included in the study.

**Authors’ Contributions**

Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work: S.S., D.E., S.R.S., S.K., S.S.M., M.B.M. Drafting the work or revising it critically for important intellectual content: S.S., D.E., S.R.S., S.K., S.S.M., M.B.M. Final approval of the version to be published: S.S., D.E., S.R.S., S.K., S.S.M., M.B.M. Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved: S.S., D.E., S.R.S., S.K., S.S.M., M.B.M.

**Funding**

None.

**Conflict of Interest**

Authors declare that they have no conflict of interest.

**References**

4 Gal-Mor O, Boyle EC, Grassl GA. Same species, different diseases: how and why typhoidal and non-typhoidal Salmonella enterica serovars differ. Front Microbiol 2014;5:391