Type of Article: Case Report

Title: Infected Abdominal Aortic Aneurysm with Variable Clinical Presentations: A Case Series

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Clinical Question Box

What is the optimal diagnostic and therapeutic approach for infected abdominal aortic aneurysms?

Infected abdominal aortic aneurysms present with variable clinical features and may have negative blood cultures. Contrast-enhanced CT is essential for diagnosis. Definitive treatment requires antimicrobial therapy and surgical excision of infected tissue, with open repair providing reliable source control. Adjunctive measures such as antibiotic-treated grafts and omental implantation may reduce reinfection risk, and postoperative antibiotics should be tailored to clinical and laboratory findings.

Abstract

Infected abdominal aortic aneurysm (AAA) is a rare but life-threatening condition requiring prompt diagnosis and aggressive management. We report three cases of infected infrarenal AAA treated with open surgical repair. The patients, aged 47–79 years, presented with variable clinical features, including localized pain, systemic inflammatory response, and rapid aneurysmal enlargement. Blood cultures were positive in two cases, while one case showed negative cultures despite clear radiologic and intraoperative evidence of infection. Contrast-enhanced computed tomography was crucial for diagnosis, revealing irregular aneurysm morphology, intramural gas, marked aortic wall enhancement, or rapid expansion. All patients underwent complete aneurysm resection with prosthetic Y-graft replacement using locally treated grafts, omental implantation, and perioperative antimicrobial therapy. One patient underwent endovascular aneurysm repair as a bridging procedure prior to definitive open surgery. No perioperative mortality, graft infection, or major complications occurred. These cases highlight the importance of open surgical repair with aggressive source control, adjunctive local anti-infective measures, and appropriate antimicrobial therapy to achieve favorable early outcomes in infected AAA.

Keywords: Infected abdominal aortic aneurysm; Open surgery; Treatment strategy; Case

report

Introduction

Infected abdominal aortic aneurysm (AAA), often categorized as an infective or mycotic aortic aneurysm,[1] is a rare but highly lethal condition, accounting for approximately 0.7%–3% of all aortic aneurysms.[2] Despite its low incidence, reported mortality remains substantial from 21% to 44%, and infected AAA contributes disproportionately to urgent surgical admissions and intensive inpatient care.[3,4] Definitive management requires prompt antimicrobial therapy and surgical source control with excision of infected tissue and arterial reconstruction.[5] Although endovascular approaches are increasingly used, open repair remains essential in cases of extensive infection, despite ongoing controversy regarding prosthetic reconstruction in contaminated fields. Adjunctive strategies, including antibiotic-treated grafts and coverage with well-vascularized tissue such as omental implantation, are commonly employed to reduce reinfection risk.[6] Here, we report three cases of infected AAA treated with open revascularization, complete aneurysm resection, prosthetic graft reconstruction with local anti-infective treatment, omental implantation, and perioperative antimicrobial therapy.

Case presentation

Case 1

A 47-year-old man presented with left knee pain and swelling without fever and initially visited a local hospital. Laboratory evaluation revealed marked inflammatory responses, with a white blood cell (WBC) count of 22,590/μL and C-reactive protein (CRP) level of 20.57 mg/dL. Renal function was preserved with serum creatinine of 0.97 mg/dL; Blood cultures were positive for *Enterococcus faecalis*. Contrast-enhanced computed tomography (CT) demonstrated a 25-mm AAA with an irregular morphology (Fig. 1A, B), raising suspicion for an infected AAA. The patient was therefore referred to our institution.

Antimicrobial therapy was initiated and continued for two weeks, during which no recurrence of fever was observed. However, follow-up CT showed aneurysm enlargement to 30 mm with evidence of impending rupture into the inferior vena cava (Fig. 1C, D). The patient subsequently underwent open Y-graft replacement with complete aneurysm resection and omental implantation (Fig. 1E, F). A prosthetic graft (J-Graft 18/11/11 mm; Japan Lifeline Co., Ltd., Tokyo, Japan) was soaked in rifampicin for 30 minutes prior to implantation. Although cultures of the aneurysm wall were negative, antimicrobial therapy was continued for four weeks postoperatively. The postoperative

course was uneventful, and the patient was discharged without complications.

Case 2

A 79-year-old man presented with generalized body pain of one week's duration. Laboratory testing revealed severe inflammatory responses, with a WBC count of 29,850/μL and CRP level of 44.74 mg/dL, along with impaired renal function with serum creatinine of 1.70 mg/dL. Blood cultures were positive for *Staphylococcus pyogenes*. Contrast-enhanced CT identified a 64 × 58-mm infrarenal AAA containing intramural gas, suggestive of infection (Fig. 2A, B).

Endovascular aneurysm repair (EVAR) was initially performed to prevent imminent rupture, followed by continued antimicrobial therapy for two weeks (Fig. 2C, D). Inflammatory markers improved substantially (WBC 8,040/μL; CRP 6.13 mg/dL). Definitive open surgery was subsequently undertaken, consisting of Y-graft replacement with complete aneurysm resection and omental implantation (Fig. 2E–H). A rifampicin-soaked prosthetic graft (J-Graft 18/9/9 mm; Japan Lifeline Co., Ltd.) was used. Intraoperatively, a large amount of purulent material was observed, and cultures from the aneurysm wall were positive. Antimicrobial therapy was continued for 12 days postoperatively. The patient's postoperative course was favorable, with no complications.

Case 3

A 69-year-old man with a history of coronary artery bypass grafting (left internal thoracic artery to the left anterior descending artery; right gastroepiploic artery to the posterior descending and atrioventricular branches) two years earlier presented with sudden loss of consciousness and fever of 37.8 °C. Contrast-enhanced CT revealed rapid enlargement of an infrarenal abdominal aortic aneurysm (AAA) from 31 mm to 62 mm with marked aortic wall enhancement (Fig. 3A–C). Laboratory findings showed elevated inflammatory markers (WBC 14,610/μL; CRP 16.05 mg/dL) with preserved renal function (serum creatinine 1.03 mg/dL). Blood cultures were negative.

Given the rapid aneurysm expansion and high rupture risk, emergent open repair was performed with complete aneurysm resection, Y-graft replacement, and omental implantation (Fig. 3D, E). A pyoctanine-treated prosthetic graft (J-Graft 18/9/9 mm; Japan Lifeline Co., Ltd.) was used. Cultures from the aneurysm wall were positive, and postoperative antimicrobial therapy was administered for two weeks. The postoperative course was uneventful, and the patient was discharged without complications. The patient was followed approximately every three months, and annually thereafter as previous patients.

Discussion

Current recommendations for the diagnosis and management of aortic infections are largely based on expert consensus, as high-quality randomized evidence is limited. Widely used frameworks and guidelines, including the MAGIC criteria and the European Society for Vascular Surgery (ESVS) guidelines,[7,8] were developed through structured consensus methods such as the Delphi process, providing practical guidance in areas where robust clinical trials are not feasible. The present case series highlights the heterogeneous clinical presentations, microbiological findings, and surgical strategies associated with infected AAA, while reinforcing the importance of aggressive source control combined with appropriate antimicrobial therapy. Consistent with previous reports, the three patients in this series demonstrated variable clinical features, ranging from localized pain without fever to systemic inflammatory response and hemodynamic instability.[9,10] Notably, blood cultures were positive in two cases but negative in one, underscoring that negative blood cultures do not exclude the diagnosis of infected AAA.[11]

In all cases, contrast-enhanced CT played a central role in diagnosis by demonstrating characteristic findings such as irregular aneurysm morphology, rapid aneurysmal enlargement, intramural gas, and marked aortic wall enhancement.[12] These imaging features, in conjunction with inflammatory markers and clinical presentation,

were critical in guiding timely intervention.[13] FDG-PET/CT is increasingly recognized as a useful adjunctive imaging modality in the diagnosis of infected aortic aneurysms and aortic graft infections.[14] By detecting metabolically active inflammatory or infectious tissue, it can improve diagnostic confidence when conventional contrast-enhanced CT findings are equivocal, and it is included as an imaging criterion within the MAGIC framework. However, despite its clinical value, FDG-PET/CT for suspected aortic infection is generally not covered by the Japanese national health insurance system, except for limited indications such as confirmed large-vessel vasculitis, which may restrict its routine use in clinical practice.

All patients in this series ultimately underwent open surgical repair with complete aneurysm resection, reflecting the continued importance of open surgery in cases of extensive infection or high rupture risk. Although EVAR has been increasingly utilized as a less invasive option, concerns remain regarding persistent infection due to incomplete source control.[8] In Case 2, EVAR was employed as a bridge to surgery to stabilize the patient and reduce rupture risk, allowing optimization of inflammatory status prior to definitive open repair. In general, EVAR was selected as a bridge strategy for patients in poor overall condition and at high risk of rupture, for whom immediate open repair was considered too hazardous.

Reconstruction in an infected field remains controversial, particularly when prosthetic grafts are used. In this series, all patients underwent prosthetic graft replacement with adjunctive local anti-infective measures, including rifampicin- or pyoctanine-treated grafts and omental implantation.[15] These strategies aim to reduce bacterial colonization and enhance local immune defense. Omental implantation, in particular, provides well-vascularized tissue coverage and has been widely adopted to decrease the risk of graft infection and reinfection.[16] The absence of postoperative infectious complications in all three patients supports the effectiveness of this combined approach.

The duration of antimicrobial therapy varied among the cases, reflecting differences in microbiological findings and clinical response. Although no consensus exists regarding the optimal duration of postoperative antibiotics, continued therapy tailored to culture results and inflammatory markers remains essential.[17] When complete excision of infected tissue was achieved and postoperative laboratory markers indicated adequate infection control, antibiotics were generally discontinued after approximately two weeks. Notably, all patients demonstrated favorable early outcomes, with no perioperative mortality or major complications.

This case series is limited by its small sample size and short-term follow-up;

however, it illustrates practical decision-making in real-world clinical settings. Our experience suggests that prompt recognition, aggressive surgical source control, use of locally treated prosthetic grafts, omental coverage, and individualized antimicrobial therapy can result in satisfactory early outcomes, even in complex and high-risk presentations.

Conclusion

Infected abdominal aortic aneurysm is a rare and life-threatening condition requiring prompt diagnosis and aggressive treatment. Open surgical repair with complete aneurysm resection, adjunctive local anti-infective measures, omental implantation, and appropriate antimicrobial therapy can achieve favorable early outcomes.

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Data Availability Statement: The datasets used in the current study are available from the corresponding author upon reasonable request.

Generative AI Declaration

During the preparation of this manuscript, the authors used OpenAI to assist with proofreading. All content was subsequently reviewed and edited by the authors, who assume full responsibility for the accuracy and integrity of the published work.

Ethical Statement: This study did not involve the participation of any animals. Informed consent was obtained from all patients. Institutional Review Board approval was waived because this was a case report.

Conflict of Interest: The authors report no conflicts of interest in this work.

References

1. Wu S, Yan J, Kang Z, Zhang J. Clinical and computed tomography angiography characteristics of infected vs. non-infected abdominal aortic aneurysm: a comparative study. *Abdom Radiol (NY)*. Dec 2024;49(12):4334-4340. doi:10.1007/s00261-024-04312-w

2. Huang YK, Chen CL, Lu MS, et al. Clinical, microbiologic, and outcome analysis of mycotic aortic aneurysm: the role of endovascular repair. *Surg Infect (Larchmt)*. Jun 2014;15(3):290-8. doi:10.1089/sur.2013.011

3. Shinya N, Seki M, Karaushi H, Asakura T, Yoshitake A, Mitsutake K. Infective native aortic and iliac artery aneurysms: Clinical profiles and short-term outcomes from a single-center cohort. *Journal of Infection and Chemotherapy*. 2025;31(4)doi:10.1016/j.jiac.2025.102644

4. Premnath S, Zaver V, Hostalery A, Rowlands T, Quarmby J, Singh S. Mycotic Abdominal Aortic Aneurysms – A Tertiary Centre Experience and Formulation of a Management Protocol. *Annals of Vascular Surgery*. 2021/07/01/ 2021;74:246-257. doi:https://doi.org/10.1016/j.avsg.2020.12.025

5. Hirano K, Tokui T, Nakamura B, et al. Hybrid Therapy for Mycotic Aortic Aneurysm with Stent-Graft and Video-Assisted Thoracoscopic Debridement. *Ann Vasc Dis*. Mar 25 2019;12(1):69-73. doi:10.3400/avd.cr.18-00119

6. Caradu C, Jolivet B, Puges M, Cazanave C, Ducasse E, Berard X. Reconstruction of primary and secondary aortic infections with an antimicrobial graft. *Journal of Vascular Surgery*. 2023;77(4):1226-1237.e10. doi:10.1016/j.jvs.2022.11.065

7. Lyons OT, Baguneid M, Barwick TD, et al. Diagnosis of Aortic Graft Infection: A Case Definition by the Management of Aortic Graft Infection Collaboration (MAGIC). *Eur J Vasc Endovasc Surg*. Dec 2016;52(6):758-763. doi:10.1016/j.ejvs.2016.09.007

8. Committee EG, Document R, Wanhainen A, et al. Editor's Choice -European Society for Vascular Surgery 2024 Clinical Practice Guidelines on the Management of Abdominal Aorto-Iliac Artery Aneurysms. *European Journal of Vascular and Endovascular Surgery*. 2024;67(2):192-331. doi:10.1016/j.ejvs.2023.11.002

9. Matsui K, Takahashi K, Tashiro M, et al. Clinical and microbiological characteristics and challenges in diagnosing infected aneurysm: a retrospective observational study from a single center in Japan. *BMC Infectious Diseases*. 2022/06/30 2022;22(1):585. doi:10.1186/s12879-022-07567-0

10. Gonzalez-Urquijo M, Salgado-Garza G, Martin AM, et al. Infective native visceral artery aneurysm (INVAA): A systematic review of etiology, treatment, and outcomes. *Vascular Medicine*. 2025/08/01 2025;30(4):510-521. doi:10.1177/1358863X251326537

11. Dang Q, Statius van Eps RG, Wever JJ, et al. Nationwide study of the treatment of mycotic abdominal aortic aneurysms comparing open and endovascular repair in The Netherlands. *Journal of Vascular Surgery*. 2020/08/01/ 2020;72(2):531-540. doi:https://doi.org/10.1016/j.jvs.2019.09.060

12. Zhang N, Xiong W, Li Y, et al. Imaging features of mycotic aortic aneurysms. *Quant Imaging Med Surg*. Jun 2021;11(6):2861-2878. doi:10.21037/qims-20-941

13. Jutidamrongphan W, Kritpracha B, Sörelius K, Hongsakul K, Suwannanon R. Features of infective native aortic aneurysms on computed tomography. *Insights into Imaging*. 2022/01/08 2022;13(1):2. doi:10.1186/s13244-021-01135-x

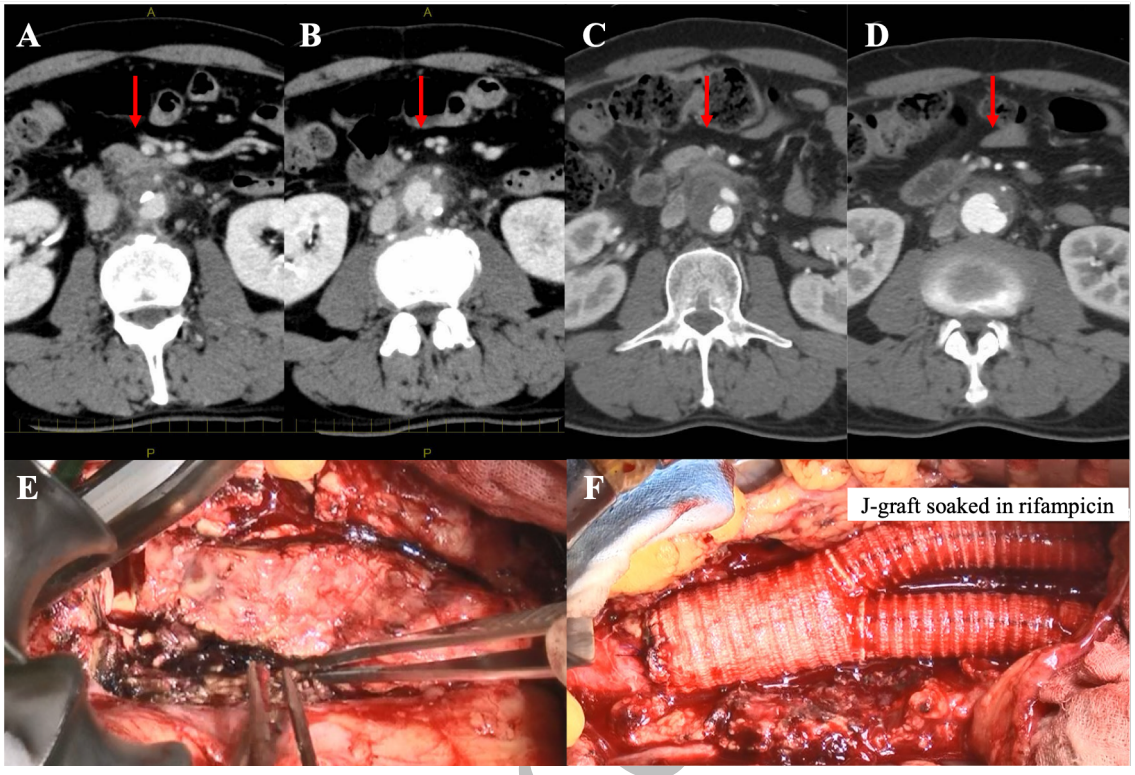
14. Badarna M, Keidar Z, Arnon-Sheleg E. FDG PET/CT in vascular graft infection: a pictorial review. *Q J Nucl Med Mol Imaging*. Mar 2025;69(1):61-68. doi:10.23736/s1824-4785.25.03612-x

15. Colacchio EC, D'Oria M, Grando B, et al. A Systematic Review of In-situ Aortic Reconstructions for Abdominal Aortic Graft and Endograft Infections: Outcomes of Currently Available Options for Surgical Replacement. *Annals of Vascular Surgery*. 2023;95:307-316. doi:10.1016/j.avsg.2023.03.005

16. Yamanaka K, Okada K, Kato D, et al. Long-term outcomes and evolving trends in thoracic aortic infections: A 25-year, single-center study in Japan. *JTCVS Open*. Dec 2025;28:1-12. doi:10.1016/j.xjon.2025.10.004

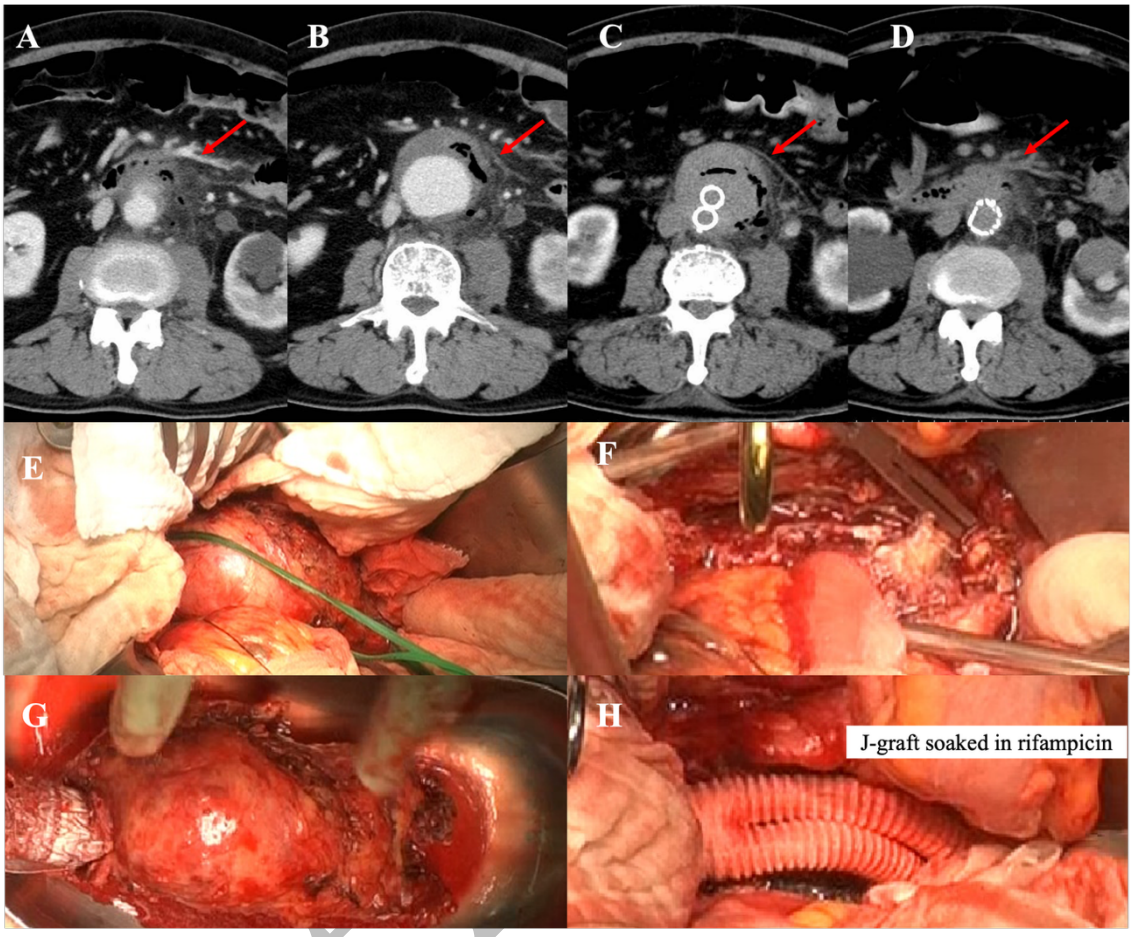
17. Wu S-J, Sun S, Tan Y-H, Chien C-Y. Analysis of antibiotic strategies to prevent vascular graft or endograft infection after surgical treatment for infective native aortic aneurysms: a systematic review. *Antimicrobial Resistance & Infection Control*. 2024/10/01 2024;13(1):116. doi:10.1186/s13756-024-01477-3

Figure. 1. Infected abdominal aortic aneurysm with rupture



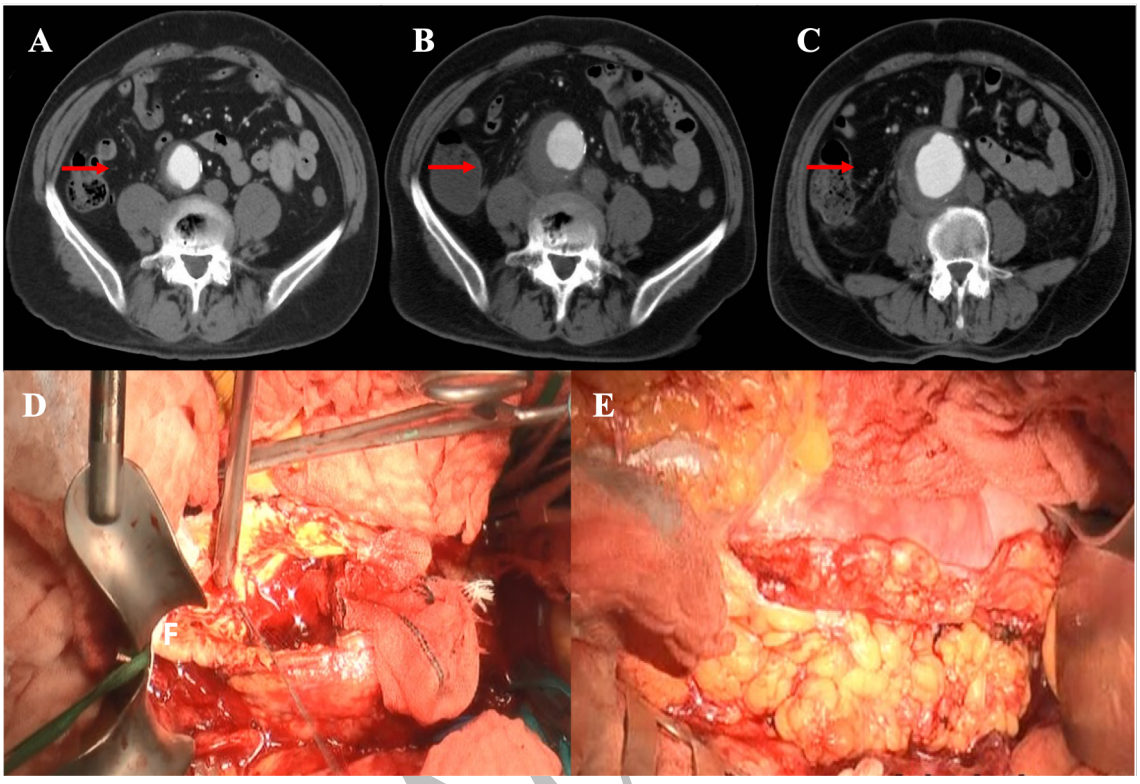
A, B: Contrast-enhanced CT showed a 25-mm abdominal aortic aneurysm with an irregular shape; C, D: Follow-up CT after 2 weeks of antibiotic therapy showed enlargement of the aneurysm to 30 mm with suspected rupture into the inferior vena cava; E, F: Intraoperative findings showed Y-graft replacement with aneurysm resection and omental implantation.

Figure. 2. Infected abdominal aortic aneurysm treated with EVAR and open repair



A, B: Contrast-enhanced CT showed a 64 × 58-mm infrarenal abdominal aortic aneurysm with intramural air; C, D: Post-EVAR imaging showed successful exclusion of the aneurysm; E–H: Intraoperative findings showed Y-graft replacement and omental implantation using a rifampicin-soaked graft.

Figure. 3. Acute enlargement of infected abdominal aortic aneurysm



A–C: Contrast-enhanced CT showed rapid enlargement of the abdominal aortic aneurysm from 31 mm to 62 mm with marked aortic wall enhancement; D, E: Operative findings showed Y-graft replacement with aneurysm resection and omental implantation using a pyoctanine-treated graft.