

Case Report: Cecal Perforation along with Pneumoperitoneum and Multi-Drug Resistant Sepsis and Septic Shock

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ABSTRACT: This report describes the clinical presentation and management of a 71-year-old female with a 10–15 year history of hypertension who presented with cecal perforation and diffuse pneumoperitonitis, complicated by multi-drug resistant (MDR) sepsis. The patient's clinical course was defined by severe, refractory sepsis and septic shock. Microbiological analysis of peritoneal pus, wound swabs, and blood cultures identified *E. coli*, *K. pneumoniae*, and *P. aeruginosa*, all demonstrating broad resistance to key agents, including most cephalosporins, aminoglycosides, fluoroquinolones, and β -lactams. This condition triggered a cascade of systemic complications, including Acute Kidney Injury (AKI), Disseminated Intravascular Coagulation (DIC), Right Axillary Vein Thrombosis, Right Diaphragm Palsy, non-critical Coronary Artery Disease (CAD), and Multinodular Goitre. This case illustrates the high fatality rate of cecal perforation when the clinical course is complicated by refractory sepsis and multi-drug resistant organisms. The case underscores the severe difficulties inherent in the management of cecal perforation when the patient presents with concurrent sepsis and infection by multiple antibiotic-resistant pathogens.

KEYWORDS: Cecal Perforation, Multiple Antimicrobial Resistance, Pneumoperitonium, Sepsis.

I. INTRODUCTION

Multiple antibiotic resistance (MAR) is a critical public health issue in India, driven by multidrug-resistant (MDR) Gram-negative bacteria like *Escherichia coli* and *Klebsiella pneumoniae*. Surveillance consistently reports high resistance to broad-spectrum antibiotics, including third-generation cephalosporins, fluoroquinolones, and last-resort carbapenems¹⁻³.

Recent data reveals alarming resistance levels in healthcare settings. A 2025 meta-analysis on nosocomial *K. pneumoniae* in India reported 34.37%

resistance between 2011 and 2023. A 2024 South Indian study noted carbapenem resistance in *Klebsiella pneumoniae* at 38.6%, with a peak of 51.9% in early 2023. *E. coli*, a primary cause of urinary tract infections, also demonstrates high MDR rates; a 2022 Gujarat study reported 48.3% MDR and over 70% resistance to third-generation cephalosporins^{1,2}.

The emergence of powerful resistance genes, such as NDM and OXA-48, severely compromises treatment efficacy and patient outcomes^{3,4,7}.

This resistance often results in the failure of empirical antibiotic therapy for sepsis.

Delays in administering appropriate antibiotics—often occurring when first-line medications fail—allow resistant isolates to flourish. This leads to severe infections associated with high mortality in Intensive Care Units, prolonged hospital stays, and

exorbitant treatment costs, which strain the quality and affordability of healthcare across the country. Robust infection prevention and strict antibiotic stewardship are essential to combat this growing emergency^{3,4,7}.

Cecal perforation is a life-threatening surgical emergency characterized by a breach in the cecal wall. This allows gas and highly contaminated fecal matter to enter the sterile peritoneal cavity, causing pneumoperitoneum (free air in the abdominal cavity) and severe fecal peritonitis. In India, cecal perforations account for only 2% to 4.5% of all gastrointestinal perforations^{5,6}.

Epidemiologically, there is a male preponderance, with females comprising only 20% to 24% of cases. A significant clinical challenge is delayed presentation, as over 50% of

patients arrive at healthcare facilities more than 24 hours after symptom onset. This delay facilitates a rapid decline into septic shock. Consequently, the

case fatality rate for large bowel perforations in women can reach up to 25%, necessitating aggressive surgical intervention to ensure patient survival^{5,6}.

II. CASE PRESENTATION

A 71-year-old woman came in with a long history of high blood pressure—she'd been dealing with it for at least a decade. She complained of feeling really weak over the past two days, barely eating, having trouble controlling her bladder, body aches, diarrhea, drowsiness, shortness of breath, a racing heart, fast breathing, and a swollen belly. Her first round of tests showed her kidneys weren't working right—her creatinine and potassium were both high. The team started her on IV Lasix, calcium gluconate, a K- Bind sachet, and a 25% dextrose insulin drip to try and get things under control.

She'd already gotten some treatment at a smaller hospital before being transferred to us, and she arrived on a ventilator. She took blood pressure meds regularly and didn't have any known drug allergies. When we checked her, she looked drowsy and needed oxygen. Her blood pressure was 150/90, heart rate at 110, temperature normal. We already knew she had a cecal perforation with a lot of air in her abdomen.

Her CT abdomen and pelvis confirmed the pneumoperitoneum. The chest CT showed a big, odd-looking nodule with calcification in her right thyroid lobe, squeezing and pushing her trachea sideways, and causing part of the right lower lung to collapse. Her chest X-ray showed the right diaphragm was a bit higher than usual, and her upper mediastinum looked wide.

Phase 1: Surgical Intervention & Initial Stabilization (Days 1–3)

The patient underwent a right extended hemicolectomy for cecal perforation. Post-operatively, the patient remained ventilator-dependent.

- Infection Control: Pus culture identified *Escherichia coli*, resistant to multiple antibiotics but sensitive to carbapenems and polymyxins.
- Management: Antibiotics were escalated to IV meropenem and IV metronidazole.
- Day 3: Patient failed a T-piece trial and was placed on CPAP. Metabolic

management included initiation of DNS, insulin, and human albumin.

Phase 2: Respiratory & Thyroid Management (Days 4–7)

- Respiratory Status: Extubated on Day 4 but required Non-Invasive Ventilation (NIV) due to tachycardia.
- Thyroid Management: On Day 7, due to persistent respiratory/compressive symptoms, a thyroidectomy was performed.
- Complications: A bile leak from the right aspirate developed post-thyroidectomy.

Phase 3: Infectious & Vascular Complications (Days 8–12)

- Secondary Infection: On Day 12, the patient developed septic shock, with cultures growing *Klebsiella pneumoniae* and *Candida tropicalis*.
- Vascular: A right upper limb venous Doppler identified axillary vein thrombosis.
- Antibiotic Escalation: Due to multi-drug resistance, treatment was shifted to polymyxin B, tigecycline, and caspofungin.

Phase 4: Cardiac Crisis & Advanced Care (Days 13–17)

- Cardiac Events: On Day 14, the patient suffered a cardiac arrest (ROSC achieved). Elevated troponin (883.9) and CK-MB suggested Acute Coronary Syndrome (ACS) or septic myocarditis.
- Procedures: Tracheostomy performed (Day 14). Coronary angiography (Day 15) revealed non-critical coronary artery disease (LAD Type III plaquing, RCA 50–60% plaquing).
- Support: Managed with noradrenaline and dobutamine.

Phase 5: Terminal Phase (Days 18–23)

- Progression: The patient developed stress-induced cardiomyopathy (Day 20) and worsening sepsis.
- Antibiotic Escalation: Cultures grew *Pseudomonas aeruginosa* (resistant to all but polymyxin B and colistin). Antibiotics changed to Zavicefta and aztreonam.
- Terminal Events: On Day 23, the patient experienced hypotension and bradycardia despite high inotropic support.
- Outcome: Cardiac arrest occurred at 9:30 AM. Per DNR status, no resuscitation was attempted. Patient expired at 9:40 AM.

Table 1: Summary of Laboratory Trends

Day	Hb (g/dl)	WBC (/cu.mm)	Creatinine (mg/dl)	Key Clinical Note
0	14.6	3600	2.81	Admission
1 (Post-Op)	8.8	14900	2.01	Post-Hemicolectomy
2	9.7	29800	1.99	E. Coli Identified
6	9.3	26200	1.99	Stable urine output
12	9.4	9300	0.93	Septic Shock onset
16	10.1	22100	0.75	Angio performed
21	8.9	27200	1.57	Pseudomonas identified
23	7.1	29900	1.58	Expiration

Table 2: Blood Culture Test

Antibiotic	1st culture	2nd culture	3rd culture
Organism	Escherichia coli	Klebsiella pneumoniae	Pseudomonas aeruginosa
Ampicillin	R	NT	NT
Cefazolin	R	R	NT
Cefuroxime	R	R	NT
Ceftazidime	R(MIC=32)	R(MIC>=64)	S(MIC<=0.12)
Ceftriaxone	R	R	NT
Cefotaxime	R	R	NT
Cefixime	R(MIC>=32)	R	NT
Cefepime	R	R(MIC>=32)	S (MIC<=0.12)
Amoxicillin/Clavulanic acid	S	R	NT
Ampicillin/Sulbactam	S	R	NT
Piperacillin/Tazobactam	S(MIC=8)	R	S(MIC<=4)
Cefoperazone/Sulbactam	S(MIC=16)	R(MIC>=128)	S(MIC<=8)
Cefepime/Tazobactam	S	R(MIC>=64)	S
Ticarcillin/Clavulanic acid	S	R	S
Ceftazidime-Avibactam	S	R	S
Co-Trimoxazole	S(MIC<=20)	R(MIC>=320)	NT

Aztreonam	R(MIC \geq 64)	R(MIC \geq 64)	S(MIC \leq 1)
Doripenem	S(MIC \leq 0.25)	R(MIC \geq 16)	S(MIC \leq 0.25)
Ertapenem	S	R	NT
Imipenem	S(MIC \leq 0.25)	R(MIC \geq 16)	S(MIC \leq 0.25)
Meropenem	S(MIC \leq 0.25)	R(MIC \geq 16)	S(MIC \leq 0.25)
Amikacin	S(MIC=2)	R(MIC=32)	S(MIC=16)
Gentamicin	S(MIC \leq 1)	R(MIC \geq 16)	S(MIC \leq 1)
Tobramycin	S	R	S
Ciprofloxacin	R(MIC \geq 4)	R(MIC \geq 4)	S(MIC=0.25)
Levofloxacin	R(MIC \geq 8)	R(MIC \geq 8)	S(MIC=0.5)
Tigecycline	S(MIC \leq 0.5)	R(MIC=16)	NT
Minocycline	R(MIC \geq 32)	R(MIC=4)	NT
Chloramphenicol	S	R	NT
Fosfomycin	S(MIC \leq 16)	R(MIC \geq 256)	S
Colistin or Polymyxin B	I(MIC \leq 0.5)	I(MIC=1)	I (MIC \leq 0.5)

III. DISCUSSION

Cecal perforation is a critical surgical emergency with high mortality, especially in elderly patients with comorbidities. This case details a 71-year-old hypertensive female who presented with cecal perforation, sepsis, and peritonitis. Despite undergoing a right extended hemicolectomy and receiving intensive postoperative care, her recovery was severely complicated by acute kidney injury, respiratory failure, and metabolic instability. The clinical course was further burdened by multidrug-resistant (MDR) and extensively drug-resistant (XDR) infections (*E. coli*, *K. pneumoniae*, *C. tropicalis*, *P. aeruginosa*), necessitating last-resort antimicrobial therapy. Ultimately, she suffered from disseminated intravascular coagulation and stress-induced cardiomyopathy, leading to death. This case underscores the catastrophic impact of antimicrobial resistance in ICU settings and the vital necessity for early diagnosis, strict infection control, and multidisciplinary management to improve outcomes in high-risk geriatric populations.

IV. CONCLUSION

Cecal perforation in elderly patients remains a critical surgical emergency with high morbidity and mortality, particularly when compounded by severe sepsis and multidrug-resistant infections. Although prompt surgical intervention and comprehensive critical care are essential, outcomes are often limited by the rapid progression of infection and the emergence of resistant pathogens. This case illustrates the complex interplay between postoperative sepsis, antimicrobial resistance, and multiorgan dysfunction, emphasizing the importance of early diagnosis, targeted antimicrobial therapy, and vigilant postoperative monitoring. Strengthening antimicrobial stewardship programs, implementing stringent infection control practices, and fostering multidisciplinary collaboration between surgical, intensive care, and microbiology teams are vital to improving prognosis in such high-risk clinical scenarios.

V. CLINICAL SIGNIFICANCE

This case highlights the extreme lethality of cecal perforation in elderly patients when complicated by multidrug-resistant polymicrobial sepsis, despite timely surgical intervention and intensive care. It underscores how antimicrobial resistance can lead to failure of empirical therapy, prolonged septic shock, and progressive multiorgan dysfunction. The report emphasizes the need for early source control, rapid culture-guided escalation to appropriate antibiotics, and robust antimicrobial stewardship to improve outcomes in abdominal sepsis.

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