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ANTIBIOTIC THERAPY IN PANCREATITIS: PRINCIPLES, CLINICAL GUIDELINES, AND MODERN APPROACHES

Rashidov Behzod Bahronovich
Asia International University
behzodrashidov2608@gmail.com
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Abstract

Pancreatitis remains one of the most significant inflammatory disorders of the gastrointestinal system and is associated with substantial morbidity and mortality worldwide. The role of antibiotics in the management of pancreatitis, particularly acute pancreatitis, has been debated extensively over recent decades. This review article evaluates the principles of antibiotic therapy in pancreatitis, indications for antimicrobial administration, current clinical guidelines, microbial spectrum, prophylactic use, therapeutic approaches, and complications associated with irrational antibiotic use. Modern evidence demonstrates that routine prophylactic antibiotics are not universally recommended in sterile pancreatic necrosis; however, targeted antimicrobial therapy is crucial in infected pancreatic necrosis and septic complications.

Introduction

Pancreatitis is an inflammatory condition affecting the pancreas and may present in acute or chronic forms. Acute pancreatitis is characterized by sudden inflammation ranging from mild edematous disease to severe necrotizing pancreatitis accompanied by systemic inflammatory response syndrome, organ failure, and sepsis. Chronic pancreatitis involves progressive inflammatory destruction leading to fibrosis and endocrine or exocrine dysfunction.

Pathophysiology of Infectious Complications

In severe acute pancreatitis, pancreatic tissue necrosis develops due to enzymatic autodigestion, ischemia, and inflammatory mediator release. Necrotic pancreatic tissue serves as an ideal environment for bacterial colonization. Translocation of intestinal bacteria across the intestinal mucosal barrier is considered the primary mechanism of infection. Gram-negative organisms such as Escherichia coli, Klebsiella species, and Pseudomonas aeruginosa are commonly implicated.

Indications for Antibiotic Therapy

Antibiotic therapy in pancreatitis should not be administered routinely in all cases. Contemporary international guidelines emphasize selective and evidence-based administration. Primary indications include infected pancreatic necrosis, pancreatic abscess formation, cholangitis associated with biliary pancreatitis, catheter-related infections, and sepsis.

Antibiotic Selection and Pharmacological Considerations

Appropriate antibiotic selection requires consideration of antimicrobial penetration into pancreatic tissue, microbial spectrum, patient-specific factors, and local resistance patterns. Antibiotics with high pancreatic tissue penetration are preferred. Commonly recommended agents include carbapenems, fluoroquinolones combined with metronidazole, piperacillin-tazobactam, and selected cephalosporins.

Guidelines and Clinical Recommendations

Several professional organizations have published recommendations regarding antibiotic use in pancreatitis, including the American College of Gastroenterology and the World Society of Emergency Surgery. Current recommendations discourage routine prophylactic antibiotics in sterile necrosis and support prompt targeted therapy in infected necrosis.

Complications of Inappropriate Antibiotic Use

Excessive or irrational antibiotic administration is associated with antimicrobial resistance, Clostridioides difficile-associated diarrhea, opportunistic fungal infections, drug toxicity, and disruption of intestinal microbiota. Antimicrobial stewardship programs play an essential role in reducing these complications.

Future Perspectives

Emerging research focuses on precision medicine, biomarker-guided antimicrobial therapy, microbiome modulation, and novel anti-inflammatory agents. Advances in minimally invasive drainage techniques continue to reduce mortality and morbidity associated with infected pancreatic necrosis.

Conclusion

Antibiotic therapy in pancreatitis requires a careful balance between therapeutic benefit and the risks associated with antimicrobial overuse. Current evidence does not support universal prophylactic antibiotics in sterile pancreatic necrosis; however, antibiotics remain indispensable in infected necrosis and systemic infectious complications. Appropriate antimicrobial selection, adherence to evidence-based guidelines, and timely source control are essential for improving patient outcomes.

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