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FATAL OUTCOME OF PERFORATION PERITONITIS DUE TO SEQUENTIAL INFECTION WITH MDR ESCHERICHIA COLI AND XDR SALMONELLA, COMPLICATED BY UNDERLYING INTESTINAL TUBERCULOSIS: CASE REPORT

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ABSTRACT Ileal perforation is a surgical emergency that may rapidly progress to generalized peritonitis, sepsis, and septic shock if left untreated. We report the case of a 37-year-old woman who underwent emergency laparotomy for two ileal perforations. The postoperative course was complicated by sepsis, poor wound healing, and a burst abdomen requiring a second surgery. Microbiological analysis demonstrated MDR Escherichia coli, while Ziehl–Neelsen staining and CBNAAT confirmed tuberculosis. In the second surgery, microbial investigations performed on the pus samples collected identified XDR Salmonella infection. These infections were associated with persistent sepsis, aspiration pneumonia, septic shock, and death.

KEYWORDS : Perforation peritonitis, Multidrug-resistant (MDR) Escherichia coli, extensively drug-resistant (XDR) Salmonella, Intestinal tuberculosis, Polymicrobial infection, antimicrobial resistance

INTRODUCTION

Ileal perforation is a common cause of acute abdomen in developing countries. It is commonly associated with enteric fever, intestinal tuberculosis, and bowel ulceration. Perforation leads to widespread peritonitis and sepsis, which require urgent surgical treatment. Clinical outcomes depend on the severity of contamination, physiological status of the patient, and response to antibiotic therapy. In this case, postoperative microbiological tests suggested intestinal tuberculosis, confirmed by ZN staining Cartridge-Based Nucleic Acid Amplification Test (CBNAAT). This finding raised the possibility of underlying intestinal tuberculosis; however, a direct causal relationship with the perforations could not be confirmed because histopathological examination was unavailable. Later, multidrug-resistant (MDR) Escherichia coli was isolated from pus culture, followed by extensively drug-resistant (XDR) Salmonella. These pathogens may have contributed to persistent postoperative sepsis, wound separation, burst abdomen, and eventually a fatal outcome, despite multiple surgeries and targeted antibiotic therapy. This case underscores the difficulties that arise from undiagnosed tuberculosis and antibiotic-resistant pathogens in postoperative peritonitis. It emphasizes the need for thorough microbiological assessments and continuous culture-based antibiotic management.

HISTORY

A 37-year-old woman attended the emergency room reporting of generalized abdominal pain that had been persisting for some days. Initially, she complained about watery stools that developed into constipation. She developed generalized abdominal distention, anorexia, and progressive abdominal pain. There was no history of any abdominal surgery, tuberculosis, or immunosuppressed status in the past.

On examination patient appeared acutely ill and dehydrated. She had tachycardia and mild hypotension on examination. Physical examination of her abdomen showed generalized distended abdomen with tenderness, rigidity, and decreased bowel sounds. X-ray of erect chest showed presence of free air under the diaphragm (pneumoperitoneum) suggestive of a hollow viscus perforation. She was resuscitated using Intravenous fluids, and broad-spectrum antibiotics were prescribed. Subsequently, the patient underwent emergency laparotomy.

The findings of the emergency exploratory laparotomy showed two holes in the ileum with contamination of the peritoneal cavity of almost 2.5 liters of stool and pus indicating generalized fecal peritonitis. The viability of the bowel in both regions was found to be good. Both perforations were repaired primarily followed by washing of peritoneal cavity with warm saline.

The postoperative period management included administration of broad-spectrum antibiotics and supportive therapy in a high dependency ward. The postoperative course failed to progress as anticipated. Her persistent fever, tachycardia, and abdominal distension persisted while wound examination showed poor healing and continued dehiscence. Several days later, she developed a burst abdomen requiring re-exploration of the wound. Intraoperative pus sample was taken for culture and sensitivity.

During her second surgical procedure after induction of general anaesthesia the patient aspirated stomach contents, leading to oxygen desaturation and cardiovascular instability culminating in intra-operative cardiac arrest. Cardiopulmonary resuscitation was initiated which leads to the restoration of spontaneous circulation after repeated resuscitation efforts. The patient was subsequently admitted to the ICU in an unstable condition on ventilator support.

On admission to the ICU, her condition worsened, and she developed refractory sepsis and metabolic acidosis. Aspiration pneumonia with secondary bacterial infection was diagnosed on clinical finding. She experienced repeated cardiac arrests in addition to multi-organ dysfunction. Despite the aggressive treatment measures instituted including maximum support in form of pressors, mechanical ventilation, and appropriate antimicrobials according to new culture results, she died in less than 48 hours from admission to ICU.

INVESTIGATIONS

Haematology and Biochemistry

Haemogram was significant for the presence of normocytic anemia with leukocytosis with predominantly neutrophils suggesting that it was caused by an acute infection. Renal function tests showed that there was increased blood urea nitrogen levels and slightly raised serum creatinine, pointing to acute kidney injury secondary to sepsis. Arterial blood gases showed persisting metabolic acidosis with decreased serum bicarbonate level with compensatory respiratory alkalosis. Serum electrolyte results showed mild hyponatremia.

Imaging

Chest X-ray with erect position confirmed the presence of pneumoperitoneum and subdiaphragmatic air, proving that hollow viscus perforation is present. Abdominal X-ray showed that the patient had distended bowel loops suggesting ileus. Post-operative radiological investigations in his chest showed consolidation and crepitation consistent with aspiration pneumonia.

Bacteriology

During the first laparotomy, pus was collected from the peritoneal cavity and sent for culture, antibiotic sensitivity testing, as well as Ziehl-Neelsen (ZN) staining for acid-fast bacilli (AFB). Since the patient had no prior history of tuberculosis or anti-tubercular therapy

(ATT), a postoperative diagnosis of tuberculosis was made after ZN staining of the pus sample showed the presence of acid-fast bacilli. The Cartridge-Based Nucleic Acid Amplification Test (CBNAAT) was then used to confirm the diagnosis of tuberculosis. This incidental but clinically relevant finding raised the possibility that the ileal perforations were caused by undetected intestinal TB. The VITEK® 2 automated identification and susceptibility testing system was used for bacterial culture and antibiotic susceptibility testing. Cultures showed growth of Escherichia coli, which exhibited multiple drug resistance. The strain was resistant to penicillin group, cephalosporins, fluoroquinolones, aminoglycoside, and trimethoprim-sulfamethoxazole. It remained sensitive only to carbapenems, tigecycline, and Fosfomycin, but intermediate with colistin.

Following the second surgical procedure, a repeat peritoneal pus sample was sent for culture. Identification and susceptibility testing again were performed using the VITEK® 2 system. After the second surgery, another peritoneal pus culture revealed extensive drug-resistant Salmonella spp. The organism showed resistance to Penicillin, piperacillin/tazobactam, cephalosporins from generation 2-4, aminoglycosides, sulfonamides, and carbapenems. It showed partial sensitivity to amikacin and colistin but complete sensitivity only to ciprofloxacin, tigecycline, and Fosfomycin. The fact that this extended drug-resistant isolate of Salmonella remains sensitive to a fluoroquinolone is remarkable and clinically relevant. The treatment plan was changed to include ciprofloxacin, tigecycline, and Fosfomycin but failed to show any improvement in the patient's condition.

DISCUSSION

In this case, we see an example of a difficult and sometimes deadly relationship between surgical pathology and the issue of antimicrobial resistance in managing perforation peritonitis.

First of all, the detection of MDR E. coli in the peritoneum can be explained by the fact that such bacteria represent intestinal flora and could get into the peritoneal cavity during an ileal perforation. Moreover, there are some cases described in the literature where the rate of resistant E. coli strains increased in patients with intra-abdominal infections.

The detection of XDR Salmonella strains is especially interesting and rare. Cases of infection with such strains are known and described in the literature but are extremely rare worldwide. Polymicrobial infection implies either the initial existence of a mixed infection in the abdomen in which the causative agent of XDR bacteria was not identified or the secondary nosocomial acquisition of the infection. Therefore, serial microbiological sampling should be performed as it can provide more information than initial sampling.

In patients with severe abdominal distention and ileus, rapid-sequence induction with proper care to avoid aspiration is very necessary especially when there is evidence of peritonitis and sepsis. The mortality rate with aspirated pneumonia complicated by secondary infection of pneumonitis and septic shock in the presence of multi-organ dysfunction is very high.

Retention of sensitivity to Ciprofloxacin among the three antibiotics against the isolated XDR salmonella strain, although rare in the literature, has been reported before. The use of three broad-spectrum antibiotics, Ciprofloxacin, Tigecycline, and Fosfomycin together is rational to treat XDR salmonella strain, but the effectiveness is highly reduced when there is multi-organ dysfunction.

CONCLUSION

The current case highlights the grave consequences associated with MDR and XDR bacteria in cases where there is a perforation peritonitis. In this case, it can be seen how an early diagnosis of MDR E. coli followed by XDR Salmonella demonstrates the changing nature of intra-abdominal infections with resistance to drugs. Microbiological investigations play a crucial role in deciding on the most appropriate antibiotics in instances of a patient failing to recover post-surgery.

Moreover, the current case serves to highlight the preventable nature of aspiration occurring during the anesthetic induction process. With antimicrobial resistance being on the increase across the globe, it is imperative that the medical community takes all measures necessary to prevent such instances from occurring in the future.

DECLARATIONS

Ethical approval and consent to participate: Written consent was provided by the next of kin of the patient for reporting this case study. The institutional ethical approval was acquired as per local policies.

Competing interests: The authors declare no competing interests.

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