The treatment of complicated nosocomial infection of a dehiscent laparotomy wound

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ABSTRACT
Complicated intra-abdominal infections and those of the skin and soft tissue are some of the most common bacterial infections. Surgical wound infections are estimated to occur in about 2% of surgeries, and in addition to the increased mortality and morbidity, thus results in an increase in treatment costs and extended hospitalisation. The presented case study represents the successful therapy of tigecycline in combination with other antibiotics in the case of a severe infection of a dehiscent laparotomy wound. In the present case, a broad spectrum of action against multi-resistant bacterial strains and tissue distribution of tigecycline was effective in the treatment of severe intra-abdominal infections.

Keywords: Intra-abdominal infections, Peritonitis, multi-resistant bacteria, tigecycline.

INTRODUCTION
Intra-abdominal infections are diseases with a very wide clinical spectrum. The most common cause of a complicated intra-abdominal infection is secondary peritonitis. In contrast to their incidence in the community (about 70%), a higher incidence of multi-resistant bacterial strains are expected in postoperative peritonitis (about 30%). [1] E. coli and Bacteroides fragilis are the most common agents of intractable infections. In cases of complicated in vitro infections, however, other enterobacteriaceae are evident, such as Klebsiella, gram-positive bacteria such as Staphylococcus, Streptococcus, non-fermenting bacteria such as Pseudomonas, other anaerobic bacteria Clostridium, Fusobacterium, and yeasts such as Candida spp. [2] In cases of secondary peritonitis, it is common to find enterococci whose occurrence is often associated with complications. The incidence of multi-resistant pathogens producing extended spectrum beta-lactamases (ESBL), metallo-beta-lactamase, methicillin-resistant Staphylococcus aureus (MRSA) and vancomycin-resistant enterococci (VRE) is increasing. [3] For complicated intra-abdominal infections, the infection progresses locally or diffusely in the peritoneal cavity, and is usually associated with a poor prognosis.

Complicated infections of the skin and soft tissues also affect larger areas, including deeper soft tissues. At its most serious, it represents the third most common cause of sepsis and septic shock (10%) after lung inflammation (55-60%) and intra-abdominal infections (25%). They are caused by Staphylococcus a. and beta-haemolytic streptococcal infections. In hospitalised patients, there is an increased incidence of infections from enterococci, Gram-negative bacteria and anaerobic bacteria, particularly in surgical wound infection on the abdominal wall or with soft tissue infections in the anal and perineal regions. [4] There are also more problematic infections, such as those by MRSA, VRE, ESBL-producing enterobacteria, pseudomonas and acinetobacter.

The choice of therapy in complicated intra-abdominal infections depends on many factors, such as the patient’s overall condition, age, associated disease, geographic region and department preferences. [5] The presented case report points to the effective
treatment of a complicated nosocomial infection of a dehiscent laparotomy wound by tigecycline.

Case report

A 64-year-old patient with a history of chronic obstructive pulmonary disease, benign prostatic hyperplasia, arterial hypertension, M. Bechteriev IV., with duodenal ulcer disease, was admitted into University Hospital in February 2017 and underwent surgical intervention for decompensated ileus for the inflammatory tumor of coli sigmoidei (Figure 1). The laparotomy, a transversostomy of a right-side Maydl’s hernia was provided and the patient was hospitalised on the surgical Intensive Care Unit (ICU). The patient was transferred to a standard ward and re-alimentation commenced on the 6th postoperative day. The patient was then allowed to leave the hospital. Four days after discharge from the hospital, he noticed a breakdown of the surgical wound, bleeding and green-yellow content. He felt pain at the wound site, without vomiting, with faecia in the stomach pocket, without flatulence, and urination without difficulty.

The patient was re-admitted to the 2nd Surgical Clinic 12 days later. He was conscious, oriented correctly, in the active position, normostenic, with abdominal obesity, anicteric skin, no dyspnoea or cyanosis, afebrile, neurologically in the norm, ameningeal, and hydrated. The stomach was above the chest level, free, throbbing, with a dehiscent wound present after laparotomy, transversostomy vital, functional, peristalsis present, and signs of peritoneal irritation absent. The laboratory screening showed low grade anaemia (Hb 119.2 g/l), leukocytosis 29.05 x 10⁹/l, hypocoagulation PT 51%, APPT 33.1 s, INR 1.54, CRP 148.63 mg/l, total protein 59.1 g/l. A combination therapy of cefotaxime at a dose of 2g/8h and metronidazole at a dose of 1.5g per day in 3 doses was used. Following the inevitable preparation and administration of 2 units of fresh frozen plasma for hypocoagulation status, the patient was sent for a surgical procedure during which the original dehiscent laparotomy was opened under general anaesthesia. In the wound, the ileum handle was caught with a incision across almost the entire intestine on the antimesenteric border with a length of about 3 cm. Apparently, it was an injury caused by Maxon (suture material) in the dehiscence of the abdominal wall. The entire small intestine distal from the finding was thickened, the wall was suffused and stiff. Therefore, a convolution of approximately 20 cm perforated ileum was resected. The proximal end was removed as a terminal ileostomy to the left of the wound. The original sigma tumour appeared to be diminished. After haemostasis, the wound was sutured in layers using Ventrophil.

The patient was placed on surgical ICU, cardiopulmonally compensated after extubation, O₂ saturation 96%, breathing spontaneously, adequately hydrated, with sufficient diuresis. Following observation, the antibiotic treatment was changed for the combination of ertapenem 1g/24h with metronidazole, and left for 5 days. Postoperative Hb was found to have decreased to 95 g/l, PT 49%, INR 1.57. Transfusions of the blood derivatives were administered quantum satis. Albumin decrease was compensated by the administration of 20% albumin daily. Both the ileostomy and the colostomy were functional with a minimal loss from a safety drain from the abdominal cavity. Due to exudation from the wound, the suture was released, and the wound was redressed twice daily with Betadine. The patient was left for 5 days on total parenteral nutrition, applied all-in-one bags at a total energy dose of 2000 kcal/24 hrs, crystalloids with complex vitamin treatment, minerals and trace elements.

Two days after admission to the clinic, Enterococcus faecium VRE-type VAN A and Enterococcus faecalis were detected in swabs taken from the depth of dehiscent wounds, which are resistant to ertapenem. An identical microbial finding was observed from the content of the safety drain, the end of which is placed in the lower pelvis (Figure 2). After 5 days of treatment with ertapenem and metronidazole, tigecycline was added at an initial dose of 100 mg, followed by 50 mg/12 hrs i.v. ertapenem was left in treatment for good sensitivity against Proteus mirabilis strains, where the MIC was 0.030. CRP and PCT values decreased from 203.33 mg/l and 0.954 µg/l to 32 mg/l and 0.110 µg/l in 10 days after commencement of tigecycline treatment. Enterococcus strains were also eradicated from the wound and the occipital drain. The wound was retained for the next 14 days, followed by a secondary suture with out complicated healing. The patient was finally released home.

DISCUSSION

VRE has become an important nosocomial pathogen worldwide due to its ability to colonise the gastrointestinal tract, its persistence in the hospital environment and the presence of several antibiotic resistance mechanisms. Infections are associated with high mortality.[6] In complicated intra-abdominal infections, tigecycline appears to be as effective as imipenem-cilastatin. It is a broad-spectrum glycylcycline antibiotic also effective against multi-resistant strains such as ESBL, MRSA and VRE.[7] Its structure is similar to tetracycline. However, tigecycline is not affected by the major mechanisms of bacterial resistance to tetracyclines, based on efflux pump activity, which reduces the intracellular concentration of the antibiotic and the protection of ribosomes.[8] Tigecycline penetrates well into the peritoneal cavity, skin and soft tissues. Resistance to tigecycline is described in Pseudomonas aeruginosa and reduced sensitivity in Proteus spp.[9]
The success of tigecycline therapy was achieved in 70.3% of patients with complicated intra-abdominal infections and 71.2% in combination with other antibiotics, while treatment with imipenem-clastatin was lower, at 68.5%. Heizmann et al. achieved 96.3% success in 27 patients with tigecycline monotherapy or in combination with other antibiotics, and a 100% success rate in the treatment of 3 patients with complicated skin and subcutaneous infection of the VRE.

Tigecycline has been in use for decades, and tigecycline-resistant strains such as *Klebsiella pneumoniae, E. coli* and *Acinetobacter baumannii* are emerging. Therefore, some authors recommend higher doses of up to 100 mg every 12 hours after an initial dose of 200 mg i.v. and, in the case of polymicrobial infections, the use of combination therapy with other antibiotics to cover a wider range of possible pathogens. Therefore, for 5 days, we also left ertapenem in the treatment. An increase in the tigecycline dose is an appropriate therapeutic option in order to maximize the antibacterial effect especially in cases of severe infections with high bacterial burden and multi-resistant strains. Studies in critically ill patients with serious infections have shown that increased doses of tigecycline in patients with multi-resistant strains do not lead to increased toxicity of treatment. The present case study is a confirmation of the efficacy of tigecycline therapy in the case of complicated intra-abdominal nosocomial infection.

**REFERENCES**


