Case Report

Toxin A-producing *Clostridium difficile* as an aetiological factor of post-traumatic wound infection

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Clostridium difficile is a well-known cause of hospital-acquired infection such as antibiotic associated diarrhoea or pseudomembranous colitis. Extraintestinal infections caused by this pathogen are described rarely. A case of post-traumatic wound infection caused by *C. difficile* in an immunocompetent, young and otherwise healthy trauma patient is reported. A 31-year-old female, a car accident victim, was admitted to hospital because of polytrauma. After open reduction and internal fixation of a supracondylar femoral fracture by means of the dynamic condylar screw (DCS) system, a purulent fistula occurred. Microbiological examination of the pus revealed *C. difficile* as the single aetiological factor of this infection. Empirical antibiotic treatment with cefazoline and metronidazole had been administered right after the surgery, but was found to be ineffective. The strain isolated from the patient was sensitive to most antimicrobials except for clindamycin, and amoxicillin/clavulanic acid was chosen for the guided therapy. Such treatment combined with the removal of the DCS system produced a desirable effect.

Received 15 December 2008
Accepted 10 March 2009

Introduction

Clostridium difficile is a well-known cause of hospital-acquired infection such as antibiotic associated diarrhoea or pseudomembranous colitis. Extraintestinal infections caused by this pathogen are described rarely and are mainly as consequences of abdominal surgical procedures. Some authors have described cases of *C. difficile* extraintestinal infections in patients who had not undergone recent surgical procedures (Bedimo & Weinstein, 2003; Garcia-Lechuz *et al.*, 2001; Gravis *et al.*, 2003; Simpson *et al.*, 1996). We report such an infection in an immunocompetent, young and otherwise healthy trauma patient.

Case report

A 31-year-old female, a car accident victim, was admitted to the hospital because of polytrauma. Medical examination done at the secondary-care hospital revealed: posterior dislocation of the right hip with a fracture of the posterior wall of the acetabulum, fracture of the right femoral head (Pipkin IV), supracondylar fracture of the left femur and dislocation of the I MCP joint of the left hand. During her

stay at the secondary care hospital, some orthopaedic trauma procedures were performed: closed reduction of the I MCP joint of the left hand and open reduction and internal fixation of the supracondylar femoral fracture by means of the dynamic condylar screw (DCS) system and metallic cerclage. Further treatment was continued at the Department of Orthopaedics and Traumatology of the University Hospital in Bydgoszcz, where the patient was admitted. Two weeks later, surgical treatment of the fracture of the right femoral head and posterior acetabulum wall of the hip was performed. Open reduction and internal fixation of both fractures was done. In the case of the femoral head fracture, Herbert screws were used, and the posterior acetabular wall was fixed by means of an AO screw. Routine antibiotic prophylaxis (cefazoline) was started 1 h before surgery and lasted for 3 consecutive days. This was the only antimicrobial treatment course that had been administered before the *C. difficile* infection occurred. Within a few days, symptoms of infection with a purulent fistula at the site of the internal fixation of the supracondylar femoral fracture occurred. One week after surgery, the decision on surgical debridement and removal of the metallic cerclage from the internal fixation of the supracondylar femoral fracture was made. During surgery, pus from the fistula was inoculated into aerobic and anaerobic culture Bactec bottles

Abbreviation: DCS, dynamic condylar screw.

(Becton Dickinson). After surgery, the patient was moved to the isolation unit of the Department of Orthopaedics and Traumatology of University Hospital in Bydgoszcz and was given an empirical antibiotic treatment of cefazoline combined with metronidazole.

During the first day of incubation, the anaerobic bottle indicated as positive. Culture maintained aerobically on solid media was negative. Gram stain of the culture revealed the occurrence of Gram-positive bacilli. The anaerobic culture on solid media revealed characteristic lentiform colonies with positive UV-366 nm fluorescence and a *p*-cresol smell. Identification and antibiotic sensitivity tests were performed with API 20 A and ATB ANA (bioMérieux), and the MIC values were determined for vancomycin and teicoplanin with Etest (AB Biodisk) following the manufacturer's recommendations. The isolated micro-organism was identified as *C. difficile* sensitive to amoxicillin/clavulanic acid, imipenem, piperacillin, piperacillin/tazobactam and metronidazole. The strain was intermediately sensitive to penicillin and resistant to clindamycin. The MIC values for vancomycin and teicoplanin were 0.5 and 0.25 mg l⁻¹, respectively. A *C. difficile* Toxin A test (Oxoid) was performed on the culture with a positive result. Stool cultures for *C. difficile* were negative.

After obtaining the microbiological report, the antibiotic treatment was changed to amoxicillin/clavulanic acid. Because of the sustained purulent infection, the whole DCS system was removed and secondary debridement was done. For a period of 10 days, drainage of her wound was continued, with protection of the fracture with skeletal traction by tibial tuberosity. During further hospitalization, there was renewal of the purulent fistula. Subsequent microbiological culture revealed *C. difficile* with the same pattern of antibiotic sensitivity. The patient was given amoxicillin/clavulanic acid again and finally the infection healed. The skeletal traction was removed after 69 days and the patient was discharged from the hospital after 95 days with recommendations of further ambulatory treatment.

Discussion

Although some authors have described cases of extra-intestinal *C. difficile* infections, only in a few cases were these bacilli isolated in monoculture: a case of pleural empyema (Simpson *et al.*, 1996), bacteraemia and iliac muscle abscess (Bedimo & Weinstein, 2003), brain empyema (Gravisse *et al.*, 2003) and surgical site infection (Kikkawa *et al.*, 2008). Garcia-Lechuz *et al.* (2001) reviewed 21 cases of extraintestinal *C. difficile* infections and only in one case were these bacilli isolated as a single pathogen. When infection has a polymicrobial aetiology, both aerobic and anaerobic, the role of *C. difficile* isolated from a clinical specimen in such cases may be discussed, because intestinal carriage of this pathogen is quite common in humans, it may easily colonize wounds localized near the perineal region and may not be identified as an aetiological factor. The other possibility is that *C. difficile* spores survived the

skin disinfection applied before each surgery or dressing change and contaminated the wound and the DCS system. This could explain why it was not a polymicrobial infection caused by mixed aerobic and anaerobic intestinal flora.

Contamination of the post-traumatic wound with *C. difficile* originating from the patient's intestinal tract is highly possible, although the stool cultures did not reveal the presence of these bacilli. The stool samples were tested after the patient was given intravenous metronidazole, which is effective in eradication of *C. difficile* from the intestinal tract. We did not find this drug to be effective in the treatment of infection in our patient. The patient received guided antimicrobial therapy, but only a combination of proper antimicrobial treatment with removal of the DCS system gave positive results and led to eradication of the infection.

To our knowledge, the patient did not have any potential risk factors for acquiring *C. difficile* such as direct or indirect hospital contact or prior antibiotic treatment and during the described stay at the hospital she did not have any diarrhoea episodes. Garcia-Lechuz *et al.* (2001) indicated that prior antibiotic treatment had not been administered in most of cases of extraintestinal *C. difficile* infections that they had reviewed.

There are no standards for the treatment of soft-tissue *C. difficile* infections (Kikkawa *et al.*, 2008). *C. difficile* strains resistant to metronidazole and ciprofloxacin have also been described (Peláez *et al.*, 2008; Spigaglia *et al.*, 2008), so only a guided antimicrobial therapy based on reliable microbiological investigations seems to be the procedure of choice in this kind of infection. In our opinion, *C. difficile* should be considered an aetiological factor in cases of wound infections localized in the perineal region.

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