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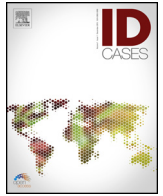
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Case report

Septic shock caused by *Gardnerella vaginalis* and *Atopobium vaginae*

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ABSTRACT

Although bacterial vaginosis is the most common and benign vaginal infection worldwide, some cases of severe acute infections have been described in the literature. We report the case of a 57-year-old French female who developed a life-threatening postoperative peritonitis after a total hysterectomy with adnexectomy in the context of the removal of leiomyosarcoma. The microbiological analysis of the peritoneal fluid identified *Gardnerella vaginalis* and *Atopobium vaginae*. The final diagnosis was a septic shock induced by an early onset peritonitis caused by *Gardnerella vaginalis* and *Atopobium vaginae*. The normal flora of the genital area could lead to a serious life threatening postoperative infection and should always be in the differential diagnosis.

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Introduction

Bacterial vaginosis (BV) is the most common and benign vaginal infection worldwide [1]. It is a dysbiosis, resulting in an imbalance in the vaginal flora through the multiplication of anaerobic bacteria and the disappearance of well-known protective lactobacilli. *Gardnerella vaginalis* and *Atopobium vaginae* are especially known to be associated with BV [2,3]. Although BV is a benign pathology, we report a septic shock caused by *Gardnerella vaginalis* and *Atopobium vaginae* after a total hysterectomy with adnexectomy due to leiomyosarcoma.

Case report

A 57-year-old French menopausal female was admitted to the gynecological emergency unit with a 6-weeks history of left lower quadrant abdominal pain with pelvic heaviness and urinary frequency. She had a past history of 5 miscarriages and a tubal ligation. She was an active smoker and was no medication. On physical examination, a large and painful mass extending up to the

umbilicus was palpated. Pelvic MRI showed a mass measuring 18 × 17 × 12 cm, well-delimited, polylobed, poorly vascularized, with central fluid component, seemingly located on the left ovary, extending up to the umbilicus. There was no lymphadenopathy, ascites or peritoneal implants. Uterus and adnexa were normal. Serum tumor markers were negative.

One month later, the surgical pelvic exploration revealed a 30-centimeter mass of the left broad ligament. There was no ascites or peritoneal carcinomatosis. Uterus and right adnexa were normal. A total hysterectomy with adnexectomy and removal of the mass was performed through median infra-umbilical laparotomy. The definitive histological diagnosis was leiomyosarcoma. On day 2 after surgery, the patient presented an isolated fever of 39 °C. Laboratory evaluation yielded a major inflammatory syndrome (leukocytes 15,000/μL, C-reactive protein 317 mg/dL). A contrast-enhanced computed tomography scan of the abdomen and pelvis showed a bilobed air and fluid collection suggesting an abscess, located in the retroperitoneum and extending along the left psoas muscle (9,1 × 7,4 × 7,5 cm) for one part and in the Douglas pouch (7,1 × 5,1 cm) for the other part. The patient's blood pressure dropped suddenly (74/46 mmHg) and did not respond to intravenous volume replacement with 2 L of Ringer Lactate. A vasopressor therapy (continuous infusion of noradrenaline) was started, allowing blood pressure stabilization at 100/60 mmHg. The patient was then transferred to the operating room for an emergency revision surgery. The peritoneal cavity exploration

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revealed a moderately abundant non-purulent serosanguinous peritoneal fluid and adhesions to the Douglas pouch, suggesting peritonitis. An attentive examination of the intra-abdominal organs revealed no surgical wound that might explain the infection. According to the French guidelines, an antibacterial treatment with piperacillin/tazobactam and gentamicin was administered, after microbiological samples were taken. The patient was extubated in the postoperative recovery room without any complication, but she still needed a hemodynamic support with noradrenaline.

She was transferred to the intensive care unit, where she slowly clinically improved. noradrenaline requirement decreased allowing its discontinuation on day 3 after revision surgery. This clinical improvement was associated with a decrease in inflammatory markers. On day 2, microbiological analysis of the peritoneal fluid identified *Gardnerella vaginalis*. gentamicin was discontinued, while metronidazole was added to the antibacterial treatment. On day 4, *Atopobium vaginae* was identified in the peritoneal fluid. Preoperative blood cultures remained sterile. Antibacterial susceptibility testing of *Gardnerella vaginalis* demonstrated resistance to metronidazole and ciprofloxacin but susceptibility to penicillin G, amoxicillin/clavulanate, cefotaxim, clindamycin and vancomycin. Antibacterial susceptibility testing of *Atopobium vaginae* showed susceptibility to all tested antibacterials, including metronidazole. In our patient's case, piperacillin/tazobactam was active against both bacteria.

The final diagnosis was an early postoperative peritonitis-induced septic shock caused by *Gardnerella vaginalis* and *Atopobium vaginae*. The patient was discharged from the intensive care unit on day 5 after the second surgery and the antibacterial therapy was stopped on day 7.

Discussion

According to the literature data, this is a rare septic shock related to a peritonitis caused by *Gardnerella vaginalis* and *Atopobium vaginae* after a total hysterectomy with adnexectomy. *Gardnerella vaginalis* and *Atopobium vaginae* use glycogen to synthesize biogenic amines that reduce the activity of lactobacilli, what causes alkalization of the vaginal cavity and facilitates their own development. These flora modifications can be aggravated by various factors, such as hormonal changes, sexually transmitted infections, intrauterine device replacement, antibacterials, excessive intimate hygiene, stress or tobacco [4]. Regarding our patient, active smoking may have participated in the modification of her vaginal flora. Also, *Gardnerella vaginalis* and *Atopobium vaginae* can be commensals of vaginal flora, as well as of male urethral flora, after contact with women carrying these microbes [5]. Nonetheless, *Gardnerella vaginalis* is reported to be present in 90 % of women with bacterial vaginosis versus only 11.5–69% of disease-free women [6]. As well, *Atopobium vaginae* is reported to be present in 40–70% of women with BV versus less than 8% of disease-free women [7]. Our patient was not complaining of malodorous and greyish vaginal secretions, which are symptoms of BV and was likely an asymptomatic carrier. During this total hysterectomy, a vaginal incision in the abdominal cavity maybe caused a bacterial dissemination and quickly progressed to peritonitis and septic shock in this context of cancer.

The standard antibacterial treatment of BV is secnidazole or metronidazole [4]. *Gardnerella vaginalis* is known to be sensitive to metronidazole while *Atopobium vaginae* is known to be resistant to this antibacterial [2]. Persistent or recurrent BV is thus frequent after treatment with metronidazole. This may also be due to the production, by some strains of *Gardnerella vaginalis* or *Atopobium vaginae*, of a protective biofilm that limits the antibacterial effectiveness [8,9]. In our patient, we noted that the antimicrobial

resistance pattern testing was unusual: *Gardnerella vaginalis* was resistant to metronidazole, while *Atopobium vaginae* was sensitive. Our patient had a severe infection implied to use a broad-spectrum antibacterial therapy: piperacillin/tazobactam.

The most similar case we found in the literature is a post-caesarean septic shock caused by *Gardnerella vaginalis* and *Peptostreptococcus* [10]. We also found various cases of acute gynecological and non-gynecological infections to one of the two organisms among men and women. Regarding *Gardnerella vaginalis*, we identified a case of bacteremia after vaginal myomectomy [11], vertebral osteomyelitis [12] and prostatic adenoma [13]. Regarding *Atopobium vaginae*, we identified a case of tubo-ovarian abscess after trans-vaginal oocyte retrieval [14] and endocarditis of the tricuspid valve [15]. Risk factors of immunodepression were identified in only two publications, which were type 1 diabetes [15] and chronic alcoholism [13].

The normal flora of the genital area could lead to a serious life threatening post-operative infection and should always be in the differential diagnosis.

Author agreement statement

We declare that this manuscript is original, has not been published before and is not currently being considered for publication elsewhere.

We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed.

We further confirm that the order of authors listed in the manuscript has been approved by all of us.

We understand that the Corresponding Author is the sole contact for the Editorial process. She is responsible for communicating with the other authors about progress, submissions of revisions and final approval of proofs.

Ethical approval

This study did not need approval of an ethics committee.

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Declaration of Competing Interest

Authors are no conflicts of interest to declare.

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