Submitted: 31 July, 2022 Accepted: 15 November, 2022 Published: 15 February, 2023 DOI:10.22514/ejgo.2023.015

CASE REPORT

European Journal of Gynaecological Oncology

Tapeworm infection and secondary hemorrhagic shock found after cervical cancer surgery: a case report

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Abstract

Radical hysterectomy is an essential component of surgery for early-stage cervical cancer, and secondary hemorrhagic shock due to infection and vaginal stump necrosis after laparoscopic hysterectomy is very rare. Here we report a tapeworm infection and secondary hemorrhagic shock in a patient with cervical cancer after radical hysterectomy. On day two after cervical cancer surgery, this patient was found to have a long-term intestinal tapeworm infection and was discharged on postoperative day 11 after deworming on postoperative day 4. The patient entered the emergency operating room for hemorrhagic shock on day 15 after cervical cancer surgery; after hemodynamic resuscitation, gauze tamponade, and anti-infective treatment, the patient's massive blood loss temporarily stopped. Two days later, the patient's vaginal stump bled again repeatedly. Eventually, after 17 hours of surgery and hemodynamic resuscitation, the patient's wound stopped bleeding profusely with ligation of the right internal iliac artery and branch arteries. This patient had a rare tapeworm infection that presented preoperatively but was detected only after cervical cancer surgery. We considered that preoperative anemia, long surgery time, surgical trauma, and intraoperative blood loss have significantly suppressed the patient's immune response. A long-term intestinal tapeworm infection increased her susceptibility to bacteria, resulting in secondary pathogenic infection and postoperative blood loss. We advised that if a patient has combined parasitic infection and recurrent fever after a hysterectomy, it is necessary to prolong the hospital stay time, improve anemia, and increase immunity until the condition stabilizes before discharge.

Keywords

Radical cervical squamous carcinoma; Tapeworm disease; Hemorrhagic shock; Case report

1. Introduction

Cervical cancer is one of the most common female malignancies in the world, and approximately 84% of cervical cancer patients come from less-developed regions [1]. It is currently the second leading cause of cancer-related deaths in women aged 20–39 years [1]. Early-stage cervical cancer is often treated surgically under laparoscopy with radical hysterectomy and pelvic lymph node dissection [2]. Common postoperative complications include wound infection, bleeding, urethral injury, and intestinal obstruction [3], while cases leading to postoperative secondary hemorrhagic shock are sporadic [4]. In this article, we report a case of cervical cancer in a patient with tapeworm infection and secondary hemorrhagic shock after radical hysterectomy.

2. Case report

A 37-year-old female patient, 160 cm in height and 60 kg in weight, from a Tibetan settlement at an altitude of 3500 m in western Sichuan underwent "radical laparoscopic hysterectomy, pelvic lymph node dissection, and abdominal main lymph node sampling" for stage IB2 cervical cancer. The operation lasted 7 hours and involved a preoperative hemoglobin (HB) level of 93 g/L, intraoperative bleeding of 700 mL, and intraoperative and postoperative day one infusion of a total of 4.5 U erythrocyte suspension. On the second postoperative day, the patient developed significant diarrhea at a frequency of 15–18 times/day. Yellow, dark-green and white streaks were visible in the stool, and the maximum body temperature reached 38.9 °C. Tests confirmed the presence of tapeworm eggs in the patient's stool. On the fourth postoperative day, the gynecologist gave the patient 600 mg of oral praziquantel to free the intestine of tapeworm. Over the next few days, the patient's diarrhea symptoms gradually disappeared as she expelled the tapeworm. On the 10th postoperative day, the gynecologist reviewed the patient's stool and found that the eggs had disappeared, and the patient voluntarily requested to be discharged on the 11th postoperative day. The patient

had been in a state of recurrent fever postoperatively, and her temperature fluctuated between 37.3 °C and 37.5 °C even with intensive antibiotic treatment. After explaining the risks involved and prescribing oral antibiotics and other medications, the doctor agreed to discharge the patient. The patient entered the emergency operating room on day 15 after cervical cancer surgery with hemorrhagic shock; after hemodynamic resuscitation, gauze tamponade, and anti-infective treatment, hemorrhagic shock was suspended. On day 16 after surgery for cervical cancer, the gynecologist found a large amount of purulent discharge from the vagina during the removal of the vaginal gauze and an overall splitting of the vaginal stump; the gynecologist temporarily stopped the bleeding by suturing the vaginal stump. From the postoperative bacterial culture, he found that conditionally pathogenic bacteria had caused the wound infection. On the evening of the 17th postoperative day for cervical cancer, the patient suffered another uncontrollable massive blood loss from the vaginal stump and entered the emergency operating room again.

The patient was unconscious when she entered the operating room and had a heart rate (HR) of 110 bpm, a blood pressure (BP) of 96/60 mmHg, and an oxygen saturation of 98%. The nurse immediately opened extensive intravenous access for hemodynamic resuscitation and intraoperative warming. Three hours after the gynecologist sutured the vaginal stump, we started the first anesthetic awakening. During this anesthetic awakening, the vaginal stump bled profusely, and the gynecologist reperformed the operation. The sonographer performed a vaginal ultrasound while the patient was on the operating table and found an 8 × 9 cm large hematoma at the top of the vagina behind the bladder, and the gynecologist decided to begin a laparoscopic exploration. During exploration, the gynecologist found that dense adhesions of surrounding tissues made the operation difficult and decided to perform an open operation instead. Intraoperatively, there were dense adhesions between the right ureter and iliac vessels, bladder, and vaginal stump, and the tissue space was unclear. On cystoscopy, the gynecologists found a markedly congested and edematous bladder with extensive inflammation of the bladder wall and could not locate the bilateral ureteral openings. Once they had cleared the hematoma at the top of the vagina, they found multiple active bleeds deep in the pelvic cavity on the right lateral wall of the vagina near the iliac vessels, which were hemorrhaging due to dense adhesions to surrounding tissues and a decaying texture. The bleeding stopped after four hours of suturing by the gynecologists, and an abdominal drainage bag was installed. During this anesthetic awakening, we noticed a sudden increase in the volume of blood in the abdominal drainage bag, accompanied by a bleeding volume that reached 800 mL in 1 minute, a drop in BP, and an increase in heart rate, with BP reaching a minimum of 40/22 mmHg and HR rising to 157 bpm. The gynecologist immediately opened the abdomen to investigate, suturing the right internal iliac artery and its branch vessels, and eventually stopped the bleeding successfully. This resuscitation lasted 17 hours from the time of entry to the operating room to the time of leaving the operating room and involved 11,000 mL of bleeding volume, 42 U of intraoperative red blood cell suspension, 3950 mL of plasma, 2 U of platelets and 80 g of human albumin; this was followed by intensive care unit (ICU) admission for further observation of the patient. Bacterial cultures of the vaginal stump showed trauma infection with conditionally pathogenic bacteria, mainly Enterococcus faecalis and Escherichia coli. On day 10 of observation in the ICU, the patient developed persistent nausea and vomiting, and the gynecologist considered that the patient had developed an intestinal obstruction and performed open surgery again. After postoperative anti-infective treatment and supportive therapy by the gynecologist, the patient was discharged after four months in the hospital.

3. Discussion

The incidence of secondary bleeding after laparoscopic hysterectomy is approximately 1.3% [5], and even fewer cases present with severe blood loss. Common causes of bleeding in the short postoperative period include postoperative infection, inflammatory wound edema, or dehiscence of the trauma and blood vessels due to premature return to physical activity [5]. When the patient entered the emergency room on day 15 postoperatively for cervical cancer, the gynecologist initially judged that the blood loss was massive due to a fractured blood vessel in the wound, so gauze was used urgently to stop the bleeding. When he removed the gauze on the second day, he found a large amount of purulent vaginal discharge. Bacterial cultures showed that Enterococcus faecalis had infected the vaginal stump, and later on, bacterial cultures of the wound also revealed Escherichia coli infection there. Enterococcus faecalis is one of the most common Gram-positive bacteria [6] and Escherichia coli is the most common Gram-negative bacteria in abdominal infections [7]. Enterococcus faecalis and Escherichia coli are conditionally pathogenic bacteria that usually inhabit the human or animal intestine. We know from common sense that conditionally pathogenic gut bacteria can spread upward through the vagina and urethra, causing bacterial infections in the vaginal stump and surrounding tissues due to the unique female anatomy. The moist internal environment of the female vagina is inherently conducive to bacterial growth, and with the routine use of anticoagulants after cervical cancer surgery, dripping bleeding also provides a conducive medium for bacterial growth. During infection, the release of inflammatory material leads to adhesions and decay of the surrounding blood vessels and tissues, and when the vessels rupture and the infection spreads, there will be severe blood loss and hemorrhagic shock.

To explore the causes of postoperative infection in this patient, we referred to a guideline for the prevention and treatment of perioperative infections in surgical site infection [8]. First, we evaluated the patient based on her presentation of stage IB2 cervical cancer without cancer metastasis and no clinical signs of cachexia, no history of immunosuppressive drug use, and no comorbidities such as hypertension and diabetes mellitus. The evaluation results indicated that the patient's physical foundation was not poor. Second, the patient underwent adequate preoperative preparation, including a preoperative shower, thorough bowel cleansing with laxatives, hair removal, prophylactic intravenous antibiotics, and surgical disinfection to reduce the risk of infection. Third, we kept the patient warm, administered albumin and antibiotic

therapy, and intensified care during the perioperative period. Meanwhile, surgery can also increase the risk of postoperative infection, with influences from the long surgical times, trauma and high blood loss. The patient had mild preoperative anemia, which studies have shown increases the risk of postoperative infection [9]. Since the patient was from a highland region, HB of 93 g/L was already equivalent to a moderate anemic state in patients from the plains, and postoperatively, the gynecologist just corrected the patient's HB to preoperative status. The 7-hour-long laparoscopic surgery and pelvic lymph node dissection aggravated the postoperative inflammatory response. Laparoscopic surgery involves lysis and separation of adherent tissue with a single-stage or bipolar electric knife, and gynecologists often stop bleeding by cauterizing tiny bleeding spots with an electric knife [10]. In this case, the patient had an enlarged uterus as if she were two months pregnant, a thickened cervix, an abundant blood supply to the parametrial tissues on both sides (Fig. 1), and dense bilateral ureteral adhesions; these factors tend to increase the risk of scorch area and scorch detachment, leading to bleeding. Compared to a cold knife, electrocoagulation triggers a more intense inflammatory cascade response and increases cytokine secretion, leading to tissue damage [11]. After pelvic lymph node dissection, pelvic inflammatory infections become even more unrestricted. In addition, poor living conditions and hygiene practices can exacerbate postoperative infections.

FIGURE 1. Patient's preoperative computer tomography scan (CT); arrows suggest poorly defined parametrial tissue and abundant vascularity.

Despite the objective reasons mentioned above, it is puzzling why this patient was the only one among our many postoperative cervical cancer patients who developed such a severe infection. As mentioned earlier, this patient's vaginal stump was examined for infection with conditionally pathogenic bacteria. Usually, these intestinal flora do not cause infections in the body, but only when the body's immunity is significantly reduced does the intestinal flora shift and become pathogenic, causing endogenous infections. It is well known that the emotional stress associated with cancer, trauma, and blood loss due to prolonged surgery can suppress the immune response in perioperative patients [12]. In addition, studies have shown that parasitic infections increase the susceptibility to co-infected bacteria [13]. In this case, it is also possible that tapeworm infections increase the immunocompromised patient's susceptibility to conditionally pathogenic bacteria. Tapeworms are worms that reside in the intestinal tract. Most patients with tapeworm infection have mild clinical symptoms, often manifesting as white proglottids in the stool, and a few may have abdominal discomfort, bloating, increased diet, and hunger. Tapeworms undergo multiple growth stages in the host, and people become infected by consuming pork, beef, or offal containing live cysticercus. Cysticercus is stimulated by bile in the body to evaginate the scolex and attach to the intestinal wall, develop into an adult worm in 2–3 months, and begin to excrete gestational segments and eggs, with each adult tapeworm laying up to 300,000 eggs per day [14]. This patient reported a long history of raw meat consumption and 5–15 episodes of diarrhea on weekdays, which were not taken seriously because the symptoms were not severe, thus suggesting that the patient's intestine had been chronically infected with tapeworms.

Three possible mechanisms of parasitic infection increase susceptibility to conditionally pathogenic bacteria. First, the persistent exposure to helminth parasites and helminth-derived excretory/secretory antigens throughout the infection led to a modified type 2 response resulting in increased pro-inflammatory factors, and decreased anti-inflammatory factors may increase susceptibility to infection [15]. Second, helminths generate isolable immune components involved in type 2 immune responses that contribute to reducing type 1 immune responses driving inflammatory disease [16]. Deworming treatment will eliminate control of type 1 immune response, resulting in pathogens around the wound being more likely to drive the inflammatory response. Third, a recent study has found that Mesocestoides vogae tetrathyridia induces the recruitment of immunosuppressive cell subpopulations, leading to the downregulation of the host immune response in combined parasitic diseases [17]. Unfortunately, we have no direct evidence that intestinal tapeworm infection is this patient's primary cause of immunosuppression. Meanwhile, a recent study showed that removing worms after a Salmonella infection does not restore the host's resistance to Salmonella infection [18]. This study suggests that the immune response to bacterial pathogens did not recover rapidly in the period following deworming treatment. Our patient also had recurrent conditionally pathogenic bacteria infections after resuscitation, and she was discharged after four months of anti-inflammatory treatment and supportive therapy.

4. Conclusions

In conclusion, this is a rare case of long-term coinfection with intestinal tapeworm recognized only after surgery for cervical cancer. The patient developed a severe vaginal stump and pelvic tissue infection 15 days after radical cervical cancer surgery, leading to hemorrhagic shock. We considered that preoperative anemia, long surgery time, surgical trauma, and intraoperative blood loss have significantly suppressed the patient's immune response. A long-term intestinal tapeworm infection increased her susceptibility to bacteria, resulting in secondary pathogenic infection and postoperative blood loss. We advised that if a patient has combined parasitic infection and recurrent fever after a hysterectomy, it is necessary to

prolong the hospital stay time, improve anemia, and increase immunity until the condition stabilizes before discharge.

AUTHOR CONTRIBUTIONS

HC, LL and HL—Project development and Data Collection. HC and HL—Manuscript writing and revision.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The patient consented to the publication of a case report according to all ethical principles that have been applied, and this case report received approval from the ethics committee of the West China Second University Hospital, Sichuan University (2022 Ethical Approval for Medical Research, No. 319).

ACKNOWLEDGMENT

Not applicable.

FUNDING

This research received no external funding.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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How to cite this article: Huan Chen, Lin Li, Hui Liu. Tapeworm infection and secondary hemorrhagic shock found after cervical cancer surgery: a case report. European Journal of Gynaecological Oncology. 2023; 44(1): 119-122. doi: 10.22514/ejgo.2023.015.