Robot-assisted laparoscopic radical prostatectomy after fluoroquinolone resistant *Escherichia coli* sepsis following a transrectal ultrasonography-guided prostate biopsy

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Abstract

The incidence of febrile urinary tract infection after transrectal ultrasonography-guided prostate biopsy has been reported to range from 0.1% to 7%, with *Escherichia coli* being the most common organism identified. The conventional wisdom is to recommend an interval of more than 4 to 6 weeks after the transrectal prostate biopsy before treating patients with radical prostatectomy. This allows time for resolution of the biopsy-induced inflammation, which might complicate the surgical planes for dissection. We present a 58-year-old man with an elevated prostate-specific antigen, who developed near-fatal sepsis following transrectal ultrasonography-guided prostate biopsy despite quinolone prophylaxis. The patient underwent a robot-assisted laparoscopic radical prostatectomy 31 days after the prostate biopsy.

Introduction

Transrectal ultrasonography (TRUS)-guided prostate biopsy is the standard procedure for obtaining a sample for the histological diagnosis of prostate cancer. However, minor hemorrhagic complications such as hematuria, hemospermia and rectal bleeding are common.[1] Infectious complications include fever, urinary tract infection, acute bacterial prostatitis, epididymoorchitis and sepsis. *Escherichia coli (E. coli)* is the most common organism associated with infections after a TRUS-guided prostate biopsy.[2] Therefore, fluoroquinolones are the most common prophylactic medication used for a TRUS-guided prostate biopsy.

Robot-assisted laparoscopic radical prostatectomy (RARP) is one of the most common techniques used to treat prostate cancer. The adoption of RARP has been very rapid due to its minimally invasive nature. In spite of the advantages associated with RARP, there are some complications that need to be considered. Complicated cases include patients with a median lobe, large prostate, post-transurethral resection of the prostate, post-radiation therapy and patients who have received androgen deprivation therapy, as well as patients with a previous hernia operation.

We report a case of a patient who underwent RARP with severe fibrosis due to fluoroquinolone-resistant *E. coli* sepsis following TRUS-guided prostate biopsy.

Case report

A 58-year-old male with an elevated prostate-specific antigen (PSA) level underwent a TRUS-guided prostate biopsy. The serum PSA was 4.11 ng/mL and the free PSA was 0.425 ng/mL. There was no palpable nodule on digital rectal examination. The prostate volume was 29 mL by TRUS. The patient had no previous medical history, such as diabetes and hypertension; he had no previous exposure to antibiotics. The prostate biopsy was performed by the 12-core extended method. The standard preoperative prophylactic protocol included preoperative bowel preparation with a glycerin enema, intravenous administration of levofloxacin 500 mg once, and levofloxacin 500 mg/day orally for 3 days. The patient did not perform the preoperative glycerin enema. He developed a high fever of 39.0°C and chills the evening after the biopsy. The patient went to the emergency department immediately and was admitted to the intensive care unit where he received intravenous treatment with third generation cephalosporin (1 g ceftriaxone) and an intramuscular aminoglycoside (800 mg isepamicin). His blood pressure decreased to 80/50 mmHg, and his white blood cell count was 17,590 uL 2 days after the biopsy. The patient had hypoxemia and disseminated intravascular coagulation. The patient was treated for severe septic shock in the intensive care unit and multiple blood cultures were obtained. The patient received vasopressor support for his shock, but did not require intubation in the intensive care unit. The blood cultures grew *E. coli* resistant to ampicillin,

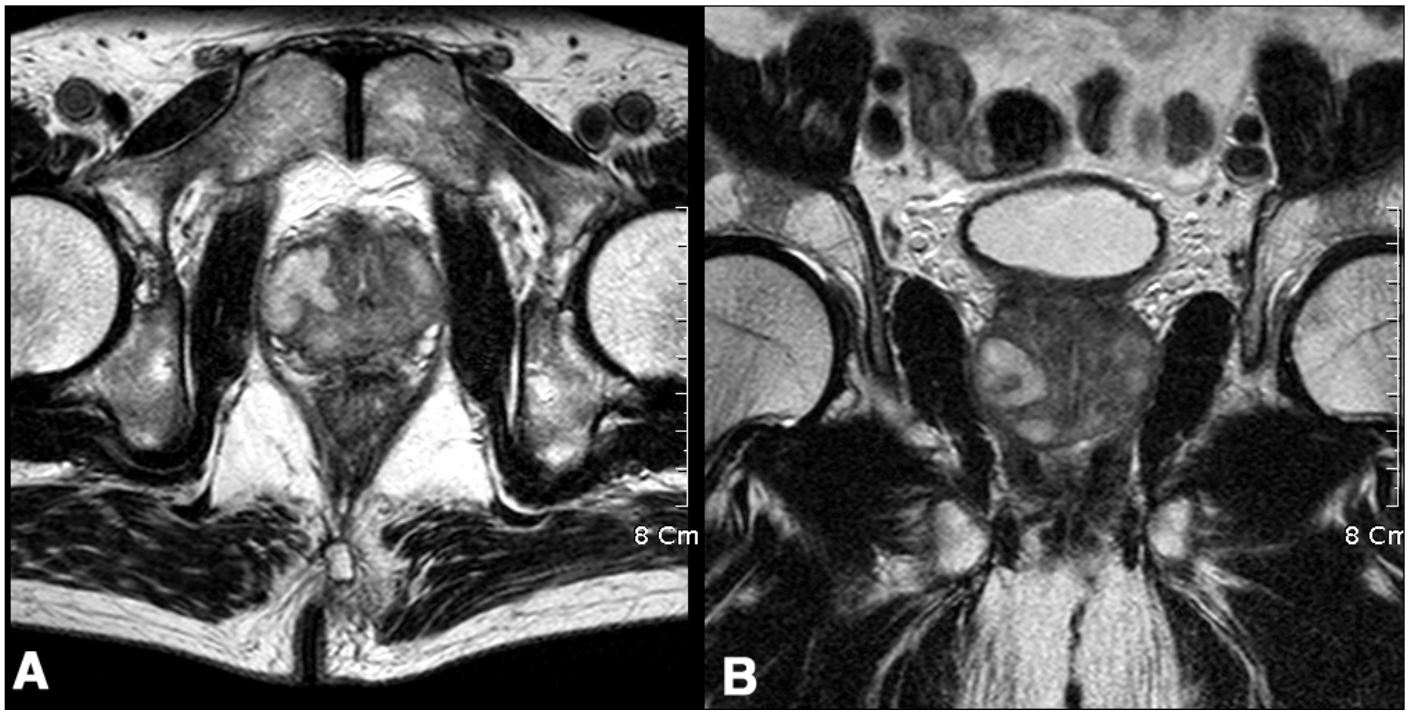

Fig. 1. There was 27 × 22 mm high signal intensity in the right lobe on the T2-weighted magnetic resonance imaging.

piperacillin, cefazolin, cefotaxime, ceftazidime, cefepime, aztreonam, ciprofloxacin, tetracycline and trimethoprim/sulfamethoxazole. The organism was only sensitive to imipenem and meropenem. After consulting with the infectious disease department, we changed to the antibiotics to 1.5 g of intravenous imipenem and intramuscular injection of 80 mg of gentamicin. Two days later, the patient's blood pressure increased to 110/80 mmHg and the fever and chills resolved. After administering 1.5 g of imipenem daily for 7 days, the patient made a full recovery.

The biopsy results showed an adenocarcinoma of the left lobe (4/12) and a Gleason score of 7 (3+4). Prostate magnetic resonance imaging (MRI) and a bone scan for the staging workup were performed 14 days after the biopsy. There were low signal intensity nodules in the left peripheral zone on the T2-weighted MRI. There was a 27 × 22-mm high-signal intensity in the right lobe on the T2-weighted MRI (Fig. 1). There were no enlarged lymph nodes or bony metastases. The patient underwent a laparoscopic radical prostatectomy with pelvic lymph node dissection using the da Vinci Surgical System (Intuitive Surgical, Sunnyvale, CA) 1 month after the prostate biopsy. A mechanical bowel preparation was done before the RARP. Second-generation of cephalosporin was used for prophylactic antibiotics. The RARP was performed by transperitoneal and antegrade approach. The surgical findings revealed severe adhesions on the right site of the prostate (Fig. 2). In addition, several neovascularization lesions were noted on the right pelvis wall. The prostate could not be dissected sharply from the endopelvic fascia. The nerve-sparing procedure could not be done because of severe adhesion. There was moderate bleeding during the lateral dissection. The operation time was 220 minutes. The estimated blood loss was 860 mL. The patient received 2 units of packed red blood cells. There were no postoperative infection-related complications. The final pathology was adenocarcinoma, Gleason score 7 (3+4) with capsular incision in the right lobe. The pathological stage was pT2aN0M0. The urethral catheter was removed on postoperative day 6. The patient was discharged on postoperative day 7 without any complications. At the 6-month follow-up, the patient had erectile dysfunction without incontinence, and his serum PSA was undetectable.

Discussion

Screening programs for the early detection of prostate cancer have increased the number of TRUS-guided prostate biopsies. As with any screening program, the morbidity and adverse effects on the quality of life in an otherwise healthy population should be minimized. However, the current prostate biopsy procedure is associated with frequent minor and rare major complications, and hospitalization is sometimes required. The frequency of febrile urinary tract infections after a prostate biopsy ranges from 0.1% to 7%, with *E. coli* being the most common organism.[2] Therefore, fluoroquinolone antibiotics are the most common prophylactic medications used for TRUS-guided prostate biopsy. However, the frequency of fluoroquinolone resistant *E. coli*

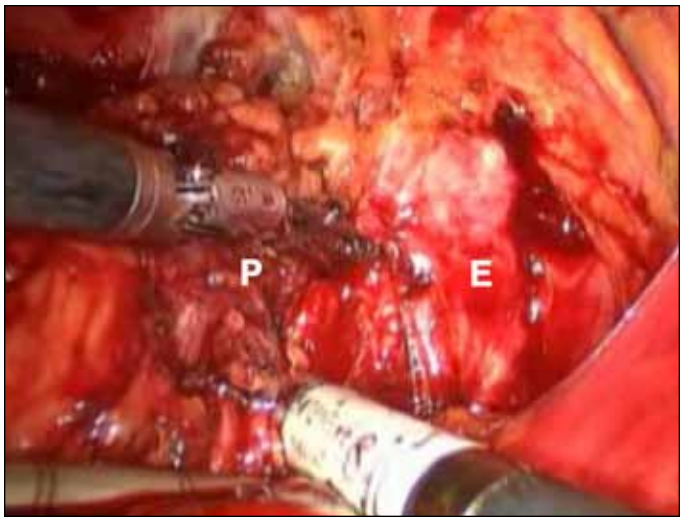

Fig. 2. The surgical findings revealed severe adhesions on the right site of the prostate. E: endopelvic fascia; P: prostate.

is increasing. In 2006, the rate of ciprofloxacin susceptible strains of *E. coli* isolated from urine was 57.2% among inpatients in Korea.[3] A recent retrospective review of 1273 Veterans Affairs patients undergoing prostate needle biopsy after prophylactic antibiotic treatment with levofloxacin demonstrated infectious symptoms in 2.4% with an overall incidence of flouroquinolone resistance of 1.2%.[4] The risk factors of quinolone resistant *E. coli* included previous use of quinolones and the presence of a urinary tract disorder (prostatic obstruction, stone, neoplasm and recurrent urinary tract infection).[5]

The patient in this report was a near-fatal case of sepsis with fluoroquinolone resistant *E. coli* after prostate biopsy, even with antibiotic prophylaxis. The sepsis improved after intravenous administration of imipenem. Imipenem is the most sensitive antibiotic for fluoroquinolone resistant strains of *E. coli*.[3] Therefore, imipenem or meropenem should be considered using for urinary tract infections associated with prostate biopsies with prophylactic antibiotics. In this case, the glycerin enema was missed before the biopsy. However, this was an unlikely cause of the urinary tract infection. Many reports have suggested that the use of a pre-biopsy enema has no significant benefit with regard to infectious complication rates and the patients' quality of life.[6,7]

Radical prostatectomy is the treatment of choice for localized prostate cancer in Korea. After the introduction of the da Vinci Surgical System (Intuitive Surgical, Sunnyvale, CA), RARP has become the mainstay of treatment for localized prostate cancer in Korea.[8] As well as the conventional open surgery, RARP is challenging in patients with previous abdominal or transurethral surgery, obesity, prior radiation, a large median lobe and a larger prostate.[9] The presence of severe inflammation has a significant adverse effect on surgical outcomes. The conventional wisdom is to recommend an interval of more than 4 to 6 weeks after the transrectal prostate biopsy before treating patients with a radical prostatectomy. This period of time allows for resolution of biopsy-induced inflammation, which might interfere with the surgical planes of dissection.[10] Despite the less invasive nature of the RARP, Martin and colleagues suggested that surgery within 4 to 6 weeks of biopsy was associated with a greater risk of complications.[11] Although the 3-dimensional visualization usually compensates for the absence of haptic feedback, inflammation and obliteration of the surgical planes might lead to increased blood loss and decreased visualization, making the fine points of the procedure more difficult to achieve (which could adversely affect the perioperative outcomes).

There are no guidelines for the optimal interval for radical prostatectomy after prostate biopsy-induced infection. In this case, the RARP was performed 31 days after the biopsy. There is no rationale for early surgery. In general, Korean patients cannot wait due to fear of the disease. Thus, active surveillance is not popular in Korea. Most patients want to undergo cancer surgery as soon as possible. The operation time was slightly longer than in other patients, and the patient received 2 packs of red blood cells. The pathology showed a capsular incision at the site of inflammation. The inflammation and obliteration of surgical planes might have a negative effect on perioperative outcomes. The RARP should be delayed for a longer time in patients with a prostate infection after prostate biopsy.

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