Case Report

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Use of a Porcine Dual Mesh to Prevent Radiation-Associated Small Bowel Injury

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Abstract

Cervical cancer is the second most common gynecologic cancer in women. However, the incidence showed a decline in the gynecologic cancer rates with the effective use of screening tests. The primary treatment at an early stage is either surgery or radiotherapy. Unfortunately, with the increasing use of radiotherapy, radiation enteritis has become an increasing problem. To avoid the radiation side effects, many technical and/or medical strategies have been described. For example, surgical placement of absorbable mesh slings and silicone prostheses have been described as a pelvic obliteration technique to keep the small intestine away from the adjuvant boost field. In this case report, we placed a Permacol™ surgical implant to displace the loops of the bowel out of the pelvis for the purpose of reducing the bowel injury due to external beam radiotherapy.

Keywords: Cervical cancer, dual mesh, radiotherapy, radiation enteritis

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INTRODUCTION

Cervical cancer is the second most common gynecologic malignancy in women, which is decreasing in frequency due to an effective use of a screening test called the Pap smear. Surgery and radiotherapy are both used to treat an early stage cervical cancer. However, in patients with an advanced stage cervical cancer or recurring cancer after surgery, radiotherapy is the only treatment option (1, 2). Unfortunately, many patients suffer acute and chronic side effects after the abdominal administration of the ionizing radiation called radiation enteritis (1, 2). There have been many technical and/or medical strategies described to avoid the side effects: those aiming to physically shift the radiation dose away from the normal tissues or to modulate the cellular and tissue response to ionizing radiation to protect the small intestine from the damaging effect of radiotherapy (3, 4). Surgical placement of absorbable mesh slings or silicone prostheses has been described as a pelvic obliteration technique to keep the small intestines away from the adjuvant boost field (4, 5). Permacol™ is a material with an acellular porcine dermal implant, combined with tensile strength of a synthetic material that does not include cells, cell debris, DNA, and RNA fractions and is preferred due to the fact that it was more histocompatible than other materials.

In this case report, we placed a Permacol™ surgical implant after the pelvic exanteration for the purpose of reducing the small intestinal exposure during pelvic radiotherapy and aimed to show the effectiveness of the porcine dermal mesh. Patient approval was obtained.

CASE PRESENTATION

A 37-year-old woman was referred to the oncology department with the diagnosis of cervical carcinoma recurrence after surgery. The initial diagnosis was stage II-a cervical carcinoma, and type II hysterectomy with pelvic lymph node dissection was performed 10 months before.

She was admitted with intensive and malodorous vaginal discharge accompanied by urine leakage from the vagina. At gynecologic examination, the vaginal cuff was fragile, and a 4-centimeter necrotic lesion located on the vaginal cuff was observed. In addition, clear fluid vaginal discharge was observed. To confirm the vesico-vaginal fistula formation, methylene blue was applied to the bladder, and methylene blue discharge from the vagina was observed. At sonographic examination, approximately a 5×5 cm solid mass with irregular borders overlying the vaginal cuff and spreading out to the vagina was observed. Moreover, the magnetic resonance imaging revealed a 5×5 cm irregular mass overlying the vaginal cuff adherent to the posterior wall of the bladder and the serosa of the recto-sigmoid colon accompanying with bilateral pelvic lymphadenopathy. Therefore, an 18-F-fluorodeoxyglucose positron-emission tomography/computed tomography was done, and it revealed a 5×7×5 cm mass with pathologic involvement (SUVmax: 10.5) and pathologic lymph node involvement on the right pelvic side. Exenterative surgery including posterior exenteration, colostomy, and ureterocutaneostomy was performed. At the end of the procedure, a surgical porcine dermal implant was placed to keep the small intestine away from the radiation area (Figure 1). The intra-abdominal drain was pulled on the postoperative 4th day, and the patient was discharged on the postoperative 7th day. The routine follow-up period consisted of two examinations performed 1 week after discharge and 40 days postoperatively. On the postoperative 3rd week. Brachytherapy and external beam radiotherapy was administered. At the 1-year follow-up, the patient did not experience any early or delayed complications, such as the bowel obstruction, occlusions, or an enterocutaneous fistula.

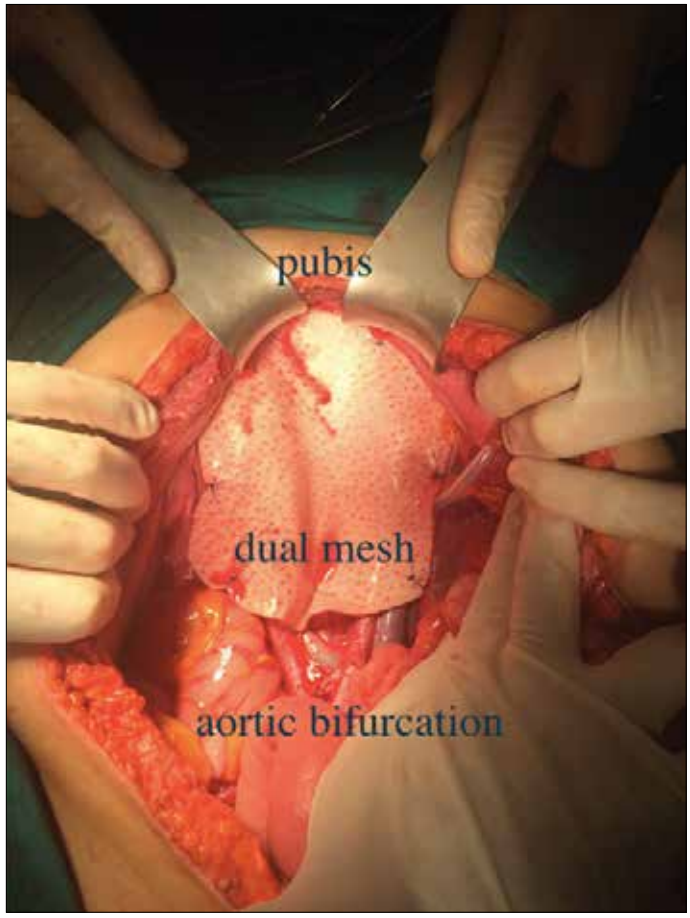

Figure 1. Placement of the porcine dual mesh

DISCUSSION

Ionizing radiation is used as the primary choice in 25% of all cancer cures, and 75% of patients receive it during the course of the disease (1, 2). Due to the abdominal or pelvic radiotherapy administration, gastrointestinal side effects, called radiation enteritis, may occur. Radiation enteritis can be classified as acute or chronic. Acute gastrointestinal side effects include bloating, colicky abdominal pain, appetite loss, nausea, and diarrhea. They occur during the 2nd week of the treatment, peak by the 4th or the 5th week of the exposure, and resolve within 3 months (1, 2). The occurrence of chronic gastrointestinal side effects depends on the small bowel damage, and they generally arise between 18 months and 6 years.

Among numerous interventions including technical strategies, which aim to physically shift the radiation dose away from the normal tissues, or medical strategies, which aim to modulate the cellular and tissue response to ionizing radiation, surgical placement of absorbable mesh slings and silicone prostheses have been described as a pelvic obliteration technique to keep the small intestines away from the adjuvant boost field (3-5).

The development of acute or chronic bowel toxicity and the severity of the bowel toxicity are directly associated with the volume of irradiated small bowel. In a study by Baglan et al. (6), it was reported that the Grade 3 small bowel toxicity was developed to a degree of 0%, 30%, and 70% in those patients with the irradiated volume of small bowel smaller than 150 cm^3, between 150 and 299 cm^3, and greater than 300 cm^3, respectively. Obliteration of the pelvic brim with a dual mesh can give opportunity to apply a higher parametrial radiotherapy dose without limiting the central dose that increases the bowel toxicity. At surgical intervention, absorbable polyglycolic acid mesh slings, tissue expanders, or pelvic prosthesis should be used to displace the small bowel out of pelvis, and it was reported in the literature that the volume of small bowels should be reduced for approximately 50%–66% with the use of only mechanical methods (7). This approach can be suitable in patients with a R2 resection who need further treatment (3-5). Devereux et al. (5) reported a case series of 60 patients who were inserted a polyglycolic acid mesh sling after resection of gynecologic or rectal malignancies, and after a mean follow-up of 28 months, there was no cases of radiation-induced bowel injury reported. In another case series of 45 patients who had resectable rectal carcinoma, Dasmahapatra and Swaminathan (8) reported similar results to those of Devereux et al. (5). In our case report, we inserted porcine dermal implant after pelvic exantration and did not encounter any bowel injury after abdomino-pelvic external radiotherapy. Also, in our case report, we placed Permacol™, a porcine dermal mesh, to remove the small bowels out of the boost area. The follow-up period was 2 years for both patients, and we did not observe any acute or chronic small bowel toxicity after the ionized radiation exposure. We preferred Permacol™ because of a better tissue compatibility.

CONCLUSION

Insertion of a dual mesh or silicone prosthesis seems to be an effective option to prevent a bowel injury due to ionizing radiation.

Informed Consent: Written informed consent was obtained from patient who participated in this case.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - S.C.U.; Design - N.P.; Data Collection and/or Processing - N.P.; Analysis and/or Interpretation - B.E.; Writing Manuscript - N.P.; Critical Review - Ö.A.; Other - S.C.U., N.P., B.E., N.A.S., Ö.A.

Conflict of Interest: Authors have no conflicts of interest to declare.

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