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May the rectus abdominis myocutaneous flap be the best option for the reconstruction of complicated large defects of pelvic exenteration for vulvar malignancies after pelvic radiation?

Case Report

Ates Karateke, Cetin Cam, Cem Celik*, Bahar Baykal, Ozgur Aydin Tosun

Zeynep Kamil Teaching Hospital, Department of Obstetrics and Gynecology, 34590 Istanbul, Turkey

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Abstract: Reconstruction of the large defects that develop after pelvic exenteration with local flaps may result in higher morbidity because of poor perineal wound healing after pelvic radiation. A well vascularised reconstructive flap originating from distant non-irradiated areas is needed. We report two cases of pelvic exenteration and rectus abdominis myocutaneous flap procedure in patients with recurrent vulvar malignancies that had undergone external beam pelvic radiation and subsequently developed pelvic fibrosis, necrosis and fistulas. Both flaps were totally viable postoperatively; the abdominal wound healed without any complication, no perineal wound complications developed with a follow-up of nine months. In conclusions, rectus abdominis myocutaneous flap reconstruction seems to be an ideal option for the large defects resulting from exenteration operations in patients with previous perineal radiation.

Keywords: *Pelvic exenteration • Pelvic reconstruction • Rectus abdominis myocutaneous flap • Vulvar cancer • External beam pelvic radiation*

1. Introduction

The noncollapsable dead space and large defect created by radical resection after pelvic exenteration combined with previously irradiated, poorly vascularized field, increases perineal wound complications [1-2]. Use of the rectus abdominis myocutaneous (RAM) flap is well documented in perineal reconstruction after pelvic exenteration. In wounds that have been previously irradiated, such a well-vascularised flap has reduced the rate of wound complications and bowel obstructions [3].

RAM flap serves a wide arc of rotation based on the consistent inferior epigastric artery pedicle, large tissue bulk, consistent viability, minimal donor site morbidity, and the relative ease and speed with which the flap can be raised [4].

We report two cases of RAM flap reconstruction that had previously undergone external beam pelvic radiation and developed associated complications.

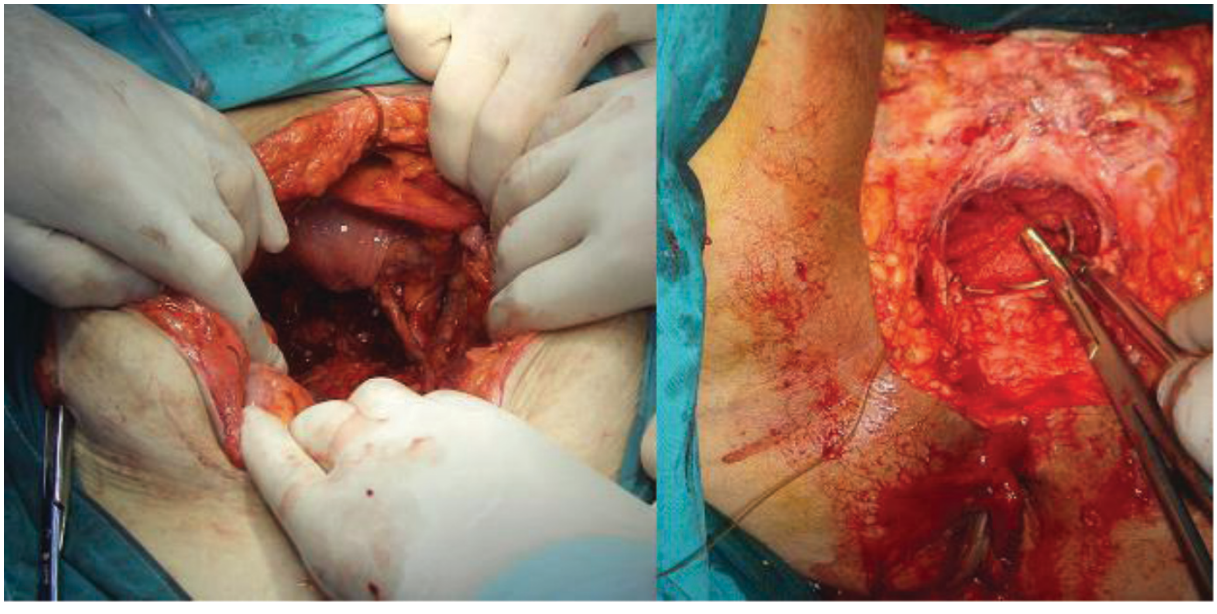
2. Case Report

Both patients had a history of previous radical operation and radiation because of squamous cell vulvar carcinoma. (Figure 1) Recurrent disease was treated with anterior and posterior pelvic exenteration operations in patients with urethral and anorectal involvement, respectively.(Figure 2) Both pelvic defects were constructed with RAM flap. The operation time was approximately 7 hours (6' 50'' and 7' 15''). The patients stayed in the hospital for 24 and 27 days. The patients were followed for wound complications at donor and recipient surgical sites. No complications such as wound infection, necrosis, fistula, hernia and bowel obstruction were observed. At postoperative ninth month both of the flaps were excellent and the donor sites were healed without any complication.

* *E-mail: cemcel@yahoo.com*

Figure 1. Preoperative conditions.

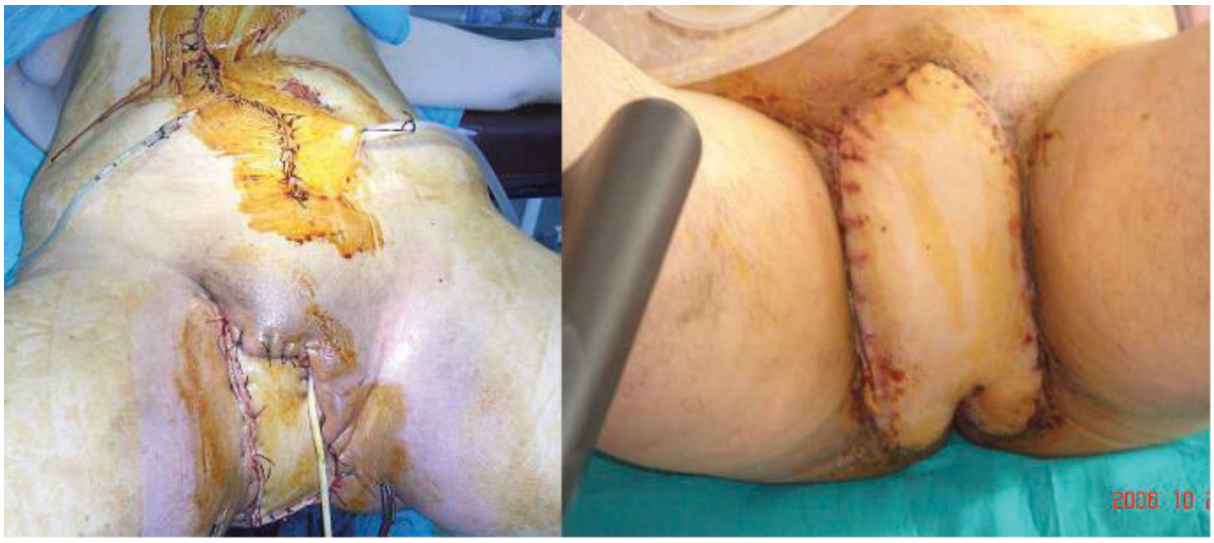
Figure 2. Large perineal defects.



2.1 Surgical Technique of vertical RAM

A full-thickness ellipsoid flap of skin and adipose tissue measuring 10–12 cm vertical x 7–8 cm horizontal was developed above the level of the arcuate line extending to the costal margin with preservation of the posterior rectus fascia. The anterior rectus fascia was incised in a slightly smaller ellipse reflecting the skin island, leaving a 6–8 cm and 4–6 cm fascial defect. The rectus muscle was divided adjacent to the cranial border of the flap and separated from the posterior sheath after loosely suturing the skin to the fascia of the flap to prevent any damage to the perforating vessels during the procedure. The Myocutaneous Island was mobilized and the rectus muscle was dissected from the anterior and posterior sheath to its insertion onto the symphysis, The inferior epigastric vessels along the posterolateral surface of the muscle were preserved where they crossed the lateral border of the muscle at the level of the arcuate line. The distal rectus muscle was not divided below the level of the vascular pedicle. The flap was rotated into the pelvis medially below the arcuate line such that the vascular

Figure 3. Postoperative conditions.



pedicle was not on tension. The flap was secured in place without tension by using multiple layers of sutures. Donor sites were repaired with primary closure without any mesh and closed suction drains were placed. (Figure 3) Perioperative prophylaxis for infective and thromboembolic complications was carried out in both patients.

4. Discussion

The most common vulvar cancers are squamous cell carcinomas. With stage 3-4 vulvar squamous cell carcinomas, extension to vagina and anus is common but distant metastases are rarely seen. Therefore, radical excisions can still produce adequate tumor control in most cases. Extensive resection of perineal structures is often required [5].

Pelvic exenteration is an important salvage therapy for advanced or recurrent pelvic malignancies. Pelvic exenteration itself decreases the viability of pelvic tissues and history of irradiation further affects the healing process [3,6]. Recent studies point out that individualized reconstructive surgery of the vulva leads to improved results in patients with recurrent vulvar cancer [7]. Various authors have linked reconstructive procedures with improved primary healing, reduced rates of intestinal complications, and reduced rates of infection [3,6,8]. Nevertheless pelvic irradiation can result in severe radiation fibrosis, necrosis, and fistulas [9]. These situations increase the concerns on the success of reconstructive operation after exenteration.

Myocutaneous flaps have some advantages such as providing a good source for neovascularization in irradiated tissues and obliteration of large pelvic defects [10]. Therefore they are more effective as a bulky tissue in the reconstruction of large defects compared to thinner fasciocutaneous flaps [11].

Many types of myocutaneous flaps for perineal wound reconstruction are reported. The gracilis myocutaneous flap is the preferred option for reconstruction of defects after simple vulvectomy procedure, but it is insufficient for the defects resulting from distal vaginal and anal resection [12]. High rate of gracilis flap loss secondary to vascular compromise (11–37 %) has been reported and another report showed overall perineal complication rate of 37% in 16 patients who underwent abdominoperineal resection and intraoperative radiotherapy [13,14]. The flap size is often inadequate for the reconstruction; therefore bilateral flaps are often necessary. This situation causes longer operation times, additionally leaving an unfavorable scar tissue in a donor site [11]. Finally, gracilis flaps have an inconsistent blood supply, a limited arc of rotation, difficulty in orienting the skin to the muscle and often lack the bulk required for adequate obliteration of the pelvic dead space [12,15].

Other described flaps include the gluteus and tensor fascia lata flaps. The gluteus flap is difficult to harvest, huge, and poorly contourable [16] and is associated with perineal wound complications in up to 44% of cases [2]. The tensor fascia lata flap results in a significant donor defect, lacks muscle coverage for radiation protection, and cannot reach to low perineal areas. For these reasons both of these flaps have severe limitations and they may lead functional impairment in ambulatory patients [16].

The omental pedicle flap has also been used to obliterate the pelvic dead space [17-18], but because of

its loose structure, inconsistent size and limited mobililty, it doesn't protect the irirradiated, poorly vascularized perineal tissue. This is intimately associated with perineal wound morbidity [19].

Vertical RAM flaps have consistent blood supply, better arc of rotation and bulky tissue needed for large pelvic defects. Therefore they seem to have higher efficacy and reliability when compared with other fasciocutaneous flap procedures [12]. Its surgical technique is simple, and its vascular supply supports large skin paddle and allows manipulation and reconstruction at lower and upper perineal areas. Additionally associated with lower failure rate and high reliability [20,16]. The advantages over gracilis flap are: better reliability, lack of unfavorable scarring and decreased risk of prolapse [7,21]. It has been stated that, in some author's opinion, RAM flap should be the first choice in neovaginal reconstruction because of it's remarkable advantages over than gracilis flap; reliable vascular pedicle, acceptable donor site scar and the ease of bringing the flap through pelvis via primary exenterative incision [4,7]. Flap necrosis rate is significantly lower than gracilis flaps [9].

Although publications state that complications of the donor site and nonperineal areas are acceptable and other morbidities are not increased [12,19], Smith and colleagues reported that 23% of patients required Marlex mesh for fascial closure of the abdominal incision [14], and in another recent report it was published that 14% of major complications were related to donor site [22]. Body mass index (BMI) seems to be correlated with complication rate, as Carsion et al reported correlation between flap loss and increased BMI. Flap may not fit to pelvis if the abdominal wall is too thick at donor site [23]. The BMI of our patients were 29 and 30, respectively, and despite their thick abdominal wall, primary closure of the defect without complications was possible.

In sexually active patients, perineal reconstruction should involve a neovaginal component. Reconstructions without creating a neovagina were found to be associated with high postoperative complications [9,24].

Both of our patients were sexually inactive and a neovagina was not necessary.

Previous applications on rectus abdominis muscle such as stomas or incisions, which comprise the vascular supply of abdominal wall (such as Maylard or Cherney incisions), may result in flap loss [11]. Patients with a history of abdominal wound incisions should be evaluated carefully, and there should be no suspicion about the type of the surgical incision.

In conclusions, RAM flap has advantages and good results on advanced vulvar cancer patients who were preoperatively irradiated compared to other types of myocutaneus reconstructive procedures. Furthermore, most experienced gynecologic oncologic surgeons are familiar with the abdominal donor site and harvesting of the flap can be performed without the need of any other surgical specialist (e.g. plastic surgeon). Our results in two cases were excellent and we think RAM flap may be the best option for poor healing of complicated tissues after extensive pelvic surgery. Further prospective studies may enable us to better understand the role of Ram flap reconstruction in decreasing perineal wound morbidities in such complicated cases.

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