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Laparoscopy-assisted immediate vaginal reconstruction with a vertical pedicled deep inferior epigastric perforator flap for primary melanoma of the vagina

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Abstract

The vagina is a rare site for primary melanoma. Here, we report on a case of laparoscopy-assisted immediate vaginal reconstruction with vertical pedicled deep inferior epigastric perforator flap.

KEYWORDS

DIEP, melanoma, treatment, vagina, vaginal reconstruction

1 | INTRODUCTION

We report on laparoscopic type B2 total radical colpohysterectomy with upper-two-thirds vaginectomy and laparoscopy-assisted immediate vaginal reconstruction with vertical pedicled deep inferior epigastric perforator flap for primary melanoma of vagina. The advantages of laparoscopy include a lower frequency of abdominal wall sequelae and better postoperative quality of life.

Mucosal melanoma is caused by the malignant transformation of pigment cells (melanocytes) in the mucosae of the respiratory, digestive, or genital tracts. Melanocytes can be found in the basal portion of the vaginal epidermidis in 3%

of adult women.[1] Mucosal melanoma is twice as frequent in women as in men. The vulva is the predominant site for melanoma in the female genital tract (accounting for 70% of cases), followed by the vagina (21%) and the cervix (9%).[2] The incidence of primary melanoma of the vagina (PMV) is about three per 10 000 000 women per year, and this subtype accounts for 0.3% of all melanomas and less than 3% of all vaginal cancers.[3] It is typically diagnosed in older women. With a 5-year overall survival rate below 20%, PMV is characterized by early recurrence and a poor prognosis relative to cases of vulvar or cutaneous melanoma.[4,5] Complete excision of the tumor (with radical excision of the parametrium and the paravaginal region) is mandatory. The void created in the

pelvis may lead to fluid accumulation and bowel translocation, with a high risk of postoperative morbidity. The objective of vaginal reconstruction is to improve patient's quality of life, body image, and sexual function[6,7] and also helps to prevent empty pelvis syndrome.

The deep epigastric inferior perforator (DIEP) flap is one option for surgical reconstruction of the vagina. This large, thick perforator flap can fill the pelvic cavity and is malleable enough for construction of a neovagina. Here, we report on a case of a laparoscopy-assisted immediate vaginal reconstruction with a vertical pedicled DIEP flap for PMV. We then discuss and the value of this treatment strategy with regard to other available techniques for reconstruction of the vagina.

2 | CASE REPORT

A 48-year-old woman with an unremarkable medical history began to experience mild, recurrent vaginal bleeding between her periods. An examination of the vagina revealed an irregular, solid, nonadherent, brown nodule (diameter: 25 mm) of the upper third of the left vaginal wall—Figure 1A). Both the parametrium and the rectum were free of palpable lesions. There were no inguinal lymph nodes, and a whole-body examination of the skin did not produce any evidence of cutaneous melanoma. A pathology assessment of a full-thickness biopsy confirmed the diagnosis of PMV. The pretreatment assessment consisted of rectal ultrasound, MRI (Figure 1B), and PET-CT. Preoperative staging procedures showed no signs of regional or distant metastases. The inferior epigastric vessels' vascular network was assessed with CT angiography (Figure 2A,B). A multidisciplinary tumor board prescribed surgery as the primary treatment. After the patient had been informed about the suggested treatment and had given her consent, we scheduled sentinel lymph node excision and laparoscopic type B2 total radical colpohysterectomy with upper-two-thirds vaginectomy and vaginal reconstruction using a DIEP flap. The surgical team comprised a gynecologist trained in pelvic and oncological surgery and a plastic surgeon trained in perforator flap techniques. The surgery was performed under general anesthesia with additional, patient-controlled epidural analgesia.

The first step in surgery involved a vaginal approach. Combined sentinel lymph node detection with blue dye and radiocolloid was performed, with intraepithelial injection at the edge of the tumor. Circumferential colpotomy was delineated with a 20-mm safety margin. Next, a laparoscopic approach was initiated. The port site for the laparoscope was located above the umbilicus. Three operating 5-mm trocars (two in the iliac fossa and one in the left flank) and one 11-mm supra-pubic trocar were implemented, taking care not to injure the inferior epigastric vessels. The
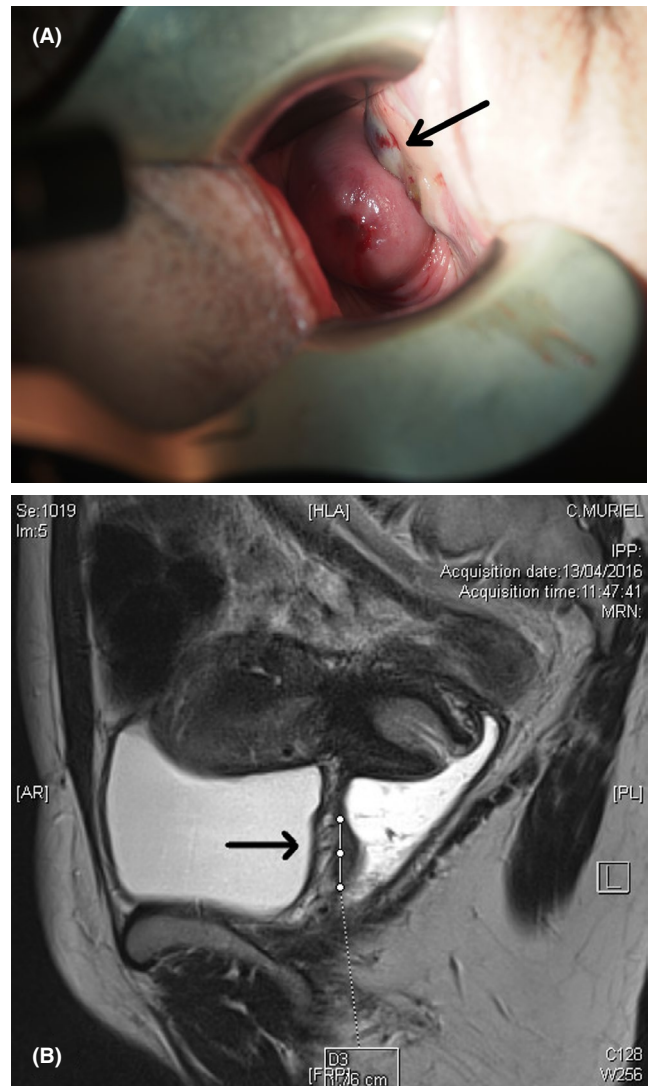

FIGURE 1 Vaginal examination (A) of the PMV lesion. Black arrow: PMV lesion. MRI-T2 sequence (B) of the PMV lesion. Black arrow: PMV lesion

frozen-section pathology assessment of three sentinel lymph nodes confirmed the absence of lymphatic dissemination. A nonconservative type B2 total radical hysterectomy[8] with upper-two-thirds vaginectomy was then performed. A senior plastic surgeon then harvested the DIEP flap. The flap was designed vertically on the left side of the abdomen and centered on the perforator vessel, which was transilluminated with the laparoscope's cold light source (Figure 3A,B). The DIEP flap pedicled on the left-side inferior epigastric artery in front of the inguinal ligament was then transferred into the pelvic cavity. In order to avoid subsequent vascular twisting, the flap was positioned behind the left ureter and umbilical artery (Figure 4A). The flap's two edges were then sutured together using interrupted absorbable sutures, in order to give the flap a cylindrical shape (Figure 4B). The lower part of the flap was securely fastened to the remaining vagina, using a combined laparoscopic and vaginal approach.
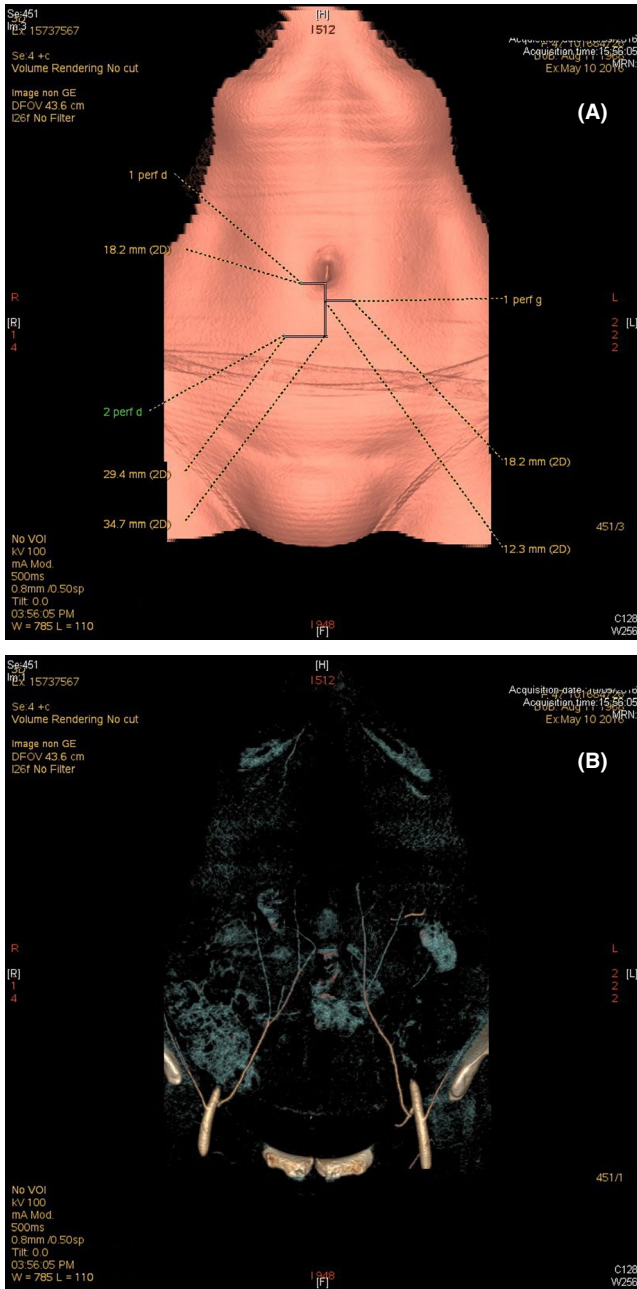
FIGURE 2 CT angiography of the deep inferior epigastric artery (A). A CT scan of the vascular network (B)

The neovagina was about 20 cm long (Figure 5). A mandrel was left in the neovagina for 2 days. With regard to the abdominal wall, transposition of the umbilicus was necessary. Nevertheless, the wound was closed without tension and with drainage. The total operating time was eight hours, and the peroperative blood loss was below 300 ml. The patient was discharged from hospital 7 days later. There were no grade 3 postoperative complications graded according to the Clavien-Dindo classification.[9] Hence, total excision of the PMV (with free margins and no lymph node involvement) was achieved. The Breslow index was 13 mm and the smallest healthy margin was 25 mm, corresponding to stage IB in the 2017

FIGURE 3 The inferior epigastric vessel transilluminated with the laparoscope's cold light source (A). EA: inferior epigastric artery

American Joint Committee on Cancer classification. No somatic B-RAF, N-RAS, or C-Kit mutations were identified. One month later, the vaginal wound had healed almost completely, and whole-body CT did not evidence recurrence or metastasis. However, metastatic disease (without any local recurrence) occurred seven months later and led the patient's death (despite immunotherapy).

3 | DISCUSSION

The first use of a pedicled DIEP flap for vaginal reconstruction was described in 2006, in the context of surgical management of congenital vaginal agenesis.[10] This method is known to be associated with fewer postoperative complications, such as wound infections and flap loss. The study by Qiu et al reported total and partial flap loss rates of, respectively, 14.3% and 23.8% for transverse rectus abdominis myocutaneous (TRAM) flaps but no losses at all for DIEP flaps.[11] Thanks to the length of the epigastric pedicle, the DIEP flap does not require microsurgery
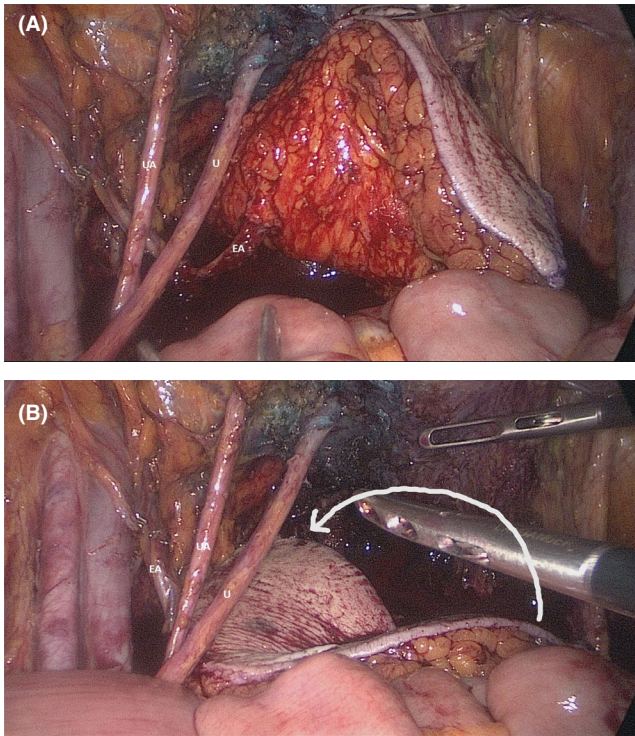
FIGURE 4 Laparoscopic view of the DIEP flap after its transfer to the pelvic cavity (A) EA: inferior epigastric artery UA: umbilical artery U: ureter. Laparoscopic view of the DIEP flap after its transfer to the pelvic cavity (A) EA: inferior epigastric artery UA: umbilical artery U: ureter. Laparoscopic view of the DIEP flap just before vaginal reconstruction (B) EA: inferior epigastric artery UA: umbilical artery U: ureter White arrow: The flap's two edges were sutured together, to give the flap a cylindrical shape
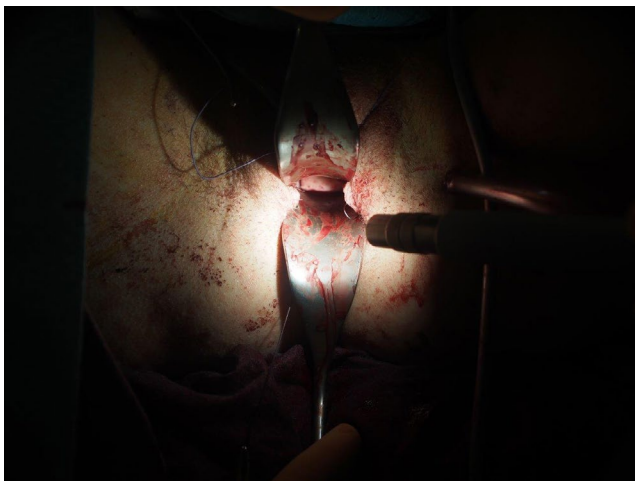

FIGURE 5 View of the neovagina after reconstruction by the DIEP flap. The length of the vagina is estimated by the length of the vaginal valve

for vascular anastomosis during vaginal reconstruction; this reduces the surgical risk of thrombosis. Vertical rectus abdominis myocutaneous (VRAM) and TRAM flaps can also be used for vaginal reconstruction but are thicker

and are associated with a greater prevalence of abdominal wall complications (hernia or weakness). Moreover, DIEP flaps are quicker to harvest than TRAM flaps (63 minutes vs 105 minutes, respectively, according to Qiu et al[11]). In a randomized study, the DIEP flap had less of an impact on abdominal muscle strength than the TRAM flap did.[12] As shown by Kaartinen et al,[13] the main complication of TRAM or DIEP flap reconstruction is abdominal hernia. Thus, the researchers recommended the use of an alternative donor site (eg, a transverse musculocutaneous gracilis flap) to spare the abdominal wall—albeit at the cost of a high necrosis rate (13%-38%).

Due to the PMV's proximity to the urogenital tract and the anus, partial or total vaginectomy results in a three-dimensional centropelvic and centroperineal defect in a high-risk anatomical area. Surgical planning depends on the height of the defect, the need for associated procedures (such as lymph node dissection, or exenteration), and the patient's comorbidities. Fasciocutaneous flaps are known to be associated with lower donor site morbidity, and a wide range of perineal flaps have been described in the coverage of perineal defects.[14,15] Nonetheless, laparoscopic DIEP flap placement has two advantages: a thick flap with a long vascular pedicle and a minimally invasive approach that decreases the occurrence of abdominal wall sequelae. Laparoscopic DIEP flap placement therefore appears to be of value for upper-two-thirds vaginal reconstruction because perineal flaps may be too short. Comprehensive preoperative imaging (MRI or CT angiography) is essential for detecting contra-indications to DIEP harvesting, such as damage to epigastric or perforator vessels during previous abdominal surgery.[7,16] Vaginal reconstruction has several objectives, including sexual rehabilitation.[7,14] However, Love et al's[17] 2-year follow-up study reported that only 14% of patients having undergone vaginal reconstructions were sexually active after treatment. Qiu et al[11] reported that the DIEP flap neovagina was softer, more elastic, and more expansible than the VRAM flap neovagina because the former resulted in less muscle atrophy and thus less sclerosis.

There is no consensus on the best treatment for PMV. Conservative wide local excision, radical surgery, radiotherapy, chemotherapy, and immunotherapy have variously been recommended. Despite the advent of effective immunotherapy,[18] the prognosis of women with PMV remains poor. In one recent study, the mean recurrence-free survival time was 16.4 months and the mean overall survival time was 22.2 months.[19] Three large US cohorts of women with PMV have been described. The Surveillance Epidemiology and End Result database study[20] comprised 201 cases of PMV, with a median age of 68:70% of the women had undergone surgery, 50% had undergone regional lymph node dissection, and 40% had received

adjuvant radiotherapy. The overall 2- and 5-year survival rates were 24% and 15%, respectively, and radiotherapy did not prolong survival. The second study (based on the US National Cancer Data Base) comprised 206 cases of PMV.[21] Sixty-six percent of these patients were treated surgically, and 40% of them received radiotherapy. The 5-year overall survival rate was 14%. In the cohort from the MD Anderson Cancer Center,[22] 76% of the women had radical excision and 10% received radiotherapy (plus chemotherapy, in some cases). Remote recurrence (lungs and liver) was observed in 88% of patients, whereas local recurrence was observed in 1% only. Radiotherapy was associated with longer survival (16.1 months vs 29.4 months without radiotherapy). Petru et al[23] suggested that radiotherapy was an effective alternative to surgery for women with lesions measuring less than 3 cm. Given that the first site of recurrence was remote and the overall and free-recurrence survival times were similar, the benefit of radical surgery over local excision is subject to debate.[24] Nevertheless, these considerations do not call into question the need for a multidisciplinary surgical strategy and for compliance with the patient's wishes, in order to improve both effective wound healing and self-acceptance.

4 | CONCLUSIONS

We reported on a laparoscopy-assisted immediate vaginal reconstruction with a pedicled vertical deep inferior epigastric perforator flap (DIEP) and its positioning within the range of surgical rehabilitation options. The advantages of laparoscopy include a lower frequency of abdominal wall sequelae and better postoperative quality of life.

CONFLICT OF INTEREST
The authors report no conflicts of interest in relation to the present study.

AUTHOR CONTRIBUTIONS
P-FD: substantially contributed to the conception, design of the work, the acquisition, and analysis and interpretation of clinical and ultrasound data and have drafted the work or substantively revised it; DL and CV: acquired clinical data (dermatology); VC-C: acquired histopathologic data; IT-K: acquired data on CT scan; PM: substantially contributed to the conception, the acquisition, analysis, and interpretation of clinical data; NK: acquired clinical data (plastic and reconstructive surgery).

ETHICAL APPROVAL
The consent of the woman is available in the medical record and with the corresponding author.

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