

Case Report

# Deepithelialization of VRAM Skin Bridge for Perineal Reconstruction: Modified Technique

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## Abstract...

We present a modified surgical technique to improve both sexual and aesthetic outcomes for a patient undergoing oncologic Abdominoperineal Resection (APR) followed by Vertical Rectus Abdominis Myocutaneous (VRAM) flap reconstruction. Here, we describe a surgical technique involving deepithelialization and skin bridge formation.

**Keywords:** VRAM flap; Abdominoperineal resection; Reconstructive surgery; Surgical technique; DE epithelialization; Perineal reconstruction; Rectal cancer.

## Introduction

Abdominoperineal Resection (APR) is the curative or palliative resection of pelvic cancer including the involved urinary, reproductive and/or hindgut visceral structures, but leaves a large surgical defect in a challenging anatomic location in patients who oftentimes have surrounding irradiated tissue and/or poor immune status [1-3]. High rates of surgical-site morbidity following APR poses a reconstructive challenge to plastic surgeons [4]. Surgical defects may be repaired with primary closure, secondary closure or flap-based reconstruction (most commonly the rectus abdominis, myocutaneous, gracilis, or gluteal flap) [5], and the selection of which modality is a topic of debate across the literature. Some studies have indicated that even when primary closure is feasible, flap reconstruction may be the preferred reconstructive option due to decreased total perineal wound complications [6,7].

The Vertical Rectus Abdominis Myocutaneous (VRAM) flap is a well-known flap in the plastic surgeon's armamentarium, and is often the flap of choice by plastic surgeons for reconstruction following APR. This flap is particularly useful for reconstruction of the posterior vaginal wall due to its cutaneous paddle which

aids in the creation of the vaginal lining, bulk for obliteration of dead space, and the flap's reliable vascularity [8]. In comparison to the gluteal and gracilis flaps, studies suggest that the VRAM flap has significantly lower wound or flap complications [9].

Here, we describe the use of a modified technique of the VRAM flap for perineal reconstruction that includes De epithelialization and formation of a skin bridge to best reconstruct the native perineal surface anatomy.

## Case report

A 62 year-old female with history of primary rectal adenocarcinoma status post Lower Anterior Resection (LAR), Diverting Loop Ostomy (DLI), and chemoradiation six years prior, now presented with new-found metastasis involving the sacrum, uterus, and posterior vaginal wall. After review of the patient's current oncological status and thorough discussion of goals of care with the patient, surgical resection and reconstruction performed. The multidisciplinary surgical procedure includes efforts from General Surgery (Abdominal Perineal Resection (APR) with end-colostomy and small bowel resection; Intraoperative radiation therapy), Obstetrics & Gynecology Surgery (Open Total

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Hysterectomy (TAH), Bilateral Salpingo-Oophorectomy (BSO), posterior vaginectomy), and Plastic & Reconstructive Surgery (Myocutaneous Flap (VRAM) for Vaginal and APR reconstruction). A modified technique of the VRAM for Vaginal and APR reconstruction was utilized, as described below.

### Surgical technique

The patient was placed in a lithotomy position. APR with end-colostomy and small bowel resection (with intraoperative radiation therapy), TAH-BSO, and posterior vaginectomy were performed. Due to the patient's previous right-sided ostomy site, we used a left VRAM flap for reconstruction.

The VRAM flap was premeasured to reconstruct the posterior vaginal wall and perineum. The patient previously had a laparotomy with an incision around the right side of the umbilicus, therefore, the same incision was used. Identification of the posterior vertical rectus abdominis and separation from the peritoneal lining was performed.

Separation was continued until the arcuate line was reached. The posterior fascia was elevated off the entire posterior muscle superiorly. Attention was then turned to the anterior muscle dissection. First, the subcutaneous fat was separated from the rectus abdominis muscle superiorly and inferiorly. The muscle was elevated off the fascia moving superiorly until reaching the tendinous inscription. The muscle was freed from the inscription all the way to the lateral edge. Color doppler ultrasonography was utilized to identify multiple perforators. Further anterior fascia dissection proceeded, taking care not to avulse the identified perforators. The dissection continued until the remaining inscriptions were reached. To free the additional inscription from the underlying muscle, the same process as described above was repeated until the superior edge of the muscle was reached. At this point, the superior edge of the vertical rectus abdominis muscle was clamped and divided.

Attention was turned to the pre-measured surface for vaginal and perineal reconstruction. A skin incision was extended around the pre-measured area, and dissection through the subcutaneous fat proceeded until only the muscle and subcutaneous tissue (preserved based off of the perforators) remained. Indocyanine green dye was injected for the SPY machine sterile-ly. It was then flushed with 10 mL of normal saline. The SPY machine was then employed to ensure that all areas of harvested flap were viable. Areas that were nonviable were marked and excised accordingly.

The VRAM flap was now ready for transfer. It was carefully rotated and delivered through the opening of the vagina and perineal area. Moving down to the lithotomy position, the previous packing was removed and then from the vaginal opening, the flap was inset using 2-0 Vicryls. This was accomplished distally first, and then along both vaginal mucosal edges until reaching the introitus.

### Modified surgical technique

Standard prior techniques would continue sutures to create a linear, continuous vaginal, perineal, and rectal flap without anterior and posterior distinction. To better emulate native female anatomy with vaginal and anal area separation, our surgeon's modified technique constructs a skin bridge to mimic

these anatomic distinctions. The introitus location is marked on the VRAM flap, and then two triangles are DE epithelialized with their points meeting where the skin bridge will later be sutured over (Figure 1). Care is taken to avoid the flap's perforators. The introitus is closed at the meeting point of the two deepithelialized triangles. Once the vaginal introitus is formed, inset of the mucosa at the vagina and then the perineum is performed. The remaining perineal flap is inset while excess flap is deepithelialized and then tucked into the perineum. The rest of the perineum is closed (Figure 2).

Vertical Rectus Abdominis Myocutaneous (VRAM) flap showed good perfusion at one month and one year follow-up (Figures 3 and 4) and the patient had no intraoperative or post-operative complications. Deepithelialization of the skin bridge at the perineal border allowed for better inset of the VRAM flap with a better aesthetic and functional long-term outcomes.



**Figure 1:** Deepithelialization of VRAM flap prior to closure.



**Figure 2:** Perioperative results following closure of skin bridge.



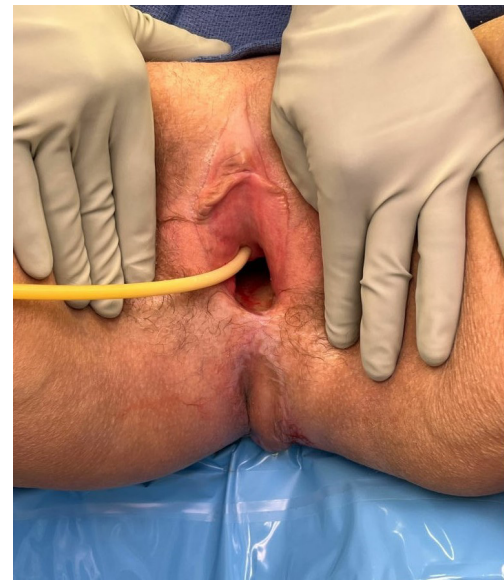
**Figure 3:** Postoperative results at one month.

### Discussion

Free flap tissue transfer is the standard for soft tissue reconstruction following many oncological resection procedures [10]. Specifically, the Vertical Rectus Abdominis Myocutaneous flap (VRAM) is commonly utilized for primary closure of large perineal defects, as it serves as a well-vascularized tissue which may contribute to reduced perineal wound complications following chemoradiotherapy without increasing abdominal wall complications [3]. With that being said, perineal flap morbidity rates remain high as demonstrated by Radwan et al. [11], states, “mean perineal flap morbidity was 27%, with a complete flap loss rate of 1.8% and a perineal hernia rate of 0.2%. Mean donor site morbidity was 15%, with an abdominal dehiscence rate of 5.5% and an incisional hernia rate of 3.3%.” Overall, although flap morbidity is significant, major complication risks remain low. Despite the risks in such patients requiring radical surgical resection due to progressive metastasis, the VRAM flap is commonly preferred by plastic surgeons as it offers the ability to modify flap design while maintaining proper vascularization throughout oncological treatments.

Although frequently used for such defects, the traditional VRAM technique for perineal reconstruction leaves patients with an undesirable external appearance. Not only does this have a profound impact on patients’ self-image, but adds additional distress as it limits patients’ sexual function post-operatively. The standard reconstructive technique leaves patients with a distorted body image due to the suboptimal flattened shape and lack of anterior and posterior separation. Our case illustrates how the addition of a minor step adds significant value to a patients’ aesthetic and functional outcomes. DE epithelialization of two triangles along the VRAM flap to then form a closed skin bridge creates a separation with defined anal and urogenital triangles. Emulating native female anatomy following major oncological resections has a profound impact on patients’ self-image and should be a plastic and reconstructive surgeon’s priority while performing such operations.

It is critical to manage each case based on patients’ cosmetic and sexual goals. Variables may apply such as stage of metastasis and magnitude of oncological resection, comorbidities, and risk for infection. Although these should be accounted for and thoroughly discussed with each patient to best restore various forms of resections, we suggest that this minor modification be



**Figure 4:** Postoperative results at one year.

implemented in all applicable VRAM perineal reconstruction candidates. This new surgical technique adds significant value to the patient’s overall surgical result, psychological well being, and improves upon sexual functionality following major oncologic resections.

### Conclusion

The key to successful APR utilizing the VRAM flap is to best emulate native surface anatomy. We believe that the utilization of our modified technique involving DE epithelialization and formation of a skin bridge should be applied to similar patient cases, and offers a significant improvement to patient satisfaction.

### Declarations

**Conflicts of interest:** The authors report there are no competing interests to declare. The authors alone are responsible for the content and writing of the paper.

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