

# A New Technique for Pelvic and Vaginal Reconstruction in Abdominoperineal Rectal Excision: Combination of Gluteus Maximus Flap and Fasciocutaneous Flap

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**Summary:** Resection of advanced rectal cancer might result in significant tissue loss, including pelvic floor and parts of the vaginal wall. Pelvic floor reconstruction using a musculocutaneous flap offers optimized healing abilities and the possibility of vaginal reconstruction. In Skåne University Hospital, two different flap techniques are used to reconstruct the perineum: the vertical rectus abdominis musculocutaneous flap and the gluteus maximus (GM) flap. A combination of a GM flap and a fasciocutaneous flap, referred to locally as a GM special (GMS) flap, is used for posterior vaginal wall reconstruction in women undergoing abdominoperineal resections including parts of or the total posterior vaginal wall. The GMS flap was introduced through a national collaboration in Sweden in 2013. The aim of this article is to offer a detailed description and illustrations of the surgical technique used to construct the GMS flap, focusing on the posterior vaginal wall reconstruction. In our experience, the GMS flap is a resilient and cosmetically appealing choice that is technically easily harvested. The flap has acceptable morbidity and long-term results with adequate neovaginal measurements. Collaborative work is further encouraged. (*Plast Reconstr Surg Glob Open* 2023; 11:e5317; doi: [10.1097/GOX.0000000000005317](https://doi.org/10.1097/GOX.0000000000005317); Published online 9 October 2023.)

## INTRODUCTION

Advanced rectal cancer often requires extensive surgery to achieve negative resection margins.<sup>1</sup> Pelvic floor reconstruction using a musculocutaneous flap offers optimized perineal wound healing.<sup>2</sup> At Skåne University Hospital (SUS), Malmö, Sweden, a referral center for advanced rectal surgery, the gluteus maximus (GM) musculocutaneous flap has been the first choice for perineal

reconstruction since 2015. In women undergoing abdominoperineal rectal excision (APR) including parts of or the total posterior vaginal wall, leaving an intact anterior wall, a combination of the GM flap and a fasciocutaneous flap can be used to reconstruct the perineum and the posterior vaginal wall.

This combined flap technique, referred to locally as the GM special (GMS) flap, was introduced through national collaboration in Sweden in 2013. An article from another Swedish center describes a similar type of reconstruction.<sup>3</sup> This article describes the surgical technique for a GMS flap in detail, after further development at SUS, focusing on the added flap for posterior vaginal wall reconstruction.

## OPERATIVE TECHNIQUE

### Incision Lines for the Fasciocutaneous Flaps

The reconstruction is performed in the prone position, although the resections might be performed in other surgical positions.

Disclosure statements are at the end of this article, following the correspondence information.

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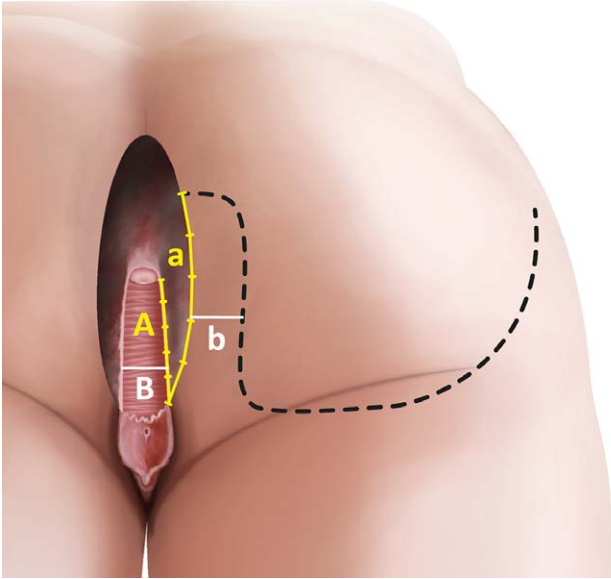
Received for publication April 25, 2023; accepted August 24, 2023.

This project was funded by Region Skåne FoU and MAS Cancer.

Presented at the Oral presentation of abstract at the annual meeting of the Swedish Surgical Society, August 26, 2022, in Sweden.

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DOI: [10.1097/GOX.0000000000005317](https://doi.org/10.1097/GOX.0000000000005317)



**Fig. 1.** The patient is placed in the prone position. The remaining vaginal tissue is measured, length A and width B. Using these measurements, the incision lines are created; A-a (in yellow), B-b (in white). The incision starts in a semicircular shape cranially, moving caudally and reaching the gluteal fold, creating the outline of the transpositional flap (vaginal reconstruction). The incision continues in an arc shape toward the trochanter major, creating the rotational flap (perineal reconstruction).

The procedure starts by measuring the length and width of the vaginal defect (Fig. 1). These measurements, indicated by lines A and B, are used to mark the incision lines, a and b, for the fasciocutaneous transpositional flap. The width-to-length ratio is preferably 1:3, although a smaller ratio is well tolerated. The incision starts cranially in a semicircular shape, continuing caudally until reaching the gluteal fold and creating a fasciocutaneous transpositional flap with an intact base used to reconstruct the posterior vaginal wall. The incision line continues in an arc just below the gluteal fold toward the trochanter major, creating the outline of the fasciocutaneous rotational flap needed to cover the perineal defect.

#### Vaginal Reconstruction; Fasciocutaneous Transpositional Flap

A deep incision through the skin and subcutaneous tissue is used to attain sufficient elevation of the fasciocutaneous transpositional flap. The flap is not dissected from deeper tissues to protect perforating vessels.

When the dissection is complete, the flap is sutured to the remaining vaginal wall using a continuous resorbable suture (4-0), beginning ipsilateral to the origin of the flap. (See figure, Supplemental Digital Content 1, which shows how the incision into the subcutaneous tissue elevates the fasciocutaneous transpositional flap, <http://links.lww.com/PRSGO/C801>.) The sutures are placed from inside the vagina starting cranially and are completed at the introitus. The flap is then turned 180 degrees against its medial border, creating a cylinder with the remaining vaginal tissue (Fig. 2). The vaginal top and the contralateral

#### Takeaways

**Question:** A reconstructive challenge is posed in women with advanced rectal cancer requiring abdominoperineal excision including the posterior vaginal wall.

**Findings:** The gluteus maximus special (GMS) flap, which consists of a fasciocutaneous transpositional flap, is used to recreate the posterior vaginal wall. After an incision through skin and subcutaneous tissue, the flap is turned 180 degrees against its medial border, creating a cylinder with the remaining vaginal tissue.

**Meaning:** The GMS flap is a resilient, technically easily harvested, and cosmetically preferable flap choice with scarring that follows the natural landmarks.

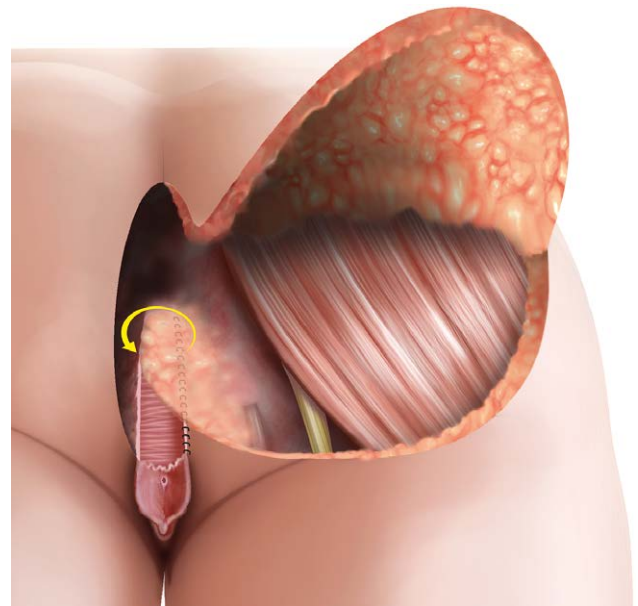
side are sutured extravaginally. The introitus is created by a tension free transposition of the base of the flap to the contralateral aspect of the vaginal defect to prevent distortion of the introitus.

#### Fasciocutaneous Rotational Flap

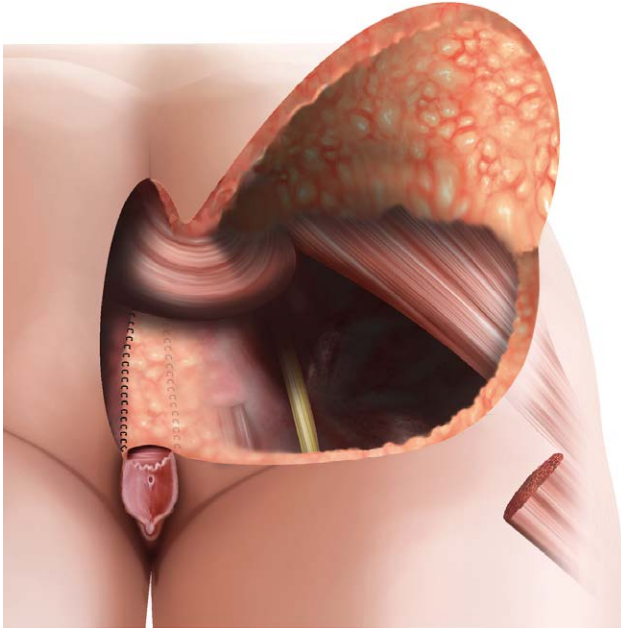
The fasciocutaneous layer is partially separated from the muscle to complete the construction of the flap and access the GM muscle (Fig. 2). Further dissection is discouraged, to protect perforating vessels. In most patients, the inferior gluteal artery is kept intact. Inferior cutaneous nerve branches may be divided when raising the flap.

#### Muscular Transpositional Flap

The elevation of the muscular transpositional flap begins with dissection along the GM, approaching the



**Fig. 2.** To achieve the cylinder shape of the neovagina, the transpositional flap is turned 180 degrees against its medial axis. Most of the deeper tissue is kept intact to assure adequate vascularization. The remaining suturing is carried out from the outside of the vagina in a continuous manner.



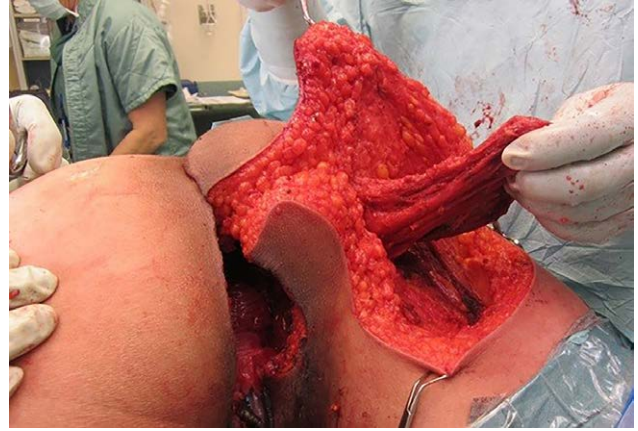
**Fig. 3.** The muscle is divided in the direction of the fibers along its length toward its origin, creating a muscular flap. The muscular flap is cut close to its insertion. The flap reaches the opposite side of the defect without tension, recreating the deep parts of the pelvic floor. Suturing the flap against underlying tissue starts at the coccyx, continuing along the borders of the defect.

insertion caudolaterally. Two-thirds of the width of the muscle is normally required to fill the defect without tension. The muscle is divided in the direction of the fibers and cut close to its origin creating a muscular transpositional flap reaching the opposite side of the defect (Fig. 3). Resorbable suture (2-0) is used to adhere the flap, commonly starting at the coccyx and continuing caudally on both sides of the defect.

To cover the superficial defect, the fasciocutaneous rotational flap is sutured using resorbable monofilament along the initial gluteal incision line. (See figure, **Supplemental Digital Content 2**, which shows the last step of adhering the fasciocutaneous flap to reconstruct the superficial perineal parts, <http://links.lww.com/PRSGO/C802>.) Figure 4 illustrates elevated flaps in a patient treated for rectal cancer. Patients follow a specific mobilization scheme postoperatively. They are encouraged to stand and walk from postoperative day 1. Sitting is allowed for a few minutes from day 13 and unrestricted after day 21.

### DISCUSSION

The use of flaps for perineal and vaginal reconstruction has been advocated in several publications in patients treated for pelvic malignancies with results suggesting a patient-tailored approach.<sup>4-8</sup> At SUS, the GMS flap is the main choice of reconstruction in women undergoing APR with posterior vaginal wall resection for anorectal cancer, with approximately 70 performed flaps since



**Fig. 4.** A GMS flap elevated in a woman treated for rectal cancer with resection of the posterior vaginal wall. The flap consists of a fasciocutaneous rotational flap intended to cover the superficial defect, a muscular transpositional flap that fills dead space, and a fasciocutaneous transpositional flap used to reconstruct the posterior vaginal wall.

2013. In this setting, the GMS flap offers adequate tissue volume needed to fill dead space, and consequently, the risk of empty pelvis is minor. The method is not suitable in patients undergoing larger vaginal resections such as anterior wall resections or colpectomies. Patients with substantial superficial tissue loss in the anterior perineal parts are also poor candidates. In these cases, the vertical rectus abdominis musculocutaneous flap is recommended.

A previous study conducted at SUS comparing short-term (90 days) complications in 105 patients treated for pelvic malignancies suggested lower flap-specific complication rates when using a GM/GMS flap compared to a vertical rectus abdominis musculocutaneous flap. Dehiscence affecting a limited portion of the flap was common (40%); the majority were treated conservatively. Most patients in the study underwent neoadjuvant radiation, which may debilitate wound healing.<sup>9</sup>

A previous SUS publication of long-term outcomes in 36 patients, 10 of whom were reconstructed using GMS flaps, demonstrated preserved quality of life and physical performance but high rates of sexual dysfunction. Measurements of the neovagina demonstrate adequate reconstructions using the GMS flap, with a median length and width of 100 and 28 mm, respectively, comparable to unoperated individuals. No cases of vaginal stenosis, sciatic nerve injuries, perineal hernia, or vaginal/perineal fistula were reported.<sup>10</sup> Patients are not routinely recommended to use silicon gauges, to prevent stenosis or strictures postoperatively. A common concern raised when using muscular flaps is atrophy over time due to denervation. In our setting cutting the inferior gluteal nerve seldom occurs.

In our experience, the GMS flap is a resilient, technically easily harvested, and cosmetically preferable flap choice with scarring that follows the natural landmarks. The morbidity is acceptable, and long-term outcomes are

satisfactory. We aim to continually develop reconstructive techniques, and future collaborative work is encouraged.

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#### DISCLOSURE

*The authors have no financial interest to declare in relation to the content of this article.*

#### ACKNOWLEDGMENT

*The authors' appreciation goes to Jan Funke for his work on the illustrations.*

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