



# Distal partial gluteus maximus musculocutaneous V-Y flap: a simplified technique for reconstruction of ischial pressure sores

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## Abstract

**Background** Ischial pressure sores are mostly seen in wheelchair-bound patients and they have a high risk of recurrence due to a multitude of reasons compared with sacral and trochanteric ulcers. Various treatment modalities have been presented but high recurrence rates maintain its importance.

**Methods** Between 2009 and 2016, a total of 14 patients with spinal cord injuries were operated on for a total of 17 Shea stage IV ischial ulcers with the described technique. Demographic variables were recorded. Postoperative outcomes were categorized as early and late complications. A partial distal portion of gluteus maximus muscle (not the whole) was dissected and freed from the femoral insertion. The muscle was used as a carrier for the triangular flap lying above. The muscle was transposed medially and the triangular flap was advanced in a V-Y fashion to cover the defect.

**Results** The follow-up periods ranged between 15 and 61 months. Among all the 14 patients, only one (7.1%) had a recurrence after 1 year postoperatively which needed an additional debridement and advancement of the previous flap. This patient had a non-recurrent period of 16 months after the second operative procedure. Wound dehiscence, as an early complication, was seen in one patient which healed secondarily.

**Conclusions** The distal partial gluteus maximus musculocutaneous V-Y flap is a simple and new approach with low complication rates for reconstruction of ischial pressure sores. Although there is still not an ideal flap for this challenge, the present technique could be a reliable option for the reconstructive armamentarium.

Level of evidence: Level IV, therapeutic study.

**Keywords** Ischial pressure sore · Myocutaneous flap · Reconstruction · Gluteus maximus

## Introduction

Ischial pressure sores are mostly seen in wheelchair-bound patients and they have a high risk of recurrence due to a multitude of reasons. These risk factors are shear force, spasticity, contractures, infections, and prolonged pressure on bony prominences [1]. Compared with sacral and trochanteric ulcers, ischial sores are considered the most difficult to treat with low success rates [2]. Spinal cord injuries represent the leading

cause of pressure sores. It is shown that approximately one-third of patients with spinal cord injuries develop pressure sores and most of them have more than one ulcer. Not only do they create an economical burden but they also constitute a medical burden for healthcare providers [1]. Thus, minimizing recurrences is a primary objective in ischial pressure ulcer treatment.

Flap selection is one of the major influences in reducing the re-operation rates [3]. Although there are various techniques described for reconstruction of ischial pressure sores, there is still a long-lasting debate on an optimal method of treatment. In pressure sore treatments, surgical techniques should be selected carefully by considering the following features: reproducible, simple, efficient, and use of flaps with low morbidities and low recurrence rates, fill dead space, and provide enough padding for the ischial tuberosity [4]. An ideal flap should ensure these features without a steep learning curve. Reconstructive surgeons should aim to approach this optimum

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method. Because recurrence rates of ischial pressure sores are high, simplicity and effectiveness should be the main determinant in flap selection so as to recover easily. Regarding the biomechanics of the ischial region, this study presents a new and simple modification in covering and reinforcing the mobile area.

## Patients and methods

Between 2009 and 2016, a total of 14 patients with spinal cord injuries were operated on for a total of 17 Shea [5] stage IV ischial ulcers with the described technique. Demographic variables including age, sex, co-morbidities (diabetes, immune deficiencies, etc.), preoperative hemoglobin and albumin levels, previous reconstructions, concurrent ulcers, and presence of osteomyelitis were recorded and presented on Table 1. All patients were either consulted from other clinics or applied from home-care facilities. Malnutritional status (albumin < 3.0 g/dL, Hgb < 10 g/dL, etc.), spasticity, and poor intellect of patient caretakers were exclusion criteria for surgery. Urethral catheterization was applied to all patients during surgery and maintained for 3 weeks post-operation. Postoperative outcomes were categorized as early and late complications. Early complications were defined as wound breakdown, dehiscence, hematoma, seroma, and partial or total flap necrosis. Late complications were characterized as ulcer recurrence, which was defined as separation of tissues occurring 1 year or more after the operation [6].

## Operative technique

Pressure sores with eschars or with poor granulation were debrided and tissue biopsies taken during outpatient visits. Patients with exposed ischial tuberosity and positive bone cultures were assumed to have osteomyelitis and were treated with intravenous antibiotics for 6 weeks. All

**Table 1** Characteristics of patients with ischial pressure ulcers

Number of patients	14 (12 male, 2 female)
Number of flaps	17
Number of previous surgery	8 patients (57.1%)
Age (years)	56.8 (38–74)
Number of osteomyelitis treated	5
Range of defect size	8 × 6–12 × 11 cm
Range of flap size	10 × 7–14 × 10 cm
Mean hospital stay	12.6 days
Duration of surgery	100–135 min
Range of follow-up time	15–61 months
Early complication	7.1% (wound dehiscence)
Late complication/recurrence	7.1% (healed with re-advancement)

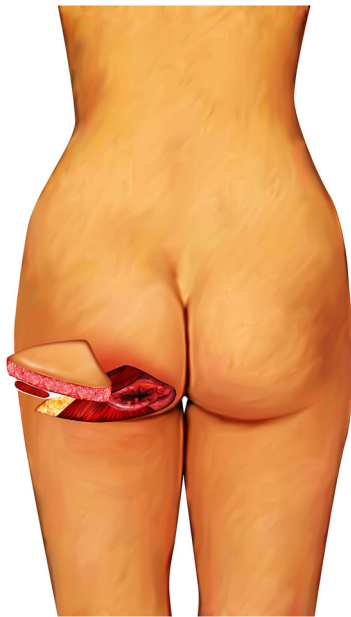
patients received a rectal enema the day before surgery. The operation was performed under general anesthesia with the patient placed in the 30° flexed prone position. Ischial tissue defects were debrided aggressively in a manner of malignant tumor extirpation so as to remove all fibrotic tissue. Care was taken to complete the bursectomy and blunt the ischial tuberosity conservatively. Bone wax was used for bone hemostasis. The overall dimension of the defect was measured and an appropriate triangular flap was drawn above the gluteal crease next to the defect (Figs. 1 and 2). Proportionate to the defect size, a partial distal portion of gluteus maximus muscle (not the whole) was dissected and freed from the femoral insertion with an electrocautery. The muscle was used as a carrier for the triangular flap lying above (Fig. 3). The muscle was transposed medially and the triangular flap was advanced in a V-Y fashion to cover the defect (Fig. 4). A drain was placed underneath the flap extending along the donor area. Care was taken to avoid any dead spaces and to maintain 3-layer closures over the ischial tuberosity. Simple sutures with 2/0 obtuse monofilament polyglyconate synthetic absorbable sutures (Maxon, Covidien, Mansfield, MA) were used to approximate the muscle fibers to the periosteum and/or gluteal plate. Skin closure was completed with staples. At the end, the tail and one side of the Y should fit on the gluteal crease. Surgical demonstration is shown in intraoperative views (Figs. 5, 6, 7, and 8).

## Postoperative care

In the immediate postoperative period, patients were allowed to lie in a supine position until reanimation

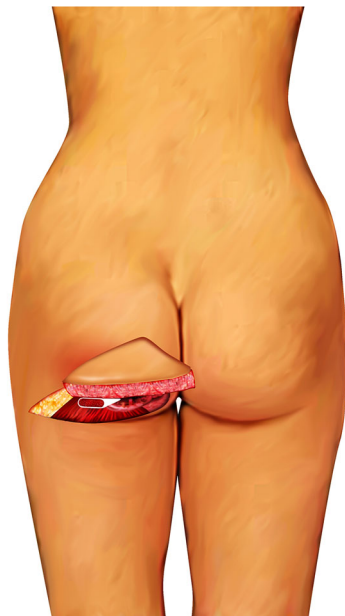


**Fig. 1** Overall dimension of the defect was measured

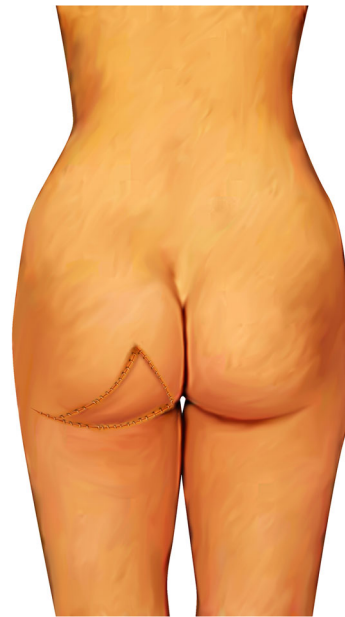


**Fig. 2** Triangular flap was drawn above the gluteal crease

was completed. All patients were placed in the prone position on air-fluidized beds for 3 weeks. They received a pulpless high-protein, high-calorie diet during this period. Dressings were cleaned with povidone iodine and changed daily. Drains were removed once the output was below 30 ml per day. Staples were removed after 3 weeks and patients were monitored by physical therapy and rehabilitation. Patients were discharged in this period unless they received intravenous antibiotics for the treatment of osteomyelitis. Meanwhile, the position was changed every 2 h for the bedridden patient. A strict sitting protocol was described to both the patients



**Fig. 3** Muscle used as a carrier

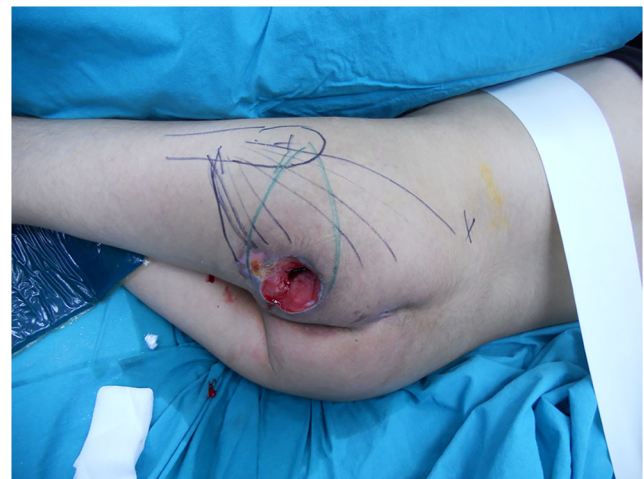


**Fig. 4** Triangular flap was advanced in a V-Y fashion to cover the defect

and their caretakers starting a month after surgery. One hour of sitting was permitted every day and was increased by 30 min every week until a total of 2 h of daily sitting was reached. Patients were allowed 10 min of sitting with 10 s of resting during this period. Monthly follow-ups were recommended for 1 year post-operatively and yearly afterwards.

**Results**

Two female and 12 male patients were included in this study. The mean age of the study population was 56.8 (38–74) years. All wounds were Shea stage IV with three having the ischial tuberosity exposed. Two patients had a positive biopsy culture and, in addition to them, a total of

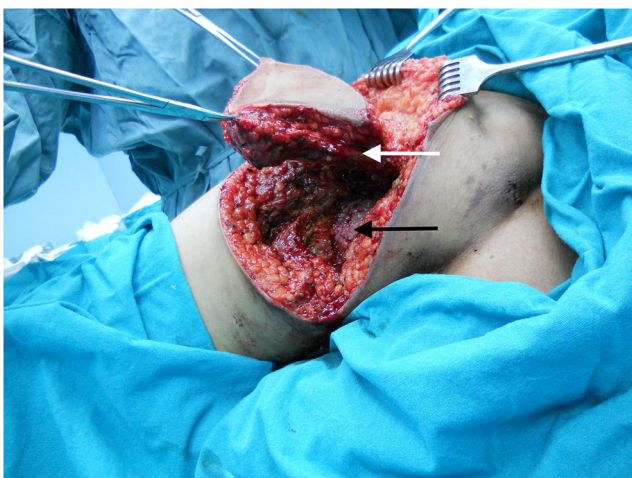


**Fig. 5** Planning of operation with hips in flexion



**Fig. 6** The distal portion of gluteus maximus muscle is freed. Note the mobility of the flap compared with classic fasciocutaneous V-Y flaps

five patients received osteomyelitis treatment. After wound debridement, the average size of the defects ranged from  $8 \times 6$  to  $12 \times 11$  cm. The mean hospital stay was 12.6 days and the duration of surgery was between 100 and 135 min. Three patients had bilateral ischial ulcers, while one had both ischial and trochanteric pressure ulcers. Some of the patients (8 patients; 57.1%) had previous surgery for reconstruction of various pressure ulcers. The follow-up periods ranged between 15 months to 5 years and 1 month. Among all 14 patients, only one (7.1%) had a recurrence after 1 year post-operation, which needed an additional debridement and advancement of the previous flap. This patient had a non-recurrent period of 16 months after the second operative procedure. Early complications such as hematomas and seromas were not seen, except in one patient who had a  $6 \text{ cm}^2$  wound dehiscence which healed with secondary intention. Patient demographics are shown in Table 1.



**Fig. 7** Flap elevated with muscle carrier. White arrow indicates gluteus maximus muscle underneath. Black arrow indicates bony prominence going to be covered with myocutaneous flap



**Fig. 8** Early postoperative view. Defect coverage with minimal donor site morbidity

## Discussion

All procedures in the literature have their own advantages and disadvantages. Despite the fact that there are numerous treatment alternatives, ischial pressure sores are still the most recurrent pressure sores and most patients have a history of more than one previous surgery for this reason [7]. Thus, alternative methods should be simple and re-applicable which could cover large ischial defects with enough padding and low morbidities. The authors believe that the present method could be a reliable treatment modality for ischial pressure sores.

Ischial pressure sore recurrence rates differ from 18.1 to 41.4% in the literature [6, 8, 9]. According to a review, ischial pressure ulcers treated with myocutaneous flaps have a recurrence rate of 8.9% while fasciocutaneous flaps have 11.2% [10]. Combination of muscle and fasciocutaneous flaps in ischial ulcer reconstruction is shown to have lower recurrence rates [11, 12]. This may be due to distribution of pressures over the ischial region by opposing tissues. However, the main disadvantage of the combined method is the long duration of operations. Our modification reduces the operational time and maintains low recurrence rates. Besides, being able to re-advance a flap is an advantage in cases of recurrence.

The importance of filling dead spaces with muscles in chronic cavities to prevent further infections and treat osteomyelitis has been emphasized in various studies [13]–[14]. Using gluteus muscle as a coverage of ischial regions provides low complication rates [12]. However, dissecting the whole muscle not only elongates the operational time but also disrupts probable ambulation. Thus, our modification reduces both disadvantages. In our experience, gluteus muscle was noted to be already atrophic in paraplegic patients. Partial detachment of the muscle would not only simplify the procedure but also

prevent from further atrophic degeneration. Nişancı et al. [15] have demonstrated promising results with a similar modification of this flap for coverage of trochanteric ulcers. In the present technique, only an adequate division of the muscle is transposed which does not need extensive dissection and does not deprive the major feeding vessels. Triangular skin island corresponding with the wound area also facilitates tension-free coverage of the donor area.

Combined techniques can be useful in preventing recurrences. It enables effective and durable coverage but is also time consuming. The combined techniques have a longer duration of surgery (3 to 4 h) with greater dissection areas compared with our method [16]. Di Pompeo et al. [17] described the anterolateral thigh flap for ischiatic sore reconstruction having a mean operational time of 212 min and covers medium-sized defects. Gracilis muscle flaps were also used in combination with fasciocutaneous flaps in order to obliterate dead space [18]. Although it necessitates additional incision sites which elongates the overall surgery time, it could be useful as an alternative. Our modification has reasonably lower operation times and is easily learned.

Retrospective design and small patient population are some of the limitations of this study. Pressure ulcer patients are not always good candidates for surgery. Thus, planning a study with a large population of ischial sore reconstruction cases is relatively hard. Nevertheless, low complication rates and operational time make this modification a promising option.

## Conclusion

Having a large repertoire of treatment methods is useful in various situations like recurrent pressure ulcers. Ischial pressure sores are privileged cases based on high recurrence rates. There are numerous treatment methods which could be designed with regard to the patient characteristics. The distal partial gluteus maximus musculocutaneous V-Y flap is a simple and new approach with low complication rates for reconstruction of ischial pressure sores. Although there is still not an ideal flap for this challenge, the present technique could be a reliable option for the reconstructive armamentarium.

## Compliance with ethical standards

**Funding information** Not applicable.

**Conflict of interest** Mustafa Nişancı and Mehmet Altıparmak declare that they have no conflict of interest.

**Ethical approval** This study was approved by “The Ethical Committee of Muğla Sıtkı Koçman University.”

**Informed consent** Not applicable.

**Participation consent statement** Mustafa Nişancı: creation of the idea, executing the operations, collecting data.

Mehmet Altıparmak: executing the operations, collecting data, writing the manuscript.

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