



Original Research Article

GLUTEAL ROTATION FLAP FOR TREATMENT OF PRESSURE SORE -A BEGINNER'S CHOICE

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ABSTRACT

Background: Ulcers due to pressure can be caused by a number of factors such as prolonged pressure which exceeds the pressure that maintains blood flow through the capillaries, or by shearing forces when skin moves over underlying bony prominences, friction or moisture, or by poor nutrition. These types of ulcers are very common among people who cannot move their bodies due to injury or neurological impairment and also have been found to result in significant health and financial problems. A variety of reconstructive techniques using surgical methods have been described for covering sacral pressure ulcers; however, there has been very little evidence regarding whether certain designs provide better results than others [1]. The gluteal rotation flap is a type of fasciocutaneous flap, based on gluteal perforators which do not involve the use of muscle and provides strong coverage of large areas of damaged tissue. Therefore, this study evaluated the outcome of gluteal rotation flaps in the treatment of sacral pressure ulcers.

Materials and Methods: We performed a prospective case series of 25 patients (19 male, 6 female; age range 23-74) with grade III-IV sacral pressure ulcers who received unilateral or bilateral gluteal rotation fasciocutaneous flaps between October 2023 and December 2024. All patients underwent complete debridement and flap planning medial to the greater trochanter and all were taken to the operating room for flap elevation in the prone position under general anaesthesia. Approximately ten days after surgery drains were removed from the patients, and all were instructed to remain in the prone position for two weeks post-operatively. Seven patients received split thickness skin grafts for coverage of the donor site, and six patients required bilateral flaps. Patients were followed up on average of fifteen months (range 8-24months) after the initial surgery.

Results: All twenty-five flaps survived and completely closed all of the sacral defects. Minor complications arose in five patients; four had superficial necrosis of the margin of the flap with slight dehiscence (which was managed conservatively), and one patient had recurrence of the ulcer at four months (due to failure to properly off-load the wound). There were no cases of total flap loss or deep infections. Twenty-four of twenty-five patients (96%) were successfully healed of their sacral pressure ulcer with the first surgery; one recurrence (4%) required revision. Average length of hospitalization was twelve days. Table 1 demonstrates patient demographics and clinical characteristics, and Table 2 lists post-operative outcomes.

Conclusion: The gluteal rotation flap provided reliable, tension-free coverage of sacral pressure ulcers with minimal morbidity in this series of patients. The simplicity of the procedure and preservation of the gluteus muscle make it easily re-elevated if necessary. Given its high success rate and low complication rate, the gluteal rotation flap is a great reconstructive option for sacral ulcers – a truly “novice-friendly” method for plastic surgeons.

Keywords: Pressure ulcer; Sacral ulcer; Gluteal rotation flap; Fasciocutaneous flap; Pressure sore.

INTRODUCTION

Pressure ulcers (decubitus ulcers), as well as the potential complications that may arise from the ulcers themselves and their treatment, continue to pose a major concern to patients with spinal cord injuries, those who are immobile, and individuals who experience various forms of neurological deficits. Pressure ulcers occur due to an individual's prolonged exposure to sustained pressure and shear force, resulting in the reduction of local blood flow and subsequent tissue ischemia and necrosis. Additional contributing factors to the development of pressure ulcers include friction, moisture and inadequate nutrition. Due to the resistance to healing and tendency to recur, the management of pressure ulcers poses significant challenges to clinicians and patients alike.^[1,2]

The sacrum is the most common site for pressure ulcers among patients who are bedridden. Treatment of the sacral ulcer will require not only removal of the pressure causing the ulcer but also provision of a vascular area for the closure of the ulcer.^[3-5]

Several surgical options have been described for the reconstruction of sacral ulcers. Some of the most commonly used include the musculocutaneous flaps (gluteus maximus, muscle sparing variations) and fasciocutaneous flaps (V-Y advancement, rotation flaps) that are based upon the gluteal arteries. Rotation and perforator based flaps have become popular secondary to the large amount of vascularized tissue provided without the sacrifice of major muscle. Secondary to the preservation of the gluteus maximus, donor-site morbidity has been significantly reduced, and the patient's hip stability has been maintained. As early as the late 1950s, surgeons began utilizing rotational techniques to close paraplegic pressure sores.^[3] Many surgeons since then have modified these flaps to emphasize designs that avoid sutureline where pressure is exerted when the patient sits.^[6-9]

Although several different approaches have been utilized to treat sacral ulcers, there is a paucity of studies comparing the various flap design objectively.^[1] The majority of published case series demonstrate that both the fasciocutaneous and myocutaneous gluteal flaps are safe and effective with minimal complications.^[1,2] Additionally, fasciocutaneous rotation flaps are advantageous as they can be elevated again if the ulcer recurs; thus they provide a useful option for patients who have developed recurrent ulcers. We find the gluteal rotation flap to be one of the easiest and most dependable flaps to use. The purpose of this article is to present the results of our study that evaluated the outcome of gluteal rotation fasciocutaneous flaps used in the reconstruction of sacral pressure sore defects in 25 patients and highlight the flap's utility, simplicity and complication profile.^[10-12]

MATERIALS AND METHODS

A prospective case series study was conducted at our hospital at Government Omandurar multi superspeciality hospital and Sri Lalithambigai Medical College and Hospital after having received approval by the ethics committee. Between October 2023 – December 2024, twenty-five consecutive adult patients (nineteen male, six female; mean age fifty-three years; range twenty-three – seventy-four years) who were diagnosed with sacral pressure ulcers (also known as pressure sores) were enrolled into the study.

Inclusion criteria for participation in the study were adults who were diagnosed with grade three or four sacral pressure ulcers and required surgical reconstruction for their ulcer. Patients who had active wound infections at the time of enrolment were initially treated with debridement and antibiotics until their wound was clean. Similarly, patients who were experiencing serious comorbid conditions (such as cardiopulmonary disease that made it unsafe to undergo surgery) were excluded.

Prior to undergoing surgery, each patient underwent preoperative assessment which included evaluation of nutritional status and control of their comorbid conditions (including diabetes mellitus in five patients and hypertension in three patients). Twelve patients had signs of malnutrition. All of the ulcers were thoroughly debrided to expose healthy tissue and all of the dead bone and scar tissue associated with the ulcers were also removed. The average diameter of the defect was seven to twelve centimeters. The surgeon designed a fasciocutaneous rotation flap on the buttocks ipsilateral to the ulcer to cover the ulcer site. The pivot point of the flap was located in the medial one-third of the gluteal region. When designing the flap, care was taken to site the suture line of the flap lateral to the midline to avoid pressure when the patient lies supine. The dimensions of the flaps varied in terms of both width and length, but the largest widths measured were twenty-five centimeters and were based upon the location of the perforating vessels of the superior and/or inferior gluteal arteries.

Each patient underwent surgery while under general anaesthesia in the prone position. After elevating the flap, the defect was closed without tension using layered closure. Seven patients were unable to have the donor site closed primarily and therefore required a split thickness skin graft (SSG) to cover the site. Six patients required bilateral gluteal rotation flaps to provide adequate coverage for the very large defect areas. Closed suction drains were used beneath the flaps and were removed once drainage decreased to minimal levels (mean ten days). Following surgery, the patients were strictly adhered to off-loading protocols, were kept in either the prone or lateral decubitus positions for approximately two weeks postoperatively and were then gradually mobilized.

The sutures were removed at two weeks post-operatively.

The patients were seen at regular intervals (at 2 weeks, 1 month, 3 months and then every 3-6 months) with a mean follow-up period of eighteen months (range eight to thirty-six months). Assessment of outcomes included evaluation of flap viability, wound healing, complications such as flap necrosis,

dehiscence, infection, and recurrence of the ulcer. Data regarding the patients' progress were documented in their clinical records and were analyzed using descriptive statistics. Due to the nature of this observational study, no statistical analyses were planned. Table 1 outlines the demographic information and clinical characteristics of the patients involved in the study.

Table 1: Patient demographics and clinical characteristics (n=25).

Characteristic	Value
Age (years) – range	23–74
Sex (M : F)	19 : 6
Etiology of Ulcer	Paraplegia/quadruplegia (15); CVA (6); Prolonged immobilization (4)
Comorbidities	Diabetes mellitus (5); Hypertension (3); Malnutrition (12)
Donor site SSG performed	7 patients (28%)
Bilateral flaps used	6 patients (24%)
Mean follow-up period (months)	18 (range 8–36)

Split-thickness skin grafting was required in 7 patients, while bilateral gluteal rotation flaps in 6 cases to achieve adequate defect coverage.



Figure 1: Sacral pressure ulcer with marking and after flap elevation



Figure 2: Gluteal rotation flap



Figure 3: Bilateral rotation flap with STSG for donor site raw area



Figure 4: Bilateral rotation flap with primary closure of the donor site

RESULTS

Successful flap reconstruction occurred on all 25 patients; the large majority (96%, i.e., 24/25) of the flaps resolved uneventfully, giving long-term, stable coverage of the sacral defects. In five of the patients (20%), there were minor complications. Four of the patients (16%) experienced partial flap edge necrosis or superficial dehiscence at the margins, which were treated non-surgically using localized wound care, resulting in complete resolution and no need for additional surgery. One patient (4%) developed recurrent ulceration four months after the operation, due to inadequate off-loading and care. This ulceration was successfully revised by flap advancement. None of the flaps resulted in complete necrosis, and none of the patients experienced deep infections, hematoma, or seromas requiring surgical intervention. The donor sites receiving SSG healed fully.

In total, twenty of the twenty-five patients (80%) had completely uneventful healing (i.e., they did not experience complications). Four (16%) of the

patients had minor complications involving marginal necrosis, and one (4%) patient had a recurrence. The average length of hospitalization for the flap surgery was approximately twelve days. At the time of the final follow-up evaluation, twenty-four of the twenty-five patients (96%) had fully healed wounds and were ulcer-free. These results are outlined in [Table 2]. The early post-operative assessment revealed adequate blood supply to each flap and absence of venous congestion in all cases. On average the

superficial drains were removed after ten (10) days. Wound dehiscence (epithelialized <2 cm) occurred in four (4) patients along the lateral margins of their wounds, which healed completely over a 4-6 week period with conservative treatment. A single recurrence noted at 4 months was identified as being due to patient non-compliance with pressure off-loading. Revision flap surgery was subsequently performed without loss of muscle mass and/or significant complications.

Table 2: Postoperative outcomes after gluteal rotation flap coverage of sacral ulcers.

Outcome	Number (%)
Flap healed uneventfully (no complication)	20 (80%)
Partial flap-edge necrosis	4 (16%)
Pressure sore recurrence	1 (4%)
Overall complete healing (no recurrence)	24 (96%)

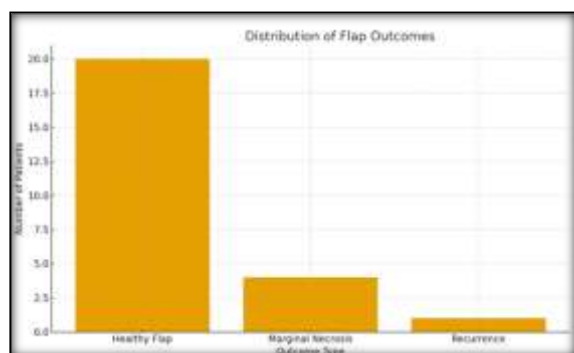


Figure 5

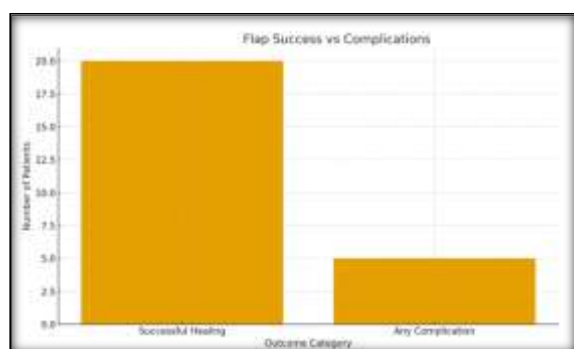


Figure 6

Note: [Figure 5 and 6] are placeholders for bar graphs depicting complication rates and flap success.

DISCUSSION

The results from the gluteal rotation fasciocutaneous flap procedure in this series of 25 patients show that there was a very high success rate and very low complication rate in the treatment of sacral pressure ulcers. There were no failures of the flaps used in this series of patients and 80% of the patients successfully healed without complications. A further 4% of the patients developed recurrent ulcers due to poor post-operative positioning rather than failure of the flap itself. Overall, the results obtained in this study are similar to those of other authors who have reported similar complication and recurrence rates using

different types of flaps to treat sacral ulcers.^[1,2] In addition, Wong & Ip demonstrated a very high healing rate with fasciocutaneous gluteal flaps (healing rate = 94%), but noted that myocutaneous flaps would have fewer recurrences.^[2]

Our experience shows that the muscle-sparing rotation flap is highly durable and does not produce the significant donor-site defects seen with muscle flaps.

The anatomy of the gluteal rotation flap is well established. The flap is created from the skin and subcutaneous fat of the buttocks and is supplied by branches of the superior/inferior gluteal artery and vein. The flap can be turned through a maximum angle of 40° to cover the sacral defect. More importantly, the gluteus maximus muscle remains intact, maintaining hip function and mass. The design of the flap ensures that the suture line will always be positioned laterally to the midline and inferiorly (overlying the distal gluteus), thereby minimizing the tension required to close the flap even when the patient is sitting. Consequently, in our experience, we have never observed hip instability or altered gait. Additionally, the flap can be re-advanced, i.e., if a recurrent ulcer develops at the original site, the same flap (or the contralateral one) can usually be re-rotated for additional coverage. This ability to re-rotate has been noted by others.^[1]

Complication rates reported by other authors for sacral flap reconstructions are variable. Wound dehiscence, hematoma and partial flap necrosis have been reported as common complications,^[4] with approximately 31% of patients in one large study of pressure ulcer flaps experiencing some type of minor wound complication (primarily dehiscence). In contrast, we identified only 20% of our patients as having minor complications (all of which were conservatively managed) and none of the patients developed a major wound problem. We believe that the low complication/morbidity rate in our patients was related to careful preoperative and postoperative patient optimization (including nutritional support and adequate infection control) and to our precise surgical techniques. All patients were instructed to

position themselves frequently and to utilize pressure relief devices during their recovery period, which likely contributed to the low recurrent ulcer rate.

The gluteal rotation flap is a simple flap to perform and is easily reproducible. No microvascular surgery is required and the flap is created from local tissues directly adjacent to the sacral defect. Therefore, the gluteal rotation flap is ideal for training surgeons in reconstructive units and has a low learning curve relative to more complex free flaps or perforator dissections, but produces reliable and consistent results. Variations in the geometry of the flap can be made to accommodate varying sizes of defects. Most importantly, the flap can be harvested entirely medial to the greater trochanter (which was done in each case in this series), thereby avoiding the lateral thigh perforators and providing ample reach.

This study is limited by the fact that it includes a relatively small number of patients and lacks a comparison/control group. Nevertheless, the consistent results obtained in this series of 25 consecutive patients lend considerable strength to the conclusion of this study. All patients in the study were treated by the same surgical team utilizing a uniform technique, thus reducing the potential for variability in the data collected. Furthermore, follow-up of at least eight months (mean = 18 months) should provide a reasonable opportunity to identify early recurrences; therefore, longer term follow-up is recommended for future studies. Finally, given the lower cost of the gluteal rotation flap compared to other, potentially more resource intensive alternatives (such as free flaps or muscle flaps), this flap represents a balance between the simplicity of the operation and its effectiveness that is consistent with resource limitations in many areas of the world, including low and middle income countries.

To summarize, the gluteal rotation fasciocutaneous flap is an effective and versatile workhorse for the treatment of sacral pressure sore reconstructions. The findings from this study demonstrate that the gluteal rotation flap provides reliable coverage of sacral pressure ulcers with low rates of complications and recurrences.^[1,2] Given the technical ease of performing this flap and the benefits associated with its use, the gluteal rotation flap should be considered a first-line option in the treatment of sacral pressure ulcers, particularly by younger or less-experienced surgeons.

CONCLUSION

The Gluteal Rotation Fasciocutaneous Flap had shown excellent results in this series to repair Sacral Pressure Ulcer reconstruction. Through careful operative design and postoperative care, all but one patient (96%) healed from their sacral pressure ulcer with minimal complications. The simplicity of the technique, its ability to be reproduced by other surgeons, and the very little donor site morbidity that is present for the surgeon utilizing this flap makes it an optimal choice for plastic surgeons reconstructing pressure sores. Due to its high success rate and how easily it may be learned, the Gluteal Rotation Flap may truly serve as a "Beginners Boon" in pressure sore surgery.

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