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Original Article

Clinical Utility of Various Fasciocutaneous Flaps for the Reconstruction of Sacral Pressure Sore

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Abstract

Introduction: Sacral pressure sore is the most common type of pressure sore encountered in bedridden patients. Management of sacral pressure sores is challenging. In recent times, the fasciocutaneous flaps have become popular for the reconstruction of sacral pressure sores. We present our experience with various fasciocutaneous flaps for the reconstruction of Stage 4 sacral pressure sores.

Objectives: The objective of this study was to analyze the versatility of various fasciocutaneous flaps for the reconstruction of Stage 4 sacral pressure sore.

Materials and Methods: A Retrospective study was conducted on 20 patients, with Stage 4 sacral pressure sore. Only post-traumatic etiology defects reconstructed with various fasciocutaneous flaps over a period of 24 months from September 2020 to September 2022 were analyzed.

Results: In our case series, done on 20 patients (14 male and 6 female) with an age range of 13–68 years, we have observed that pressure sores reconstructed with fasciocutaneous flaps had better outcomes in terms of nil recurrence of the pressure sore during the average follow-up period of 12 months.

Conclusion: Muscle-based flaps were traditionally used for the reconstruction of Stage 4 pressure sore but the disadvantage is the donor site morbidity with muscle usage, especially in patients with recovering paraparesis. Fasciocutaneous flaps have emerged as an alternative in the reconstruction of sacral pressure sore with less morbidity.

Key words: Bedsore, Decubitus ulcer, Fasciocutaneous flap, Pressure injury, Pressure sore, Spine injury

INTRODUCTION

Sacral pressure sores are associated with high morbidity and its reconstruction is challenging. There are many factors contributing to the development of pressure ulcers, but the final common pathway is tissue ischemia. When external pressure exceeds the capillary closing pressure of 30–32 mmHg, it leads to microcirculatory occlusion and finally tissue ischemia. The majority of people with pressure sores are those who are immobilized in bed or chair for prolonged periods due to various illnesses. Ideally, prevention of pressure sore by frequent postural offloading is better than surgical methods. Conservative management with offloading is done for early stages – NPUAP Staging 1 and 2. For NPUAP Stages 3 and above, thorough surgical debridement and flap cover are the norm. An ideal flap used for the cover should be easy to design, have a reliable vascular supply and with low donor site morbidity. Fasciocutaneous flaps have emerged as an excellent option for the reconstruction of Stage 4 sacral pressure sore, compared to the conventional muscle-based flaps.

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Aims and Objectives

The objective of this study was to analyze the versatility of various fasciocutaneous flaps for the reconstruction of Stage 4 sacral pressure sore in terms of technical ease of harvest, complications, and recurrence rate.

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MATERIALS AND METHODS

We conducted a retrospective study which included a total of 20 patients. All were patients with Type 4 sacral pressure sore reconstructed with various fasciocutaneous flaps such as transposition, rotation, Limberg, pacman, perforator propeller, and unilateral/bilateral V-Y advancement flaps for a period of 24 months from September 2020 to September 2022 were retrospectively analyzed.

Inclusion Criteria

1. Only patients with Type 4 sacral pressure sore of post-traumatic spinal injury etiology were included in the study.

Exclusion Criteria

The following criteria were excluded from the study:

1. Multiple pressure sores coexistent in the same patient
2. Patients with poor general condition.

Preoperatively patient's nutritional status was optimized and anesthetic fitness for surgery was obtained.

Surgical Technique

Preoperatively perforators were marked using a handheld Doppler. Under general anesthesia, the patient was in the prone position, and adequate debridement was done. Perforators were located through the initial exploratory incision. Subfascial approach to the pedicle was followed. The best perforator was identified and meticulous peri-perforator dissection was done. Based on the biogeometry of the propeller and Pacman flaps, the flap was harvested and inset was given. Similarly for the rotation, transposition, Limberg, and advancement flaps, the flap raised in the subfascial plane, and the inset given. A drain was kept under the flap. Postoperatively all patients were nursed in a prone or lateral position to offload the reconstructed area.

REPRESENTATIVE CASES [TABLE 1]

Case 1

40/M, case of L3 burst fracture developed sacral pressure sore which was reconstructed with right gluteal rotational flap [Figure 1]. Postoperatively flap settled well.

Case 2

60/M, case of trochanteric fracture developed sacral pressure sore which was reconstructed with transposition flap from right side [Figure 2]. The flap healed without any complications.

Case 3

38/M, case of L5-S1 spondylolisthesis developed sacral pressure sore which was reconstructed with Limberg flap [Figure 3]. The flap healed well.

Case 4

13/Fch, case of L4 burst fracture with sacral pressure sore was reconstructed with pacman flap from right side [Figure 4]. The flap healed without any complications.

Case 5

52/F, case of L3 burst fracture with sacral pressure sore was reconstructed with right inferior gluteal artery perforator propeller flap [Figure 5]. The flap settled well.

Case 6

68/M, case of L5 spondylolisthesis with large sacral pressure sore was reconstructed with bilateral Pacman flap [Figure 6]. Postoperatively the patient has midline wound dehiscence which healed subsequently by conservative management.

Case 7

19/M, case of L5-S1 spondylolisthesis with sacral pressure sore was reconstructed with unilateral V-Y advancement flap [Figure 7]. The flap settled well. There are no post-operative complications.

Case 8

56/M with L3 burst fracture, sacral pressure sore, bilateral V-Y advancement flap done. There are no post-operative complications [Figure 8].

RESULTS

All 20 patients (14 male and 6 female) with an age range of 13–68 years underwent reconstruction with fasciocutaneous flaps and had satisfactory outcomes. Two flaps developed mild wound dehiscence in the midline but healed subsequently. All other flaps had no major or minor complications. There was no recurrence of the pressure sore for any of the patients in our study during the average follow-up period of 12 months. The average flap size was 13.8×7.1 sq cm. The mean age of patients was 44.6 years [Table 1].

DISCUSSION

Avoidance of pressure sore is ideal. Stages 1 and 2 of pressure sore can be managed conservatively. Various modalities are postural changes every 2nd h, offloading mattresses, hydrocolloid dressings for Stage 2 or non-infected Stage 3 pressure ulcers, and alginate or foam dressings for infected Stage 2 or 3 ulcers. The emerging role of electrostimulation of gluteal muscles is to improve the vascularity of that area and for pressure redistribution.[1] Stages 3 and 4 require thorough debridement of devitalized tissues and flap cover, with systemic antibiotics in the

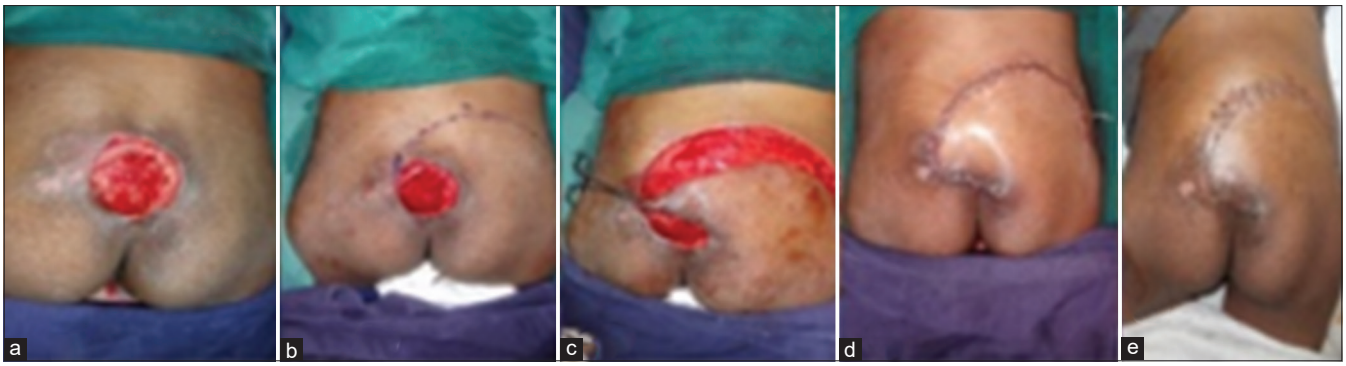

Figure 1: Right gluteal rotation flap. (a) Post-debridement of case 1, (b) Rotation flap marking of case 1, (c) flap elevation of case 1, (d) immediate intraoperative flap inset of case 1, and (e) late post-operative of case 1

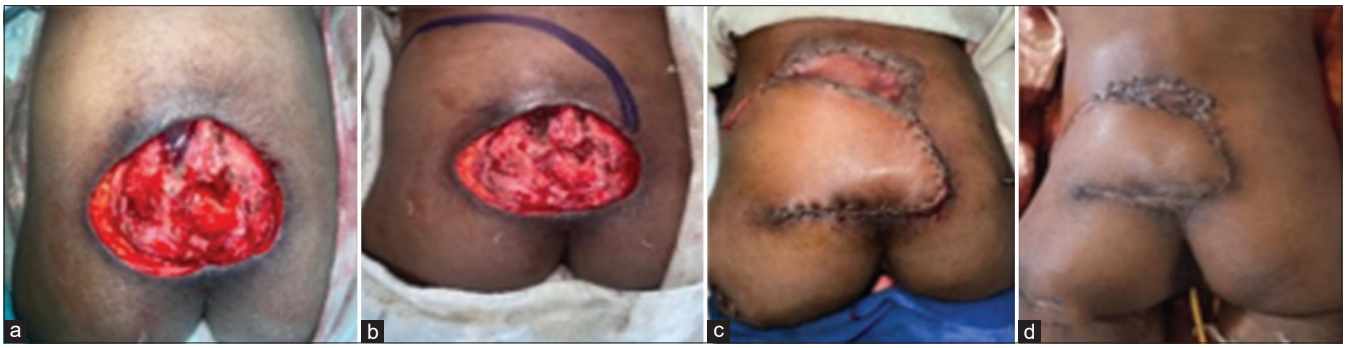

Figure 2: Transposition flap, (a) post-debridement of case 2, (b) transposition flap marking, (c) flap inset of case 2, and (d) late post-operative of case 2

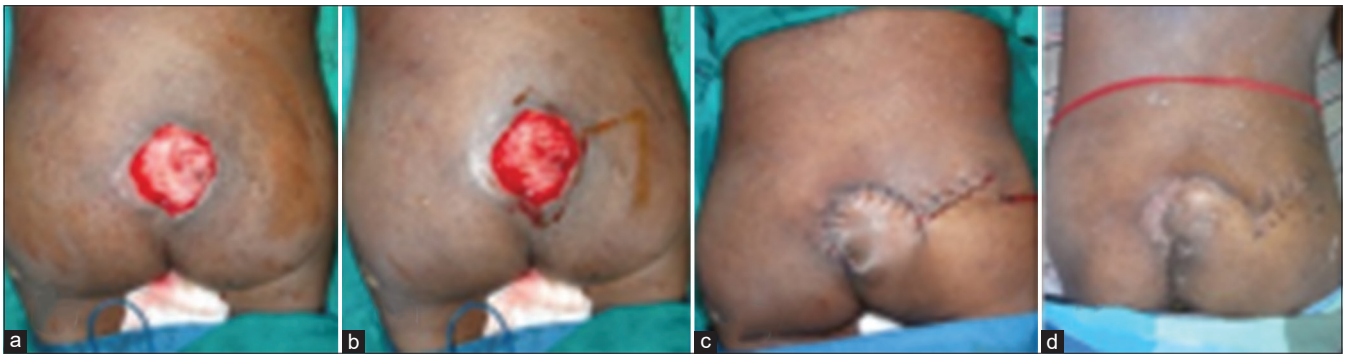

Figure 3: Inferiorly based Limberg flap. (a) Post-debridement of case 3, (b) flap marking of inferiorly-based Limberg flap, (c) flap inset, and (d) late post-operative of case 3

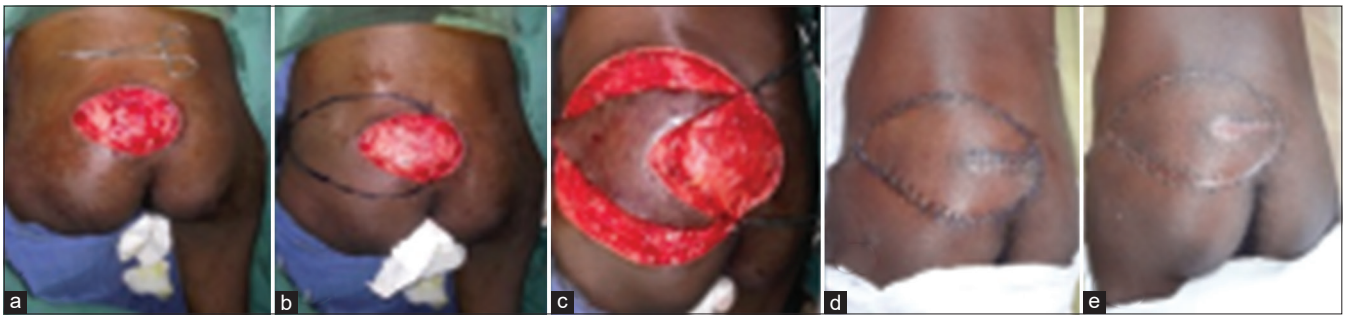

Figure 4: Left unilateral Pacman flap. (a) Post-debridement, (b) flap marking of unilateral pacman flap, (c) flap elevation, (d) flap inset, and (e) late post-operative of case 4

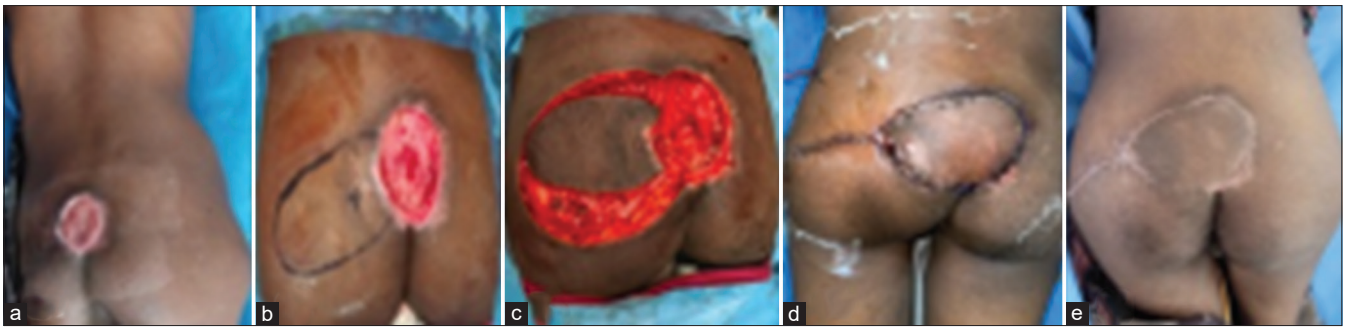

Figure 5: Left inferior gluteal artery perforator propeller flap. (a) Pre-operative pressure sore picture, (b) flap marking of left gluteal artery perforator propeller flap, (c) flap elevation, (d) flap inset, and (e) late post-operative of case 5

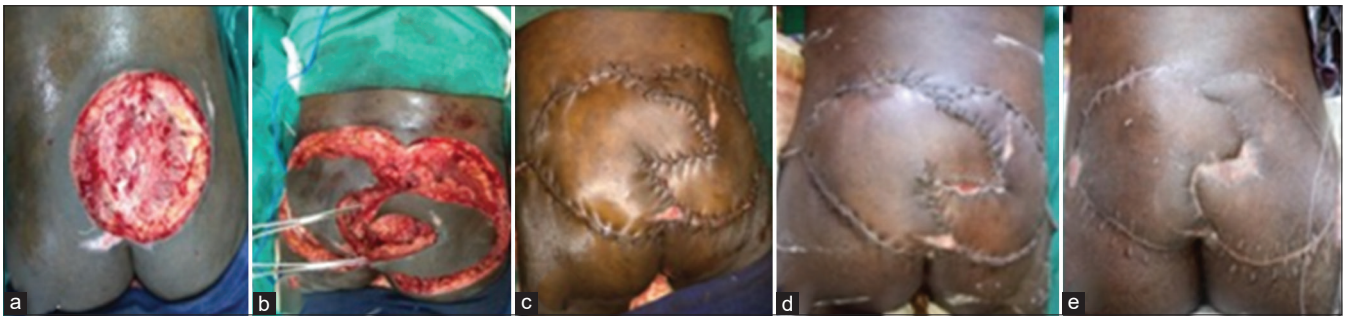

Figure 6: Bilateral pacman flap. (a) Post-debridement of case 6, (b) bilateral pacman flap elevation, (c) flap inset, (d) wound dehiscence-immediate post-operative, and (e) late post-operative of case 6

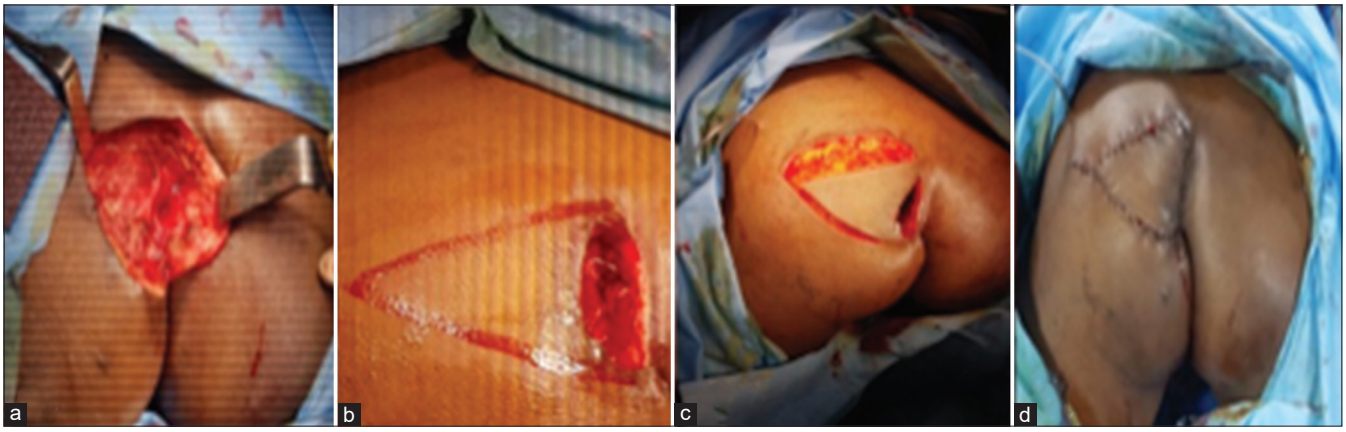

Figure 7: Unilateral V-Y advancement flap, (a) Post-debridement of case 7, (b) flap marking of unilateral V-Y advancement flap, (c) flap elevation, and (d) early post-operative of case 7

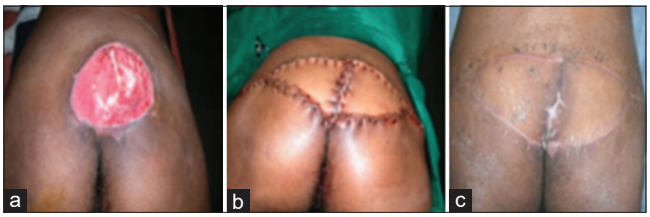

Figure 8: Bilateral V-Y Advancement flap. (a) Pre-operative defect of case 8, (b) flap inset- B/L V-Y advancement flap, and (c) late post-operative of case 8

perioperative period. Primary closure after debridement is not advocated due to high rates of recurrence. The local fasciocutaneous flaps are an excellent option for providing durable cover with adequate cushioning. The muscle-based flaps though have good vascularity and are able to fill the voids created by debridement, which has the disadvantage of donor site morbidity of muscle harvest.

Pressure sore defects present a challenge due to high rates of wound complications and recurrences. Myocutaneous flaps were considered the standard first-line treatment for pressure sores failing conservative treatment. They may be transposed as rotational flaps,[2] islanded flaps,[3] or as a V-Y advancement flap.[4] However, the major disadvantage was the sacrifice of the gluteus maximus muscle resulting in loss of future reconstructive possibilities.

Table 1: Demographic data of the clinical patients

S. No	Age	Sex	Precipitating cause of sacral pressure sore	Type of fasciocutaneous flap	Flap size (sq cms)	Complications	Recurrence
1	40	M	L3 burst fracture	Gluteal Rotational flap	12×6	Nil	Nil
2	60	M	Trochanteric fracture	Transposition flap	18×6	Nil	Nil
3	38	M	L5-S1 Spondylolisthesis	Limberg flap	10×4	Nil	Nil
4	13	Fch	L4 burst fracture	Unilateral Pacman flap	18×8	Nil	Nil
5	52	F	L3 burst fracture	Inferior gluteal artery perforator propeller flap	12×6	Nil	Nil
6	68	M	L5-S1 Spondylolisthesis	Bilateral Pacman flap	20×10	Wound dehiscence	Nil
7	48	F	Trochanteric fracture	Right Pacman flap and transposition flap	20×12	Nil	Nil
8	35	M	L2 burst fracture	Gluteal rotational flap	10×6	Wound dehiscence	Nil
9	55	F	Trochanteric fracture	Left Pacman flap and right gluteal rotational flap	22×18	Nil	Nil
10	44	M	L3 burst fracture	Left Pacman flap	10×8	Nil	Nil
11	50	M	L5-S1 Spondylolisthesis	Gluteal Rotational flap	12×6	Nil	Nil
12	45	M	Trochanteric fracture	Superior gluteal artery perforator propeller flap	8×6	Nil	Nil
13	60	F	Neck of femur fracture	Limberg flap	8×4	Nil	Nil
14	28	F	L4 burst fracture	Transposition flap	12×6	Nil	Nil
15	30	M	Trochanteric fracture	Gluteal rotational flap	18×8	Nil	Nil
16	50	M	L3 burst fracture	Inferior gluteal artery perforator propeller flap	12×4	Nil	Nil
17	40	M	Trochanteric fracture	Right Pacman flap	14×6	Nil	Nil
18	48	M	Trochanteric fracture	Superior gluteal artery perforator propeller flap	10×4	Nil	Nil
19	33	M	L5-S1 Spondylolisthesis	Unilateral V-Y advancement flap	12×6	Nil	Nil
20	56	M	L3 burst fracture	Bilateral V-Y advancement flap	18×8	Nil	Nil

Yamamoto *et al*. found that fasciocutaneous flaps provided better long-term results in surgical reconstruction of pressure sores than the myocutaneous or muscle flap.[5] Jiao *et al*. described the usage of a modified bilobed fasciocutaneous flap for the reconstruction of sacral pressure sore.[6] Bonomi *et al*. described the Pacman perforator-based v-y advancement flap for the reconstruction of pressure sores.[7]

Chen *et al*. compared the gluteal perforator flaps versus the gluteal fasciocutaneous rotational flaps for the reconstruction of sacral pressure sore and found no major difference between both groups in terms of complications and recurrence.[8]

In our case series, we have analyzed the various fasciocutaneous flaps such as the Limberg flap, fasciocutaneous rotational flap, Pacman flap, propeller, and transposition flap for the reconstruction of sacral pressure sore.

CONCLUSION

In our case series, we have observed the utility of various fasciocutaneous flaps for the reconstruction of Stage 4 sacral pressure sore and found that the prospectus for re-rotation/re-advancement is associated with fasciocutaneous flaps. It has the added advantage of reducing donor site morbidity by preserving muscle and providing durable cover. We have observed nil recurrence of pressure sore in our case series.

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