

## Original Article

# Surgical Closure of Sacral Pressure Sores by Gluteal Skin Flap.

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### Abstract:

Pressure sores are an ancient medical problem; even found during autopsies of Egyptian mummies. This prospective study was carried out in the Department of Plastic Surgery, Dhaka Medical College & Hospital (DMCH), Dhaka between January 2012 to December 2012 to evaluate the outcome of surgical closure of sacral pressure sores by Gluteal skin flaps. Twenty two patients admitted into DMCH with stage III & IV sacral pressure sores were included. Over two-thirds (68.2%) of the ulcers were in Stage-III and over three-quarters (77.3%) had signs of local infection. The average horizontal and vertical lengths of the defects before excision were 10.4 and 8.8 cm respectively which increased to 12.6 and 10.6 cm respectively after excision of dead and devitalized tissues. The average medial advancement of the flap was 6.3 cm. Postoperative flap-monitoring did not reveal infection, seroma or hematoma in any of the patients. Only 2(9.1%) patients had marginal flap loss. Marginal flap losses developed in two cases were excised and direct-suturing (secondary closure) were done. More than 90% of the patients exhibited good outcome. The study concluded that Gluteal skin flap produces good result in majority of the patients with large sacral sores with almost no complications or recurrences. The Gluteal skin flap has the advantages of muscle sparing, less donor site morbidity, versatility in design and less effort to harvest.

**Keywords:** Pressure sore, Gluteal skin flap, Sacral sore coverage.

### Introduction:

Pressure-sores present a difficult challenge because of the high rate of wound complications and recurrences. Pressure ulcers pose a considerable burden on health care resources and the community (in terms of mortality and morbidity) with costs estimated to be as much as \$6 billion a year.

It has now become an axiom that in addition to neuropathic factor and shearing forces, the single most

important factor in the aetiology of pressure sores is ischemic necrosis resulting from sustained excessive pressure against bony prominences. Sacral pressure sores are more common in patients nursing in supine position. It is estimated that in supine position, sacrum is subjected to maximum pressure in the range of 40 to 60 mm of Hg. Malnutrition, anaemia, infection and chronic illness can also contribute to their formation by the impairment of blood supply and delayed wound healing. Resultant necrosis at the skin level is usually small compared with that of the necrotic area over bone, which resembles an inverted cone

The following principles of surgery should be borne in mind:

- Complete excision of the sore, surrounding scar and underlying bursa is first performed.
- Underlying bony prominences are removed until healthy bleeding bone remains.
- Resurfacing of the defect with healthy skin, including adequate subcutaneous padding.
- It is better to have a large flap design in order to avoid sutures in the pressure areas and to minimize tension.
- Avoid violation of adjacent flap territories, which may be needed for future use.

The ideal covering of pressure sores is to replace the lost tissue i.e. skin and subcutaneous tissue. Since the most common areas

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of pressure ulceration (e.g. the sacrum) do not normally have any layer of muscle interposed between the bone and the skin, coupled with the fact that skin and subcutaneous tissue are less sensitive to ischemia than muscle, it is preferable to use Gluteal skin flap in closure of sacral pressure sores. It is considered as the standard first-line treatment for sacral pressure sores that fail conservative therapy.

Gluteus flaps have been used as originally described by Ger (1971). There are different types of gluteus flaps, which can be based on the method of transfer of the flap – such as, island flaps, V-Y plasty, rotational flaps and they can be based on the types of tissue included, such as, cutaneous flaps or myocutaneous flaps. Recently, Gluteal skin flaps have been used successfully for the coverage of the defects of sacral sores.

The advantages of gluteal skin flap in sacral pressure sore reconstruction are:

- It provides adequate blood supply with durable coverage
- Less likely to have a functional deformity in the donor site
- Better reconstruction of the normal anatomic arrangement over bony prominences
- It does not preclude the use of other flaps for recurrent ulcer reconstruction
- Versatility of design
- Provides large flap, easy to raise, re-rotation is feasible

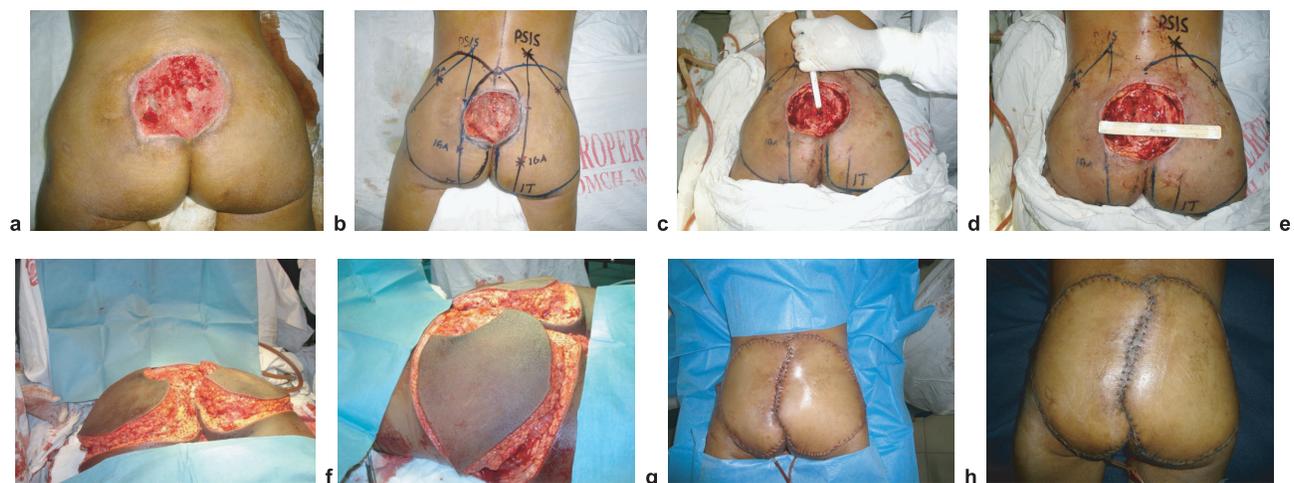
Despite the potential disadvantage of this flap that the resultant suture line lies directly over the sacrum in the midline, bilateral Gluteal skin flaps (based on the superior and inferior gluteal vascular pedicles) slide horizontally to cover the defects of the sacrum in a V-Y advancement manner. The present study is, therefore, intended to evaluate the outcome of bilateral gluteal skin flaps in the management of sacral sores.

**Patients and Methods:**

This prospective interventional study was conducted in the Department of Plastic Surgery, DMCH, Dhaka over a period of one year January 2012 to December 2012. Twenty two patients admitted into DMCH with stage III & IV sacral pressure sores were included. All patients were prepared with nutritional support, anaemia was corrected by blood transfusion and wounds infections were controlled by antibiotics according to culture and sensitivity tests and by daily dressings.

The operation was done under spinal anaesthesia. Excision of the ulcer was done. It included excision of all the scared tissue, underlying bursae and calcified soft tissues well down to the healthy looking tissue. The bony prominences were removed and the irregularities resulting from the osteotomy were smoothed with a rasp to have an evenly contoured sacrum. Proper haemostasis was ensured. The flap outline was planned based on size and orientation of excised area from lateral to medial direction.

The superior and inferior gluteal arteries were identified using anatomical landmarks like posterior superior iliac spine, greater trochanter of the femur and ischial tuberosity as surface landmarks. The superior gluteal artery (SGA) was marked on the skin of the buttock at a place one-third of the way on a line drawn from the posterior superior iliac spine to the top of the greater trochanter. Likewise the inferior gluteal artery (IGA) was marked on the skin of the buttock at a place two-thirds of the way on a line drawn from the posterior superior iliac spine to the ischial tuberosity. The skin was designed as V-Y advancement, with its base along the sacrum and its sides along the superior and inferior border of gluteus maximus converging on its insertion in the greater trochanter. Skin incision was given as per design of the flaps. The flaps were advanced medially as per requirement of the defect. The wound was closed primarily in layers with low negative suction drains.



**Fig-1:** a - Sacral pressure sore, b - Gluteal skin flap design, c - Excision of bony prominences, d - Defect created after excision, e - Elevation of Gluteal skin flap, f - Elevation of Gluteal skin flap, g - At the completion of surgery, h - 3<sup>rd</sup> Post operative day.

All patients were put on a standard postoperative regime including:

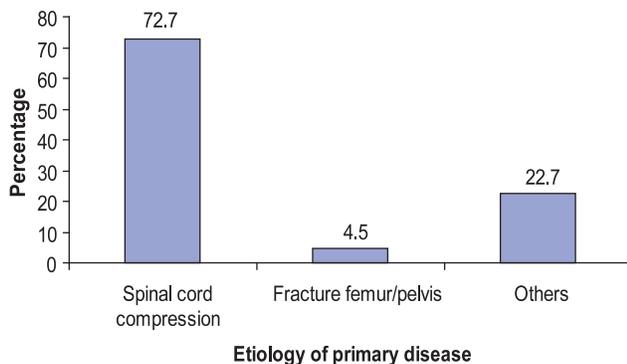
- keeping negative suction drain until they produced less than 10 cc of fluid in 24 hours,
- maintaining low residual diet in the first week and prone position to avoid pressure on the flap,
- maintaining nutrition, hydration, and correction of anaemia to expedite wound-healing process,
- intravenous antibiotic coverage was continued postoperatively according to wound swab culture and sensitivity report,
- check dressing was done on 3<sup>rd</sup> and 6<sup>th</sup> postoperative day,
- flaps were monitored initially hourly for 6 hours, then 12 hourly for 24 hours then daily..

All the patients were advised to come for subsequent follow up visits in 1<sup>st</sup>, 3<sup>rd</sup> and 6<sup>th</sup> months postoperatively to see the outcome

### Observations and Results:

The mean age of the patients was 34.5 years (range 14 – 60 years). A male predominance was observed with male to female ratio being 3:2. Primary and secondary level education each comprised about one-third (31.8%) and illiterates were 27.3% of the patients. In terms of occupation about one-third (31.8%) were farmer and 22.7% were student.

Nearly three-quarters (72.7%) of the patients were bed-ridden due to spinal cord lesion, 4.5% due to fracture of the femur or pelvis and 22.7% due to other reasons (Fig.2).



**Fig. 2:** Distribution of patients by etiology of primary disease (underlying disease)

In terms of nutritional status, 5(22.7%) patients were underweight and 3(13.6%) were overweight or obese. The rest 14(63.7%) were of normal weight for their height. 86.4% patients were anaemic.

Over two-thirds (68.2%) of the ulcers were in Stage-III and the rest in Stage-IV. The average horizontal and vertical lengths of the defect before excision were 10.4 and 8.8 cm respectively. Discharge were invariably present in the sores and over three-quarters (77.3%) of those had signs of local infection which was confirmed by wound swab culture and sensitivity test(Table 1).

**Table-I**

*Distribution of patients by characteristics of lesion (n = 22)*

Characteristics of lesion	Frequency (%)	Mean ± SD	Range
Stage of ulcer			
Stage-III	15(68.2)	-	-
Stage-IV	07(31.8)		
Horizontal length of defect before excision(cm)	-	10.4±2.6	7–15
Vertical length of defect before excision (cm)	-	8.8±1.8	5–12
Local infection	17(77.3)	-	-
Discharge	22(100.0)	-	-
Bone exposed	7(31.8)	-	-

The average horizontal and vertical lengths of the defect after excision of dead and devitalized tissues were 12.6 and 10.6 cm respectively. The average medial advancement of the flap was 6.3 cm. The mean operative time was 168.4 minutes. All of the patients required blood transfusion before or during operation (Table-II).

**Table-II**

*Distribution of patients by their Per operative findings (n = 22)*

Per operative findings	Mean ± SD	Range
Horizontal length of defect after excision (cm)	12.6±2.4	10–16
Vertical length of defect after excision (cm)	10.6±2.4	7–14
Medial advancement of flap (cm)	6.3±1.2	5–8
Operative time (min)	168.4±38.3	100–245

In-hospital outcome of the patients demonstrates that only 2(9.1%) patients had medial marginal flap loss (<1 cm). Postoperative flap-monitoring did not reveal infection, seroma, hematoma or wound dehiscence in any of the patients (Table-III).

**Table-III**

*Distribution of patients by postoperative complications (n = 22)*

In-hospital outcome	Frequency (%)	Median±SEM	Range
Flap loss			
Marginal loss	2(9.1)		
No loss	20(90.9)	-	-
Infection	0(0.0)	-	-
Seroma	0(0.0)	-	-
Hematoma	0(0.0)	-	-
Wound dehiscence	0(0.0)	-	-

In two patients marginal flap loss were excised and secondary suturing were done (Table-IV). Medial marginal necroses were salvaged by excising the necrosed margin and closure of the wound with secondary sutures.

**Table-IV**  
*Management of complications (n = 22)*

Management of complications	Frequency	Percentage
Conservative	0	00.0
Excision and secondary suturing	2	09.1
Excision and advancement	0	00.0
Reconstruction with alternate procedure	0	00.0

None of the patients developed recurrence within the follow up period.

**Discussion:**

In the search for improved results in reconstruction surgery, surgeons have used a variety of flap techniques to achieve excellence in form and function (Geddes et al., 2003). Sacral pressure sores are the common “sores” seen in patients confined to bed during medical and surgical emergencies where the patient is comatose and particularly common in patients with paraplegia. Most of these patients are found to have been nursed in supine position without timely and adequate change of posture because of ignorance and callousness.

Regarding the aetiology of the primary diseases for which patients were bed ridden for long time sufficient to develop sacral sores in this study were observed as follows: more or less 72.7% were due to traumatic spinal cord compression, 4.5% due to fracture of femur & pelvis and 22% due to other causes like meningitis, cerebro vascular disease, transverse myelitis etc. For those primary diseases about three quarters received conservative treatment, less than one quarter received surgical treatment and few patients did not receive any treatment. This aetiological study is very much consistent with the study of Edberg et al. (1973), Kosiak M

(1959) and Maklebust J. (1987).

Nutritional status including BMI, percentage of haemoglobin, serum albumin level is very important parameters for flap take up & survivality. In present study, 22.7% patients were underweight and 13.6% were overweight or obese and the rest 63.7% were of normal weight for their height. 86.4% patients were anaemic. So most of the patients were prepared with nutritional support and anaemia was corrected by blood transfusion.

The average horizontal and vertical lengths of the defects before excision were 10.4 and 8.8 cm respectively and after excision of dead & devitalized tissues the horizontal and vertical lengths were increase to 12.6 and 10.6 cm respectively. The medial advancement of the flaps was 6.3 cm. The above observation of the study runs more or less parallel to the study of SH Khundker & MA Kalam (2000) and Yuan Sheng Tzeng et al. (2007).

Complications of gluteal skin flap surgery were observed very carefully in the early post operative period in terms of flap loss, infection, seroma, haematoma and wound dehiscence. The data were collected as follows: only two patients exhibit medial marginal flap necroses which were salvaged by minor surgical procedures but none of the patient revealed seroma, infection, haematoma or wound dehiscence. It can be concluded that complications were very minimal & negligible. This observation is consistent with the study of SH Khundker & MA Kalam (2000) and Constantian M (1980). But the study does not coincide with the study of Serhan Tuncer et al. (2004) where the incidence of post operative complication was higher. This may be due to selection of the patients with co morbid conditions and larger sample size.

The final outcome of the patients was assessed in terms of good, acceptable & poor. The outcome categorized as good when there was no flap loss, no infection and excellent flap adhesion. On the other hand, the flap was categorized as acceptable when there was marginal flap necrosis but the flap was salvaged. And the outcome was categorized as poor when there was major flap loss, flap was not salvageable



**Fig.-3:** a - After stitch removal, b - Post operative results one month after surgery, c - Post operative results three months after surgery, d - Stable result six months after surgery.

and alternate procedure was required. The present study conducted to evaluate the outcome of Gluteal skin flap, composed of skin and subcutaneous fat, sparing gluteus maximus muscle, which demonstrated good outcome in more than 90% cases, acceptable outcome in rest (9.1%) of the cases & none of them exhibit poor outcome.

None of the patients developed recurrence within the follow up period. Hentz (1979) found that pressure sore recurrence is proportionate to post operative complications. As no significant complications developed in the present study, recurrence at 6 month follow up was absent. There was no recurrence after four years of surgical closure of sacral pressure sore by SH Khundkar and MA Kalam (2000). Thus the success rate of the present study is consistent with the study done by SH Khundkar and MA Kalam (2000). This similarity may be due to similar pattern of geographical status and post operative management was adequate and sample size of both study were excluded from distinct co morbid pathology.

In case of perforator flap, dissection of the perforator is tedious, require the use of loupe magnification and the aid of bipolar diathermy and vessel micro clips to control the tiny musculature branches of the perforators. Sometimes full skeletonization of the perforator vessel is required to help the flap to reach to the recipient site which carry the risk of stretch, kink or twist that can lead to complications such as vasospasm or even blockage of blood flow with total loss of the flap (Yuan-Sheng Tzeng et al., 2007 and Kroll and Rosenfield, 1988).

Free flap coverage is a time-consuming procedure. Reconstruction by free flap requires highly skilled micro vascular anastomosing technique and needs expertise. Microsurgical free flap can only be considered where local tissue is not available (Foster RD, 2006).

#### **Conclusion:**

Therefore, advantages of Gluteal skin flaps over the musculocutaneous flaps include muscle sparing, less donor-site morbidity, versatility in flap design improve postoperative recovery of the patients. Although the flap is thinner than its myocutaneous variant, which is considered by some

authors as a drawback of the Gluteal skin flap, yet it meets the reconstructive requirement of the defect as the parasacral area is naturally devoid of muscles (Geddes et al., 2003). In addition to the fact that skin and subcutaneous tissue are less sensitive to ischemia than muscle, therefore, Gluteal skin flap in closure of sacral pressure sore is preferable.

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