



Reconstruction of Sacral Pressure Sore defects by Gluteus Maximus Myocutaneous V-Y Advancement Flaps

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Abstract

Background: Sacral region is a common site for pressure sore development in paraplegic patients. Wound excision in sacral pressure sores often result in large soft tissue defects. Skin graft, local flaps, muscle flaps and free flaps have been applied to reconstruct such defects. This study was to evaluate the efficacy of gluteus maximus myocutaneous v-y advancement flap for reconstruction of sacral pressure sore defects. **Aim of the study:** To evaluate the efficacy of reconstruction of sacral pressure sore defects by Gluteus Maximus Myocutaneous v-y advancement flaps. **Methods:** This prospective observational study was conducted in the Department of Burn, Plastic and Reconstructive Surgery, Enam Medical College Hospital (EMCH), Saver, Dhaka over a period of March 2020 to August, 2020. A total of 20 cases were included for the study. Sample was selected by purposive sampling technique. The operation was done under spinal anaesthesia. 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. Standard formulae was used and statistical analysis of the result was obtained by using window-based computer software devised with Statistical package for Social Science (SPSS-17). **Results:** Age distribution shows that 15(75%) patients were below 40 years old. The mean age patients was 30.8 years and range was 14 and 52 years. Study of characteristics of the lesion shows that 90% of the ulcers were in Stage-IV. The mean horizontal and vertical lengths of the defect before excision were 9.075 and 8.45 cm respectively. The medial advancement of the flap was 5.73 cm. The mean operative time was 227.25 minutes. About 85% of the patients exhibited excellent outcome. Only one patient developed recurrence at 03 months of period. **Conclusion:** It could be concluded that the Gluteus Maximus Myocutaneous flap produces good result in majority of the patients with paraplegia having large sacral sores with few complications or recurrences.

Keywords: Pressure Sores, Paraplegic, Closure, Flaps.

INTRODUCTION

Studies have shown that pressure sores commonly occur on ischium (28%), sacrum (17-27%), trochanter (12-19%) and heel (9-18%).^[1] Pressure sores over sacral region impose challenges due to the nature of the defects after wound excision. Exposure of underlying bones, muscles and often large defect size makes reconstruction a huge challenge. Among available surgical options, skin graft results in unstable wound coverage with high recurrence rate. Local flaps are often inadequate to reconstruct large defects. Microsurgical technique or free flap requires specialized instruments, long operative time and often technically challenging. V-Y advancement of gluteus maximus myocutaneous flap provide durable and adequate coverage for such defects. The incidence in hospitalized patients ranges from 2.7 to 29%. Patients in critical care units have an increased risk of developing pressure ulcers. Elderly patients admitted to acute care hospitals for non-elective orthopaedic procedure, such as hip replacement and treatment of long bone fractures are at even greater risk of developing the condition and in whom it is one of the most costly diseases to treat.^[2] Persons with spinal cord injury and associated co-morbidity are also at increased risk. The incidence of pressure sores in this population is in the range of 25-66%.^[3] Patients predisposed to pressure ulcers are at higher risk of morbidity and mortality with infection being the most common major complication of pressure ulcers.^[4] Despite current interest and advances in medical science, sacral sores remain a challenge to medical and nursing staff, for they are reluctant to heal, prone to recur, difficult to operate upon and costly to treat.^[5] It has now

become an axiom that in addition to neuropathic factor and shearing forces, the single most important factor in the etiology of pressure sores is ischemic necrosis resulting from sustained excessive pressure against bony prominences.^[3] Pressure sores almost invariably occur over bony prominences. Sacral pressure sores are more common in patient 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.^[6] Wide use of the gluteus Maximus musculocutaneous (GM) flap in the repair of pressure sores has marked a prominent reduction in the rate of post-operative complications and recurrences, and it is currently the most widely used flap for treatment of sacral pressure sores.

OBJECTIVES

a) General objective:

- Evaluation of outcome of reconstruction of sacral pressure sore defects by Gluteus Maximus Myocutaneous V-Y Advancement flaps.

b) Specific Objectives:

- To assess the viability of the flap.
- To find out the complications.
- To see the efficacy of the flap to cover the defect completely.
- To assess recurrence of sacral sore within the follow up period.

MATERIALS AND METHODS

This prospective observational study was conducted in the Department of Burn, Plastic and Reconstructive Surgery, Enam Medical College Hospital (EMCH), Savar, Dhaka over a period of March 2020 to August, 2020. A total of 20 cases were included for the study according to following inclusion and exclusion criteria. Sample was selected by purposive sampling technique. The operation was done under spinal anaesthesia. Excision of the ulcer was done in such a way so as to make the resultant defect into a broad vertical ellipse. The flap outline was planned based on size and orientation of excised area. 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. Data were collected from the selected patients using a pre-designed structured questionnaire. Standard formulae was used and statistical analysis of the result was obtained by using window-based computer software devised with Statistical package for Social Science (SPSS-17).

• Inclusion Criteria

Patients with following characteristics were included in the study:

- Patients presenting with grade III and grade IV sacral pressure sores.

• Exclusion Criteria

Patients with following characteristics were excluded:

- Patients with other pressure area sores

- Poly trauma and life-threatening condition
- Previous history of radiotherapy in sacral area.
- Unwilling to take part in the study.

RESULTS

Age distribution shows that 15(75%) patients were below 40 years old. The mean age of patients was 30.8 years and range was 14 and 52 years (Table I). Study of characteristics of the lesion shows that 90% of the ulcers were in Stage-IV. The mean horizontal and vertical lengths of the defect before excision were 9.075 and 8.45 cm respectively. Discharge were invariably present in the sores and 65% of those had signs of local infection which was confirmed by wound swab culture and sensitivity test. In about 80% of lesions the underlying bone was exposed (Table II). The mean horizontal and vertical lengths of the defect after excision of dead and devitalized tissues were 11.08 and 10.48 cm respectively. The medial advancement of the flap was 5.73 cm. The mean operative time was 227.25 minutes (Table III). In-hospital outcome of the patients demonstrates that only 3(15%) patients had medial marginal flap loss (<1cm) (Table IV). In three patients marginal flap loss were excised and secondary suturing were given (Table V). About 85% of the patients exhibited excellent outcome. In 03 (15%) patients, the outcome was considered good (Table VI). Only one patient developed recurrence at 03 months of period (Table VII). Pre-operative, per-operative and 3 months follow up photograph of Gluteus Maximus Myocutaneous V-Y Advancement Flaps(Figure I-VII).

Table I: Distribution of patients by demographic characteristics (n = 20)

Age (years)	Frequency	Percentage
<20	4	20
21-30	7	35
31-40	4	20
41-50	1	5
51-60	1	5
Sex		
Male	17	85
Female	3	15
Mean age= 30.8 years	Range=14-52 years	

Table II: Distribution of patients by characteristics of lesion (n=20)

Characteristics of lesion	Frequency (%)	Mean ± SD	Range
Stage of ulcer			
Stage-III	2(10%)	---	---
Stage-IV	18(90%)	---	---
Horizontal length of defect before excision (cm)	-----	9.075	7-12
Vertical length of defect before excision(cm)		8.45	7-11
Local infection	65	--	--
Exudates	20(100%)	--	--
None	0	--	--
Serosanguinus	35	--	---
Purulent	65	--	--
Bone exposed	16(80%)	-----	----

Table III: Distribution of patients by their per-operative findings (n=20)

Per operative findings	Mean± SD	Range
Horizontal length of defect after excision (cm)	11.76±1.3	9-14
Vertical length of defect after excision (cm)	10.48±1.25	9-13
Medial advancement of flap (cm)	5.73±0.61	5-6.5
Operative time (min)	227.25±8.03	210-240

Table IV: Distribution of patients by post-operative complication (n=20)

Flap loss	Frequency (%)
Marginal loss	03(15%)
No loss	17(85%)
Infection	0(00%)

Table V: Management of complications (n=20)

Management of complications	Frequency	Percentage
Conservative	0	00.0
Excision and secondary suturing	03	15
Excision and advancement	0	00.0

Reconstruction with alternate procedure	0	00.0
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Table VI: Distribution of patients by final outcome (n=20)

Final Outcome	Frequency	Percentage
Excellent	17	85
good	03	15
Poor	00	00.0

Table VII: Distribution of patients by recurrence (n=20)

Recurrence	Frequency	Percentage
At 1st month	00	00.0
At 3rd month	01	05
At 6th month	00	00.0



Figure I: Pre-operative photograph



Figure IV: Flap elevation



Figure II: After wound excision



Figure V: Flap mobilization



Figure III: Flap design



Figure VI: Immediate post-operative



Figure VII: Follow up after 3 months

DISCUSSION

The mean age of the patients was 30.8 years and the youngest and the oldest patients were 14 and 52 years old respectively. Age distribution shows that 15(75%) patients were below 40 years old. These demographic data of this study run more or less similar with the observations of the SH Khundkeret al^[7] and Tuncer et al.^[8] Not only is the dimension of the wound but deeper involvement like muscle and bone also important. It is being mentioned earlier that classification of Shea is followed in this study to qualify the severity of pressure sore, starting from stage I to stage IV. Here 90% of the defects were in stage IV & rest in stage III. Discharge was invariably present in the sores and about one third (65%) of them had signs of local infections. None of the lesions was fixed to the underlying structures. The average horizontal and vertical lengths of the defects before excision were 09.08 and 8.5 cm respectively and after excision of dead & devitalized tissues the horizontal and vertical lengths were increase to 11.08 and 10.48 cm respectively. The medial advancement of the flaps was 5.73 cm. The mean operative time was 227.25 minutes. The above observation of the study runs more or less parallel to the study of SH Khundkeret al^[7] and Yuan Sheng

Tzeng et al.^[9] Complications of gluteus musculocutaneous flap surgery were observed very carefully in the early post-operative period in terms of flap loss, infection, seroma, haematoma & wound dehiscence. The data were collected as follows: only three patients exhibit marginal flap necrosis which were salvaged by wound excision and secondary suture but none of the patient revealed seroma, infection, haematoma or wound dehiscence. This observation is consistent with the study of SH Khundkeret al^[7] and Constantian M.^[10] 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^[9] and Kroll and Rosenfield^[13]). Pressure sore management has been improved through the development of musculocutaneous flaps causing significant reduction in the incidence of wound complications. The use of gluteus maximus muscle or musculocutaneous flaps to close sacral pressure sores considered to be a revolutionary method because of the reliability of blood flow. However, mobilization of gluteus maximus muscle is little bit complicated and causes much blood

loss. In addition, in case of paraplegic patients the gluteus maximus muscles may have been already atrophied. On the contrary, gluteus maximus muscle is an important muscle in ambulatory person because it is the primary extensor and abductor of the hip. A number of similar studies conducted in 1980s showed that a passive muscle carrier is not necessary for flap survival if careful dissection of the musculocutaneous perforator vessels is accomplished.^[10] The final outcome of the patients was assessed in terms of good, acceptable & poor. The outcome was categorized as poor when there was major flap loss, flap was not salvageable and alternate procedure was required. The present study conducted gluteus musculocutaneous flap to evaluate the outcome of flap, composed of skin, subcutaneous fat and gluteus maximus muscle, which demonstrated good outcome in more than 85% cases, acceptable outcome in rest (15%) of the cases & none of them exhibit poor outcome. One of the patients

Limitations of the study:

The sample size was small. Short period of post-operative follow up.

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developed recurrence within 03 months the follow up period. Hentz^[12] found that pressure sore recurrence is proportionate to post-operative complications. As no significant complications developed in the present study, recurrence at 6 months follow up was absent. There was no recurrence after four years of surgical closure of sacral pressure sore by SH Khundkar et al.^[7] Thus, the success rate of the present study is consistent with the study done by SH Khundkar et al.^[7] This similarity may be due to similar pattern of geographical status, post-operative management was adequate, and sample size of both studies were excluded from distinct comorbid pathology. In other studies, the outcome was poor than that of present study in terms of recurrence, like SerhanTuncer et al,^[8] This may be due to inclusion of patients with distinct co morbid diseases, patients with recurrences and poorly nourished patients, large sample size and longer duration of follow up.

CONCLUSION

From the findings of the study and discussion thereof, it could be concluded that the Gluteus Maximus Musculocutaneous flap produces good result in majority of the patients with paraplegia having large sacral sores with few complications or recurrences.

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