

Reading Man Flap for Sacral Pressure Ulcer Reconstruction

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Abstract

Background: The treatment of pressure sores represents a great challenge to health care professionals. Although, pressure ulcers management requires a multidisciplinary approach, the soft tissue defects requiring reconstruction are mainly considered for surgical repair. Local myocutaneous and fasciocutaneous flaps can provide stable coverage of pressure sores.

Aim of Study: To evaluate the versatility and outcomes of “reading man flap” in the reconstruction of sacral pressure sores.

Patients and Method: Between April 2015 to January 2017, ten patients with sacral pressure sore were treated by using Reading man flap. The patient’s ages were ranging between 35-65 years (mean 53), 6 of them were males, and 4 were females. All of them were subjected to local wound care and management without considerable benefit. We exclude those patients with poor medical status and patients with severe contracture and spasticity. The diameter of the sacral pressure sores ranging from 4cm to 7cm (mean 5.5cm).

Results: The “reading man flap” technique was seen to be a useful, versatile and simple flap for coverage of pressure sores, with no postoperative complications in 8 of our patients during the follow up period. The other 2 patients, one of them developed partial flap necrosis (treated conservatively), and the other one developed recurrence after 2 months.

Conclusion: The “reading man flap” was found to be a versatile and easily performed technique for closure of small to medium sized sacral pressure sores.

Key words: sacral pressure sore, reading man flap, local flap.

Introduction

Bed sore or pressure sore is regarded as one of the major global health problem that require an interdisciplinary team for its management. Pressure sore by definition is an area of localized soft tissue ischemic necrosis caused by prolonged pressure higher than the capillary pressure with or without shear, related to

posture which usually occurs over a bony prominence. Pressure ulcer can affect different sites of the body. About 3-4% of all hospitalized patients may develop pressure ulcer. Pressure sore incidence has been estimated to be 2.7-9% in acute care setting, while in long term its incidence reach up to 2.4-23%. Pressure sore care and management is expensive, in united states the treatment cost can be ranging from \$6,000 to \$60,000 depending on the stage of pressure ulcer, The complications and the recurrence rates are the major problems in pressure sore reconstructions. (7% to 62%)^[1,2,3,4,5,6.]

One of the commonly seen pressure ulcer in patient with unrelieved pressure position is sacral pressure sore; of course not only pressure is only factor in pressure sore

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pathogenesis. Shear, friction and moisture play role in pathogenesis of pressure sore. Sacral pressure sore can be treated by using skin graft when the defect is small or when the defect is due to short-term disables. One of the most common flaps used for sacral pressure sore reconstruction are the flaps based on gluteus maximus muscle like V-Y flap. Other flaps which can be employed for treatment of sacral bed sore are vertical and transverse lumbosacral flap that based on the lumbar perforating vessels [7,8,9].

In this study we are evaluating the use of “reading man flap” for sacral pressure sore reconstruction.

Patient and Method

Ten patients presented to us with complaint of sacral bed sore between April 2015 to January 2017 and

they were surgically treated using “reading man flap” technique. Patient’s data are shown in table 1 below.

All the patients included in this study were subjected to preoperative medical assessment. Those patients with severe spasticity, patient with poor medical condition, and finally those patients with recurrent sacral pressure sore were excluded from this study. Preoperative general condition care was done including correction of hemoglobin level, maintenance of albumin above 3 g/dl and control of blood glucose. Wound care was done using local dressing and local antibiotic (silver sulphadiazine cream twice daily), and all the patients were provided with pneumatic mattress and their family instructed to reposition their patient every one hour. Preoperative informed consent was taken from all patients.

No	gender	age	Size of defect(after debridement)	Main cause of pressure sore	Associated medical condition	Duration of sore before presentation	Stage of the sore
1	F	55yr	5*4 cm	CVA	DM,IHD	5 months	IV
2	F	60yr	4*3 cm	fracture neck femur	DM	7 months	III
3	M	65yr	6*6 cm	fracture neck femur	HPT,IHD	8 months	IV
4	M	35yr	5*3 cm	paraplegia	/	3 months	III
5	F	60yr	6*4 cm	CVA	DM,HPT	6 months	IV
6	M	52yr	6*5 cm	fracture neck femur	DM	4 months	IV
7	F	56yr	7*6 cm	CVA	HPT,IHD	6 months	IV
8	M	52yr	5*4 cm	fracture neck femur	DM	6 months	III
9	M	45yr	6*6 cm	paraplegia	/	4 months	III
10	M	50yr	5*5 cm	paraplegia	DM	5 months	IV

*F=female, M=male, yr=year, CVA=cerebrovascular accident, DM=diabetes mellitus, IHD=ischemic heart disease.

Operative Technique

All operations were done in prone position without local injection of adrenaline. After finishing of draping and disinfection, the pressure sore bursa was sprayed by methylene blue dye to stain it and demarcate it. After that wound excision was done by sharply excising all

necrotic and dead tissue. The bursa and all dead tissue were removed till we reached a healthy tissue. After finishing of soft tissue debridement, the underlying bone was evaluated for the presence of any necrotic part which was removed up to healthy normal bone tissue. Hemostasis was secured by using bipolar cautery and for bleeding from the bone; the hemostasis was

secured using a bony wax. After finishing of wound debridement the wound was measured, and the wound ends cut into circular or semicircular shape. After that we began marking of reading man flap. First, we have to choose the area of maximum extensibility and then the central limb of unequal z-plasty was marked as a line that pass tangential to ulcer margin, its length should be 50% more than the diameter of the ulcer. We marked another limb of the z-plasty which will be at 60° angle to the central limb; the resultant flap will represent the quadriangular flap (f1) that will close the ulcer. The third line of z-plasty is drawn from the other end of the central limb which lies tangential to ulcer, and it is located at 45° to the central limb. The resultant flap will represent the triangular flap (f2) which will be used to cover the defect site of quadriangular flap (f1) as shown in figure(1).

The operation starts by incising the skin and subcutaneous tissue along the previously marked limb of unequal z-plasty. The incision is gradually deepened to include the underlying deep fascia. First, we raised the quadrangular flap (f1) from its underlying muscle,

then this flap was transposed to close the ulcer, drain tube (redivac suction tube) was placed, then the flap was sutured by deep dermal interrupted 3/0 polyglycolic suture and the skin then closed with minimum tension using 3/0 silk suture.

Then, the triangular flap (f2) was raised from its underlying attachment to the muscle and transposed to close the donor site of quadriangular flap and sutured in the same manner as quadrangular flap figure (2) (3). The wound was dressed by using antibiotic impregnated gauze with a second layer of dry gauze. The dressing fixed in its position using medical adhesive plaster. Patients and their families instructed to change the position of the patient between lateral and prone position and continue using air mattress bed.

The patients were discharged home after 5 days postoperatively. At day 15-20, the sutures and the suction drain was removed. At 21-day postoperatively patients were allowed to sleep in supine position. Position change by family was kept during follow up period which was extended till 4-8 month postoperatively.

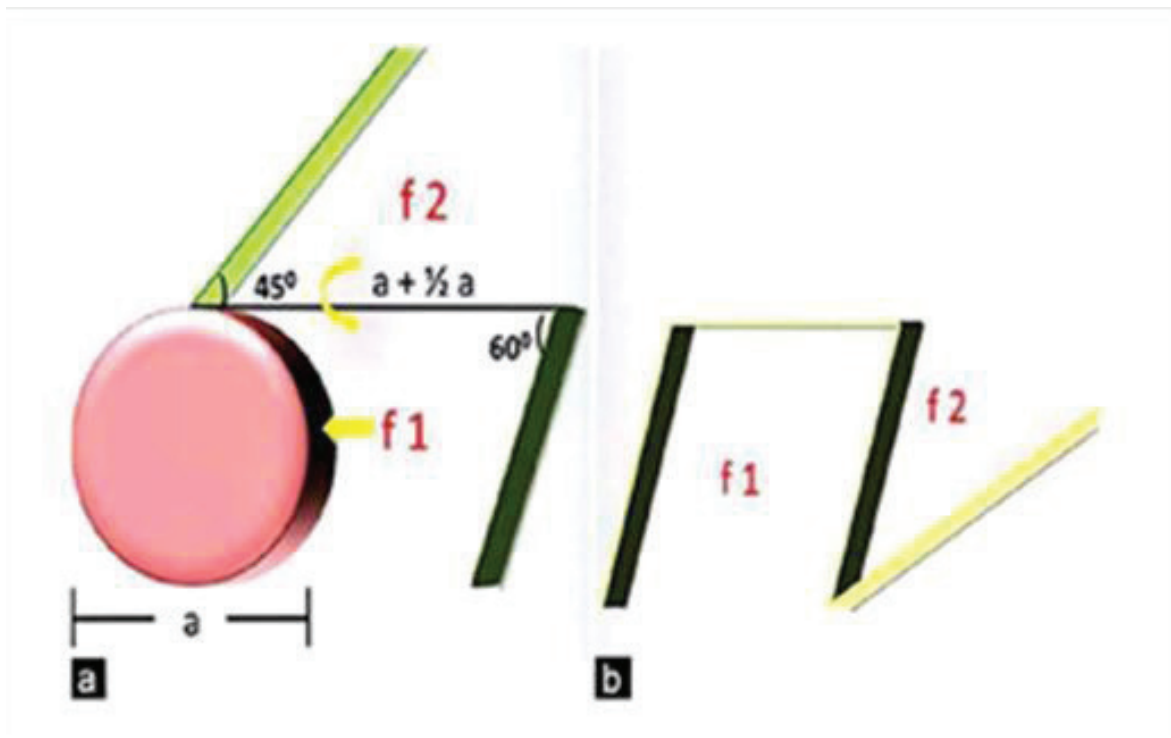


Figure 1. Planning of reading man flap

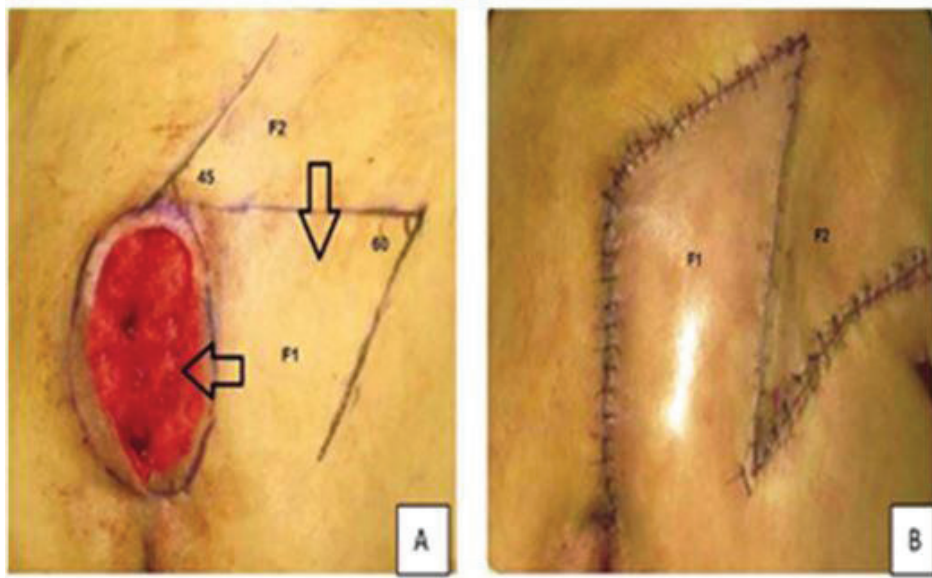


Figure 2 Transposition of the flaps

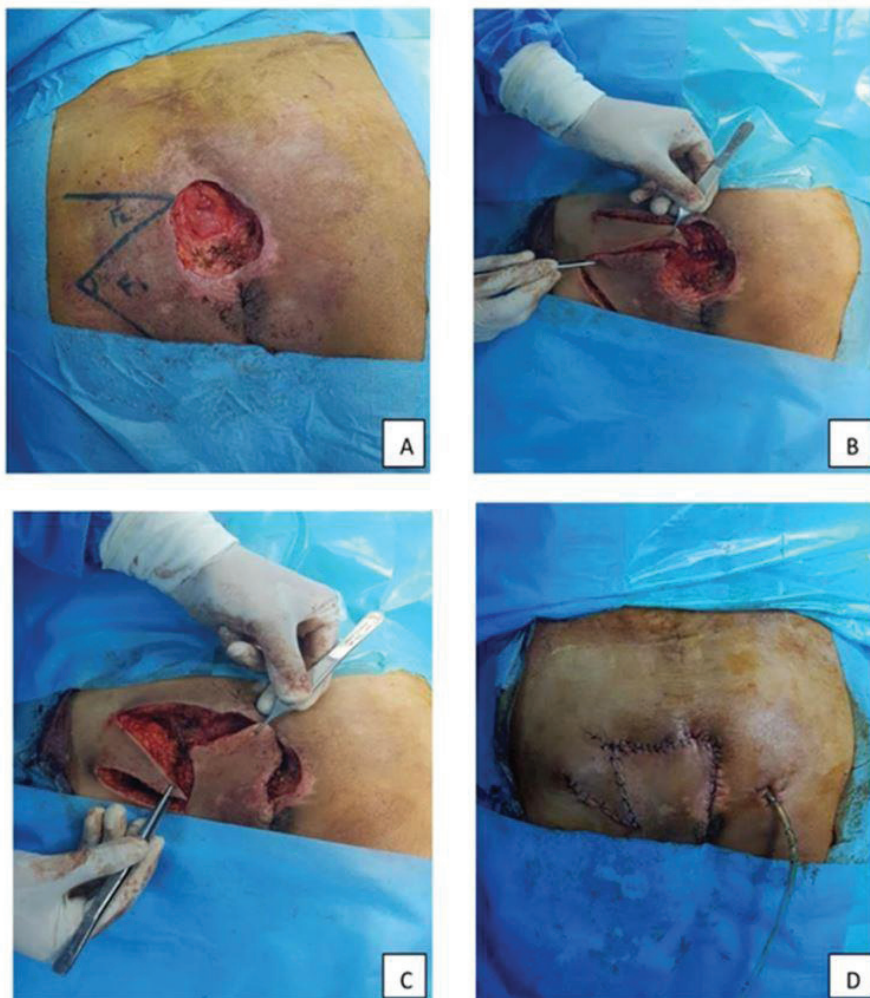


Figure 3: Intraoperative planning of reading man flap: (A) planning of reading man flap. (B) elevation of the flaps. (C) transposition of the flap. (D) after suturing of the reading man flap with suction drain insertion.

Results

Eight of our patients had uneventful postoperative course without any complication like flap necrosis, wound infection, wound dehiscence or hematoma. During follow-up period none of these 8 patients had pressure sore recurrence and the flap provided durable coverage of the sore. One of our patient, had flap congestion with

partial necrosis at the tip of the triangular flap (f2). This patient was kept on conservative local wound care and the wound healed by secondary intention with no subsequent sequelae.

In one of our patient, the pressure sore recurred after 2-months of operation at the same site and this patient was scheduled for later on surgical reconstruction.

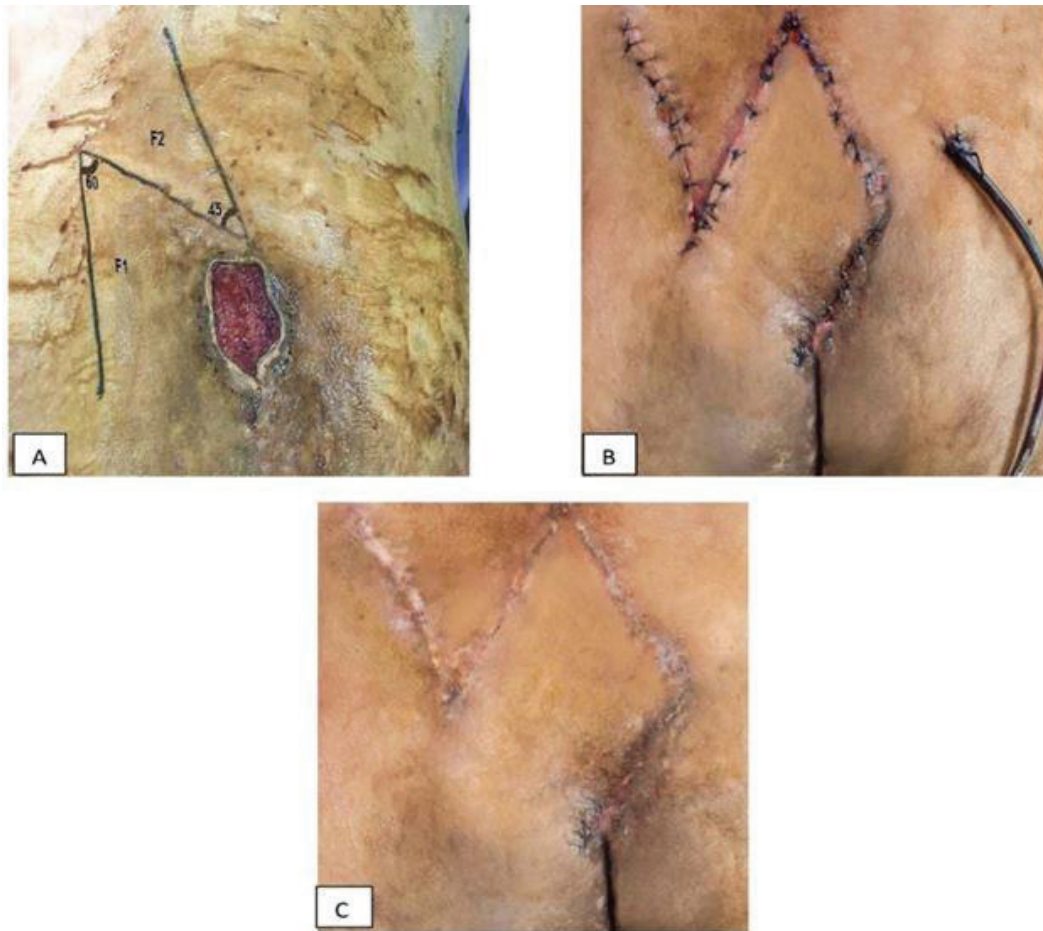


Figure 4. A. preoperative marking. B. At the end of reading man procedure. C. After stiches removal.

Discussion

The “reading man flap” was first described by Mutaf m. et al. as new surgical technique that used for closure of circular defect. Reading man flap is unequal z-plasty (60° - 45°) fasciocutaneous flap, it depends on using of adjacent skin laxity to close the defect. It was first described to close circular defect in face and calf region [10].

In this study “reading man flap” technique was used to close sacral pressure sore in ten patients. Eight out of ten patient had shown smooth and uneventful postoperative result with complete closure of defect without any flap congestion or necrosis. Also there was no recurrence of sacral pressure ulcer in those eight patients during the follow-up period which was extended up to 8 months postoperatively. One of our patient had developed flap congestion which was noticed on first postoperative day and this patient ended with partial flap

necrosis. We attributed this complication to incorrect planning, since this patient was the first case in this series. In this patient central limb of z-plasty was not more than 50% of the defect size, this lead to narrow base quadrilateral flap which closed under tension ending in flap congestion and partial necrosis. Fortunately, this complication not affected the final closure of the ulcer, since wound healed by secondary intention. The other patient had recurrence of the same ulcer after 2month of the operation, this patient had poor compliance with our postoperative instructions regarding frequent patient repositioning. 1

Our results are in general consistence with Marius Roatis et al [11]. Where they used the reading man flap technique in five patients with lumbar and sacral pressure sore and defect (4 patients with skin malignancy and one patients pressure sore). Their results were satisfactory and the entire wound healed uneventfully. Only one patient had slight wound dehiscence which was healed by secondary intention.

“Reading man flap” technique showed to be reliable and easy method for reconstruction of small to moderate size sacral defect, depending on the principle of z-plasty which involved creation of two transposition flap that interdigitate with each other’s [12]. In classical z-plasty, the flaps have identical angle degree, while in the reading man flap technique; the angles of z-plasty are unequal. This will enable us to have two different designed flap, one of them is quadrangular design (60°) which is transposed to close the defect, and the other flap had triangular design (45°) which is used to close the donor site of the quadrangular flap, in such case no skin graft is used as seen when using classical rotational fasciocutaneous flap to close the sacral pressure ulcer were skin graft is used to close the donor site of the flap [13].

Fasciocutaneous flap use for pressure ulcer reconstruction have many advantages:

- v Preservation of the underlying muscle is important to ambulatory patients.

- v Local flap is ideal alternative for skin defects of the size in our study,

- v It is a simple and safe procedure with minimal invasion and preserves the underlying donor tissues for further reconstruction, if needed.

- v The technique is simple, less donor site morbidity, and provides functional and esthetical reconstruction of the defect.

Both Daniel and Faibisoff had investigated the normal soft tissue coverage of pressure point in autopsy specimen’s, and they observed that all pressure points in human body are covered by skin and subcutaneous tissue and not by muscle [9,14].

Although it seems that using of musculocutaneous flap for pressure sore reconstruction provide mass of cushioning tissue over the pressure area and its use improve the surgical outcome, but it has many disadvantages. Musculocutaneous flap need extensive dissection and blood loss, it require more tedious surgical manipulation than fasciocutaneous flap, more risk of injury to the pedicle which lead to complete loss of flap, and using of musculocutaneous flap is not recommended for ambulatory patients, since this lead to functional loss. In addition by atrophy with time will lose its function as cushion to absorb the pressure. Also we believe that using musculocutaneous flap as first choice will increase donor site morbidity and decrease the options available for later on treatment of recurrent cases (as low as 3-6% and as high as 33-100%) [3,15,16].

In a study which was conducted by Philip E. Thiessen et al., they found no difference between musculocutaneous and fasciocutaneous flap used for pressure sore reconstruction in relation to rate of infection, hematoma, seroma, dehiscence, and need for secondary procedure. Also they found no significant statistical difference in the recurrence of pressure sore that were treated whether by musculocutaneous or fasciocutaneous flap [16].

One of the key points that increase success rate of using of “reading man” flap procedure in reconstruction of sacral pressure sore, is the ability to choose the site of maximum skin laxity for our flap. It is better to choose a donor site in an area that had no previous operation or scar, as the presence of a scar will hinder availability and mobility of the flap to close the defect. Also, it is

better to use the “reading man” flap technique for mild to moderate size sacral pressure sore, as large area need more tissue coverage which cannot be provided by using “reading man” flap technique.

Conclusion and Recommendation:

“Reading man flap” technique which is used to reconstruct sacral pressure sore of mild to moderate size showed to be versatile and easy to perform technique, that provide adequate and durable coverage of pressure sore. It enabled us to preform tension free closure of sacral pressure sores with minimum scarring and no donor site morbidity.

Conflict of Interest: The authors declare that they have no conflict of interest.

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