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Comparison of gluteal fasciocutaneous rotational flaps and myocutaneous flaps for the treatment of sacral sores

Received: 12 September 2005 / Revised: 23 September 2005 / Accepted: 7 October 2005 / Published online: 7 December 2005
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Abstract To compare the outcomes of gluteal fasciocutaneous rotational flaps and myocutaneous flaps in the treatment of sacral sores, together with a review of surgical complications in two matched cohorts. Thirty-eight patients (18 gluteal fasciocutaneous rotational flaps and 20 myocutaneous flaps) were reviewed retrospectively at a mean follow-up of 58 weeks. The rate of healing of the sore, the sore healing time, and the incidence of surgical complications, together with rate of recurrence, were obtained by chart review. Treatment groups were matched by patient characteristics, operative time and blood loss. The rate of healing of the sore, sore healing time and complication rate were comparable in the two groups but the rate of recurrence was lower to a statistically significant extent in myocutaneous flap patients. The authors suggest that both methods are comparable, good and safe in treating sacral sores; myocutaneous flaps are more durable.

Résumé Comparer l'issue de deux types de lambeaux de rotation prélevés à partir de muscles fessiers—facio-cutanés ou myo-cutanés—dans le traitement des escarres sacrales, avec une examination des complications chirurgicales chez deux cohortes de patients. Trente-huit patients (18 lambeaux de rotation fessiers facio-cutanés et 20 myo-cutanés), ont été revus de façon prospective après un suivi moyen de 58 semaines. Ceci a permis d'obtenir un score de guérison de l'escarre, ainsi que le temps de guérison, et d'apprécier également les complications chirurgicales et la proportion de réapparition. Les groupes de traitement ont été répartis en fonction des caractéristiques des patients, du temps opératoire et de la perte sanguine. L'évaluation de la guérison de l'escarre, ainsi que le temps de guérison et la proportion des complications ont été comparables entre les deux groupes,

mais la proportion de réapparition est inférieure de façon statistiquement significative chez les patients ayant bénéficié d'un lambeau myo-cutané. les auteurs pensent que les deux méthodes sont comparables. Tous les deux donnent un bon résultat avec sécurité dans le traitement des escarres sacrales, mais le lambeau myo-cutané semble plus durable que le lambeau facio-cutané.

Introduction

Sacral sores are a challenge to medical and nursing staff because they are reluctant to heal, prone to recurrence, difficult to operate upon, and costly [1–3].

Gluteus flaps have been used in treating sacral sores since 1970, as originally described by Ger [4]. 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 fasciocutaneous flaps or myocutaneous flaps. Although their results are well evaluated in the literature [5–8], to the author's knowledge there is a paucity of studies comparing fasciocutaneous flaps to myocutaneous flaps in treating sacral sores. We performed a cohort study of thirty-eight clinical cases to compare gluteal fasciocutaneous rotational flaps and myocutaneous flaps in treating sacral sores.

Materials and methods

Between 1994 and 2004, all patients admitted to our department with sacral sores who were treated with gluteal fasciocutaneous rotational flaps (FC group) or myocutaneous flaps (MC group) were reviewed and compared retrospectively. Those patients with poor morale, severe immunocompromise, and short life expectancy were excluded from our study. During the early phase of the treatment, we performed debridement surgeries, regular dressing and appropriate antibiotics coverage for all patients to control the infection. Gluteal rotational flaps were

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Fig. 1 Creation of arc of a fasciocutaneous rotational flap

performed by experienced hand surgeons in patients without infection, and release of concomitant hip and knee contractures were done where indicated. All patients were put on a standard post-operative regime including keeping redivac drain for at least one week and low residue diet in the first week; regular turning of the patients and sitting out of bed to avoid pressure on the flap were emphasized. Flaps were inspected on day five and day 14 if uneventful. A minimum postoperative follow-up period of 52 weeks was chosen to provide time for detection of recurrence of the sore. Complications including flap necrosis; persistent cavity and sinus formation were charted.

The surgical technique for gluteal fasciocutaneous rotational flaps was outlined as follows.

The operations were performed under general anaesthesia. The patient was in prone position; after debridement, a fasciocutaneous flap was raised from either side of the buttock depending on which side had extensive sore involvement or on which side the sore was further away from midline; we then created an arc of fasciocutaneous rotational flap (Fig. 1), and the tension was redistributed

Fig. 2 Redistribution of tension by proper placement of the stitches

Table 1 Demographic data

No. of patients	FC group	MC group	<i>P</i> value
Male : Female ratio	18 1:1.25	20 1.5:1	
Age			
Mean	62.2	58.6	0.59
Standard deviation	19.2	21.7	
Range	26–84	24–84	
Reason for being bed-ridden			
Cerebrovascular accident:	6	7	–
No. of patients			
Cervical spine disorder:	5	6	
No. of patients			
Traumatic brain injury:	5	5	
No. of patients			
Fractured femurs: No. of patients	2	2	
Average follow up period (months)			
Mean	57.8	57.7	0.96
Standard deviation	5.3	5.4	
Range	52–70	52–70	
Operative time (mins)			
Mean	81.1	88.5	0.13
Standard deviation	14.1	15.7	
Range	60–120	70–120	
Estimated blood loss (mls)			
Mean	104.7	108.3	0.75
Standard deviation	35.1	34.6	
Range	80–200	80–200	

by proper placement of the stitches. We employed three methods to facilitate lateral-edge wound closure, which were the use of back cut, z-plasty and delayed primary closure. A redivac drain was inserted at the end of procedure to facilitate drainage of blood and discharge in all patients (Fig. 2).

Table 2 Data comparison at 12-month follow-up

	FC group	MC group	<i>P</i> value
Healed sore:	17 (94%)	19 (95%)	1.00
<i>N</i> (%)			
Sore healing time (weeks)			
Mean	2.89	3.25	0.13
Standard deviation	0.58	0.85	
Range	2–4	2–5	
Recurrence of sore:	4/17 (24%)	0%	*0.04
<i>N</i> (%)			
Complications			
<i>N</i> (%)	3 (17%)	3 (15%)	1.00
Nature	1 flap necrosis, 2 sinus formation	2 sinus formation, 1 small cavity	

*Statistically-significant difference with *P* value<0.05

The surgical technique for myocutaneous flaps was similar, except that the gluteal muscle was included in the flap.

The two treatment groups were well-matched by patient age, sex, reason for being bed-ridden, and follow-up period. The final outcomes in terms of rate of healing of the sore, sore healing time, complications and rate of recurrence were compared between the two groups.

The statistical difference was calculated using the Fisher exact test for dichotomous variables with frequency <5, Chi-square test for frequency >5, Student's unpaired *t*-test for normally-distributed data, and the Mann-Whitney U test for skewed distribution in continuous variables. A *P* value of less than 0.05 was taken as significant.

Results

Of the thirty-eight patients included in the study, 18 patients were in the FC group and 20 patients were in the MC group. The demographic data in each group, including the sex, age, reason for being bed-ridden, follow up-period, operative time and estimated blood loss are summarized in Table 1.

The two groups were statistically comparable in terms of rate of healing of sore, sore healing rate and complication rate, whilst the rate of recurrence was lower to a statistically-significant extent in the MC group (Table 2). All complications were treated successfully with simple debridement and regular dressing, and all patients with recurrent sores had exposed sacrum over the sore during the flap surgery.

Discussion

The advantages of the fasciocutaneous rotational flap are well substantiated in the literature. It has good blood supply via the fascial plexus; it provides a large flap, easy to raise; re-rotation is feasible [5, 6]. One patient suffered with partial flap necrosis, due to excessive tension over the skin of the necrotic part during suturing. In order to achieve tension-free distribution of the flap after rotation, the circumference of the flap should be around 5–8 times the width of the sore [9].

In addition, we found that those patients with exposed sacrum, thin skin and subcutaneous tissue had a higher rate of recurrence. This is because of the paucity of padding over the pressure points, particularly over the avascular bony prominences in those patients who received fasciocutaneous flaps. Excisions of part of the sacrum not only remove the pressure points, but also remove avascular bone, which theoretically will help the healing of the flap.

On the other hand, myocutaneous flaps had their value in reducing the rate of recurrence, by padding the pressure points; and their advantage is well substantiated by the

literature [8, 10, 11]. However, myocutaneous flaps have their limitations. They provide a limited arc of rotation; there is high atrophic degeneration with time; they are technically demanding; and if they are used initially, fasciocutaneous flaps cannot be performed subsequently due to poor blood supply [5, 12].

Whilst Haheer JN et al. [13] mentioned the release of flexion contractures as a prerequisite for the treatment of pressure sores in their ten cases, the importance of hip and knee contractures cannot be overemphasized. We found that it can facilitate nursing care and prevent recurrence of the sacral sore by allowing easier passive mobilisation of the patients.

Our study confirms that the sore healing rate and time, as well as the complication rate using both fasciocutaneous flaps and myocutaneous flaps were good, and that they were statistically comparable. In addition to the nature of the flap, we believe that proper patient selection, adequate debridement, dressing and antibiotic coverage can provide a base without infection for healing of the flap. Excellent nursing care is needed to provide regular turning to avoid pressure on the flap or sacrum.

Conclusion

We concluded that fasciocutaneous rotational flaps and myocutaneous flaps are comparable in treating sacral sore after proper patient selection. Myocutaneous flaps are more durable, and more suitable in preventing recurrence of the sore for those patients with thin skin and subcutaneous tissue or exposed sacrum.

References

1. Riggs A (2003) Pressure ulcers lead to increased mortality, liability. Prevention, treatment require planning, team work. *J Ark Med Soc* 100(5):160–161
2. Reddy M, Keast D, Fowler E, Sibbald RG (2003) Pain in pressure ulcers. *Ostomy Wound Manage* 49(4 Suppl):30–35
3. Dharmarajan TS, Ahmed S (2003) The growing problem of pressure ulcers. Evaluation and management for an aging population. *Postgrad Med* 113(5):77–78, 81–84, 88–90
4. Ger R (1971) The surgical management of decubitus ulcers by muscle transposition. *Surgery* 69(1):106–110
5. Yamamoto Y, Ohura T, Shintomi Y, Sugihara T, Nohira K, Igawa H (1993) Superiority of the fasciocutaneous flap in reconstruction of sacral pressure sores. *Ann Plast Surg* 30(2):116–121
6. Krupp S, Zaach GA (1976) Operative treatment of pressure sores in paraplegics by rotation flap. *Paraplegia* 14(1):29–35
7. Minami RT, Mills R, Pardoe R (1977) Gluteus maximus myocutaneous flaps for repair of pressure sores. *Plast Reconstr Surg* 60(2):242–249
8. Aggarwal A, Sangwan SS, Siwach RC, Batra KM (1996) Gluteus maximus island flap for the repair of sacral pressure sores. *Spinal Cord* 34(6):346–350
9. Ip FK, Ko PS (2001) Soft tissue surgery. In: Leung KS, Ko PS (eds) *Practical manual for musculoskeletal trauma*. Vol II, operative techniques in fracture fixation. Springer 333

10. Wilk A, Rodier C, Beau C, Stricher F, Lesage F, Lecocq J et al (1991) Sacral bed sore: an evaluation of 10 years' treatment with the gluteus maximus muscle. *Ann Chir Plast Esthet* 36 (2):132–137
11. Takacs J (1992) Experience with using a myocutaneous flap, obtained from the gluteus maximus, in covering sacral decubitus wounds. *Orv Hetil* 133(43):2767–2770
12. Daniel RK, Faibisoff B (1982) Muscle coverage of pressure points—the role of myocutaneous flaps. *Ann Plast Surg* 8 (6):446–452
13. Haheer JN, Haheer TR, Devlin VJ, Schwartz J (1983) The release of flexion contractures as a prerequisite for the treatment of pressure sores in multiple sclerosis: a report of ten cases. *Ann Plast Surg* 11(3):246–249