

Cutaneous flaps in the treatment of 338 pressure sores

A better choice



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Cutaneous flaps in the treatment of 338 pressure sores. A better choice

AIM: Muscular flaps are considered by many surgeons as a treatment of choice for pressure sores. Nevertheless fasciocutaneous and adipofascial flaps are less sensitive to ischemia, more resistant to pressure and have higher mechanical resistance. The aim of this study is to evaluate the results of our integrated rehabilitative and surgical protocol in pressure sore management based on the use of cutaneous flaps.

MATERIAL OF STUDY: Since 1998, we treated 338 pressure sores (PS) in 195 patients (120 males; 75 females), 189 patients were affected by paraplegia and tetraplegia and 6 of them by neurological disorders.

RESULTS: Ninety sacral, 156 ischiatic, 75 trochanteric, 9 calcanean and 8 sores of the iliac-crest were successfully treated. All showed an involvement of the bone element, with osteitis and/or periosteitis. 14 cases of trochanteric sores showed a deeper bone involvement, with evidences of osteomyelitis. Follow up ranges from 7 years to 2 months. Median time for wound healing was 18 days.

DISCUSSION: The use of fasciocutaneous flaps, as an alternative to the traditional musculocutaneous flaps in the treatment of pressure sores leads to good and statistically comparable, healing rate, time and incidence of complications. Reconstructive plastic surgery as is a decisive factor to reach a good rehabilitative outcome, minimizing the time of rehabilitation with a following decrease of hospitalization costs. In spinal cord injured patients, surgical treatment of pressure sores is not proposed as the main procedure, but it is an important stage during the natural history of pressure sores.

CONCLUSIONS: Cutaneous, adipofascial and fasciocutaneous flaps are less invasive, of a relatively easy execution, provided by a reliable vascular pedicle and they could be "re-used" in case of recurrences.

KEY WORDS: Cutaneous Flap, Musculocutaneous Flap, Pressure Sores, SCI Patients

Introduction

Reconstructive plastic surgery as a treatment for pressure sores is a decisive factor to reach a good rehabilitative

outcome, minimizing the time of Rehabilitative Project with a following decrease of hospitalization costs.

Since 1998, we treated 195 patients with 338 pressure sores located in the most common sites like sacral region, trochanteric region, ischiatic and calcanean region.

The 97% of those patients are spinal cord injured (SCI) patients; the 3% of them have neurological damage that implies a longer hospitalization. In Literature, muscular flaps represent the first surgical treatment choice in pressure sores reconstruction¹⁻⁵.

Our suggestion concerns the use of cutaneous flaps for pressure sores repair, relying on the encouraging results we observed and by underlining the possibility to "re-use" these flaps, because of the high rate of ulcers relapses.

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The result of our experience is also supported by anatomical and physiological criteria. The muscle is a deeply vascularised tissue, though liable to ischemia. Moreover these patients show minor resistance against pressure, due to atrophy and fibrosys of their muscular tissue.

In the end, reconstructive surgery of pressure sores is often a compulsory stage in the life of these patients, because this complication is weighed by a high risk of relapse; according to this assumption, surgical choice must contemplate the need for multiple reconstructive options.

The aim of this study is to evaluate the results of our integrated rehabilitative and surgical protocol in pressure sore management based on the principles explained above.

Materials and methods

Since 1998, we treated 338 pressure sores (PS) in 195 patients (120 males; 75 females) with an average age of 49 (age between 21 and 84); 189 patients were affected by paraplegia and tetraplegia and 6 of them by neurological disorders.

The 43% of pressure sores are relapses of previous surgery, with poor chances for further surgical treatment. As regarding the anatomical sites, we treated 90 sacral sores, 156 ischiatic sores, 75 trochanteric sores, 9 calcaneal and 8 sores of the iliac-crest. (Table I)

Every sore shows an involvement of the bone element, with osteitis and/or periosteitis, while in 14 cases of trochanteric sores, the bone involvement is deeper with evi-

TABLE I - Total Number Of Sores Is Reported In Association To Their Anatomical Location, Type Of Surgical Treatment And Flap Selection.

Sore	N°	Treatment	Flap Type
Sacral	90	79 Flaps 7 Skin Grafts 4 Direct Suture	79 Cutaneous Flaps
Ischiatic	156	156 Flaps	142 Cutaneous From Posterior Thigh Flap 14 Cutaneous Pre-Expanded From Posterior Thigh Flaps
Trochanteric	75	72 Flaps 3 Direct Suture	44 Cutaneous Flaps Latae Flap With Fasciocutaneous Flaps Coverage 14 Muscular Vastus Lateralis Flap With Cutaneous Flaps Coverage 14 Muscular Tensor Fasciae Flap With Fasciocutaneous Flaps Coverage
Others	17	17 Flaps	17 Cutaneous Flaps

TABLE II - Characteristics of the samples. Recurrent sores and Osteomyelitis in patients presenting to our department.

Sore	No	Recurrence	%	Osteomyelitis	%
Sacral	90	1	1,11	0	—
Ischiatic	156	3	1,92	0	—
Trochanteric	75	0	0	14	18,66
Others	17	0	0	0	—
Total	338	4	1,18	14	4,1

dences of osteomyelitis. (Table II) In all cases we performed a wide surgical treatment which included the removal of the necrotic tissues, bone remoulding with tangential osteotomy and bioptic specimen for the microbiological exam. The treatment of sacral pressure sores contemplated the use of 79 cutaneous flaps, 7 cutaneous skin grafts and, in 4 cases, due to the particular clinical conditions of these patients, an immediate suture. Trochanteric pressure sores were treated by using 14 flaps obtained from the tensor fasciae latae muscle, 24 cutaneous flaps and, in three cases, in relation to the clinical conditions of the patients, through the use of a direct suture. In 14 cases trochanteric pressure sores were complicated by femoral head osteomyelitis and joint capsule involvement. We performed disarticulation of the femoral head and a vastus lateralis muscular flap was harvested and overturned in the acetabular fossa. The cutaneous layers were then repaired with cutaneous flaps. Ischiatic pressure sores were treated with cutaneous flaps from the posterior area of the thigh. In 14 patients with simultaneous trochanteric and ischiatic pressure sores, the reconstruction was executed by means of a cutaneous pre-expanded flap from the posterior region of the thigh. Flaps based on the trunk or pelvis have been demonstrated to provide better outcomes in the coverage of ischial ulcers than those based on the more mobile lower extremity^{8,10}. We opted for this solution in order to minimize tension, especially after ischial ulcer coverage. All iliac crest and heel pressure sores were treated with cutaneous flaps.

During postoperative we set a targeted antibiotic therapy for 15 days. It was always based on bioptic intraoperative finds. In those cases complicated by osteomyelitis the management had a 6 weeks length and continued up to the reduction of the inflammatory markers (VES, PCR, bone scintigraphy with marked leucocytes). To avoid excessive tension/pressure on flaps during the postoperative period, patients lied on air fluidized therapy bed; this device also reduce the importance of nursing care with no need of regular turning on bed. The protocol foresee postoperative physical examination with interventions that include strategies to reduce extrinsic and intrinsic risk factors associated with tissue ischemia, furthermore monitoring and optimizing patient's nutritional status. Neurological and psychiatric consulting reg-

istered neurologic status according to the standards of the American Spinal Injury Association (ASIA) ⁶ and functional status by the Functional Independence Measure (FIM) ⁷.

Results

Follow up ranges from 7 years to 2 months (mean 55,27 months, median 3,5 years). Median time for wound healing was 18 days. In 10 patients was observed the presence of seroma that resolved after needle aspiration, with no lengthening of the overall healing time. In 13 patients we observed the presence of hematoma; in 4 cases it implied a delay of the process of wound healing of about 15 days. In 5 patients an infection delayed the wound healing process by 30 days.



Fig. 1: Preoperative view of relapsed sacral pressure sore.



Fig. 2: Intraoperative view. Harvesting and preparation of bilateral cutaneous flaps.



Fig. 3: Postoperative outcome.

Three patients showed an apical suffering of the flap, but only one needed surgical revision, instead of other two cases, which completed the wound healing process in 21 days.

In 4 cases (1,18%) we observed late recurrence of pressure sores: three of them in the ischiatic area after 6 months, 1 year and 2 years from the first surgical treatment and one in the sacral region after 5 months since surgery. Ischiatic relapses were treated with cutaneous flap from the posterior area of the thigh, pre-expanded in just one case; sacral recurrence was treated with necrotic areas debridement and primary closure. All patients were submitted to specific protocols as regard the posture, especially during the immediate post-operative care and afterwards in the sitting position.

Discussion

In spinal cord injured patients, surgical treatment of pressure sores is still not proposed as the main procedure: it is an important stage during the natural history of pressure sores.

In this regard, muscular flaps are considered the first choice treatment by many surgeons ¹⁻³.

The main reason is because muscle is a well vascularised tissue but on the other hand they have two big disadvantages: they are invasive and not repeatable in case of pressure sore relapse. The results of our experience are supported by anatomical and physiological criteria; in fact, muscle is a deeply vascularised tissue though liable to ischemia in comparison to skin and subcutaneous tissue.

Furthermore, especially in spinal cord injured patients, the muscular tissue is often atrophic and fibrotic, showing minor resistance against pressure. Moreover, areas most commonly affected by pressure sores are anatomi-

cally void of muscular tissue. The use of the muscular flap finds its indication in cases complicated by osteomyelitis⁴ such as trochanteric pressure sores⁵, complicated by femoral head osteomyelitis and joint capsule involvement, in which the vastus lateralis flap acts as a "carrier" for the antibiotic therapy and also obliterates dead spaces. Furthermore, a musculocutaneous flap, such as gluteus maximus flap at sacral area, changes the physiological point contact with abnormal body weight distribution, allowing the possible creation of a new ischiatic pressure sore. Myocutaneous flaps also provide a limited arc of rotation, showing also an important atrophic degeneration with time and, if used as primary option, they limit a secondary fasciocutaneous flap mobilization, due to poor blood supply⁸⁻¹⁰.

The transfer of muscular groups could also expose to dramatic local complications, which contemplate sore's relapse, urinary implications with urethral and exposure of minor pelvis' organs^{8,9}.

Finally, primary use of musculocutaneous flaps strongly interferes with further treatment in patients with high-risk of recurrence. The use of fasciocutaneous flaps, as an alternative to the traditional musculocutaneous flaps, was noted by some Authors⁸⁻¹⁰.

T.C. Wong et al.⁸ suggested that sore healing rate and time, as well as the complication rate using both fasciocutaneous and myocutaneous flaps, are good and statistically comparable. In their studies, they mentioned myocutaneous flap as more durable and more suitable option in preventing recurrence, especially in patients with thin skin and subcutaneous tissue or exposed sacrum. Other Authors, like Borman and Maral⁹, suggest that flap choice should be decided case-by-case, according to specific indications. A musculocutaneous flap may be more appropriate for a large, deep ulcer, in fact if the loss of subcutaneous tissue beyond the wound periphery is extensive, then it is difficult to obliterate the dead space with a fasciocutaneous flap. On the other hand, if the loss of subcutaneous tissue is minimal, then a fasciocutaneous flap will fill the ulcer defect well in most cases.¹¹

Sometimes adipofascial and fasciocutaneous flaps can be used for deeper sores with exposure of bone tissue. For example the sacral area is normally muscular tissue free, so cutaneous or adipofascial flaps could play an effective role for covering and filling these kind of wounds.

According to the exposed data, we firmly state that cutaneous flaps preparation is a poorly invasive procedure and makes easier the simultaneous treatment of multiple lesions. We also stress on the fundamental importance of postoperative posturizing and rehabilitation, keeping always in mind the need of a multidisciplinary approach to these complex patients.

We also believe, as Borman suggests in his studies, that fasciocutaneous and adipofascial flaps are less sensitive to ischemia and more resistant to pressure than muscular flaps and have a higher mechanical resistance. Moreover,

blood loss is reduced and the percentage of pressure sore-free survival is increased when fasciocutaneous flaps are used⁹.

Beyond these features, the possibility of repeatable cutaneous flaps could be increased by skin pre-expansion. Preventive skin expansion of the donor site offers two important advantages: it makes the donor site closure easier and it helps blood vessels improvement at distal flap portion¹².

Conclusion

Our experience, supported by Literature, points out that cutaneous, adipofascial and fasciocutaneous flaps are less invasive, of relatively easy execution and provided by a reliable vascular pedicle. Moreover they could be "re-used" in case of recurrences and for this reason to be considered more suitable for patients with high risk of recurrence. It is important to underline the basic role of prevention and follow up, because without them every result is unpredictable.

Finally we truly believe in the essential role of a detailed rehabilitative protocol. It has to be personal and performed in every single patient, in order to characterize the correct posturing to reach an exhaustive prevention of pressure sores.

Riassunto

La chirurgia plastica ricostruttiva svolge un ruolo chiave all'interno del complesso approccio multidisciplinare rivolto al paziente con lesioni da pressione.

Una corretta strategia chirurgica che garantisca un'adeguata copertura della perdita di sostanza comporta la diminuzione dei tempi di riabilitazione e la conseguente riduzione dei costi legati al prolungato periodo di ospedalizzazione.

Questo risulta fondamentale soprattutto nei pazienti miellesi, nei quali il ricorso al trattamento chirurgico delle ulcere da pressione è considerato a tutt'oggi un'opzione frequente, a volte imprescindibile. L'utilizzo di lembi muscolari dotati di ottima vascolarizzazione, rappresenta per molti autori la prima scelta. D'altro canto, esiste la possibilità di sfruttare lembi locali fascio-cutanei e fascio-adiposi che risultano essere più resistenti agli insulti meccanici, ai danni pressori e per questo meno soggetti ad ischemia.

In questo articolo viene riportata la nostra esperienza con una serie di 195 pazienti, affetti da un totale di 338 lesioni da pressione coinvolgenti vari distretti corporei (90 regione sacrale, 156 regione ischiatica, 75 regione trocanterica, 9 regione calcaneale e 8 cresta iliaca), e trattati chirurgicamente con successo mediante l'allestimento di lembi locali di copertura cutanei, fascio-cutanei e fascio-adiposi. Lo scopo del nostro studio è quello di

evidenziare come questi lembi cutanei rappresentino un'ottima alternativa all'utilizzo dei classici lembi muscolari, con risultati sovrapponibili sia in termini di tempi di guarigione che di incidenza di complicanze postoperatorie. Dal 1998 ad oggi 120 pazienti maschi e 75 femmine, di cui il 97% paraplegici e/o tetraplegici ed il resto con disordini neurologici, sono stati trattati attraverso il nostro protocollo integrato riabilitativo e chirurgico. Sulla base delle confortanti evidenze in letteratura e della nostra esperienza clinica, riteniamo importante sottolineare il ruolo dei lembi cutanei, fascio-adiposi e fascio cutanei nel trattamento chirurgico delle lesioni da pressione. L'allestimento di questo tipo di lembi è sicuro e di facile esecuzione. Garantiscono infatti un'adeguata vascolarizzazione associata ad una minore invasività locale, con la possibilità di ripetibilità della procedura in vista di un ulteriori interventi.

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