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LOWER LIMB TRAUMA: A REVIEW OF 40 CASES TREATED AT THE REGIONAL BURNS AND PLASTIC SURGERY UNIT, MERSEYSIDE, ENGLAND

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LOWER LIMB TRAUMA: A REVIEW OF 40 CASES TREATED AT THE REGIONAL BURNS AND PLASTIC SURGERY UNIT, MERSEYSIDE, ENGLAND

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SUMMARY

This is a review of 40 patients with lower limb trauma that required reconstruction, treated at Mersey Regional Plastic Surgery and Burns Centre during the year 1989. 73% had bone involvement while there was soft tissue injury only, in 27%. Seven patients (18%) had the affected limb amputated. Of the rest, 6 were treated with skin grafts only, 13 with local flaps and 14 with free flap reconstruction. The soft tissue healing time was least in patients who had free flaps. The time taken by skin and bone to heal and the average duration of hospitalisation was also less in cases that had early management compared to those who had delayed and late treatment. Early reconstruction in severe lower limb trauma is desirable and cost effective.

INTRODUCTION

Acute soft tissue injuries of the lower limb with or without bony involvement are best managed along standard lines by adequate debridement and primary closure of clean wound or delayed primary closure of seriously contaminated wounds. With several options of distant and locally available tissue, most lower limb wounds can be closed satisfactorily often as a single stage procedure and avoiding undue chronicity with its attending problems. This presentation is a retrospective analysis of cases with lower limb trauma that required reconstruction performed at Mersey Regional Plastic Surgery and Burns Centre during the year 1989. Patients with burns of the lower limb and pretibial lacerations were excluded from the study.

MATERIALS AND METHODS

The information for this study was obtained from theatre and ward log books and from patients medical records. Wound description was based on Gustilo's(1) classification of open fractures, thus:

Grade I: small puncture wound 1cm. or less in length, with no gross contamination,

Grade II: wound, 1-3cm., no gross contamination and no extensive soft tissue damage or avulsion,

Grade IIIa: all larger or smaller ones with gross contamination, adequate closure of the fracture by soft

tissue is possible,

Grade IIIb: extensive soft tissue injury, and stripping of periosteum with exposure of bone; massive contamination is common,

Grade IIIc: as above, with associated major vascular or neural injury.

The cases were divided into groups for the purpose of review. The results were analysed with respect to method of reconstruction. A further division in accordance with the time of management into early, (within 3 days of injury), delayed (between 72 hours and 3 months) and late (after the third month) cases was carried out. The results of management were compared. The soft tissue healing time was the time taken for complete wound closure, while the bone healing time was the period between trauma and weight bearing mobilisation.

RESULTS

There were 40 patients comprising 32 males, and 8 females. Mean age was 35 ± 23.5 years, the range being 2 to 87 years. Road traffic accidents was the major cause accounting for 68% of the injuries. There was bone involvement in 73% and soft tissue injury only in 27%. The time of presentation to plastic surgery ranged between day one and 36 years post trauma. The mean time of presentation of late cases was 11.8 years. All the fractures were compound, of which 5% were Type II, 5% Type IIIa, 70% Type IIIb and 20% Type IIIc.

Table 1

Duration of Reconstruction and Soft tissue Healing Time of 40 patients with Lower Limb Trauma

	Local flap	free flap	Skin graft	Amputation
Number of cases	13	14	6	7
Average duration of reconst(hr)	16±0.9	6.9±2.4		
Average soft tissue healing time; surgery--wound closure(days)	61	28	52	54

Table 2

Average healing time of 20 cases based on time of management.

	Early	Delayed	Late
Number of patients	7	7	6
Average soft tissue healing time	40	46	416
Trauma - wound closure(days)			
Average bone healing time(weeks)	7	10	66
Average duration of hospitalisation(weeks)	6.7	8.7	9

Seven patients (18%) had the affected limb amputated (Table 1) while of the rest, six had skin grafts, 13 had local flaps and 14, free flap reconstruction. Of the local flaps, nine were muscle and four fasciocutaneous flaps. Three of the free flaps were fasciocutaneous, nine were muscle, and two were musculoperiosteal. Average operating time for the local flaps was 1.6 ± 0.9 hours and 6.9 ± 2.4 hours for free flaps. The soft tissue healing time was least in patients who had free flaps. The time taken by skin and bone to heal was significantly less in cases that had early management compared to those who had delayed and late treatment (Table 2). The average duration of hospitalisation was also less.

DISCUSSION

Failure of primary wound healing not only occurs in complex injuries with or without loss of skin but also complicates the open reduction of simple fractures if closure is attempted in the presence of significant tension and subcutaneous and subfascial oedema. In order to achieve primary wound healing, adequate

irrigation and debridement preferably within six hours of injury are essential. Jet lavage is a very effective system of irrigation. The surgeon must avoid the temptation to resuture avulsion flaps as the major part is destined to necrosis because of extensive soft tissue and microvascular injury. The safest course is to resect and apply skin graft to the defect provided the recipient bed is suitable.

In defects with bone involvement where early coverage is desirable, bone fragments need only be mechanically cleansed and left in place(2). If surgery is carried out after 72 hours post-trauma, defensive debridement or the longing to preserve as much bone fragments should be avoided in order to prevent post operative infection. Some form of bone fixation, internal or external, is preferable.

After the management of underlying structures, an intact cutaneous covering must be restored immediately. This is essential to prevent infection, reduce fibrosis, and interference with local blood supply. The need for early reconstructive intervention therefore cannot be overemphasised. This is borne out by the shortest soft tissue and bone healing times in our early cases. Complication rate is less when the patient is managed by early reconstruction.

For tissue closure, partial thickness skin grafts can be used provided the bed has an adequate blood supply to make the graft survive. Otherwise, a flap, local, regional or distant should be used. Although the thigh is provided with many muscles surrounding the femur making flap transfers unnecessary, there are occasional cases of bone exposure, for example, in the greater trochanter in which the tensor fasciae latae(3) musculocutaneous flap can provide adequate cover. In the knee region and upper third of the leg, medial or lateral gastrocnemius(4) musculocutaneous or muscle flap covered by partial thickness skin can be used. For mid third of the leg, soleus muscle may be transposed locally as the gastrocnemius may not reach adequately.

Flaps consisting of skin and deep fascia (fasciocutaneous flaps) along with rich network of vessels contained on top and just under deep and transferred in one stage have largely replaced the use of cross leg flaps in recovering lower leg, ankle and foot defects. The fasciocutaneous flap can be in form of a rotation, transposition, reverse flow or turn over flap. For massive defects and where local tissue is not freely available, free flaps(2) using fasciocutaneous e.g. radial forearm, lateral arm, scapular flaps, or musculocutaneous e.g. latissimus dorsi flap need be considered.

One of the major complications of inadequate primary management of compound limb fractures is the development of chronic osteomyelitis. Recent advances in tissue cover involving local tissue transfer and microvascular surgery have radically changed the management of this complication with much improved outcome. The treatment consists of

radical debridement, and tissue transfer either in the form of vascularised bone, or muscle with or without bone. The latter provides a dual control of infection, by virtue of the abundant blood supply through the muscle, as well as bone regeneration. This treatment could be staged or combined as in our cases in which the serratus anterior musculoperiosteal flap was used to provide cover and framework for bone regeneration after thorough debridement.

None of our patients had complete transection of the dominant arterial supply of the lower limb. Such an injury indicates poor prognosis. Presentation of such cases should call for consideration of other prognostically favourable factors in order to obtain a reasonable expectation for salvage of the limb. The factors include intact sensation of the sole of the foot, absence of significant trauma to ipsilateral foot and a short warm ischaemic time. Early amputation in those with associated unfavourable factors is not a failure of treatment but is an alternative to a long, expensive reconstructive process fraught with complications, disappointment, and a strong possibility of a request for amputation in the end.

In conclusion, early reconstruction is desirable and

certainly more cost-effective in severe lower limb trauma. Given the several available means of reconstruction, the severely injured, particularly those with lower limb bone involvement can be spared the misery of prolonged confinement with its attendant complications.

REFERENCES.

1. Gustilo, R.B. and Anderson, J.T. Prevention of infection in the treatment of one thousand and twenty five open fractures of long bones. retrospective and prospective analyses. *J.Bone Surg.* 58: 453, 1976.
2. Godina, M. Early microsurgical reconstruction of complex trauma of the extremities. *Plast. Reconstr. Surg.* 78: 265, 1986.
3. Nahai, F. Silverton, J. S. Hill, L.H. and Vasconez, L.O. The tensor fasciae latae musculocutaneous flap. *Ann Plast.Surg.* 1: 372, 1978.
4. McCraw, J.B., Pishman, J.H and Sharzer, L.A. The versatile gastrocnemius myocutaneous flap. *Plast. Surg. Reconstr. Surg.* 62:15, 1978.