

RESURFACING OF THE KNEE JOINT AFTER RELEASE OF CONTRACTURE

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SUMMARY

Fifteen cases of post burn contracture of the knee were resurfaced after release of contracture by the medial head of gastrocnemius muscle and free skin graft, during the last 5 years period. It was found to be a much superior and useful method as compared to the conventional method of free skin grafting.

Contracture of the knee following extensive deep burn of inferior extremity has got multiple problems. There is acute shortage of normal skin and subcutaneous tissue to cover the raw area after release. The use of free skin graft to cover this raw area has got many drawbacks because there is high risk of recurrence of the contracture and repeated ulcer formation due to break-down of the unstable scar. The cosmetic appearance is not pleasing.

Ger in 1966 popularised the technique of muscle flap and free skin graft. In 1977 McCraw described the use of medial gastrocnemius myocutaneous flap for covering lower leg defects. In 1978 McCraw et al. reported the extensive use of the flap.

Gastrocnemius muscle and its associated skin territory on the posterior calf can be used as a muscle flap, a musculocutaneous flap, as a neurovascular island flap or as a fasciocutaneous flap.

The gastrocnemius muscle arises from the back of the condyle of femur and spreads out to cover the posterior surface of leg and is inserted as an achilles tendon on to the calcaneum. The medial head of the muscle is bulkier and longer than the lateral head and is supplied by popliteal artery. The nerve supply comes from the tibial nerve which is derived from the 1st and 2nd sacral nerve. The peculiarity of blood supply to the muscle is that the artery runs through the middle of the muscle as a single dominant vessel (Dibbell et al,

1980). It is buried deeply enough within the muscle belly. The advantage of deep seated vascular supply is that the muscle can be increased in girth and length by incising it longitudinally or cross hatching it by repeated incisions (Fig. 1.). The present study was carried out to assess the result of resurfacing the knee after release of contracture by medial head of gastrocnemius muscle.

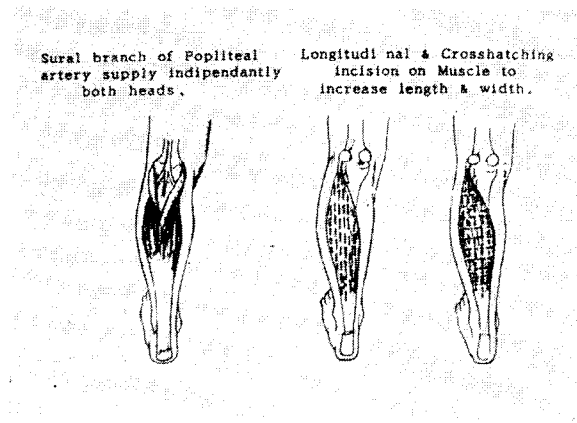


Fig. 1. Anatomy and method of processing.

Material and Methods

Twenty seven cases of contracture of knee joint were admitted under my care during the last 5 years from Jan., 1984 to Jan., 1989 in the Department of Plastic Surgery at S. S. K. M. Hospital, Calcutta. 15 cases had contracture of long duration following deep burns of the inferior extremity. The movement of the knee joint was completely restricted in all the cases.

Careful history was recorded after admission and thorough clinical examination of the part was made. Out of 15 cases 9 were females and 6 were males. Three cases had bilateral contractures of the knee. All male patients were adult and out of 9 females 3 were children within 12 years of age. The etiological factors responsible for contracture were flame burn in 12 cases and scald burn in 3 cases. The duration of contracture ranged from 6 months to 7 years. All the cases were disabled being unable to stand on both leg and most of them used to spend their life in squatting position. Routine investigations like blood, urine and X-ray of knee joint were carried out, and they were within normal limit. Physiotherapy was advised for 2-3 weeks prior to surgery. Then the cases were put up for operation (Fig. 2).



Fig. 2. Pre-operative photograph of unilateral contracture.

Under general anaesthesia pneumatic tourniquet was applied over the thigh to minimise bleeding during operation. Then the patient was put up in prone position for reassessment and release of contracture under anaesthesia. Transverse incision was made over the contracture which was gradually extended to release

the soft tissue contracture. As the soft tissue was released the contracted tendons came up and became prominent like bow-strings on the surface of the wound. To release the contracture in between the muscles, vessels and ligaments, the dissection was carried out both proximally and distally. In majority of cases the shortening of tendons were present and they required lengthening by Z-plasty or by tendon graft to extend the knee as much as possible. Out of 15 cases, lengthening of contracted tendon by Z-plasty was done in 7 cases and tendon graft was done in 3 cases.

To cover this uneven exposed tendon surface the medial head of gastrocnemius muscle was selected. A longitudinal incision was made on the anterior border of the muscle. The muscle was released on its medial margin by dissecting it both proximally and distally. The muscle was made completely free from its attachment to the skin and the soleus muscle. Then the muscle was separated from its lateral head by finger dissection. Now the defect at the back of knee was measured both in longitudinal and transverse axis. Medial head of gastrocnemius muscle was divided from its distal end keeping the length as per length of the defect at the back of the knee. After division the muscle was placed on the raw surface. The width of the muscle was usually shorter than the transverse axis of the defect, so multiple longitudinal incisions were made to gain the additional width. After this the muscle was spread out over the defect and was fixed to the surrounding soft tissues by multiple catgut stitches.

Free skin graft was taken from the opposite thigh to cover the raw muscle surface (Fig. 3). Then the wound was closed properly and dressing was applied. Anterior plaster cast was applied. Three cases had bilateral knee contracture which were resurfaced by bilateral medial head gastrocnemius muscle. Post-operative period of the patients were uneventful in all the cases. Take up of the graft on the muscle was cent per cent and the wound got resurfaced in 7-10 days time.

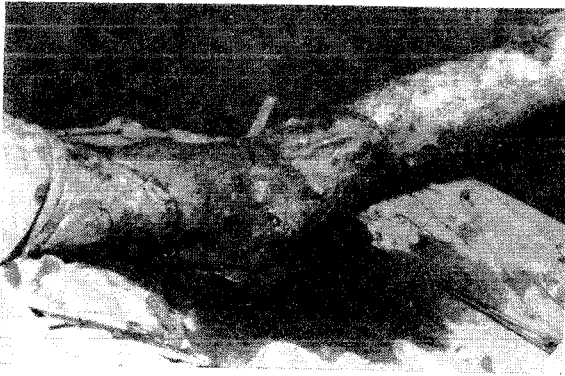


Fig. 3. After completion of operation.

Observations

Out of 15 cases skin traction by weight was applied post-operatively in 8 cases, which helped gradual stretching of the contracted muscle and tendon and correction of the residual deformity. After 3 weeks of surface traction the residual flexion deformity was completely corrected. To prevent recurrence of contracture a tube casing was made and kept for 2-3 weeks. To make the joint completely mobile, the type of correction needed to release the contracture are shown in (Tab. 1).

Table 1. Type of correction needed for Release of Contracture in 10 cases

| Type of correction | No. of patients |
|------------------------|-----------------|
| Z-plasty of the tendon | 7 |
| Tendon Graft | 3 |

Post-operative physiotherapy was advised after removal of casing.

Discussion

Resurfacing of lower leg defects is quite often a problem. Burn is a common and major injury in our population. Most of these cases are treated in district hospitals where proper facilities are lacking, specially the rehabilitation part of the treatment. As a result good number of cases develop contracture either during or immediately after the treatment. The contracture of the knee joint is a common problem following extensive deep

burns of the inferior extremity. Once the patient develops a contracture, it gradually goes on increasing and ultimately the patient attains the squatting posture and is unable to walk.

Due to lack of normal skin and subcutaneous tissue and presence of hypertrophic scars around the knee joint the situation is such that preparing a local fasciocutaneous or musculocutaneous flap for cover is not feasible. Another problem after release of contracture of the knee is that the shortened tendons become prominent and make the surface uneven and unsuitable for free skin grafts.

The gastrocnemius muscle is the largest underlying muscle flap which can be used to cover the lower leg and knee defects (McCraw et al., 1977, 1978). In our present study we have observed excellent results by using gastrocnemius muscle as a cover for the knee joint defects in problematic cases. Over and above this, the muscle flap has got some added advantages. The deeply buried vascular supply through the middle of the muscle has made this flap versatile for use (Rob and Smith, 1986). The length and width of the flap can be increased in both axis as per requirement of the defect. We



Fig. 4. Post-operative follow up after 6 months.

have increased the width of the muscle more than its half size by deep incisions or by cross hatching and have observed no necrosis or loss.

Another important observation is that due to its enriched vascular supply the taking up of free skin graft on the surface of the muscle is cent percent (Fig. 4).

The use of post-operative weight traction does not produce any harm to the local part. In 53% of our cases we have used traction for gradual stretching of the shortened tendon but in none of our cases we have observed any

break down or ulcer formation on the surface of the muscle.

Results

The cases in the present series were followed up from 6 months to 5 years period. The correction of deformity was complete. There was no difficulty in running or walking even in children where either one or both the heads of the gastrocnemius muscles were used. Cosmetically the joint surface looked normal. The joint itself remained soft, pliable allowing complete range of movement.

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