

THE USE OF MUSCLE FLAPS IN SURGERY FOR CHRONIC OSTEOMYELITIS*

S. K. JENA AND S. K. PARIDA

SUMMARY

Muscle tissue because of its bulk and vascularity forms an ideal material to fill up defects and obliterate dead spaces. 10 muscle flaps were used in chronic osteomyelitis of lower limb after sequestrectomy and saucerization. The results were better as compared to those obtained following the standard procedure of debridement alone.

(Key Words : Muscle Flaps, Chronic Osteomyelitis)

The recurrence of symptoms in chronic osteomyelitis is due to the interplay of 3 important factors. They are, (a) Persistence of a rigid walled cavity after surgery, (b) Relative avascularity of the bone and (c) Resistance among the micro-organisms. Accumulation of blood and tissue fluids in the dead space provide a base for the growth of bacteria, while reduced vascularity of the area is a limiting factor in the systemic antibiotic therapy. The key to successful treatment of this chronic disease lies in breaking this cycle of events somewhere. Many attempts have been made to obliterate the dead space. To name a few, the use of autogenous bone grafts, treated xenografts (Kiel bone grafts), antibiotic impregnated bone cement have been tried with variable results. Electrically induced osteogenesis is a recent technique tried at many centres. Honestly the results have not been entirely satisfactory with any of the above. Lining the cavity with skin graft often controls the recurrence. Its use, however, is limited to the subcutaneous bones like tibia because the results are aesthetically unpleasant.

The use of a viable muscle flap, with or without skin grafts, appears to provide a very suitable material because of its bulk and vascularity. Patrick J. Kelly (1983) of Mayo Clinic Foundation has reported 28 muscle flaps in chronic osteomyelitis done from 1971

through 1979 with a 2 year follow-up. The work has been reviewed by Irons and Woods (1977 and 1980). With the recent upheaval of our knowledge of the vascularity of different muscles, we have started its use routinely in all accessible areas of chronic osteomyelitis.

Material and Methods

5 cases of osteomyelitis of upper end of tibia, 2 cases of lower end of tibia and 3 cases of lower end of femur, form the material of this study. All of our cases had undergone multiple surgical procedures, a maximum of 7 in one instance. A recent roentgenogram was obtained in all to note the exact site of involvement. The muscle to be used was selected pre-operatively. For the lower end of femur vastus medialis and lateralis were used depending on whether the medial or the lateral side was predominantly involved. The side of discharging sinus usually corresponded to the side of initial surgical approach. For the upper end of tibia, medial gastrocnemius was always used. For the 2 cases of lower end of tibia, tibialis posterior muscle was used in one and soleus in the other.

Under tourniquet the skin was incised and the dissection deepened to expose the involved bone taking care not to injure the proposed muscle. All sequestra, pus and granulation tissue were removed and the area

*Presented at the 23rd Annual Conference of the Association of Plastic Surgeons of India at Madras.

saucerized. The edge of the gutter on the side of transposition was carefully rounded off to avoid sharp edges. The cavity was then packed with saline soaked ribbon gauze. Then the muscle was dissected carefully, often splitting through its fibres when a thinner width of the muscle was required. After dissecting sufficient length of the muscle it was test-fed into the cavity. The gastrocnemius was often dissected through a posterior midline incision in the calf and delivered into the defect. A few drill holes were made near the edges of the gutter which would be used to pass anchoring sutures. The tourniquet was released and haemostasis obtained. The perforated tubing of a sterile closed suction drain was placed

in the gutter and the muscle was then fed into the space. Anchoring sutures with chromic cat-gut were used to keep the muscle in place. Incisions were then closed and when required the muscle was skin grafted on the outer surface. Tension over the transposed muscle was always avoided. Sometimes a corrugated rubber drain was used subcutaneously. After dressing the wound with sterile paraffin gauze, pad and bandage the limb was immobilized by P. O. P. posterior slab. The suction set was then put to action. After 48 hrs the dressings were changed and the rubber drain removed. The suction tube was kept as long as it drained and often pulled out a bit to facilitate drainage. Suitable antibiotic cover was

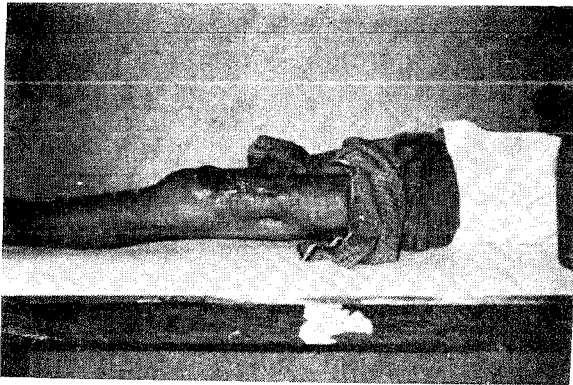


Fig. 1. Picture of a patient with chronic osteomyelitis of left femur showing the scars of multiple previous operations.

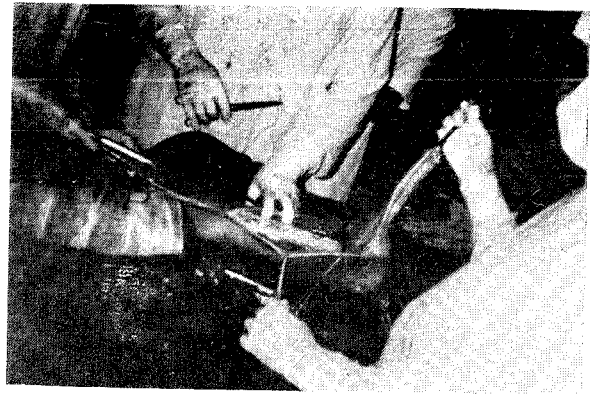


Fig. 2. Picture showing dissected Vastus lateralis muscle flap held with a towel-clip.



Fig. 3.- Picture showing the bony cavity re-opened and debrided.

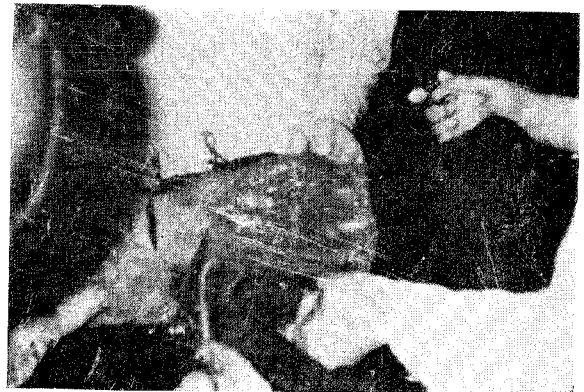


Fig. 4. Picture taken after placing the muscle flap inside the cavity shown anchored with sutures.

provided intra-operatively and for 8 to 10 days following surgery. After healing of the wound the limb was encased in a full plaster for a minimum of 6 weeks and more when the bony defect was larger.

Observations

All of our cases were of haematogenous osteomyelitis. *Staph. aureus* was isolated from the discharge in 6 cases, *pseudomonas* in 2 cases, *proteus* and *E. coli* in one case each. In most cases the organisms were resistant to routine antibiotics including early generation of cephalosporins. All of them were, however, sensitive to cefazoline sodium and this was the antibiotic of choice. The suction drainage became dry by 6 to 8 days time (Fig. 1-4). A wound swab taken from the tip of the tube after its removal was found to be sterile in all the cases.

Discussion

The standard surgical procedure in chronic osteomyelitis has been saucerization and packing of the cavity with sterile ribbon gauze kept for 48 to 72 hours. Dressings continue for long periods of time and the wound invariably heals by second intention. Muscle tissue because of its bulk and vascularity form an ideal material for filling the cavity. The size of the defect does not pose any problem and this helps the surgeon to make extensive debridement when required. Besides, muscles serve the useful purpose of delivering optimum concentration of antibiotics and chemotherapeutics at the target sites. The use of individual muscle flaps have been tried in various deep and difficult defects of leg in orthopaedic and plastic surgery practice. At the present time a number of muscles are found

to be useful after extensive study of their vascular pattern. It is observed that the muscles get adhered to the wall of the bony cavity. The antibiotics can reach the organisms trapped in the minute crevices. The latter is often the cause of a relapse. The procedure reduces hospital stay. It requires no specific equipments nor long and cumbersome manoeuvres like the silver iontophoresis or suction-irrigation techniques. When used widely, modifications and innovations of the technique shall help us to approach the areas which are apparently inaccessible at the moment.

Results

The maximum follow up period was 2 years (Fig. 5). There has been no case of recurrence in this period and the growth of the bone has been found to be satisfactory in all the cases.



Fig. 5. Picture of the patient at follow-up after 2 years showing no evidence of recurrence.

REFERENCES

1. IRONS, G. B., ARNOLD, P. G., MASSON, J. K. AND WOODS, J. E. : Experience with 100 muscle flaps. *Annals of Plastic Surgery*. 1980; 4 : 2-6.
2. KELLY, P. J. : *Chronic Osteomyelitis in adults*. Recent Advances in Orthopaedics, Fourth Edition, Mc Kibbin : Churchill Livingstone. 1983.

3. MC CRAW AND ARNOLD : Atlas Muscle and Musculocutaneous Flaps. First Edition : Hampton Press Publishing Co., Virginia. 1977.
4. WOODS, J. E., IRONS, G. B. JR. AND MASSON, J. K. : Use of muscular, musculocutaneous and omental flaps to reconstruct difficult defects. Plastic and Reconstructive Surgery. 1977; 59 : 191-199.

The Authors

DR. S. K. JENA, M.S. (Ortho.), M.Ch. (Plastic), *Lecturer in Plastic Surgery*, S. C. B. Medical College, Cuttack-753007.

DR. S. K. PARIDA, M. S. (Surg.), *Surgeon*, Link Polyclinic and Nursing Home, Mangalabagh, Cuttack-753 001.

Request for Reprints

DR. S. K. JENA, Department of Plastic Surgery, S. C. B. Medical College, Cuttack-753 007.