THE TREATMENT OF CHRONIC OSTEOMYELITIS BY SAUCERISATION AND SECONDARY SKIN GRAFTING

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The treatment of chronic osteomyelitis is often straightforward and effective. An episode of acute recrudescence often responds to rest and antibiotics. A discharging sinus may be caused by a sequestrum, the removal of which is followed by healing. Obliteration of cavities by bone grafting and cover by flap or pedicle graft has been advocated. Saucerisation and closure, after removal of sequestra and infected granulation tissue, is probably the procedure most commonly used, but it is not always possible to avoid pocketing because of the situation of the infection. Thus, cavities extending down into the femoral condyles or lying in the upper end of the tibia just below the knee joint are difficult to drain, and recurrence of infection is common. Occasionally amputation is unavoidable.

Skin grafting the cavity after excision of infected bone is not a new procedure (Robertson 1945), and was widely practised for gunshot wounds during the second world war. Knight and Wood (1945) advocated the method as a stage in the obliteration of cavities by bone grafting but, though it has certain advantages when simpler methods have not proved effective, it has not received attention as an elective and final procedure. In the first place, it seems never to fail. A thin split-skin graft will take well over live cancellous bone and over cortical bone which has a thin covering of periosteum or granulation tissue, and in our series there was no case with less than 80 per cent take at the first dressing. In time the graft thickens and it lasts indefinitely. The first patient in the series was treated by grafting in 1945 and his leg has remained healed ever since save for occasional minor ulceration within the cavity. In no case so far has there been recurrence or spread of bone infection after the operation. In one or two cases there has been minor ulceration of the skin graft from time to time. In one instance the cavity became difficult to keep clean because insufficient soft tissue was removed from its periphery, and a second operation was carried out to widen the approach to the bone, with complete relief of symptoms. Perhaps the most satisfying feature of the operation has been the immediate and complete relief of pain.

TECHNIQUE OF OPERATION

The excision of infected bone should be as complete as possible. It may be advisable to determine the extent of disease by tomography, because sclerosis may mask an extensive medullary infection. Whenever possible the nature and sensitivity of the infecting organisms should be determined, so that the operation may be performed with antibiotic cover. The incision usually includes the sinus or sinuses but sometimes, when the sinuses are in a difficult area such as the popliteal fossa, the bone is exposed by a medial or lateral vertical incision and the sinuses are curetted and left to heal of their own accord. When sinuses have been present for many years, and particularly in the femur where there is thick muscle overlying the bone, the soft tissues may be extensively scarred and honeycombed with infection. This area must be included in the excision and saucerisation procedure, so that there is a wide approach to the bone cavity through healthy muscle which will readily accept a skin graft. Because one may have to burrow down into the condyles of the femur or up into the head of the tibia, it is not always possible to shape the resultant bone cavity in a shelving manner. But provided the graft is on reasonably healthy bone the cavity can be lined with skin. Clearly the bed is not sterile, but split skin is likely to succumb only to virulent infection or to haemorrhage.
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beneath it. Sometimes the bone infection extends through the opposite cortex and there are sinuses on both sides of the limb. This does not seem to matter, because opening up the cavity and lining it with skin promote closure of any sinuses left, and the skin graft eventually grows over any bone defect left in the floor of the wound.

The operation is carried out in two stages. It is best done without a tourniquet so that the vascularity or otherwise of the bone may be the more easily determined. The first stage includes the excision and saucerisation procedures, and is completed by packing the cavity with Vaseline gauze, and the application of a firm bandage over wool, partly to control bleeding and partly to allow a thin film of granulation tissue to grow over the cavity walls (Fig. 1). At the second stage, seven to ten days later, the skin graft, cut as thinly as possible, is applied. It is packed into position with cotton wool soaked in flavine and paraffin. This is left for a further ten days before the first dressing.

At the first dressing there is usually a fairly complete "take," though there will be some areas, particularly over cortical bone edges, which have not healed (Fig. 2). The cavity requires regular dressing and irrigating with a weak antiseptic until healing is complete. When bone resection has been considerable (Fig. 3) it is our practice to protect the remaining bone with a caliper for three to six months: we have not had a case of pathological fracture.

**MATERIAL**

Chronic osteomyelitis of a degree and resistance sufficient to require such treatment is unusual; we have had only eleven cases in over twenty years.

**ILLUSTRATIVE CASE REPORTS**

**Case 1**—An officer aged twenty-two sustained an open fracture of the upper end of the tibia from a gunshot wound. The fracture united, but with a large infected cavity in the bone just below the knee, which continued to discharge. After saucerisation and skin grafting it healed
and has remained so ever since except for occasional ulceration. A recent radiograph shows no evidence of active bone infection, and the cavity is clean and dry. He has a full and painless movement of the knee.

**Case 2**—A man of fifty-four had chronic osteomyelitis of the lower half of the femur for forty years, and a persistent discharge for eleven years: pain was severe. Radiographs showed extensive bone disease with a cavity extending into the femoral condyles. After treatment by saucerisation and grafting pain was immediately relieved, and the cavity remained healed until the patient's death from unrelated causes ten years later.

**Case 3**—A man of thirty-seven came with recurrent abscesses in the shaft of the tibia, following acute osteomyelitis at the age of eight. In 1960 he had a discharging sinus over the subcutaneous surface of the tibia, leading down to sclerosed and chronically infected bone (Fig. 4). This was excised and the resultant cavity lined with skin (Fig. 5). The leg has remained healed since, except for the appearance a year after operation of a small ulcer which healed after the discharge of a small sequestrum (Fig. 6).

**Case 4**—A man aged forty-eight had had a discharging sinus over the outer aspect of the thigh for twenty years, with two episodes of acute inflammation. Pain was severe. The infected bone was widely saucerised, and the cavity was lined with skin. Relief from pain was immediate and complete, and the cavity has remained dry.

**Case 5**—A man aged forty-three came in 1963 with an abscess in the upper end of the tibia. This was drained and the skin was closed, but there were recurrences of infection. In 1966 tomographs showed active bone infection with multiple abscess cavities. The infected area was widely excised, and the cavity was lined with skin. It has remained healed.

**Case 6**—A man aged fifty-two sustained a compound fracture of the ankle in January 1966. The bone became infected and a sinus opened and continued to discharge in spite of treatment by antibiotics and operation. In December 1967 a cavity in the lower end of the tibia was excised and lined with split skin. The leg has remained soundly healed.
**Case 7**—A man aged twenty-eight came in 1960 with a thirteen-year history of recurrent abscesses in the popliteal fossa, and an eleven-year history of a discharging sinus. Radiographs showed a cavity in the lower end of the femur (Fig. 7). This was curetted and lined with split skin. It has remained healed (Fig. 8).

**SUMMARY**

1. In chronic osteomyelitis grafting a cavity with split skin is a reliable method of treatment. The skin cover so obtained is durable.
2. The method may be used with good prospects of success even when the cavity is large and there is extensive disease of bone.
3. Operation is indicated for the relief of pain, to close a sinus or sinuses, to obtain healing of an ulcer or to prevent recurrent episodes of acute infection.
4. The technique of operation employed in eleven cases is described and illustrative case reports are given.

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**REFERENCES**
