FAILURE IN EARLY SECONDARY REPAIR OF SKULL DEFECTS WITH TANTALUM*

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The introduction of tantalum for the repair of cranial defects has been very gratifying to the neurological surgeon. The highly satisfactory results which have proved possible in the last few years are attributable, in part, to the parallel development of drugs that prevent or arrest infection—the sulfa drugs and penicillin. We know that in the past under ideal circumstances foreign bodies such as boiled bone, rubber or celluloid have been tolerated by tissues without the use of specific drugs. Experience with combat wounds has shown complete (and perhaps permanent) healing of wounds containing large quantities of clothing, hair and metallic fragments. One can hardly question that healing was made possible by the use of penicillin and the sulfa drugs. These facts are mentioned since it is only fair in comparing tantalum with its predecessors, which would doubtless have proved more successful with the addition of our present means of combating infection.

It has been conventional neurosurgical practice to replace separated bone fragments when a depressed skull fracture has been debrided and closed within 8 hours of injury, if operation has converted the wound to a clean one. The "safe period" has been lengthened under favorable circumstances. The use of tantalum rather than bone replacement in the primary repair of cranial defects probably does not increase the risk. However, when primary closure is performed late, neither separated bone fragments nor tantalum should be placed in the wound to jeopardize healing.

The favorable results, then, in primary plating1 are in accord with proved surgical principles. But this useful addition to our surgical armamentarium must not mislead ardent surgeons to perform secondary plating under unfavorable conditions.

The secondary repair of skull defects is an elective procedure in all respects. Correspondingly, all established principles must be observed. Complete neurosurgical facilities must be available since no intracranial procedure should be undertaken without allowing for the possibility of encountering unexpected obstacles. Tropical climates are undesirable because of the difficulties of wound healing and at times the unfavorable general condition of the patient. Above all, sufficient time must have elapsed after complete

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wound healing. Secondary plating must not be compared with the more immediate, necessary measures such as foreign body removal and excision of osteomyelitis which are required for healing of the wound and which lessen the possibility of brain abscess and meningitis in patients with open head wounds.

Adequate time for the healing of a wound before a reconstructive procedure such as plating is performed accomplishes two important things. First, time is given for the many small foci of bacteria, enmeshed, but still viable, to be largely or completely destroyed by the healing tissues. Probably recrudescences of infection are as much or more to be feared when wounds have healed with the help of anti-bacterial drugs. Organisms potentially dangerous, but insensitive to the available drugs, may be among those present and capable of a devastating spread if the natural barriers are prematurely broken. Second, healing tissues increase greatly in strength and mobility when allowed adequate time. Wounds that would have required extensive relaxing incisions while the scalp was friable in the premature stages of healing may be closed with ease after sufficient time has increased the mobility and strength of the layers. The best practices in plastic surgery, employing primary skin grafting of uncovered areas, are utilized when complete closure is otherwise impossible, but must not be resorted to when they would be made unnecessary by a wait of a few months. Any added incision must be made only after careful appraisal of its effect upon the blood supply and upon the subsequent reconstructive procedure.

In the 8 cases reported here, secondary plating with tantalum was attempted in a forward area under unfavorable conditions. Only 2 patients successfully plated under similar circumstances were seen at this hospital during the period in which these 8 patients were evacuated.

REPORT OF CASES THAT REQUIRED REMOVAL OF TANTALUM PLATES

Case 1. This 39-year-old man was wounded by shell fragments on 3 May 1945, at Okinawa, sustaining a compound cranio-cerebral wound of the left occipital area. Initial debridement was carried out the same day. He was transferred on 9 May to an advanced Naval Base Hospital. Neurological examination was negative except for serious bilateral impairment of vision. The optic discs showed papilledema. On 16 May a combined wound debridement and tantalum cranioplasty was carried out. An occipital lobe abscess containing 60 cc. of pus was entered and drained, and a tantalum plate was inserted to prevent additional cerebral herniation. On 15 August a secondary suture was done to obtain closure over the plate.

He was admitted to this hospital on 11 September 1945, with two granulating areas extending from the margins of the scalp defect over the tantalum plate. On 26 September the plate was removed. There was a thick layer of unhealthy granulation tissue beneath the scalp overlying the tantalum plate. Wound culture showed Staphylococcus albus.

Case 2. A man aged 29 years was wounded by shell fragments on 9 March 1945, at Iwo Jima, sustaining a compound cranio-cerebral wound of the left temporoparietal area. He was transferred on 13 March to an advanced Naval Base Hospital in critical condition with marked right hemiplegia and aphasia. Debridement of necrotic scalp, bone, and brain was carried out on 21 March. On 9 July a combined debridement and tantalum cranioplasty was