THE USE OF ORLON FOR DURAL REPLACEMENT

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(Received for publication April 11, 1955)

The continuity of the dura mater is a prime necessity. Various processes may interrupt this continuity, such as a tumor growing in its inner surface, a fracture of the skull associated with a gross laceration of the dura mater, and certain surgical procedures that may destroy part of this membrane.

The herniation of the brain and the leptomeninges through the dural defect may have undesirable consequences. Sometimes meningoencephalic adhesions are formed; even craniocerebral erosions may occur. If the arachnoid breaks and there is an underlying fracture of the cribiform plate or of the petrous portion of the temporal bone, the cerebrospinal fluid will leak, and rhinorrhea or otorrhea may result. These fistulas connecting with the pneumatic cavities of the face may give passage of the air into the skull, and pathogenic agents may spread into the cranial cavity causing infections such as meningitis or brain abscesses.

As the dura mater does not regenerate with ease, any of the above complications may occur with undesirable sequelae. Therefore, the closure of a dural defect is of paramount importance in neurosurgery. In the past many methods have been tried:

(a) Grafting.

(b) Use of albumin as a base substance for the regeneration of the dura mater: products prepared from human fibrinogen and human thrombin; fibrin foams and films—Gelfoam-fibrin.

(c) Prostheses. Replacements of the dura mater have been attempted in different ways using metal foils, polyethylene, celluloid, cellophane, rubber tissue, etc.

All these methods have brought a great advance in the treatment of dural defects, but each method can be seriously criticized. The grafts may deteriorate. Fibrinogen and thrombin sometimes encourage the formation of septic foci. Metal foils are too rigid to take over the functions of a flexible dura mater. Most prosthetic appliances thus far have acted as a foreign body producing a tremendous reaction with formation of a membrane or an increase of the scar tissue.

The ideal material would be one of nonbiotic origin which would have the advantages of being readily available in all sizes, without the necessity of meticulous processing, which would protect the brain without producing reaction of the glial tissue or meningoencephalic adhesions, and which would keep the normal shape of the hemispheres and spinal cord.
Fig. 1. Orlon prosthesis after removal of the bony calvarium. The dura mater has proliferated over the edges of the Orlon and sealed them.

Fig. 2. Extent of dural replacement in 2 of the monkeys.