

Interim Use of Polytetrafluoroethylene Membrane to Facilitate Delayed Posttraumatic Cranioplasty

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INTRODUCTION

Decompressive craniectomy is the main treatment for subdural hematomas that develop shortly after severe head injury. Effective decompressive craniectomy reduces intracranial pressure, prevents cerebral herniation, and saves lives. After duraplasty, to ensure decompression, the bone flap is not returned to the cranium until several months later when secondary cranioplasty is performed.

During secondary cranioplasty, it is often difficult to detach the skin flap from the dura mater. There is also a risk of cerebrospinal fluid leakage if the dura is injured. Herein, we present a method that can be used to easily separate these layers.

METHODS

After duraplasty using polyglycolic acid felt and fibrin glue,¹ a polytetrafluoroethylene (PTFE) membrane is placed on the dura and the surrounding bone at the cranial defect (Fig. 1). After 2–3 months, during secondary cranioplasty, a capsule is formed around the PTFE membrane. Because the PTFE membrane and the capsule are not adherent, simply identifying and removing the PTFE membrane reveals the cranial bone defect (Fig. 2). By cutting the edge of the capsule, the cranial defect is exposed without bleeding, and cranioplasty can be performed without any need to detach the skin from the dura.

RESULTS

We have performed this technique on five patients aged 52–66 years by following decompressive craniectomy. At the secondary cranioplasty, the PTFE membrane could be recognized, and the elevated skin flap was easily separated without any adhesion.

DISCUSSION

This method was inspired by the tissue expanders widely used in breast reconstruction. A capsule forms around the tissue expander, after which the expander can be removed easily. Capsule formation in reaction to a foreign body also occurs around PTFE membranes.²

The advantages of this procedure include not only the ease of elevating the skin flap but also the presence of a watertight covering over the reconstructed dura mater due to capsule formation. According to a previous study, the incidence of cerebrospinal fluid leakage and subcutaneous retention is approximately 6% after nonsuture dural closure using polyglycolic acid felt and fibrin glue.¹ Capsule formation may reduce this incidence.

This method is only used during decompressive craniectomy in preparation for secondary cranioplasty. This method has never been performed during debridement for epidural or subdural abscesses. Therefore, alloplastic materials should be used with caution in areas where an infection has occurred.

In conclusion, intentionally facilitating capsule formation using a PTFE membrane is a useful technique that can foster separation of the skin and dura during secondary cranioplasty.

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DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

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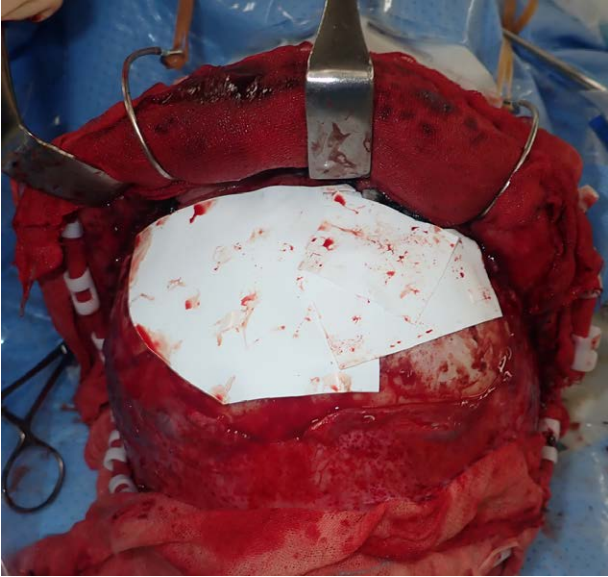


Fig. 1. Intraoperative view after placing a polytetrafluoroethylene membrane on the dura and the surrounding bone of the cranial defect. Note that there was no need for fixation.

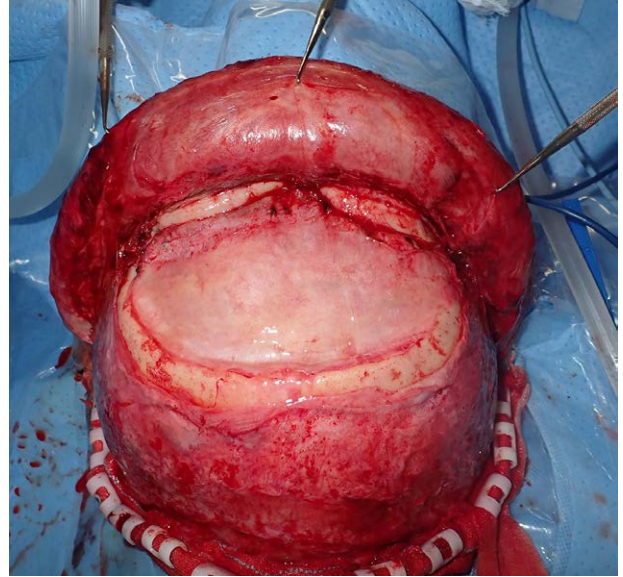


Fig. 2. Intraoperative view after removing the polytetrafluoroethylene membrane and elevating the skin flap during secondary cranioplasty. Note that capsule formation occurred on the dura and skin flap.