

Surgical Treatment for Epidural Abscess in the Posterior Cranial Fossa Using Trapezius Muscle or Musculocutaneous Flap

ABSTRACT—Two patients developed an epidural abscess in the posterior cranial fossa following tumor dissection from the occipital region of the head and underwent surgical treatment. After debridement of necrotic and infectious tissues inside the abscess was performed, the empty cavity was filled and the tissue defect was reconstructed by using a trapezius muscle flap or a trapezius musculocutaneous flap. Both patients had good clinical results, and their abscesses were healed. The trapezius muscle flap and trapezius musculocutaneous flap were quite useful in the treatment for epidural abscess in the posterior cranial fossa.

To prevent postoperative cerebral hernia, tumor dissection from the occipital region of the head is sometimes associated with decompression of cranial bone, opening of the great foramen, and laminectomy of the atlas. The suboccipital muscles are separated from the cranial bone to obtain a surgical view. Because of these manipulations, there may be dead space between the dura mater and the suboccipital muscles.¹ When cerebrospinal fluid is retained or a hematoma develops in this dead space and secondary infection occurs, an epidural abscess may develop that may further develop into serious intracranial complications and then result in death.

The authors examined two patients who developed an abscess in the posterior cranial fossa following brain tumor dissection. In the treatment for abscess, the dead

space was closed with a trapezius muscle flap or trapezius musculocutaneous flap, and the abscess was cured. These flaps are used in reconstruction surgery for the head and neck,²⁻¹² but they have not been used in the treatment of epidural abscess in the posterior cranial fossa.

SURGICAL PROCEDURES

As a first step, the abscess in the posterior cranial fossa is opened, and complete removal of necrotic and infectious tissues is performed. This creates a cavity, and the dura mater is exposed on the bottom.

After extensive washing of the cavity, either the trapezius muscle flap or the trapezius musculocuta-

neous flap is prepared. The flap is selected according to the depth and shape of the cavity. If the cavity is deep and has a complicated form, the muscle flap is safer because it is more flexible in shape, and it is easier to fill the cavity. If the cavity is relatively shallow, the musculocutaneous flap is chosen, and a vertical skin island in the width and shape of the skin defect is made from the patient's back. Each flap has the transverse artery and veins of the neck as the major nutrient vessels (Fig. 1).

The flap is shifted to the occipital region, and the cavity is completely filled with the muscular tissues of the flap. If the unilateral flap is insufficient in volume, bilateral flaps are prepared and used for filling. After the preparation of the muscle flap, the exposed muscle receives mesh skin grafting. After the preparation of the musculocutaneous flap, the island flap is sutured to the skin defect on the occipital region.

RESULTS

The abscesses of the two patients were cured, and infection did not recur.

Case number 1 was a 64-year-old woman with cerebellar convexity meningioma. Seven days after the brain tumor dissection, the patient developed skin necrosis on the wound, leakage of cerebrospinal fluid with pus from a part of the wound, fever of 38°C, and symptoms of meningitis. With computed tomography, the presence of an epidural abscess in the posterior cranial fossa was confirmed (Fig. 2A). Debridement of the necrotic skin on the wound and of a part of suboccipital muscles was performed, and the abscess was opened (Fig. 2B). After extensive washing of the cavity, the

trapezius musculocutaneous flap was elevated, its muscle tissues were used to fill the cavity, and the island flap was used for the reconstruction of skin defect (Fig. 2C-E). Postoperative process has been good, and there has been no occurrence of spinal fluid leakage or infection (Fig. 2F, G).

Case number 2 was a 62-year-old woman with petroclival meningioma. Ten days after tumor dissection, the patient developed leakage of cerebrospinal fluid with pus from the surgical wound, symptoms of meningitis, and fever of 39°C. With computed tomography, presence of an epidural abscess in the posterior cranial fossa was confirmed (Fig. 3A). Debridement of the necrotic skin on the wound and the suboccipital muscles was performed, and the abscess was opened (Fig. 3B). The cavity was extensively washed, the bilateral trapezius muscle flaps were elevated, and the cavity was completely filled with the flaps. The exposed muscles received mesh skin grafting (Fig. 3C, D). The postoperative course was good, there was no spinal fluid leakage, and the abscess was cured (Fig. 3e). Unfortunately, the patient developed acute cardiac failure 7 months after surgery and died.

DISCUSSION

In principle, the abscess is sectioned and the pus is drained, and the lesion is healed as an open wound or by grafting thin split-thickness skin. However, if an important organ is exposed through the wound, these treatments are associated with a high risk of injury to the organ. In such a case, the infectious area should be closed temporarily with vascularized thick tissues. Muscle tis-

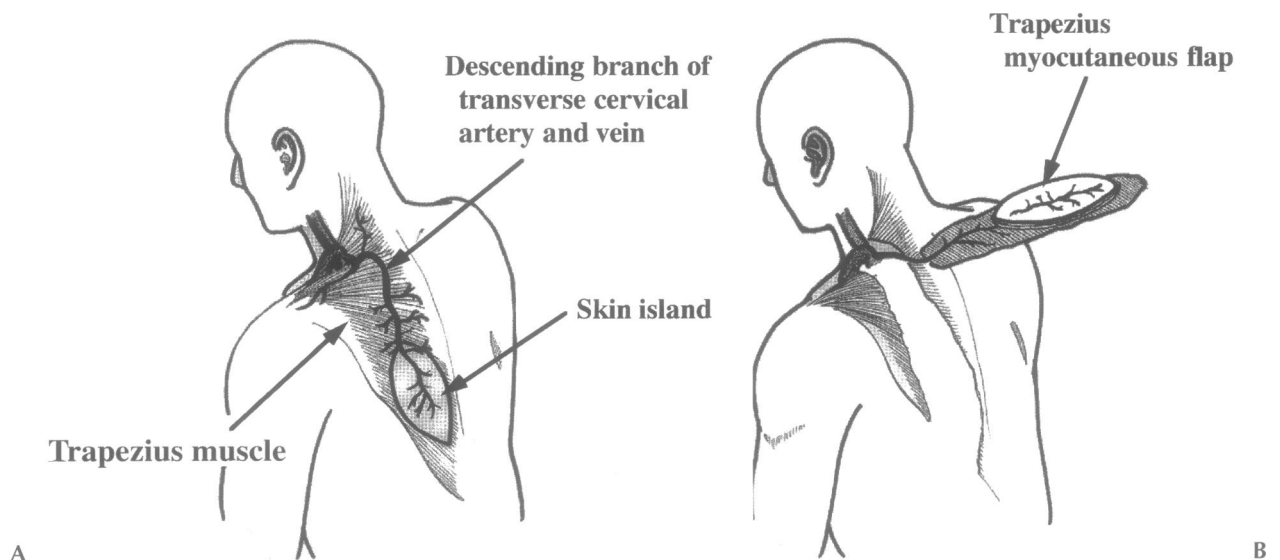


Figure 1. (A) Vascularization of the trapezius muscle. (B) Trapezius myocutaneous flap with the transverse artery and veins of the neck as the pedicle.

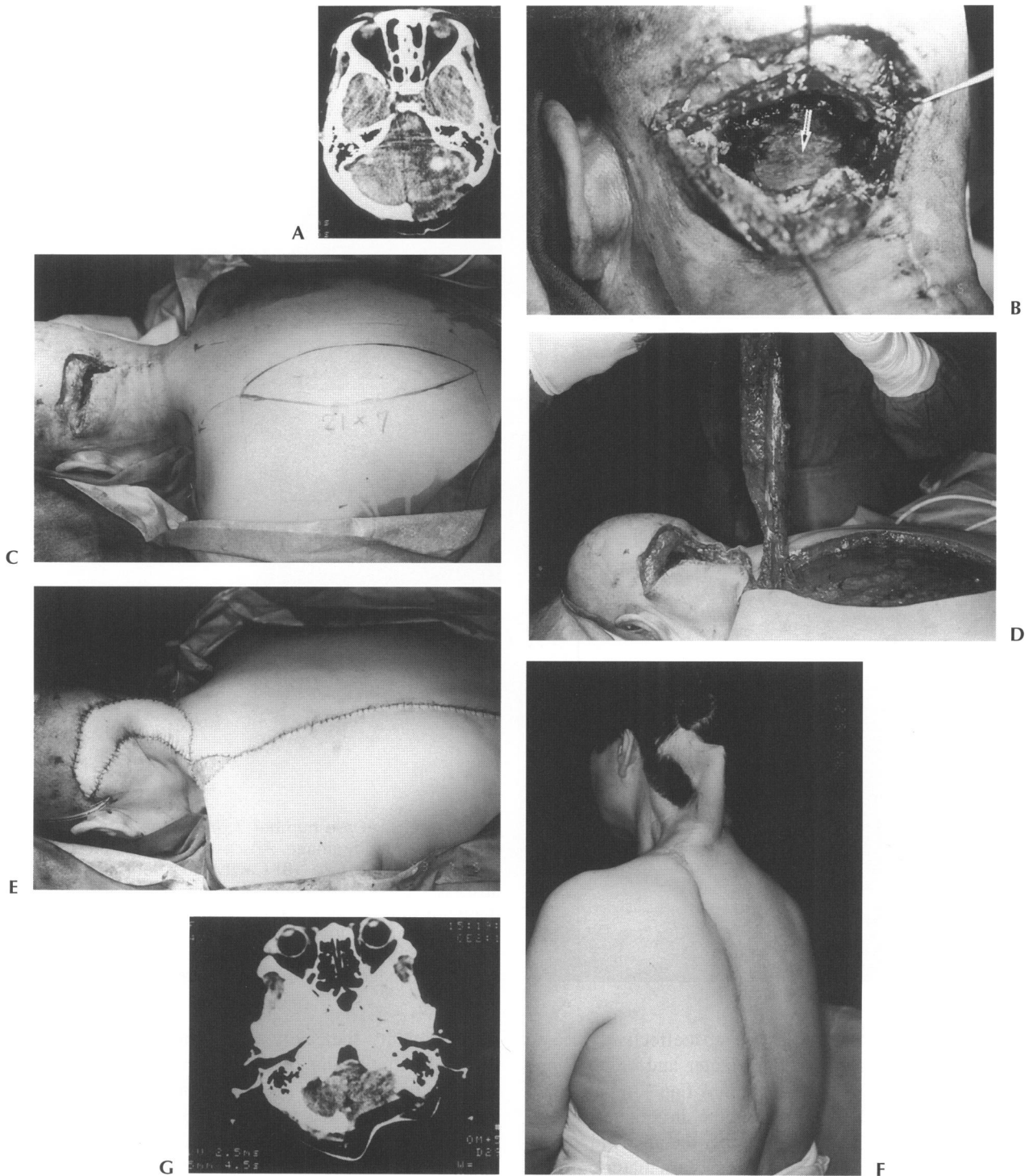


Figure 2. Case number 1. (A) Preoperative computed tomography image. Abscess was depicted in the posterior cranial fossa. (B) Cavity after debridement of abscess. Arrow shows the dura mater. (C) Design of trapezius myocutaneous flap. (D) Trapezius myocutaneous flap. (E) After grafting the flap. (F) Computed tomography image 11 months after surgery. (G) Posterior neck and skull 11 months after surgery.

sues possess a high cure rate for the wound, and the muscle flap and musculocutaneous flap are used for coverage and filling of infectious wounds. For example, the greater pectoral muscle flap is used in treatment for mediastinitis and sternal osteomyelitis following open

heart surgery.¹³⁻¹⁸ A free flap prepared from the abdominal rectus muscle¹⁹ or latissimus dorsi muscle of the back is used in treatment for postoperative infectious wounds on the skull base. These treatments have achieved good clinical results. Therefore, abscess in the

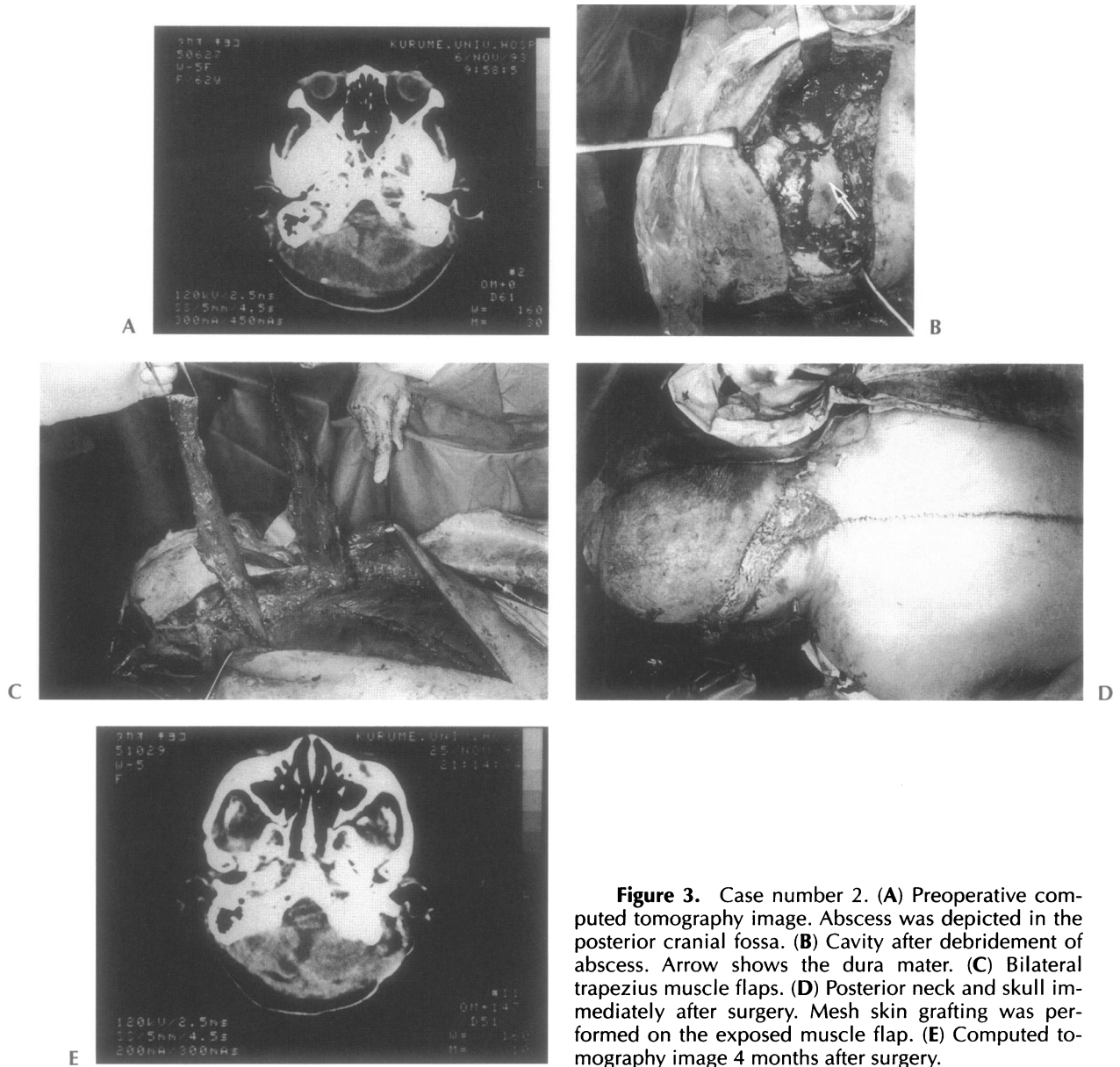


Figure 3. Case number 2. (A) Preoperative computed tomography image. Abscess was depicted in the posterior cranial fossa. (B) Cavity after debridement of abscess. Arrow shows the dura mater. (C) Bilateral trapezius muscle flaps. (D) Posterior neck and skull immediately after surgery. Mesh skin grafting was performed on the exposed muscle flap. (E) Computed tomography image 4 months after surgery.

posterior cranial fossa would be most effectively healed by covering the exposed dura mater and cranial bone with a muscle or musculocutaneous flap.¹ In particular, if cerebrospinal fluid leaks from the dura mater, a muscle flap is more efficacious to cover the area and to stop the leakage. Avascularized artificial dura mater or fascia lata is used for dura reconstruction and on infectious wounds, but their take rate is low, and they could aggravate infections. Our two patients also had spinal fluid leakage at surgery, but it was cured without associating other problems.

Elsahy and Achecar¹ had an idea similar to ours and used a splenius muscle of the head flap in treatment for abscess in the posterior cranial fossa produced after surgery for Arnold-Chiari syndrome. This flap is located proximal to the posterior cranial fossa and is applicable for reconstruction with less surgical invasion. However,

in our patients, the cavity after drainage was too big to be filled with this flap. In addition, we could not use the splenius muscle in our patients because of the muscle's poor blood flow due to preoperative embolization as well as previous surgery for tumor. On the other hand, the trapezius muscle or musculocutaneous flap has the transverse artery and veins of the neck as the major nutrient vessels (see Fig. 1), and they are used as a pedicle flap in the reconstruction of posterior neck and skull.¹² In addition, patients take a prone position during posterior skull surgery, and preparation of these flaps does not require position change. The other musculocutaneous flaps, such as abdominal rectus muscle flap or latissimus dorsi muscle flap, require not only position change but also anastomosis of blood vessels for their use as a free flap. These make surgical procedures very complicated. Omentum possesses rich immunologic

functions, and it is another quite useful flap in treatment for infectious wounds.^{13,20,21} However, omentum requires laparotomy. Therefore, trapezius muscle or musculocutaneous flap was evaluated as the most appropriate flap in treatment for abscess in the posterior cranial fossa followed by brain tumor dissection. The volume of muscle tissue in trapezius muscle or musculocutaneous flap is smaller than it is for abdominal rectus muscle flap or latissimus dorsi muscle flap, but trapezius muscle or musculocutaneous flap can be elevated simultaneously from both sides, and this allows the filling of a relatively large cavity (Fig. 3C, D).

The frequency of abscess occurrence in the posterior cranial fossa is lower than it is in the other area. However, the posterior cranial fossa is adjacent to such critical organs as the cerebellum and medulla oblongata. Therefore, the current procedure would be quite useful in saving the lives of patients who require treatment for abscesses formed in this area.

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