

Microvascular decompression: Incidence and prevention of post-operative CSF leakage in a consecutive series of 134 patients

Shahid Khan

Neurosurgery consultant at James Cook University, UK

This study is to share our experience of an effective dural repair technique, which we have utilised to minimise the incidence of postoperative CSF leakage in patients undergoing microvascular decompression (MVD) for Trigeminal Neuralgia and Hemifacial Spasm. Between 1987 and 2018, 134 patients had microvascular decompression, mainly for Trigeminal Neuralgia and Hemifacial Spasm in our unit. All our patients having posterior fossa MVD using the technique described by Jannetta, had an apparently watertight repair of the dura at the end of the operation. We describe our technique using Duraguard® and Histacryl® glue. The post-operative outcome of the duraplasty was assessed retrospectively by case note review. Of 134 patients, 129 (96.2%) had no post-operative CSF leakage. Only 5 (3.7%) of the patients experienced post-operative CSF leakage (3 from the wound, 2 from the nose). We conclude that dural repair using the described technique utilising a dural substitute (Duraguard) and Histacryl glue is safe and effective in preventing post operative CSF leak following MVD. Cerebrospinal fluid (CSF) leakage is one of the most common complications after microvascular decompression (MVD) for neurovascular cross compression syndrome, including hemifacial spasm (HFS), trigeminal neuralgia, and gloss pharyngeal neuralgia. Current treatments comprise reducing CSF pressure by continuous lumbar drainage or repeated spinal taps and administering antibiotics to prevent infections. Failure of these treatments finally requires additional surgical intervention. Even after these treatments, fatal situations, such as pseudomeningocele, meningitis, and abscess formation, may complicate the postoperative course and lead to permanent deficits. To prevent CSF leakage after MVD, it has been highly emphasized by Peter J. Jannetta to ensure watertight dural closure. Additionally, primary dural closure (primary reapproximation and suturing of the dural edges) is the best seal without the introduction of autologous grafts of fat or artificial dural substitutes. However, this is not always possible due to shrinkage of the dura mater only from exposure during surgery and/or electrocautery for dural bleeding. Although many dural replacements have been introduced and used to ensure watertight dural closure, no substitute has proven to be complication-free in a large clinical trial, even suggesting some benefit. Therefore, primary dural closure should be attempted during the closure of craniotomy or craniectomy for MVD. In this study, clinical outcomes related to CSF leakage after retrosigmoid craniectomy with MVD were analyzed after

using a simple technique to maintain the integrity of the dural flap, allowing for primary dural closure. Between 2010 and January 2019, 360 consecutive cases were treated with retrosigmoid craniectomy, with MVD for HFS in 309 (85.8%) patients, trigeminal neuralgia in 50 (13.9%) patients, and glossopharyngeal neuralgia in one (0.3%) patient, and they were followed up more than one month after surgery. A retrospective review of medical records was performed to identify patients who experienced CSF leakage, including CSF rhinorrhea, otorrhea, pseudomeningocele, and/or incisional leak, during the initial hospital stay or by the first postoperative clinical follow-up usually at one month after surgery. The primary outcome was the primary dural closure rate using the surgical technique described below. Additionally, the author defined the secondary outcome as persistent CSF leakage that needs management with additional neurosurgical intervention such as continuous lumbar drainage, repeated spinal taps, and/or neurosurgical revision operation. Moreover, all patients with symptomatic CSF leakage were examined and assessed by otolaryngologists. We collected all of the patient data based on information contained in hospital electronic medical records and followed the case record form, which was approved by the institutional review board. As a retrospective study, there was no risk to the subjects (minimum risk study), and the IRB committee approved (B-1903-528-105) the exemption of consent from the subjects. In this article, the author describes a straightforward and rapid technique to prevent CSF leakage that can occur after MVD through retrosigmoid craniectomy. To prevent CSF leakage, the surgeons should try various methods at each stage of surgery, but primary closure is fundamental. Besides, the author describes the surgical technique that enables primary dural closure in detail. After that, the extra fibrinogen/thrombin-based collagen fleece (TachoComb®; Nycomed, Linz, Austria) is applied to the dural incision site after use for hemostasis, and to the opening of the mastoid air cell, which enhances the watertight primary dural closure. Then, cranioplasty using artificial bone cement, which eliminates dead space on the craniectomy site, is performed. Finally, the soft tissues, from muscles to the skin, are closed watertight. With each step, the author could significantly reduce the occurrence of persistent CSF leakage that requires lumbar drainage or surgical intervention. It is crucial to achieving tight and reliable dural closure while performing retrosigmoid craniectomy with MVD. The CSF leakage leads to increased morbidity, prolongation of hospital stay, and enhanced costs, as well as the

need for revision surgery . The previous reports have described techniques using autologous grafts, artificial dura, bone cement reconstruction, and postoperative lumbar drainage to address the problem of CSF leakage and these have been reported over the years with varying rates of success. However, preparing these additional grafts intraoperatively and their post operativemanagement is time-consuming, increasing costs and causing patient inconvenience . On theother hand, the bone cement reconstruction is a feasible way of preventing CSF leakage. Furthermore, continuous lumbar drainage can cause CSF over drainage, mechanical irritation, and is associated with the risk of meningitis, and these problems often require revision operations. Therefore, it may be ideal to restore the opened dura mater to its original form to make it possible for watertightclosure primarily. A simple technique using pulling stay sutures to stop bleeding from the dural edges and placinga wet cottonoid on the exposed dura can make primary dural closure easier. The application offibrinogen/thrombin-based collagen fleece on the dural closure site and bone edges, and elimination ofdead space by bone cement cranioplasty might enhance positive effects on primary dural closure interms of the prevention of CSF leakage after MVD. We conclude that dural repair using the described technique utilising a dural substitute (Duraguard) and Histacryl glue is safe and effective in preventing post operative CSF leak following MVD.