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The awake endoscope-guided sealant technique with fibrin glue in the treatment of postoperative cerebrospinal fluid leak after extended transsphenoidal surgery: Technical note.

Authors: Cavallo L.M., Solari D., Somma T., Savic D., Cappabianca P.

Publication Date: 2014

PMID: 602094901

Abstract

Background: The introduction of extended endoscopic endonasal approaches for the management of midline skull base lesions has brought again the focus on the problem of postoperative cerebrospinal fluid (CSF) leak management. Notwithstanding the improvements in reconstruction techniques that have reduced the rate of postoperative CSF leakage, no technique has proven to be thoroughly effective. Methods: Nine patients complaining of postoperative CSF leaking after extended endoscopic endonasal surgery for different suprasellar lesions were managed without reoperation by means of repeated endoscopic endonasal fibrin glue injections in the sphenoid sinus cavity while they were awake in the outpatient operating room. Only a few patients required light sedation with benzodiazepine. To help the healing process, lumbar CSF diversion was used in four patients who complained of moderate and severe leaks, Results: We achieved an effective and resilient closure of the skull-base defect in all cases who underwent the endoscope-guided fibrin glue injection for the management of postoperative CSF leak after endoscopic endonasal surgery. Of the four patients presenting a "weeping" leak, one patient required a single injection, whereas three required two procedures; no lumbar drainage was used. Two patients with "moderate" leaks received four injections and in both a lumbar drain also was positioned. In the other two patients, three (in this case a lumbar drain was used) and two injections were performed, respectively. We managed the patient with severe leaking by performing an injection five times, and lumbar drainage was placed. No complications related to procedure or to the use of this material were observed (mean follow-up, 26.6 months; range, 5-63). Conclusions: An endoscope-guided sealant technique with fibrin glue used while the patient is awake has proven, in our experience, to be effective in reducing the rate of reoperations in the management of postoperative CSF leaking after endoscopic endonasal approaches for the treatment of intradural skull base lesions. This technique, which needs larger case series to be validated, could be considered in the spectrum of possibilities to manage selected postoperative CSF leakages. Copyright © 2014 Elsevier Inc.

Fibrin glue to treat spinal fluid leaks associated with intrathecal drug systems.

Authors: Freeman E.D., Hoelzer B.C., Eldrige J.S., Moeschler S.M.

Publication Date: 2014

PMID: 52885605

Abstract

Intrathecal drug delivery systems (IDDSs) are used to treat resistant pain states as well as intractable spasticity via medication delivery into the spinal fluid. Risks associated with implantation of these devices include infection, bleeding, intrathecal granuloma formation, and neurologic sequelae similar to other neuraxial procedures. Intrathecal catheter placement creates the additional risk of persistent spinal fluid leak, which can lead to postdural puncture headaches as well as seroma formation and may require subsequent surgical exploration or explantation. This retrospective case series examines 3 patients at a single institution with persistent spinal fluid leak after IDDS placement (and explantation in one case) resulting in headache and/or seroma formation that were treated with epidural fibrin glue. Three patients underwent IDDS implantation with baclofen for spasticity. In 1 patient, a cerebral spinal fluid leak developed at 1-week postoperatively. After several unsuccessful epidural blood patches and surgical exploration with a catheter revision, she was ultimately treated successfully with a fibrin glue patch. The second patient received an IDDS and did well until a seroma developed 1 year later. He was likewise treated with an epidural fibrin glue patch after 2 failed blood patches. In a third patient, a spinal fluid leak developed after explantation of an IDDS and was treated with an epidural fibrin glue patch as initial therapy. © 2013 World Institute of Pain.

Tisseel utilized as hemostatic in spine surgery impacts time to drain removal and length of stay.

Authors: Epstein N.E.

Publication Date: 2014

PMID: 600323031

Abstract

Background: Although fibrin sealants (FSs) and fibrin glues (FGs) are predominantly utilized to strengthen repairs of cerebrospinal fluid (CSF) fistulas (deliberate/traumatic) during spinal surgery, they are also increasingly utilized to achieve hemostasis. Here, we investigated whether adding Tisseel (Baxter International Inc., Westlake Village, CA, USA), utilized to address increased bleeding during multilevel lumbar laminectomies with non-instrumented fusions, would reduce or equalize the time to drain removal and length of stay (LOS) without contributing to infections or prolonging time to fusion. **Methods:** Prospectively, 39 patients underwent multilevel laminectomies and 1-2 level non-instrumented (in situ) fusions to address stenosis/olisthesis; 22 who demonstrated increased intraoperative bleeding received Tisseel, while 17 without such bleeding did not. **Results:** The 22 receiving versus 17 not receiving Tisseel, with similar clinical parameters, underwent comparable average multilevel laminectomies (4.36 and 4.25) and 1-2 level fusions (1.4 vs. 1.29 levels). As anticipated, for those receiving Tisseel, the average intraoperative estimated blood loss (EBL), total postoperative blood loss, and total perioperative transfusion requirements [red blood cells (RBC), fresh frozen plasma (FFP), platelets] were higher. However, Tisseel had the added benefit of equalizing the time to postoperative drain removal [e.g. 3.41 days (with) vs. 3.38 days (without)] and LOS [e.g. 5.86 days (with) vs. 5.82 days (without)] without increasing the infection rates (e.g. one superficial infection

per group) or average times to fusion (e.g. 5.9 vs. 5.5 months). Conclusions: Adding Tisseel for increased bleeding during multilevel laminectomies/in situ fusions contributed to hemostasis by equalizing the average times to drain removal/LOS compared to patients without increased bleeding and not requiring Tisseel. Copyright: Copyright © 2014 Xu R.

Sellar repair with resorbable polyglactin acid sheet and fibrin glue in endoscopic endonasal transsphenoidal surgery.

Authors: Yano S., Tsuiki H., Kudo M., Kai Y., Morioka M., Takeshima H., Yumoto E., Kuratsu J.-i.

Publication Date: 2007

PMID: 46038495

Abstract

Background: Cerebrospinal fluid leakage after transsphenoidal surgery represents a serious problem. Various methods to prevent postoperative CSF leakage are available, but immediate and tight dural closure is still difficult. The efficacy of a novel sellar repair was described. Methods: The sellar repair using absorbable PGA sheet and fibrin glue was applied to 18 consecutive patients with sellar tumors that include 13 pituitary adenomas, 2 craniopharyngiomas, 2 Rathke's cleft cysts, and 1 meningioma within 135 patients who were treated with endoscopic endonasal transsphenoidal approach. The reaction speed and strength between PGA sheets and fibrin glue were examined in vitro. Results: Polyglactin acid sheets were adhered to the rabbit skin with fibrin glue within 3 minutes and withstood a pressure of more than 220 mm Hg. Postoperative CSF leakage of the patients was not observed in any patients, and excellent adhesion of the PGA sheets to surrounding mucosa was estimated by endoscopic observation after the surgery. Conclusions: Repair of the sellar floor with PGA sheet and fibrin glue is a safe and effective method to prevent postoperative CSF leakage, which decreases the necessity for lumbar drainage after the operation. © 2007 Elsevier Inc. All rights reserved.

Nonsuture dural repair using polyglycolic acid mesh and fibrin glue: Clinical application to spinal surgery.

Authors: Hida K., Yamaguchi S., Seki T., Yano S., Akino M., Terasaka S., Uchida T., Iwasaki Y.

Publication Date: 2006

PMID: 43112147

Abstract

Background: In spinal surgery, repair of the dura is difficult when it is torn or fragile or is ossified as in cases with ossification of posterior longitudinal ligament. We report our experience with a nonsuture dural repair technique in patients undergoing spinal surgery; it uses a dura substitute composed of polyglycolic acid (PGA) mesh and fibrin glue. Here, we report the efficacy and safety of nonsuture

duroplasty using PGA mesh and fibrin glue (PGA-fibrin sheet). Methods: The artificial dura mater is composed of a PGA-fibrin sheet. The dural defect is covered with a patch sprayed with fibrin glue without suturing to the dura mater. We first evaluated this technique in an experimental study by performing water leakage tests. Between May 2001 and January 2005, we used it in 160 spinal surgeries that required intraoperative dura repair. Results: Our preliminary tests showed that the threshold for water pressure without leakage was 161 +/- 42 and 96.5 +/- 32 mm Hg when the unsprayed margin around the perimeter of the patch was 5 and 2 mm, respectively. Of the 160 operated patients, 10 (6.3%) experienced subcutaneous cerebrospinal fluid (CSF) leakage. Of these, 6 required a second operation; in the other 4, the CSF collection diminished spontaneously. There were no other complications such as allergic reaction, adhesion, or infection. Conclusion: In combination with CSF diversion, the PGA-fibrin sheet is a viable alternative method for dural repair in spinal surgery. © 2006 Elsevier Inc. All rights reserved.

Fibrin sealant for treatment of cerebrospinal fluid leaks.

Authors: Siedentop K.H., O'Grady K., Park J.J., Bhattacharya T., Sanchez B.

Publication Date: 1999

PMID: 30117023

Abstract

Objective: Persistent cerebrospinal fluid leaks in the human population are rarely found in otherwise healthy individuals, but occur in patients with comorbid illnesses. These leaks are frequently resistant to dural suturing or closure of the defect site with connective tissue, cartilage, or plastic materials. In this study, fibrin sealant (ViGuard Fibrin Sealant was used to adhere muscle grafts to surgically created dural defects to close cerebrospinal fluid leaks in chinchillas. Histologic evaluation of the defect sites were conducted to assess healing and tissue response in the test and control groups. Method: In 20 chinchillas, after a skin incision, a 6 mm X 6 mm window was created in the right superior bulla exposing the underlying bony tegmen. Using a microcutting burr, a 3 mm X 3 mm area of tegmen was drilled out and the exposed dura was resected to create a large cerebrospinal fluid (CSF) leak. In the control group (n = 10), a small muscle graft from the surrounding tissue was placed into the defect site. In the test group (n = 10), the muscle graft was glued into the defect with ViGuard Fibrin Sealant. Bulla and skin were then closed. All animals were killed at 3 weeks into the experiment, and tissue was harvested for histologic examination. Setting: The Department of Otolaryngology, Head and Neck Surgery Research Laboratory, University of Illinois, Chicago. Results: Three weeks after surgery in the test group the tegmen defects were found to be closed by bone or connective tissue or both. Meninges had regrown, and the underlying brain appeared histologically normal. There was no evidence of CSF leak, toxicity, infection or other deleterious tissue reactions. In the control group, again the meningeal and bony tegmen defects were seen to be closed by connective tissue or bone or both. Brain tissues appeared histologically normal. There was no evidence of CSF leak, toxicity, or other deleterious tissue reactions. One animal of the test group died of unknown causes. On autopsy, no signs of meningitis or encephalitis could be detected and the cause of death was unapparent. Conclusion: Fibrin Sealant, made from pooled donor blood and treated with viral elimination procedures, was found in combination with muscle grafts to securely close induced CSF leaks in the chinchilla model. Inflammation, infection, or toxic reactions were not observed. We believe that ViGuard Fibrin Sealant has stronger bonding power compared with available autologous fibrin tissue adhesives.

Non-traumatic cerebrospinal fluid rhinorrhea associated with hydrocephalus: A case report. [Japanese]

Authors: Tokuno T., Ban S., Nakazawa K., Yoshida S., Matsumoto S., Shingu T., Sato S., Yamamoto T.

Publication Date: 1995

PMID: 25093834

Abstract

We report an unusual case of non-traumatic cerebrospinal fluid rhinorrhea associated with aqueductal stenosis and hydrocephalus. The patient was a 10-year-old girl who suddenly developed massive CSF rhinorrhea following severe edema of the left side of her face. CT scan showed marked dilatation of the lateral and third ventricles and enlarged sphenoid sinus of water density, extending to the lateral wall of the left orbit and to the left pterygoid fossa. Immediately after the onset of CSF rhinorrhea, ventricular drainage was performed, but the rhinorrhea persisted. Ventriculography revealed predominant flow of the contrast medium into the left temporal horn and abnormal collection in the sphenoid sinus. Coronal CT scan did not show any focal bony defect, but a thin layer was seen in the base of the left middle fossa. Exploration of the skull base in the left middle fossa was performed through a left frontotemporal craniotomy. An irregular bony defect measuring 7 x 12 mm was then found in the anterolateral floor of the middle fossa and the dura was also perforated there. Brain tissue including the temporal horn protruded through the bony defect into the sphenoid sinus. After excision of the herniated brain tissue, repair was accomplished by packing muscle into the bony defect and covering the dural defect with fat reinforced by coating with fibrin glue. Postoperatively, the CSF rhinorrhea has stopped and the edema of her face has disappeared. We discuss the etiology of this unusual spontaneous CSF leakage through the middle fossa and the abnormally enlarged sphenoid sinus.