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Fibrin Glue Injection for Cavernous Sinus Hemostasis Associated with Cranial Nerve Deficit: A Case Report

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Abstract
Fibrin glue injection has been used to control intraoperative cavernous sinus (CS) venous bleeding. There have been no reported complications related to this maneuver.1,2 We present a case where a patient developed a sensory trigeminal nerve deficit after injection of fibrin glue into the posterior CS during resection of a petrosal meningioma. We believe that this deficit was due to the compression of the trigeminal ganglion similar to balloon compression procedures. Although fibrin glue injection may achieve satisfactory cavernous sinus homeostasis, the volume and rate of injection should be kept in mind to avoid a compressive lesion on traversing cranial nerves and surrounding structures, or retrograde filling of the venous tributaries.

Keywords
► fibrin glue
► cavernous sinus
► cranial nerve

Introduction
Fibrin glue injection (Baxter Healthcare Corp., Deerfield, Illinois, United States) has been used to control intraoperative cavernous sinus (CS) venous bleeding. There have been no reported complications related to this maneuver.1,2 We present a case in which a patient developed a sensory trigeminal nerve (TN) deficit after injection of fibrin glue into the posterior CS during resection of a petrosal meningioma. We believe this deficit was due to the compression of the trigeminal ganglion (TG) similar to balloon compression procedures but persistent until the glue resolves.

Case Report
A 40-year-old woman with radiation-induced petrous apex meningioma underwent resection of the lesion via a posterior fossa approach. After complete resection of the lesion, the involved dura was excised to the junction of the superior petrosal sinus and the posterior wall of the CS, where venous hemorrhage ensued. This was easily controlled with injection of fibrin glue into the posterior CS. The remaining of the procedure was uneventful. Postoperatively the patient developed new-onset ipsilateral facial numbness. There was dense hypoesthesia in the trigeminal V1 and V2 distributions, and less affected, in V3. The motor trigeminal function was intact. Postoperative magnetic resonance imaging (MRI) demonstrated total gross resection; however, there was expansion of the CS by the fibrin glue. Repeated postoperative MRI at 3 months demonstrated resolution of the CS expansion (► Fig. 1). However, the patient’s sensory TN deficit persisted after the 18-month follow-up.

Discussion
Multiple intraoperative techniques have been described for cavernous sinus hemostasis that include the use of Surgicel...
(Ethicon Inc., Somerville, New Jersey, United States), thrombin-soaked Gelfoam (Pfizer, New York, New York, United States), FloSeal (Baxter Biosciences, Vienna, Austria), and fibrin glue. Despite its prevalent use, there has been a wide variation of the PBC parameters including the amount of pressure (459–2080 mm Hg), duration (0.5–15 minutes), and volume (0.5–1.1 mL) of balloon compression. Studies have demonstrated a direct correlation between the duration of balloon compression and the development of facial numbness. Lee and Chen performed PBC in 80 patients, while keeping the other parameters stable, the duration of compression was either 60 seconds or 180 seconds. At 1-year follow-up, patients with a shorter duration of compression had lower rates of facial numbness, with similar rates of efficacy. Brown and Pilitsis also demonstrated an association between duration of PBC compression (1.18 versus 1.06 minutes) and facial numbness in 65 PBC procedures. Zanusso et al performed PBC with intraoperative pressure monitoring and demonstrated an association between high PBC pressure with greater side effects but with lower recurrence rates at 1 year. Similarly, Brown and Pilitsis demonstrated a trend toward facial numbness with higher PBC pressures.

Drawing analogies from the preceding discussion regarding PBC and TN sensory deficits, the fibrin glue injection produced a compressive lesion on the trigeminal ganglion with the resultant sensory deficit. Sensory complaints associated with PBC have been well documented. In a large retrospective case series, 441 of 496 patients undergoing PBC had early facial numbness (89%). However, the facial numbness persisted for > 3 months in only 23 patients (4.6%). Despite its prevalent use, there has been a wide variation of the PBC parameters including the amount of pressure (459–2080 mm Hg), duration (0.5–15 minutes), and volume (0.5–1.1 mL) of balloon compression. Studies have demonstrated a direct correlation between the duration of balloon compression and the development of facial numbness.

**Conclusion**

Although fibrin glue injection may achieve satisfactory cavernous sinus homeostasis, the volume and rate of injection should be kept in mind to avoid a compressive lesion on traversing cranial nerves and surrounding structures or retrograde filling of the venous tributaries.

**References**

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