



The use of TachoSil® as a sealant of dural sutures in brain and spinal tumor neurosurgery

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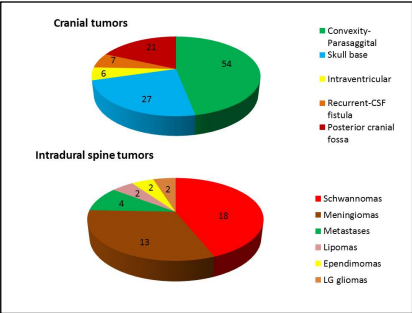


Introduction

CSF collections may complicate brain and spinal intradural procedures. Even the most accurate dural closure may fail. These events delay patient's discharge and cause even more severe complications as pseudomenigocele, wound dehiscence, infections, meningitis. Since dural suture tightness is so relevant, different sealant and haemostatic product have become available to reinforce dural closure. Either in cranial or in spinal surgery, we usually pursue a watertight closure of the dura, if this is not possible we prefer to employ autologous materials, mainly pericranial grafts. Only when such options are not available, dural substitutes or eterologous dural patches are considered. In the last years different types of fibrin glues or sealant materials have been increasingly used to reinforce all kind of dural sutures. Tachosil® is a ready to use sealant and haemostatic agent already safely used in general surgery. It consists of an absorbable equine collagen sponge coated on one side with human Fibrinogen and Thrombin human without allergenic aprotinin. Placed epidurally over a suture, it has strong adhesive properties in all body fluid, creating an air- and liquid-tight seal. A honeycomb-like matrix on the sponge builds a fibrin clot by mimicking the final step of natural blood clotting and helping to seal the corresponding tissue it is applied to.

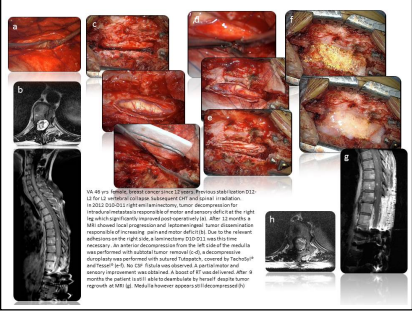
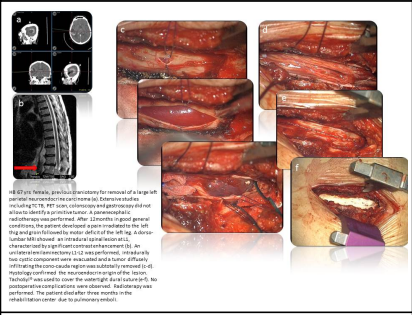
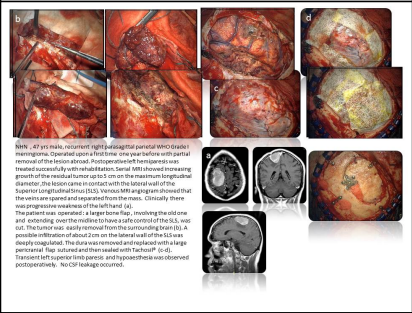
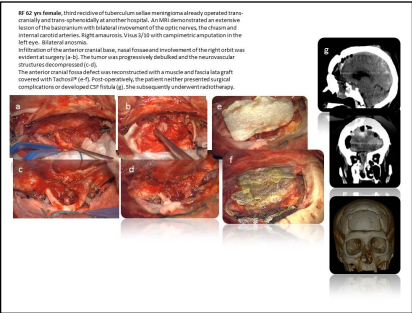
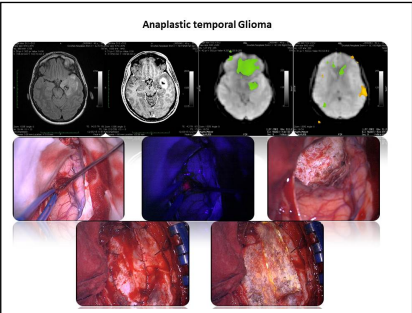
Methods

From October 2010 to January 2014, we used TachoSil® in 115 craniotomies for brain tumor and in 41 spinal procedures for intradural tumors. It was applied as strips, over the standard dural suture or a dural defect previously repaired with a dural substitute. Follow-up ranged between 39 and 4 months. The decision on the selected technique pertained to the single surgeon, without preoperative randomization and belonged to the own surgical experiences. In particular Tachosil® was preferentially used: i) to seal the frontal sinus and to reinforce dural closure in the mini supraorbital approaches; the open sinus is filled with muscle and sealed with TachoSil®. ii) to seal dural reconstructions in posterior fossa surgery; iii) having carefully sutured the dura with 6-0 prolene, after unilateral mini-invasive approaches to remove intradural spinal schwannomas, meningiomas and other less frequent tumors and iv) in complex spine surgery as somatectomies and vertebrectomies to reinforce the dural closure even in absence of an evident CSF fistulas. In 54 cases (39 cranial and 15 spinal) Tachosil® was used alone over the dural sutures; in the other cases, especially involving recurrent lesions or surgery required to repair known dural fistulas, other fibrin glues or dural substitutes were added to Tachosil® and/or implemented also by a spinal drainage. We retrospectively evaluate the 78 supratentorial and 31 postero fossa procedures, with other 100 supratentorial and 40 infratentorial tumor cases, operated on by the same surgeons before october 2010 without Tachosil®, to evaluate their time to discharge from the hospital and their complications.



Results

The use of Tachosil® was straightforward and the patches appeared to readily adhere to the sutured dura or dural substitutes and to resist tension forces, provided that definite margins were available. In cranial surgery we had four failures within two weeks: one patient with a left fronto-parietal en plaque meningioma, one old patient with large recurrent frontal-temporal meningioma and two with posterior fossa tumor. Spinal drainage was not effective in two patients ultimately required V-P shunt for hydrocephalus. Median time of discharge after surgery was 7 days for supratentorial procedures and 10 days for posterior fossa tumors.



CSF fistula incidence in cranial and spinal procedures	
Posterior fossa surgery	3-15%
Transphenoidal surgery	1-6%
Skull base surgery	8%
Ponto-cerebellar angle surgery	3-17%
Convexity supratentorial surgery	2%
Intradural spinal tumors surgery	4-13%

In spinal surgery for intradural tumors, we had CSF fistula requiring reoperation, in only one patient with recurrent meningioma, where Tachosil® was used over a large patch of Tutopatch® that had been incompletely sutured, to indefinite dural margins. In the supratentorial series without Tachosil®, we reported four cases requiring a spinal drainage for CSF fistula, two of them ultimately were submitted to revision surgery. Time to discharge was 8 days. The difference was significative (Mann Whitney test p= 0.001). In the posterior fossa group without Tachosil® we had four failures and a permanent V-P shunt for hydrocephalus was required. Median time time to discharge was 9 days and the difference was not significant (Mann Whitney test p = 0.53).

Conclusions

TachoSil® is not a dural substitute and it always requires an adequate dural suture or at least, a dural reconstruction with other available materials. Alone or in combination with other products, it helps to prevents CSF leakage thus decreasing patients discomfort, hospital stay with related costs and more severe complications. The avoidance of trivial wound complications is particularly relevant in cancer patients who may require to be submitted to adjuvant therapies without delay. Incidence of CSF leakage was 4.3 % in this series involving different types of intracranial tumors and intradural spine tumors. In our experience, it may fail if used to seal large dural defects as it may occur in trauma surgery or after removal of bulky meningiomas, when the suturable margins are indefinite, and in cases with associated persistent intracranial hypertension due to hydrocephalus.