Author's response to reviews

Title: Epidemiological characteristics of 778 patients who underwent surgical drainage of chronic subdural hematomas in Brasilia, Brazil.

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Author's response to reviews: see over
Reviewer's report and point-by-point description of the changes made

**Title:** Epidemiological characteristics of 778 patients who underwent surgical drainage of chronic subdural hematomas in Brasília, Brazil

**Version:** 1

**Date:** 10 September 2012

**Reviewer:** Yvonne Mondorf

**Reviewer's report:**

*This manuscript summarizes the outcome of a large series of patients who underwent burr-hole trepanation because of chronic subdural hematoma. The patients were retrospectively analyzed. They were admitted to hospital between 2006 and 2011. The special thing about this manuscript is the description of the outcome of large series and the epidemiological characteristics in Brazil. I would favor its publication since it is the first analysis of a large series in Brazil.*

1. Minor essential revisions:

Cranial computed tomography: when was it performed before and after surgery?

*The cranial computed tomography was performed before the surgical procedure to diagnose the pathology. This radiological exam is not performed routinely after surgery for chronic subdural hematoma in our service.*

Was there a stay on ICU?

*There was not a stay in the ICU. After surgery, the patients stayed in the post-anesthesia recovery room and in the neurosurgical ward.*

How long did the drainage stay intracranial?

*Patients with CSDH who underwent single burr-hole with closed-system drainage retained the drainage system for a period of 48 hours. Patients who underwent craniotomy did have an intracranial drainage system.*

Follow up? (For example telephone interview)

*There was no follow-up of patients after discharge from the hospital because there were many incomplete medical records.*

I think it would be useful to show some examples of ct-scans before and after surgery.

**Figure 1.**

Surgical technique should be described exactly.
The neurosurgical staff on duty selected the type of surgical procedure (burr hole with closed-system drainage or craniotomy). The surgery was performed under general anesthesia by creating one burr hole of approximately 10 mm in diameter in the side of the location of the hematoma. After exposing the dura mater and the outer membrane of the hematoma, the collection of blood was evacuated under its own tension, and irrigation was performed using physiological saline solution until clear fluid came out. When the subdural space allowed, a closed subdural drainage system, without any negative pressure, was placed and subcutaneously tunneled for at least 5 cm. Subdural drainage was continued up to 48 hours after surgery, during which time, the patient was supine in bed. During the craniotomy, a piece of bone was removed and the largest portion of the brain was exposed. After exposing the dura mater and the outer membrane of the hematoma, only the outer membrane was removed. After evacuation of the hematoma, the piece of bone was replaced and fixed to the skull. Surgical hemostasis was performed with monopolar/bipolar cautery and oxidized regenerated cellulose (Surgicel®).

Anticoagulant or antiaggregant therapy should be mentioned and explained in its importance.

Anticoagulant/antithrombotic drugs were stopped if used by a patient. After a normal international normalized ration was confirmed, the surgery was performed. In case of an emergency procedure and coagulopathy, anticoagulant status was reversed with vitamin K and fresh frozen plasma.

Subcutaneous injection of 40 mg of enoxaparin was used after 24 hours of surgical procedures for prophylaxis against deep vein thrombosis during the patient’s stay in hospital.

Chronic anticoagulation/antiaggregant therapy uses are also at increased risks for CSDH. Although the process is incompletely established, it has been suggested that asymptomatic “microbleeds” permit the development of a symptomatic hemorrhage. These drugs, which are used in a large proportion of the elderly population, may add to the risk of CSDH by as much as 42.5 times. Some studies report that patients initially taking anticoagulant medications have more risk of recurrence and longer stays in the hospital. Our results show only 3.5% of all CSDH patients admitted were chronically anticoagulated/antiaggregated or had coagulopathy history. In one study, 41% of all CSDH patients admitted to a neurosurgical department in Switzerland were chronically anticoagulated. Our data may be explained by incomplete medical records and by deficiencies in Brazilian public health in diagnosing pathologies requiring the chronic use of these drugs, as well as deficient distribution of these medicaments to the population.

How was the hemostasis perioperative.

Surgical hemostasis was performed with monopolar/bipolar cautery and
oxidized regenerated cellulose (Surgicel\textsuperscript{R}).

Occurrence of seizures?

After the surgery, the patients routinely received seizure prophylaxis with 15 mg/Kg of phenytoin by slow IV, followed by 100 mg IV every 8/8 hours, and prophylactic antibiotic with cefazolin 1 g IV every 8/8 hours for 48 hours.

There was no follow-up of patients regarding seizures during the stay or after discharge from the hospital because there were many incomplete medical records.

2. Recurrence rate seems very low.

Accepted management of CSDH (burr hole with or without closed-system drainage, twist-drill craniostomy, or craniotomy) is accompanied by recurrence rates of 4 to 26\%. In our series, 96.5\% of the surgical procedures undertaken in patients with CSDH were burr holes with closed-system drainage, and only 5.4\% of patients experienced a recurrence. Craniotomy is the most invasive, encompassing the longest operating time and the greatest blood loss and remains an option in calcified or CSDH with numerous thick membranes. Twist-drill craniostomy can be performed at the bedside in patients with multiple medical co-morbidities; however, there is a theoretical increased risk of contamination.

The most frequently used technique is burr-hole craniostomy with or without drainage. The debate regarding the role of a drainage system in the surgical management of this pathology is ongoing. According to some reports, the installation of a drainage system helps brain expansion, decreasing the chance of recurrence. However, the reported complications of a drainage system are significant, including hemorrhage, seizure induction, and infection. Thus far, doubt persists about whether the installation of a drainage system is safer and more useful than irrigation without leaving a drainage system in place. Perhaps another explanation for the low recurrence rate of CSDH in our study is the lack of follow-up data of patients.

Furthermore, there are no new aspects that were regarded and a lot of aspects that are missing (see above). I would like to see a longer discussion concerning the pathomechanisms of CSDH.

CSDH occur in the dural border cell layer, located between the dura mater and the arachnoid. The dissection of these cell layers creates a subdural cavity. Patients with extensive brain atrophy (elderly and alcoholics) or conditions resulting in intracranial hypotension (ventriculoperitoneal shunt) are vulnerable to developing CSDH. Traversing veins are being increasingly stretched by the
shrinking brain until only a minor additional force is sufficient to cause the rupture of the bridging veins and create the hematoma. This is followed by fibrin deposition, organization, enzymatic fibrinolysis, and liquefaction of the clot. An inflammatory reaction occurs, and neomembranes (inner or visceral and outer or parietal membranes) are formatted with the growth of neocapillaries and enzymatic hyperfibrinolysis. CSDH tend to gradually enlarge because repeated micro-hemorrhage may lead to clinical signs and symptoms of increased intracranial pressure or compression brain structures.

**Level of interest:** An article of limited interest

**Quality of written English:** Needs some language corrections before being published.

**Statistical review:** Yes, but I do not feel adequately qualified to assess the statistics.

**Declaration of competing interests:**

I declare that I have no competing interests