SPONTANEOUS INTRACRANIAL HEMORRHAGE: NEWSLETTER

Intraparenchymal intracranial hemorrhage (ICH) causes 10-15% of initial strokes. The following will discuss this topic in depth so that the reader has a better understanding of the disease, its management and its outcomes.

Common Locations and Distributions:

Fifty percent of ICHs are located in deep brain structures, 35% are lobar, 10% are cerebellar and 6% involve the brainstem.

Clinical Presentation:

ICH most often presents with focal neurologic deficit, altered consciousness, headache, emesis, and elevated blood pressure.

Initial Evaluation:

When patients present with intraparenchymal ICH the practitioner should strive to obtain information regarding vital signs, pregnancy status, signs and symptoms, time of onset, patient age, past medical history, past and current medications including over the counter products, list of ingested anticoagulants/antiplatelets, family history and any currently or previously used illicit drugs (cocaine, stimulants, IV drugs). Diet supplements and other nutritional/performance supplements should also be noted since many have additives that can increase blood pressure, damage liver function, and induce coagulopathy.

Emergent imaging always involves head CT. MRI and cerebral angiography can be used when indicated.

Laboratory testing must include routine chemistries and cell counts. Additional studies should include liver function tests, coagulation studies, platelet studies, pregnancy screen, toxicology studies, inflammatory studies, and hypercoagulability studies.

ICH Etiologies:

Etiologies for intraparenchymal ICH include:

Hypertension
Amyloid angiopathy
Vaculopathy/Vasculitis
Coagulopathy
Dural sinus thrombosis

Hypercoagulability
Arteriovenous malformation
Cavernous malformation
Aneurysm that ruptures into the surrounding brain parenchyma
Brain tumor
Ischemic stroke with secondary hemorrhagic conversion
Mycotic aneurysm
Infection
Unrecognized trauma
Arteriovenous fistula with venous hypertension
Venous infarction

Management:

Initial management of intraparenchymal ICH involves universal A, B, Cs (Airway/Breathing/Circulation). Once the A, B, Cs are established and the CT scan confirms anatomic size and hematoma location, specific management decisions can be made.

Medical:

1. All patients should initially be managed in an ICU setting
2. Early mobilization is beneficial
3. DVT prophylaxis using intermittent compression stockings is of benefit. Once bleeding has stopped based on sequential CT scans, low dose sub q heparin can be started after 2-3 days and warfarin can be restarted within 7-10 days. These times can be modified based on other medical issues.
4. Hypertension should be treated to reduce the risk of recurrent bleeds.
5. Steroids show no benefit as per randomized studies. Steroids should actually be avoided since hyperglycemia has been shown to predict increased risk of 30 day mortality.
6. Recombinant Activated Factor 7 (90 micrograms/kg; 2.6 hour half life) should be considered for patients with coagulopathy and for those patients taking anticoagulant and antiplatelet agents. Factor 7 can stimulate thrombin formation which in turn will convert fibrinogen to fibrin
7. Consider reversing warfarin using Vitamin K and FFP
8. Consider administering platelets for patients on antiplatelet agents.
10. Consider reversing heparin with protamine sulfate
11. Blood pressure management is complicated. While decreasing blood pressure may reduce the incidence of re-bleeding, reduction of blood pressure in the face of increased

intracranial pressure could reduce cerebral perfusion pressure and induce further brain ischemia. There is currently minimal evidence for specific blood pressure levels.

12. While hyperosmolar agents like Mannitol, 3% saline, and urea can transiently reduce intracranial pressure and potentially increase cerebral perfusion pressure, there is no evidence that such agents improve overall outcomes.
13. Hyperventilation can serve to transiently reduce intracranial pressure by reducing paCO2 and inducing vascoconstriction. Nevertheless, hyperventilation is a double-edged sword. Vasoconstriction can also reduce blood flow and induce further ischemia to at risk brain tissue.
12. Head elevation to 45 degrees and head positioning to avoid jugular vein kinking can help reduce intracranial pressure without untoward side effects.
13. While one would think that monitoring intracranial pressure and cerebral perfusion pressure would be of benefit in this disease, no randomized studies have shown any benefits as they relate to survival or outcomes.
14. Due to a 28% incidence of seizure activity in the first 30 days following hemorrhage, prophylactic anticonvulsants should be considered in all patients with ICH.
15. Patients should be kept normothermic. There is no evidence that hypothermia in this patient population is beneficial.

Surgical:

1. Cerebellar hematomas >3 cm in diameter should be evacuated if possible especially if the patient is deteriorating, has brainstem compression, or has hydrocephalus.
2. Infusion of thropmbolytics into the hematoma cavity to ease evacuation is of no proven benefit.
3. Minimally invasive evacuation using endoscopic approaches is of no proven benefit in randomized trials.
4. Decompressive craniectomy is of unknown benefit.
5. Routine evacuation of supratentorial hematomas is of no proven benefit. While most patients will not tolerate hematomas greater than 60cc in volume, the decision to surgically evacuate a hematoma is done on a case by case basis and is generally reserved for patients who are worsening.

<u>Mortality and Morbidity</u>:

ICH is devastating. Fifty percent of deaths from ICH occur within the first 48 hours. Thirty day mortality is 35-52%. Twelve month mortality as pertains to location reveals 51% for deep bleeds, 57% for lobar bleeds, 42% for cerebellar bleeds, and 65% for brainstem bleeds. At 6 months, only 20% of all ICH victims are independent.

Thirty day outcome predictors for ICH include large hematoma volume, hydrocephalus, non-cortical locations, high fibrinogen levels and poor GCS. The strongest predictor of 30 day mortality is hematoma volume and GCS. When hematoma volume is >60cc and GCS is <8, 30 day mortality is 91% while when hematoma volume is <30cc and GCS is >9, 30 day mortality is 19%. Hematoma volume greater than 30cc predicts inability to function independently at 30 days.

Conclusion:

Intraparenchymal ICH can be an unforgiving entity. Rapid identification and treatment to ameliorate the secondary effects of the hematoma on normal brain can help to improve outcomes.