Acute Intracranial Hemorrhage in Adult Cancer Patients

This practice algorithm has been specifically developed for MD Anderson using a multidisciplinary approach and taking into consideration circumstances particular to MD Anderson, including the following: MD Anderson’s specific patient population; MD Anderson’s services and structure; and MD Anderson’s clinical information. Moreover, this algorithm is not intended to replace the independent medical or professional judgment of physicians or other health care providers.

PRESENTATION

Abrupt onset of focal neurological symptom(s) without history of trauma

Coagulopathy or thrombocytopenia? ?

Yes

Consult Benign Hematology

Communicate with Transfusion Services regarding potential need for blood products: pager 713-404-3472

No

See Box A on Page 2

ASSESSMENT

Head CT scan without contrast [MRI or CT angiography if clinical or radiological suspicion of underlying cause such as tumor or arteriovenous malformation (AVM)]

Laboratory tests (if not already completed): BUN, serum Creatinine, Total bilirubin, CBC, PT, PTT, Fibrinogen, D-Dimer, Type and Screen

Radiographic evidence of acute intracranial hemorrhage; notify primary team

• Neurosurgery consult to include discussion with primary team
• Urgent multidisciplinary conference of all the teams involved (See footnote 2)
• Transfer to appropriate level of care

Further treatment indicated?

Yes

(e.g., good baseline performance status, controlled disease with more than 1 year life expectancy)

No

(e.g., poor baseline performance status, life expectancy less than 6 months, refractory thrombocytopenia, massive bleeding with neurological devastation)

Reversible thrombocytopenia? ?

Grade 2, 3, 4?

Yes

See Appendix A for recommended treatment

No

See Box A on Page 2

Reversible coagulopathy?

Yes

See Box A on Page 2

No

See Box B on Page 2

See Box A on Page 2

1 Intracranial hemorrhage includes: subarachnoid hemorrhage, subdural hematoma, epidural hemorrhage, intraparenchymal hemorrhage, intraventricular hemorrhage

2 The objective of this meeting/conference is to discuss the immediate plan of care including whether surgery is indicated and if not, whether the patient is neurologically devastated and the chances of recovery are very poor justifying further discussion about end of life, do-not-resuscitate status, limitation of life supportive measures (e.g., blood products, ventilation, vasopressors, cardiopulmonary resuscitation) and transition to comfort care.

3 WHO/NCI Thrombocytopenia Criteria:
   Grade 1 150 – 75 K/microliter
   Grade 2 75 – 50 K/microliter
   Grade 3 50 – 25 K/microliter
   Grade 4 less than 25 K/microliter

   Thrombocytopenia not reversible (platelet refractory) defined as a one hour or next morning post transfusion platelet increment of less than 3,000/ul per unit transfused.

   Trend for patient’s platelet count response should be reviewed from their medical record.

4 Benign Hematology consult to determine reversibility of coagulopathy or thrombocytopenia.
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1 Possible Surgical Indications:
- Intracerebellar hematoma greater than 30 mm in diameter, hydrocephalus, or brainstem compression
- Supratentorial hematoma 10-20 mL, herniation greater than 30 mL and within 1 cm of the surface
- Intraventricular hemorrhage with hydrocephalus

A
Start Neuro-monitoring per ICU protocol

B
No
Surgery indicated as determined by neurosurgeon?

C
Consider:
- Clinical management
- Palliative Care
- Comfort Measures

Multidisciplinary conference to discuss immediate and long term plan of care

Post operative care as clinically indicated

Surgery

Yes
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### APPENDIX A: Hemostatic Defect

<table>
<thead>
<tr>
<th>HEMOSTATIC FINDING</th>
<th>RECOMMENDED TREATMENT</th>
<th>Target INR less than or equal to 1.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Warfarin-induced</td>
<td>If warfarin-induced coagulopathy, use Prothrombin complex concentrates and add IV vitamin K 10 mg at 1 mg/minute</td>
<td></td>
</tr>
<tr>
<td>● Disseminated Intravascular Coagulation (DIC)</td>
<td>Fresh frozen plasma (10-15 mL/kg) with ideal recovery would raise factor levels 15-20%</td>
<td></td>
</tr>
<tr>
<td>● Hepatic dysfunction</td>
<td>Vitamin K 10 mg at 1 mg/minute IV daily</td>
<td></td>
</tr>
<tr>
<td>● Vitamin K deficiency</td>
<td>Vitamin K 10 mg at 1 mg/minute IV daily</td>
<td></td>
</tr>
<tr>
<td>● Fibrinogen less than 1 gram/L</td>
<td>Cryoprecipitate 1 unit/5 kg up to a total dose of 10 units (target fibrinogen: greater than or equal to 1 gram/L)</td>
<td></td>
</tr>
<tr>
<td>● Congenital Factor VII deficiency</td>
<td>Recombinant Factor VII activated 15-30 mcg/kg every 4-6 hours (not recommended for spontaneous ICH without Factor VII deficiency or oral anticoagulant reversal)</td>
<td></td>
</tr>
<tr>
<td>● Factor VIII deficiency (Hemophilia A)</td>
<td>Each Factor VIII unit raises plasma Factor VIII levels by 2% [50 units/kg used to raise levels to 100% (80-100 international units/dL)] Target Factor VIII activity level of 100 international units/dL and maintain level of 50% for 7-10 days (A variety of Factor VIII products are available.)</td>
<td></td>
</tr>
<tr>
<td>● Factor IX deficiency (Hemophilia B)</td>
<td>Each Factor IX unit raises plasma Factor IX levels by 1% [100 units/kg used to raise levels to 100% (60-80 international units/dL)] Target Factor IX activity level of 100 international units/dL and maintain level of 50% for 7-10 days (A variety of Factor VIII products are available.)</td>
<td></td>
</tr>
<tr>
<td>● von Willebrand Disease</td>
<td>Target Von Willebrand Ristocetin Cofactor (VWF:RCo) and Factor VIII activity levels of 100 international units/dL and maintain levels of 50% for 7-10 days. Use Humate-P® or Alphanate®, begin 40-60 international units/kg</td>
<td></td>
</tr>
<tr>
<td>● Thrombocytopenia</td>
<td>Ideal target platelet count of 100 K/microliter in patients who are not refractory to platelets. Each unit transfused should increase platelet count by 5 – 10 K/microliter.</td>
<td></td>
</tr>
</tbody>
</table>
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SUGGESTED READINGS


DEVELOPMENT CREDITS

This practice consensus algorithm is based on majority expert opinion of the Intracranial Emergencies work group at the University of Texas MD Anderson Cancer Center. It was developed using a multidisciplinary approach that included input from the following core team members:

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