Cerebral Arteriovenous (AV) malformation resection in a 14-year-old female with abnormal coagulation factors

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Introduction

• Low fibrinogen can have a detrimental consequence to a patient who is getting a high risk surgery such as resection of a cerebral arteriovenous malformation
• According to Wei, patients who have a fibrinogen less than 200 mg/dl were shown to have a lower survival rate, increased risks for hematomas, and increased blood loss in removal of intracranial tumors
• Another source says fibrinogen level should be:
  • Non-Surgical Patients 50-100 mg/dl
  • Surgical Prophylaxis 100-200 mg/dl
• Deciding how a certain fibrinogen level will correlate clinically and the action to be taken can sometimes be difficult

During preoperative discussion the family refused cryoprecipitate and fresh frozen plasma. It was debated how an elevated PTT and low fibrinogen would effect this patient. There was discussion about involving risk management and ethics.

The neurosurgeon believed this was an elective procedure, and told the family he would not do the procedure unless they consented to all blood products. After much debate, the family finally agreed, and 3 units of cryoprecipitate were given prior to incision.

Case Report

A 14 year-old otherwise healthy female who presented with a 0.9-cm superior temporal gyrus malformation for resection with stereotactic guidance. Lab work obtained prior to surgery revealed:

PT level of 13.6 (ref 11.3-14.9),
PTT level of 38.4 (ref 25.0 – 33.2)
Fibrinogen level of 198 (ref 220-440)

With the elevated PTT and low fibrinogen, Transfusion medicine was consulted, and recommended getting additional factor levels. The results were:

Factor 8 level 86% (ref 47%-141%)
Factor 9 level 57% (ref 67%-141%)
Factor 11 level 65% (ref 48%-139%)

Discussion

This case is a high risk surgery in a patient with a low fibrinogen, factor 9 level, and an elevated PTT of unknown clinical significance and a family who refusal of blood products. She had no history of easy bruising, nose bleeds, family history of bleeding, or heavy menses. However, an elevated PTT could have been due to low fibrinogen.

• Cryoprecipitate components
  • Fibrinogen 150 – 250 mg
  • Factor VIII 80-150 IU
  • Von Willenbrand Factor
  • Factor XIII
  • Fibronectin 30-60 mg

A dose of 1 unit / 10 kg of Cryoprecipitate will increase plasma fibrinogen 60-80 mg/dl.

• Fibrinogen concentrate (Riastap)
  • Alternative to cryoprecipitate for low fibrinogen in setting of massive bleeding
  • Dose fibrinogen concentrate mg/kg = (desired fibrinogen concentration mg/dl – actual fibrinogen concentration mg/dl) / 1.75
  • Alternatively, Fibrinogen Concentrate dose = 70 mg/kg

• Thromboelastography has the potential to establish the clinical significance of an elevated PTT and low fibrinogen
  • K value shows the time to clot formation and normally relates to fibrinogen level
  • Some evidence that TEG or ROTEM guided transfusion strategies may reduce blood products and decrease morbidity

REFERENCES