Use of Cryosupernatant in a Pediatric Jehovah’s Witness Patient Undergoing Scoliosis Surgery.

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Introduction:
Maintaining hemostasis during scoliosis surgery in a Jehovah’s Witness (JW) pediatric patient can be challenging as blood products are often refused for religious reasons. [1] Adult JW patients have been reported to accept both cryoprecipitate and cryosupernatant. [2] The use of cryosupernatant has not been previously reported for hemostatic management of a JW pediatric surgical patient.

Figure 1: Fresh Frozen Plasma, Cryosupernatant and Cryoprecipitate

Case Report:
A 16-year-old boy with progressive scoliosis, Dandy Walker Syndrome, Noonan syndrome, hypertrophic cardiomyopathy, hydrocephalus, SIADH, portal hypertension caused by perinatal thrombus, presented for T2-L3 posterior spinal fusion surgery. Prior to surgery, after informed consent, the patient and family, in consultation with church elders, agreed to the use of intraoperative cell salvage (if kept in continuity with the patient’s circulation), colloid fluid, cryoprecipitate and cryosupernatant. They refused packed red blood cells (PRBC), platelets and FFP. Per Hematology, preoperative erythropoietin was contraindicated due to the patient’s higher risk of thrombosis and thus, intraoperative antifibrinolytics were not used either. A court order was obtained to allow blood transfusion in the event of life-threatening blood loss.

Preoperative hemoglobin (Hb) concentration was 10.8 g/dL (Hematocrit (Hct) 33.4%). The calculated intraoperative blood loss was 1,300 mL (47% of total blood volume). Total intravenous fluids administered were 2,500 mL crystalloid (62.19 mL/kg), 750 mL 5% Albumin (18.66 mL/kg), 100 mL Cryocryoprecipitate (2.49ml/kg), 1,140 mL Cryosupernatant (28.36 mL/kg) and 350 mL salvaged blood from continuous autologous transfusion system (8.71 ml/kg; Hct 72%). Immediately after surgery, the Hgb was 6.7 g/dL (Hct 19.8%), platelet count was 115,000/dL, fibrinogen was 193 mg/dL and prothrombin time (PT), international normalized ratio (INR) and activated partial thromboplastin time (APTT) values were normal. No blood was transfused.

Total operative time was 6 hours. Patient remained intubated and was transferred to the intensive care unit for postoperative care. Postoperative course was complicated by a surgical wound infection requiring two incision and drainage surgeries with vacuum dressing changes. On POD 12, after his second procedure, with a Hb of 4.3 g/dL, (Hct 13.4 %) and transient heart block, he received 4 units of PRBC transfusion (1,092 mL, 27.16 mL/kg). He went home on POD 26.

Discussion:
Scoliosis correction surgery is associated with massive blood loss which can exceed the patient’s blood volume (6% - 162% of estimated blood volume). [3] Although several blood conservation techniques were used, large intraoperative and postoperative blood loss can still occur.

The JW Watchtower publication instructs members to decline transfusion with PRBC’s, platelets and plasma along with antifibrinolytics not kept in continuity with the patient’s circulation. However, decisions regarding acceptance of blood fractions is left to the individual’s conscience. [2] In a recent study from Duke, more than 95% of 463 eligible JW subjects agree to accept both cryoprecipitate and cryosupernatant as shown in table 2. [4]

Table 2: Acceptance of blood products by Jehovah’s Witness patients

<table>
<thead>
<tr>
<th>JW Status</th>
<th>All</th>
<th>None</th>
<th>Cryoprecipitate</th>
<th>Cryosupernatant</th>
</tr>
</thead>
<tbody>
<tr>
<td>JW-B (n=388)</td>
<td>10 (3.1%)*</td>
<td>14 (3.6%)</td>
<td>374 (96.6%)</td>
<td>371 (95.6%)</td>
</tr>
<tr>
<td>JW-R (n=37)</td>
<td>10 (27%)</td>
<td>0</td>
<td>37 (100%)</td>
<td>37 (100%)</td>
</tr>
<tr>
<td>JW-S (n=35)</td>
<td>10 (28.6%)</td>
<td>0</td>
<td>38 (100%)</td>
<td>38 (100%)</td>
</tr>
</tbody>
</table>

1. baptized, active JW (JW-B), 2) studying to be a JW (JW-S), or 3) raised JW (JW-R).
2. *P <0.001 as compared to JW-R and JW-S

Anesthesiologists, surgeons, along with church elders, patients and parents need to have a comprehensive discussion about perioperative plan to ensure adequate hemostasis, limit blood loss and prevent and manage coagulopathy. Preoperative blood augmentation with erythropoietin, intraoperative antifibrinolytics and cell salvage are considerable options. Intraoperative use of fractions of blood products such as cryoprecipitate and cryosupernatant will facilitate the management of maintaining coagulation system, minimize intraoperative blood loss and avoid red blood cell transfusion. Using this approach in JW patients will help us to optimize perioperative care while complying with their religious belief.

Conclusion:
We describe a novel approach to the management of a JW adolescent undergoing scoliosis surgery using cryoprecipitate and cryosupernatant (plasma, cryoprecipitate reduced), a blood fraction derived from frozen plasma.

References:
4. Lockhart. Transfusion 2012;52:113A