Title: Compassionate, Investigational Use of SANGUINATE™ (PEGylated Carboxyhemoglobin bovine) in a Jehovah’s Witness Patient With Hematemesis

Category: Transfusion Practice

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Background/Case Studies: Jehovah’s Witnesses (JWs) pose a clinical challenge in the setting of critical anemia. Most JWs do not accept whole blood or its main components, but do accept hemoglobin-based oxygen carriers (HBOCs). SANGUINATE™ (PEGylated carboxyhemoglobin bovine), is a dual action carbon monoxide (CO) releasing/oxygen transfer agent. It was well-tolerated by 18 healthy volunteers in a phase I clinical trial, and was shown in pre-clinical trials to protect the myocardium against ischemia/reperfusion injury in diabetic and normal mice. We report the investigational use of SANGUINATE™ in a JW patient.

Study Design/Methods: The patient was a 42 year-old female JW with systemic lupus erythematosus, and a gastroduodenal EBV+ lymphoproliferative disorder treated with rituximab, dexamethasone and cyclophosphamide over the past year. The patient, hospitalized for liver abscesses, experienced an acute hematemesis with hemoglobin decreasing from 7.3 to 3.1 g/dL overnight, and was transferred to the medical intensive care unit for hemorrhagic shock. Despite fluid resuscitation, the patient required vasopressor support and was intubated for shock and encephalopathy. The gastroenterology and interventional radiology (IR) services deferred further interventions because the patient was too unstable for procedures in the absence of transfusion. Transfusion medicine obtained SANGUINATE™ (PEGylated bovine carboxyhemoglobin, Prolong Pharmaceuticals, South Plainfield, NJ), for compassionate use. Following emergency use investigational new drug approval from the FDA, emergency institutional review board approval, and patient consent, she received 6 doses (each as 500 mL bags of 40 mg/mL SANGUINATE™) over 7 days. Supportive therapy included iron, folate, vitamin B12, and daily darbepoetin alfa injections.

Results: Following the first infusion, her shock and encephalopathy improved with decreased vasopressor requirement. Blood gas analysis demonstrated a decrease in metabolic acidosis (∆pH= 7.30 to 7.35) and decreased lactate (5.21 to 2.10 mmol/L). Gastroenterology performed an upper endoscopy and discovered an actively bleeding vessel in the gastric antrum. IR subsequently performed a successful coil embolization of a bleeding pseudoaneurysm of the gastroduodenal artery. The patient experienced no reactions or adverse events related to the HBOC. The patient’s native hemoglobin gradually trended up to baseline 2 weeks after the first
infusion. On day 35 follow-up, the patient was hospitalized in a step-down unit with no further bleeding events.

**Conclusion:** SANGUINATE™ stabilized (bridged) a critically ill anemic patient for life-saving interventions without adverse effects. Additional studies are warranted to explore the drug’s safety profile and efficacy.