A 64-year-old man presented to the emergency department with complaints of abdominal pain and rectal bleeding as well as extensive bruising on his arms and legs. The patient was discharged from an outside hospital 2 days prior on rivaroxaban for a deep vein thrombosis and clopidogrel for a recent non-ST elevation myocardial infarction. Upon arrival, he was awake, alert, and oriented with a blood pressure of 77/55 mm Hg, heart rate of 62 beats per minute, and oxygen saturation of 96% on room air. Initial point-of-care hemoglobin was 4.5 g/dL. Due to concern for bleeding, low blood pressure and perceived difficulty in obtaining intravenous access, intraosseous (IO) access was obtained. After IO placement, the patient experienced significant pain and was unable to tolerate large volumes administered through the IO. Given the low hemoglobin and inability to obtain other laboratory test results, Prothrombin SD (factor IX complex [human] [factors II, IX, XI]) 1490 U was administered to help to replenish the factor X that the rivaroxaban was inhibiting. This prothrombin complex concentrate has a much smaller volume compared with blood products and was tolerated without complication. This is the first reported case of administration of prothrombin complex concentrate via IO access.

Rivaroxaban is a new oral anticoagulant (NOAC) indicated for deep vein thrombosis, pulmonary embolism, and nonvalvular atrial fibrillation. Bleeding is a major adverse effect reported with rivaroxaban. Only blood products are available to try and correct bleeding caused by NOACs. Prothrombin complex concentrates (PCCs) have been thought to replace factors that NOACs inhibit. Prothrombin complex concentrate (PCC) is a 3-factor PCC that includes factors II, IX, and X. Administration of PCC via the intraosseous (IO) route has not been previously described in the literature. We present a case in which 3-factor PCC (Prothrombin) was successfully administered via IO access to treat bleeding caused by a NOAC.

A 64-year-old man presented to the emergency department by ambulance with a complaint of abdominal pain and melena. He was noted to have extensive bruising on all extremities. His medical history included pain and melena as the IO was encountered. Fortunately, the patient did experience significant pain through the IO access; however, no other adverse reactions during or after the dose. The patient was transferred to the medical intensive care unit for further management where they were able to place an ultrasound-guided IV line. Blood pressure improved to 90s/50s mm Hg and hemoglobin (Hgb) was 8.9 g/dL from a venous blood draw 1 hour after Prothrombin administration. The patient received an esomeprazole infusion and 2 U of packed red blood cells. The following morning his Hgb decreased (6.1 g/dL); 2 days later, his Hgb was 10.2 g/dL. Laboratory monitoring could not be performed to confirm Prothrombin aided in ceasing bleeding; however, the patient did not experience any additional melena and hemodynamics stabilized. Unfortunately, because of the patient's other medical conditions, the patient transitioned to comfort care.

Patients who cannot get IV access may be a candidate for IO vascular access [1,2]. The IO route is a noncollapsible access site that can be obtained quickly and is often used in the prehospital setting. A majority of medications can be administered through the IO route at the same dose as for the IV route. If conscious patients experience pain, the manufacturer recommends instilling lidocaine 40 mg into the IO [3]. Lidocaine 10 mg was used due to the patient’s cardiac history and concern that systemic lidocaine could cause additional adverse events. Unfortunately, the patient did experience significant pain through the IO, even after administration of lidocaine and fentanyl.

Rivaroxaban is a reversible inhibitor of factor Xa [4]. Some potential proposed advantages to the NOACs are lack of routine monitoring and dose adjustments; however, there are no antidotes available [5]. The PCC products are hypothesized to aid in the reversal of NOACs, although PCC products differ in the factors that they possess. Because of the volume of the blood transfusions, patient tolerance, and the critical nature of the clinical picture in conjunction with the POC Hgb, it was decided to use Prothrombin to help reverse the rivaroxaban. This PCC was selected because it could help reverse the rivaroxaban by supplying additional factor X. The same dose that would be used IV was given to the patient IO without adverse effects. There are currently no published cases of any PCC product being administered IO. Fresh frozen plasma has been used to try to aid in reversal of rivaroxaban, and blood products may be administered IO per the EZ-IO manufacturer. The advanced trauma life support guidelines recommend blood transfusions through the IO; however, there are concerns for hemolysis of blood transfusions due to shearing forces [6,7]. Burget et al [8] report administration of blood through a tibial IO in a 79-year-old woman with hemorrhage. There was no comment on the patient’s blood counts to evaluate patient response. No other case reports of blood transfusions through the IO were available at the time of this case.

Please cite this article as: Means L, Gimbar RP, Prothrombin complex concentrate administration through intraosseous access for reversal of rivaroxaban, Am J Emerg Med (2015), http://dx.doi.org/10.1016/j.ajem.2015.07.057
Prothrombin nine was used to treat a bleeding patient with IO access. It appears that Prothrombin nine is well tolerated IO; however, further studies are needed to evaluate if this is an effective practice.

Laura Means PharmD

Renee Petzel Gimbar PharmD

Department of Pharmacy Practice, University of Illinois at Chicago College of Pharmacy, Chicago, IL.

Hospital Pharmacy Services, University of Illinois Hospital and Health Sciences System, Chicago, IL.

*Correspondence to: L. Means, UK Health, 800 Rose Street Room H-110, Lexington, KY 40536. Tel.: +1 248 974 9707

**Correspondence to: R.P. Gimbar, University of Illinois at Chicago College of Pharmacy, 833 South Wood Street, 164 PHARM Chicago, IL 60612. Tel.: +1 312 413 9828

Email addresses: lmeans88@gmail.com, rpetze1@uic.edu
rpetzelm@gmail.com

References

http://dx.doi.org/10.1016/j.ajem.2015.07.057