SHORT REPORT

Revisiting the past: Intra-arterial vasopressin for severe gastrointestinal bleeding in Crohn's disease

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Abstract

Technological advances in the last couple of decades have led to a tremendous improvement in the safety and efficacy of embolization making it the therapeutic intervention of choice in angiogram positive lower gastrointestinal bleeding. Vasopressin has thus been forgotten and it is hardly ever used by the current generation of interventionists. However, coil embolization is technically challenging and requires greater expertise. Difficulty in super-selective catheterization and lack of adequate collateralization can also prevent successful delivery of coils. In this article we present the successful use of intra-arterial vasopressin in a patient with Crohn's disease with severe lower gastrointestinal bleeding. Despite not being the first choice, vasopressin can be safely and effectively used in selected patients who are not candidates for embolotherapy. The purpose of this article is to discuss the relative merits and demerits of vasopressin vis-à-vis embolization and to identify the role of vasopressin in the current era of super-selective embolization. Successful control of massive lower gastrointestinal bleeding by intra-arterial vasopressin infusion has previously been reported only once before in Crohn's disease. We suggest that this technique may be used in an attempt to avoid surgery in these patients.

1. Introduction

The incidence of lower gastrointestinal (LGI) bleeding is approximately 20–30/1,000 adults and this increases with increasing age.1 In a vast majority of cases the bleeding resolves with conservative management. Endoscopic, vascular and surgical interventions are reserved for the small
minority with significant bleeding not responding to conservative measures. The advent and evolution of coil embolization has replaced and relegated the use of intra-arterial vasopressin to medical history. Herein, we describe the successful use of intra-arterial vasopressin in a patient with refractory LGI bleeding secondary to active Crohn’s disease whose anatomy was not favorable for embolization.

2. Case summary

A 60 yr old male was admitted to the hospital with altered mental status. Past medical history was significant for long standing Crohn’s disease and multiple abdominal surgeries for fistulae and recurrent intestinal obstruction. He was on Mesalamine maintenance therapy. His recent flare was 2 weeks prior to admission, colonoscopy revealed active ileitis. He also had poorly controlled hypertension, diabetes mellitus and stable coronary artery disease. On evaluation he was found to have malignant hypertension and subarachnoid hemorrhage with intraventricular extension. He was intubated, started on intravenous nicardepin and urgent neurosurgery consult was sought. He subsequently underwent ventriculostomy for worsening hydrocephalus. At the time of admission the patient was on high dose oral steroid, ciprofloxacin and metronidazole for a recent flare of his Crohn’s disease and these were continued intravenously. The patient developed a massive gastrointestinal hemorrhage (manifested by melena) with hemodynamic instability a week after hospitalization. He was resuscitated with crystalloid and multiple units of packed RBC. Urgent gastroenterology and surgery consults were called after initial stabilization and the patient underwent evaluation to localize the source of bleeding. CT scan of abdomen, upper and lower gastrointestinal endoscopies were unrewarding and did not reveal any obvious source of bleeding. Nuclear scan revealed a potential source of bleeding in the area of the small bowel. Patient’s hemoglobin continued to drop despite frequent RBC transfusions and his hemodynamics remained tenuous. He was deemed to be a poor surgical candidate in view of active Crohn’s disease and extensive adhesions from his multiple prior abdominal surgeries. An interventional radiology consult was therefore sought for potential embolization of the culprit vessel. Mesenteric angiogram revealed brisk bleeding from one of the branches of superior mesenteric artery in the region of ileum (Fig. 1). The anatomy was deemed unfavorable for embolization due to lack of adequate collaterals, hence putting a large segment of bowel at risk for infarction. We therefore decided to use local vasopressin infusion to control his bleeding. Selective catheterization of the SMA was done with a Sos Omni 2 microcatheter and intra-arterial vasopressin infusion was started at 0.2 U/min. A repeat angiogram showed persistent bleeding despite uptitrating the dose to 0.4 U/min (Fig. 2). We then proceeded to super-selective catheterization of the culprit vessel and restarted vasopressin infusion. It was started at 0.2 U/min and was titrated in 0.1 U increments every 20 min if there was evidence of continued bleeding on angiogram. Hemostasis was finally secured after 20 min of infusion at 0.4 U/min (Fig. 3). Thereafter, the catheters and sheaths were secured and vasopressin infusion was continued at 0.1 U/min for 12 h. Vasopressin was then discontinued after a repeat angiogram confirmed the absence of any further bleeding (Fig. 4). Total procedure time was 90 min, initial procedure lasted 70 min and the later check angiogram took 20 min. Patient was closely monitored in the intensive care unit for any clinical or laboratory evidence of coronary, mesenteric or limb ischemia. Patient tolerated the procedure well without any peri
or post-procedural local, systemic or mesenteric complications. Patient's hemoglobin and hemodynamics stabilized and he tolerated enteral feeding without any further bleeding. After discharge from the hospital he had two follow up visits at 1 month and 6 months, without any recurrence of bleeding.

3. Discussion

Acute gastrointestinal bleeding is rare in Crohn's disease. Twenty-one of the fifteen hundred twenty-six patients with Crohn's disease (CD) treated at the Mount Sinai Hospital between 1960 and 1986 developed severe gastrointestinal hemorrhage. There were 26 separate episodes of severe hemorrhage: 17 patients bled only once, three bled twice and one bled three times. The frequency of bleeding was significantly higher among patients with colonic involvement (17 of 929; 1.9%) than among those with small bowel disease alone (4 of 597; 0.7%). Nonsurgical management includes Infliximab, recombinant factor VIIa, endoscopy and therapeutic angiography.

The presence of an endoscopically treatable lesion is highly uncommon. Although super-selective embolization is the primary option of angiographic therapy, vasopressin is preferable for diffuse lesions and cases in which super-selective catheterization is not technically possible, as our patient. Successful control of massive lower gastrointestinal bleeding by intra-arterial vasopressin infusion has previously been reported only once before in Crohn's disease.

The diagnostic utility of angiography in identifying the site of bleeding was first demonstrated by Nusbaum and Baum in 1963 and is currently well established. In 1968, Nusbaum et al. were the first to describe the use of intra-arterial vasopressin infusion for controlling gastrointestinal (GI) bleeding in a patient with esophageal varices. Catheter directed embolization for treatment of LGI bleeding was first introduced by Bookstein et al. in 1974. The unacceptably high incidence of bowel infarction with coil embolization prevented it from gaining much ground from the mid 1970s through early 1990s. At present super-selective embolization has become established as the primary therapeutic modality in the treatment of angiogram positive LGI bleeding and use of vasopressin has practically been forgotten.

Typically, vasopressin therapy involves an initial 20-minute infusion at a rate of 0.2 U/min followed by repeated arteriography to determine whether bleeding has stopped. Higher infusion rates (0.3–0.4 U/min) can be used but each increment requires a waiting period and repeat angiogram for reassessment. Though the overall intra-procedural time is similar for both procedures, vasopressin infusion needs to be continued for a total 12–24 h and thus entails longer post-procedural time commitment. The complexity of maintaining an indwelling arterial catheter for a prolonged period has led vasopressin to lose favor with many interventionists.

Another major disadvantage of intra-arterial vasopressin is its potential for systemic side effects. Hypertension, reflex bradycardia, coronary vasoconstriction, cardiac arrhythmias, and bowel ischemia have all been described even with very selective infusion. The reported frequency of cardiovascular complications is 0–21% with the average rates being 5–8%. Nitroglycerin is known to
reverse vasopressin-induced coronary vasoconstriction without affecting the therapeutic vasoconstriction of the mesenteric vessels and could potentially be used to decrease the systemic side effects of vasopressin.\textsuperscript{17} Catheter dislodgement and complications of infusion into the nontarget vessel like flank pain, hematuria (renal artery) and dissection of the target vessel due to the prolonged presence of the catheter tip are known but infrequent.\textsuperscript{15}

There are also rare reports of spontaneous bacterial peritonitis attributed to enhanced transmural bacterial migration due to bowel wall ischemia.\textsuperscript{12} Access site complications for either method include hematoma, thrombosis, limb ischemia, pseudo-aneurysm and catheter related sepsis. Despite the prolonged catheter dwell times, studies have not shown any overall increase in access site complications with vasopressin.\textsuperscript{15} The only major complication of embolotherapy is intestinal infarction.\textsuperscript{11} However, the availability of newer microcatheters, embolic agents and microcoils have significantly reduced this complication and most modern series report no major intestinal ischemia. Minor ischemic complications like mild abdominal pain, asymptomatic serum lactate elevation or endoscopically identified but asymptomatic ischemic discoloration are self limited and often do not require any therapy.

Embolotherapy eliminates the prolonged catheterization times of vasopressin infusion, is free from systemic effects and produces an immediate cessation of hemorrhage and thus has many distinct advantages over vasopressin infusion in the treatment of LGI bleeding.\textsuperscript{13} Despite the overall efficacy and safety of coil embolization, it is technically more challenging and needs a higher level of operator expertise. Failure to achieve superselective catheter position due to vasospasm, vessel tortuosity or stenosis, is the most common reason for failure to deliver embolotherapy.\textsuperscript{18} Embolotherapy is also not possible when the underlying pathology is more diffuse or there is lack of adequate collateralization as in our patient. Vasopressin infusion with its comparable efficacy and ease of application can thus be utilized in cases where embolization cannot be done or has failed. Successful use of vasopressin in such scenarios has been previously reported.\textsuperscript{19}

In summary intra-arterial vasopressin remains a useful alternative when embolization cannot be done due to technical or anatomical reasons in Crohn’s disease patients with refractory LGI bleeding.

References


