Endoscopic Hemoclip Application in a High-Risk Pediatric Patient with GI Bleeding Following Endoscopic Biopsy

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We present an infant who previously underwent hematopoietic stem cell transplant that required esophagogastroduodenoscopy with routine biopsy to evaluate for graft versus host disease. He developed significant bleeding as a complication and placement of endoscopic hemoclips was necessitated. Hemostasis was achieved and, despite prolonged retention of the hemoclips, no further complications occurred. Endoscopists should be aware of hemoclips as a therapeutic option for mechanical hemostasis in young children with significant gastrointestinal bleeding, including those with thrombocytopenia, platelet dysfunction or coagulation disorders, which may result in increased bleeding risk. Hemoclips may be retained for a prolonged period of time (up to 18 months) in pediatric patients, requiring special precautions regarding magnetic resonance (MR) imaging.

INTRODUCTION

Gastroenterologists should be cognizant of increased bleeding risks associated with routine endoscopy and biopsy in patients who have undergone bone marrow transplantation, hematopoietic stem cell transplantation (HSCT) or have platelet dysfunction for other reasons. Despite platelet numbers that fall within the normal range, these patients are still at risk for bleeding due to poor function of the circulating platelets. During cases in this population, in which excessive bleeding from routine biopsy may occur, hemoclips are a therapeutic option. Frequently used for hemostasis and shown to have a high rate of success in adults, hemoclips may prove to be effective in the endoscopic management of bleeding complications that may arise in pediatric patients.

Case

A 13-month-old male with a medical history significant for cardiac disease and hemophagocytic lymphohistiocytosis status post hematopoietic stem cell transplant (HSCT) at 11 months presented with recurrent vomiting, diarrhea, poor appetite and rash. Medications at the time of his presentation included fluconazole, acyclovir, cyclosporine, enalapril, ondansetron, amlodipine, hydrochlorothiazide, metoclopramide and intravenous immunoglobulin (IVIG). On presentation, his weight was 11.1 kg. An esophagogastroduodenoscopy (EGD) and colonoscopy were performed [with the GIF-160 endoscope (9.8-mm outer diameter with 2.8-mm channel) (Olympus America, Inc., Melville, NY)] to assess for graft versus host disease (GVHD). The EGD revealed friable gastric mucosa but otherwise was visually unremarkable; colonoscopy was also visually normal. Using standard biopsy forceps, multiple sets of biopsy specimens were taken throughout the gastrointestinal tract. There were no signs of hemodynamic instability.
Figure 1. Upper endoscopy performed for evaluation of GI bleeding 2 days after initial endoscopy. A. Large hematoma in the greater curvature of the stomach with active bleeding noted at prior biopsy site B. Duodenal hematoma at prior biopsy site C. Greater curvature hematoma with endoclip applied

during the procedure. Prior to these procedures, the patient’s platelet count was 54 K/μL (reference range: 150-400 K/μL).

Duodenal and gastric biopsy specimens showed low-grade acute GVHD while the remainder of the biopsy specimens were unremarkable. As dictated by routine oncologic care, blood work was obtained 6 hours post procedure. The patient’s hemoglobin was 8.9 g/dL compared to 12.1 g/dL prior to the procedure. Ten hours after the procedure, his hemoglobin was 8.6 g/dL and he had one episode of melena and coffee-ground emesis. He was transfused with packed red blood cells (PRBC) and then underwent a repeat EGD for persistent bleeding. Five hematomas were identified at the previous biopsy sites, three in the stomach and two in the duodenum (figure A&B), actively oozing blood. The bleeding sites were each injected with a total of 10 cc of epinephrine diluted to 1:10,000.

The two hematomas on the greater gastric curvature were hemoclipped utilizing Resolution® clips, size 11mm (Boston Scientific Inc., Natick, MA) to achieve hemostasis (figure C). The duodenal lesions were not amenable to clipping due to limitations in extension of the clips as a function of comparative small patient and available equipment size. After the procedure, the patient was stable without further bleeding and was discharged home.

Four months after clip placement, the patient had several episodes of hematemesis. A KUB done three days earlier showed both clips present but raised the possibility of clip migration. Endoscopic examination revealed both hemoclips in place with minimal active bleeding noted around one of the clips. Adequate hemostasis at the bleeding site was obtained with dilute epinephrine injections totaling 2 cc. Despite occasional benign episodes of blood-streaked emesis and hemoccult positive stools during 4 months of additional follow-up, the patient remained hemodynamically stable requiring no further endoscopic therapy. Radiographic studies performed as part of continued oncology care demonstrated the presence of hemoclips 18 months after their initial placement. An abdominal x-ray done 21 months after placement demonstrated that the clips had passed.

Discussion

Pediatric patients with thrombocytopenia (platelets <50,000/mm³) or other coagulation abnormalities are known to be at risk for developing duodenal hematomas following endoscopic biopsies (1, 2). These are more likely to be symptomatic in small pediatric patients compared to adolescents and adults due to their small duodenal luminal diameter. Additionally, patients who have undergone HSCT or bone marrow transplant (BMT) can have tremendous fluctuations in blood cell and platelet counts, which may predispose them to endoscopic complications. A number of factors may be responsible including underlying disease, HSCT status, GVHD and necessary transplant medications. In patients with disorders affecting platelet function, there is an increased risk of bleeding despite normal platelet counts. A study of 27 adult HSCT patients by Pihusch et al demonstrated that their platelets had a

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reduced number of dense bodies (required for primary hemostasis) and a deficiency of platelet receptors, though the platelet counts were adequate (3).

There are few reports describing the incidence of post-endoscopic bleeding as a result of routine biopsy, but one analysis reported this complication in 5 out of 1000 colonoscopies (4). In patients taking aspirin (5) or with other conditions affecting platelet function, this risk is significantly higher. In a retrospective analysis of hemoclip use in adult patients experiencing post procedure bleeding, all patients who had significant post biopsy bleeding underwent hemoclipping with subsequent permanent hemostasis (6). Primary hemostasis is achieved in 84-100% of cases in adults utilizing hemoclips and rebleeding rates are low (7); thus, the rebleeding demonstrated by our patient after hemoclip placement is an uncommon event, presumably secondary to his underlying medical condition and potential platelet dysfunction. Ultimately, he did achieve hemostasis with hemoclips in place.

In addition to minimizing the number of endoscopic biopsies in at-risk patients who require endoscopy for diagnosis and initiation of therapy, pediatric endoscopists should anticipate a higher rate of complications in these patients and be prepared to endoscopically intervene if complications occur. Using a mechanical method for endoscopic hemostasis may be preferable to injection therapy alone in patients with presumed adequate platelet counts but inadequately functioning platelets, as described above. Prospective series of ulcer bleeding have shown decreased rebleeding rates and requirement for surgery in those patients who undergo combination therapy with injection and clipping compared to injection alone (7), though in some analyses clipping alone may be equally efficacious to combination therapy (8). In addition, establishment of hemostasis is immediately apparent after successful clip application. Although our patient did not have an ulcer, based on the presumed rate of bleeding and need for transfusion, endoscopic therapy was required to resolve the bleeding episode.

After application, hemoclips dislodge spontaneously with time and pass in the stool. The Resolution clip has been shown to have longer retention compared to other commercially available endoscopic clips with no major complications reported from retained or detached endoscopic clips (9,10). Our patient did not have complications related to retention of hemoclips and these were in place for at least 18 months. No reports have described complications related to clip retention; however, it is advised that patients known to have clips in place avoid magnetic resonance imaging (MRI) as recommended by the manufacturers. This may be more challenging in young oncologic or transplant patients, as serial imaging is often required as part of their routine care and MRI may reduce the risk of cumulative radiation exposure in these at risk patients. There are no pediatric case series documenting the duration of hemoclip retention.

Endoscopists caring for those patients with conditions similar to our patient’s should be aware of the increased risk of bleeding complications following routine endoscopic biopsy and consider the use of mechanical methods for hemostasis. Clip application in the second portion of the duodenum may be difficult in young infants due to limitations in commercially available clips and injection therapy may be required in addition to clipping based on patient size and equipment availability. Recently manufactured clips, Resolution® II (Boston Scientific Inc., Natick, MA)(11), which have just become commercially available may be more amenable to application in smaller pediatric patients due to a slightly shorter clip length and lack of a sheath, although no pediatric data has been reported to date.

References