A noninvasive imaging technique to evaluate therapeutic efficacy after injection of n-butyl-2-cyanoacrylate tissue adhesive into gastric varices: A case report

Bret J Spier MD1, Andrew J Taylor MD2, Patrick R Pfau MD1, Adnan Said MD MSPH1, Deepak V Gopal MD FRCP FACP FASGE1

A novel use of multidetector computed tomographic intravenous (MDCT IV) portography in the evaluation of gastric varices treated with tissue adhesive is described. A 55-year-old man presented with upper gastrointestinal hemorrhage as a result of bleeding gastric varices. The patient was stabilized and the gastric varices were treated with n-butyl-2-cyanoacrylate (two injections, total 7.5 mL). MDCT IV portography performed after injection revealed thrombosis of all but one of the submucosally based gastric varices. The endoscopist who performed repeat endoscopy three weeks later was then able to direct therapy at the remaining patent submucosally based gastric varix. This represents the first reported use of MDCT IV portography in the evaluation of treatment adequacy in a patient with gastric varices treated with n-butyl-2-cyanoacrylate.

Key Words: CT portography; Gastric varices; Surveillance; Tissue adhesive

Tissue adhesives have been used for many years, and recent reports suggest benefit of their use in patients with portal hypertension and bleeding gastric varices (1-5). However, there is little evidence to suggest how patients should be evaluated for adequacy of therapy after treatment. Recently, we have successfully used multidetector computed tomographic intravenous (MDCT IV) portography to assess treatment adequacy. A case of gastric variceal injection using n-butyl-2-cyanoacrylate, with the successful use of MDCT IV portography to noninvasively evaluate the efficacy of endoscopic glue therapy, is reported.

CASE PRESENTATION

A 55-year-old man with previous alcohol abuse and no other significant medical history, experienced an episode of hematemesis. Initial upper endoscopy revealed only small esophageal varices and a large collection of gastric varices in the fundus, one being ulcerated and likely the bleeding source (Figure 1).

Before endoscopic treatment, the patient underwent MDCT IV portography to rule out a portal venous clot as well as to delineate the blood supply of the gastric varices (Figure 2). The patient then underwent repeat upper endoscopy with injection of n-butyl-2-cyanoacrylate (two injections, total 7.5 mL) via a 25-gauge Carr-Locke (US Endoscopy, USA) sclerotherapy needle. A flexible sigmoidoscope (ES 3830; Pentax, USA) was used for the repeat esophagogastroduodenoscopy examination, to allow for a larger working channel and greater flexibility with retroflexion of the channel and greater flexibility with retroflexion of the

Injection Technique

The n-butyl-2-cyanoacrylate (Henkel Loctite Corp, Ireland) was kept refrigerated, and was subsequently maintained on ice until the gastric varix was visualized. Eight 0.5 mL vials were drawn into a 10 mL syringe and injected via a 25-gauge Carr-Locke sclerotherapy needle. A flexible sigmoidoscope (ES 3830; Pentax, USA) was used for the repeat esophagogastroduodenoscopy examination, to allow for a larger working channel and greater flexibility with retroflexion of the catheter.

A 55-year-old man with previous alcohol abuse and no other

significant medical history, experienced an episode of hematemesis. Initial upper endoscopy revealed only small esophageal varices and a large collection of gastric varices in the fundus, one being ulcerated and likely the bleeding source (Figure 1).

Before endoscopic treatment, the patient underwent MDCT IV portography to rule out a portal venous clot as well as to delineate the blood supply of the gastric varices (Figure 2). The patient then underwent repeat upper endoscopy with injection of n-butyl-2-cyanoacrylate (two injections, total 7.5 mL) via a 25-gauge Carr-Locke (US Endoscopy, USA) sclerotherapy needle. A flexible sigmoidoscope (ES 3830; Pentax, USA) was used for the repeat esophagogastroduodenoscopy examination, to allow for a larger working channel and greater flexibility with retroflexion of the catheter.

Injection Technique

The n-butyl-2-cyanoacrylate (Henkel Loctite Corp, Ireland) was kept refrigerated, and was subsequently maintained on ice until the gastric varix was visualized. Eight 0.5 mL vials were drawn into a 10 mL syringe and injected via a 25-gauge Carr-Locke sclerotherapy needle. A flexible sigmoidoscope (ES 3830; Pentax, USA) was used for the repeat esophagogastroduodenoscopy examination, to allow for a larger working channel and greater flexibility with retroflexion of the catheter.

A 55-year-old man with previous alcohol abuse and no other significant medical history, experienced an episode of hematemesis. Initial upper endoscopy revealed only small esophageal varices and a large collection of gastric varices in the fundus, one being ulcerated and likely the bleeding source (Figure 1).

Before endoscopic treatment, the patient underwent MDCT IV portography to rule out a portal venous clot as well as to delineate the blood supply of the gastric varices (Figure 2). The patient then underwent repeat upper endoscopy with injection of n-butyl-2-cyanoacrylate (two injections, total 7.5 mL) via a 25-gauge Carr-Locke (US Endoscopy, USA) sclerotherapy needle. A flexible sigmoidoscope (ES 3830; Pentax, USA) was used for the repeat esophagogastroduodenoscopy examination, to allow for a larger working channel and greater flexibility with retroflexion of the catheter.

Injection Technique

The n-butyl-2-cyanoacrylate (Henkel Loctite Corp, Ireland) was kept refrigerated, and was subsequently maintained on ice until the gastric varix was visualized. Eight 0.5 mL vials were drawn into a 10 mL syringe and injected via a 25-gauge Carr-Locke sclerotherapy needle. A flexible sigmoidoscope (ES 3830; Pentax, USA) was used for the repeat esophagogastroduodenoscopy examination, to allow for a larger working channel and greater flexibility with retroflexion of the catheter.
Evaluating therapy for gastric varices

Can J Gastroenterol Vol 23 No 6 June 2009 413

The channel preparation technique using olive oil, was performed similar to that described by Caldwell et al (2). Under direct visualization, n-butyl-2-cyanoacrylate was then injected into the ulcerated gastric varix as previously described (2). Although the United States Food and Drug Administration approved its use as a tissue adhesive, the use of n-butyl-2-cyanoacrylate for the treatment of gastric varices is a well-described off-label use and, accordingly, appropriate informed patient consent was obtained for its use before the procedure.

MDCT IV Portography
MDCT IV portography was performed on a 64-channel scanner. Slice thicknesses of 5 mm taken every 3 mm were obtained. From this, 1.25 mm slices were reconstructed. These thin sections were used to reconstruct the portal venous system and left upper quadrant varices with maximum-intensity projection display. Intravenous injection of 150 mL of a 300 mg/mL low-osmolar iodinated contrast agent was performed, followed by a 50 mL saline flush, which was injected at 5 mL/s with a 70 s delay. Reconstructions were performed on a three-dimensional workstation under the guidance of a radiologist (AJT) familiar with the case.

DISCUSSION
The treatment of gastric varices can be a challenge. Reducing portal pressure via a surgical or transvenous intrahepatic portosystemic shunt are options for the proper candidate. Injection of n-butyl-2-cyanoacrylate or other tissue adhesives for those who are not candidates for portosystemic shunting is proving to be a valuable alternative. However, there is no effective measure of treatment adequacy. The postprocedural demonstration of treatment should be safe, noninvasive, inexpensive, accurate and reproducible among institutions.
The use of tissue adhesives creates a dilemma for determining adequate therapy. At repeat endoscopy, gastric varices treated with tissue adhesives appear as they were before treatment, but firm to probing. Endoscopic ultrasound has been shown effective in the diagnosis of varices before therapy (6,7); however, after tissue adhesive injection, endoscopic ultrasound findings are of unclear significance (3).

We have successfully used MDCT IV portography as a non-invasive measure of treatment adequacy. Our post-treatment imaging revealed successful thrombosis of all submucosal gastric varices except for one collection, which was subsequently treated on follow-up endoscopy.

CONCLUSION
The present case demonstrates a novel use of MDCT IV portography for the evaluation of gastric varices that have been treated with tissue adhesive. This method will need further validation with larger studies, but appears to be a safe, non-invasive and reproducible approach to determine therapeutic efficacy.

REFERENCES