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BRIEF COMMUNICATION

Cyanoacrylate in the treatment of gastric varices complicated by multiple pulmonary emboli

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Abstract

Bleeding gastric varices are increasingly being obliterated with the aid of endoscopic injection of *n*-butyl-cyanoacrylate (histoacryl) diluted with lipiodol. This glue acts as a tissue adhesive that polymerizes on contact with blood in a gastric varix. Severe glue pulmonary embolism is a rare complication of injection therapy. This case involves a 52-year-old man with fundal gastric varices, who developed multiple pulmonary emboli following glue injection with profound hypoxia requiring hospital admission for 13 days, but with eventual recovery of normal lung function.

Up to 30% of cirrhotic patients with portal hypertension will bleed from the upper gastrointestinal varices at 2 years; gastric varices account for one-quarter of these bleeds.[1,2] Due to the size and location of gastric varices, standard endoscopic techniques are often not effective. Both surgical shunting and transjugular intrahepatic portosystemic shunt (TIPS) can lead to significant complications and death.[3–6] Studies indicate that endoscopic injection of gastric varices with cyanoacrylate (histoacryl) is both effective and safe.[7–9] The reported primary hemostasis rate is 94–97% with low rebleeding and death.[9–11]

Cyanoacrylate injected into a varix immediately polymerizes on contact with blood. This carries the risk of gluing the injector needle to the varix and attempted removal of such a needle can cause fatal bleeding.[12] To prevent this complication and for the purposes of fluoroscopic monitoring, 1 mL of cyanoacrylate is usually diluted with 1–3 mL of lipiodol. The mixture results in delayed polymerization; however, this also increases the risk of distal embolization.[12] In this article, we describe such a case in which multiple pulmonary emboli occurred as a result of injection of gastric varices with cyanoacrylate and lipiodol mixture.

In 2001, a 52-year-old man was diagnosed with primary sclerosing cholangitis. In 2004, he was commenced on beta-blockers for the treatment of portal hypertension and associated gastric and oesophageal varices but soon developed severe leucocytoclastic vasculitis requiring permanent discontinuation of beta-blockers. A number of hospital admissions followed for gastrointestinal bleeding from multiple oesophageal varices, which were eradicated with repeated endoscopic band ligation therapy. However, in January 2005, he presented with endoscopically proven bleeding from large gastric varices, which ceased spontaneously. He was listed for liver transplantation. In February 2005, the decision was made to treat the gastric varices endoscopically with cyanoacrylate to decrease the risk of future bleeding episodes. One millilitre of cyanoacrylate was diluted with 3 mL of lipiodol (4 mL in total) and injected into a large gastric varix. There was significant bleeding from the varix on removal of the injection needle. To achieve hemostasis, a further 2 mL of mixture (0.5 mL of cyanoacrylate and 1.5 mL of lipiodol) was injected into the varix with immediate cessation of bleeding.

Following the completion of endoscopic injection therapy, the patient became severely hypoxic. Oxygen saturation was recorded at 71% in room air and only increased to

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100% with the commencement of 10 L of oxygen. A chest radiograph, carried out immediately after the procedure, showed extensive branching opacities throughout both lungs (Fig. 1). A nuclear lung scan the next day showed extensive and bilateral unmatched perfusion defects (Fig. 2). An echocardiogram carried out 3 days later showed moderate right ventricular free wall hypokinesis and right atrial enlargement. The estimated pulmonary artery pressure was double that measured 12 months previously (current pulmonary artery pressure was greater than 51 mmHg, normal range less than 40 mmHg). Spirometry carried out after 1 week showed a reduced transfer coefficient (KCO) of 3.0 mL/min/mmHg/L (normal range 3.4–6.7).

In consultation with the respiratory unit, the patient was given a trial of oral prednisolone. He did not develop fever, chest pain or cough. Hypoxia persisted for 13 days and was most pronounced after limited exertion. He made steady progress and was finally discharged when he no longer required supplemental oxygen therapy.

Eleven weeks after endoscopic injection therapy, the cardiorespiratory investigations were repeated. Despite the obvious respiratory improvement clinically, his chest X-rays continued to show extensive glue emboli in the pulmonary vascular system (Fig. 3). However, a repeat nuclear lung scan showed dramatic improvements despite some residual emboli (Fig. 4). An echocardiogram showed a return to normal pulmonary artery pressure of 32 mmHg. Sprirometry also showed a normal diffusion capacity (gas transfer of 4.5 mL/min/mmHg/L).

Variceal bleeding is a life-threatening complication of portal hypertension. The risk of bleeding from gastric varices is less than that from oesophageal varices. The incidence of bleeding is 10–36% but the bleeding is usually massive and more difficult to control.[13] Gastric variceal bleeding has a higher recurrence rate than oesophageal variceal bleeding and a reported 1 year death rate of 52% for fundal varices.[2] Because of their deep submucosal location, large size and wide distribution, gastric varices

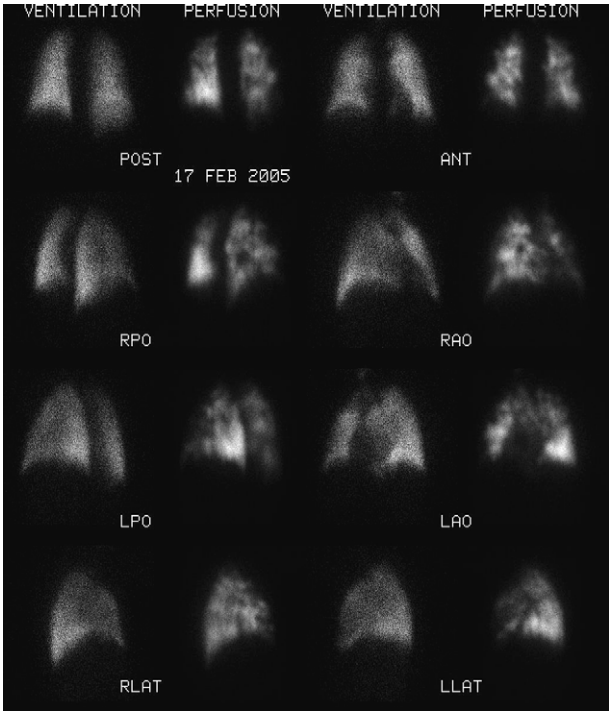

Figure 2 Ventilation perfusion lung scan (VQ), 1 day after variceal injection, showing extensive and bilateral unmatched perfusion defects. ANT, anterior; LAO, left anterior oblique; LLAT, left lateral; LPO, left posterior oblique; POST, posterior; RAO, right anterior oblique; RLAT, right lateral; RPO, right posterior oblique.

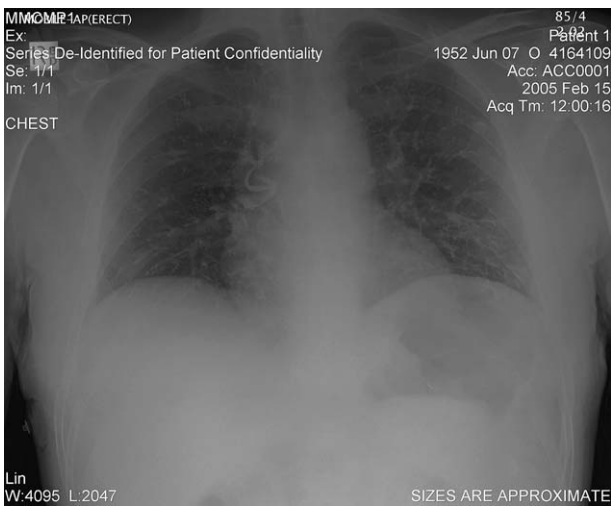

Figure 1 Chest radiograph, immediately following variceal injection, showing extensive branching opacities of lipiodol and cyanacrylate mixture throughout both lungs.

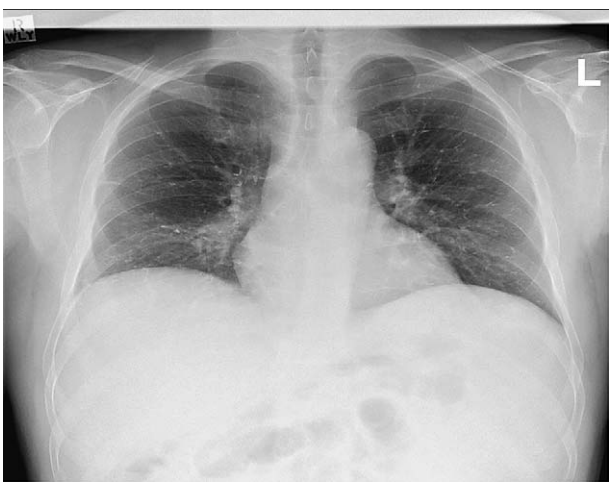

Figure 3 Chest radiograph, 11 weeks after variceal injection, showing no resolution in opacities throughout both lungs.

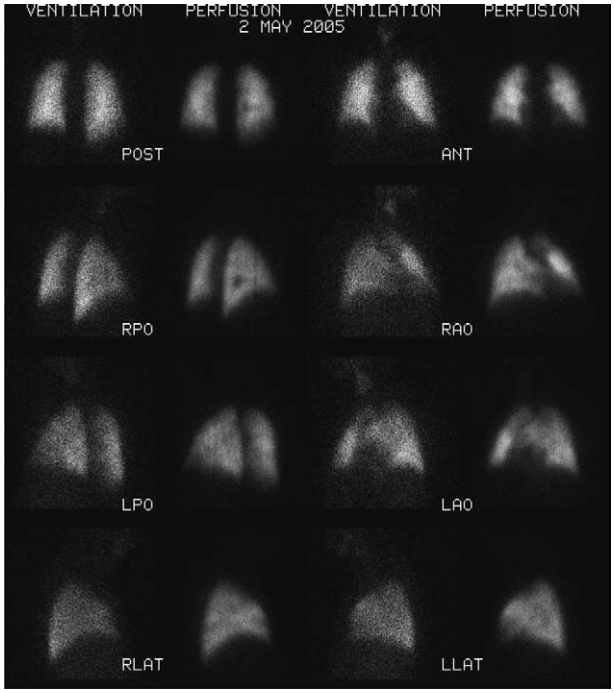

Figure 4 Ventilation perfusion lung scan (VQ), 11 weeks after variceal injection, showing dramatic improvements in size and extent of emboli. ANT, anterior; LAO, left anterior oblique; LLAT, left lateral; LPO, left posterior oblique; POST, posterior; RAO, right anterior oblique; RLAT, right lateral; RPO, right posterior oblique.

cannot be eradicated successfully with endoscopic band ligation or sclerotherapy. TIPS has also been shown to be less effective in the treatment of gastric varices than oesophageal varices.[14] The unpredictable nature of gastric variceal bleeding further complicates management. Not all gastric varices are the same and there does not appear to be a direct relationship between portal pressure and the risk of bleeding.[15]

The blood supply to most fundal gastric varices is from the short gastric and epiploic veins, which drain to the left renal vein via a large gastrorenal shunt.[16] Systemic embolization from the portal circulation to any organ can occur with the lungs being the most common site.[17] Although complications from cyanoacrylate treatment are uncommon, the most frequently reported cases relate to embolization of the glue. Respiratory failure as a result of glue embolization has been described.[18]

In a retrospective study by Hwang *et al.*, the volume of injected mixture was shown to be a predictor of embolization.[19] Six out of 140 patients (4.3%) with pulmonary emboli were given a mean volume of more than 4.2 mL as opposed to 1.8 mL for those without pulmonary emboli. Four of these six patients had respiratory symptoms, although there were no direct deaths as a result of pulmonary embolization. The speed of injection as well as the size of gastric varices have been reported as risk factors for distal embolization.[18,20]

Our patient illustrates the risk of pulmonary glue embolization following treatment of large gastric varices with high volumes of cyanoacrylate and lipiodol. We believe that it would be prudent to use a one to one mixture of cyanoacrylate and lipiodol and to limit the total volume injected to less than 4 mL during each session. Further bleeding can occur in patients with large gastric varices if an inadequate amount of glue is injected. Rather than managing this problem by injecting large volumes of glue, thus risking embolization, clinicians might consider alternative therapies such as the use of balloon tamponade followed by serial, small-volume injections once tamponade is successful in controlling the acute haemorrhage. Even with the use of multiple modalities, control of haemorrhage in a patient with briskly bleeding gastric fundal varices remains a major clinical challenge.

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