Cerebral embolism following *N*-butyl-2-cyanoacrylate injection for esophageal postbanding ulcer bleed: a case report

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Abstract Systemic embolization is a rare but serious complication of variceal injection with cyanoacrylate. We report a case of cerebral embolism a few hours after an injection of Histoacryl into a bleeding esophageal postbanding ulcer. Echocardiogram revealed patent foramen ovale.

Keywords Histoacryl · Esophageal post-banding ulcer · Cerebral embolism

Introduction

There have been a few reported cases of embolic complications of variceal injection with *N*-butyl-2-cyanoacrylate (Histoacryl). Both pulmonary and systemic embolisms have been reported. Table 1 shows the case series on the incidence of various embolic complications following gastric varices injection with Histoacryl in six centers [1–6].

Cerebral embolism following variceal injection with cyanoacrylate is rare. In these six case series, which include 1,022 episodes of gastric varices injections, there was only one case of cerebral embolism [1]. In addition, there are three case reports on cerebral embolism associated with Histoacryl injection for gastric varices [7–9].

Table 2 summarizes the three case reports [7–9] on cerebral embolism following Histoacryl–lipiodol injection for gastric varices.

There is a paucity of data on the injection for esophageal varices with cyanoacrylate. We found two reported cases of cerebrovascular accidents after endoscopic injection for esophageal varices with bucrylate [10].

We report a case of a patient who developed blindness and limb weakness following Histoacryl–lipiodol injection for a bleeding esophageal postbanding ulcer.

Case report

A 40-year-old man with Child's C liver cirrhosis due to chronic hepatitis C was admitted to the surgical ward with Fournier's gangrene and underwent wound debridement under general anesthesia on November 6, 2007.

He had an index esophageal variceal bleed in the year 2000 and was subsequently placed on a banding program.

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Table 1 Case series on the incidence of various embolic complications following gastric varices injection with Histoacryl

Author	Publication year	Country	Number of gastric varices cases in the series	Indication for Histoacryl	Volume ratio of Histoacryl to lipiodol	Incidence of embolism
Cheng [1]	2007	China	635	Obliteration of gastric varices	1:1	One cerebral embolism, three splenic infarction, one pulmonary embolism
Noophun [2]	2005	Thailand	24	Bleeding gastric varices	5:8	One small bowel infarction, one pulmonary embolism
Sato [3]	2006	Japan	129 (45 emergency; 84 elective)	Obliteration of gastric varices	Histoacryl mixed with 5% lipiodol	Two splenic infarction, one pulmonary embolism
Dhiman [4]	2002	India	29 (18 bleeding gastric varices; 11 prophylactic)	Obliteration of gastric varices	1:1 in the first 10 cases and undiluted Histoacryl in the remaining	One case of embolism in pelvic area
Jang [5]	2006	Korea	85 (65 within 1 week of gastric varices bleeding)	Obliteration of gastric varices	Not available	Two pulmonary embolism, one splenic infarction
Hwang [6]	2001	Korea	120	Obliteration of gastric varices	1:1	Six with radiological evidence of pulmonary embolism (four symptomatic; two asymptomatic)
Total number of cases			1,022	Total number of embolic complications		20

Table 2 Case reports on cerebral embolism following Histoacryl–lipiodol injection for gastric varices

Author	Age/sex	Cause of portal hypotension	Source of GI bleeding	Histoacryl:lipiodol volume ratio	Complications	Imaging	Cause of right to left shunt
Appenrodt [7]	68/F	Liver cirrhosis	Esophageal and gastric varices	TIPS inserted, and during the procedure, gastric varices were injected with 1 ml of Histoacryl/lipiodol (ratio 1:4)	Near complete blindness; weakness left upper extremity	MRI brain—multiple infra and supratentorial infarction	Patent foramen ovale on echocardiogram
Roesch [8]	66/F	Mesenteric vein thrombosis due to Polycythemia Rubra Vera	Fundal varices	1 ml of Histoacryl:lipiodol (ratio 1:1) injected three times	Comatose after procedure	Multiple emboli in lungs, coronary arteries, cerebrum and spleen	Presumed arterio-venous malformation (since patent foramen ovale was ruled out)
Upadhyay [9]	65/M	Non-cirrhotic portal hypertension due to bilharziasis	Gastric varices	Histoacryl:lipiodol 1.5 ml/2.1 ml	Inferior myocardial infarction and cortical blindness	Multiple emboli in cerebral arteries and occipital infarct	Patent foramen ovale on echocardiogram

The last esophageal variceal banding was done in April 2007 and the subsequent upper gastrointestinal endoscopy in May 2007 revealed two columns of grade I esophageal varices. He was scheduled for a repeat upper gastrointestinal endoscopy on November 16, 2007.

On November 16, 2007, which was 10 days after the wound debridement, upper gastrointestinal endoscopy was performed as scheduled and it showed three columns of grade II esophageal varices with red-wale signs. Four band ligations were placed (Cook, Six Shooter Saeed Multi-Band Ligator MBL-6, Wilson-Cook Medical, Winston-

Salem, NC). No gastric varices were seen at any time during his endoscopy. He was planned to have a repeat upper gastrointestinal endoscopy after 2 weeks to reassess the esophageal varices. At that time, we did not routinely give any proton-pump inhibitor to patients following an endoscopic variceal banding.

A day before his scheduled repeat upper gastrointestinal endoscopy, he had hematemesis and became hypotensive. Emergency upper gastrointestinal endoscopy under conscious sedation showed three columns of grade II esophageal varices with a bleeding postbanding ulcer. A mixture

16–18]. In theory, using undiluted Histoacryl may prevent distal embolization because the polymer solidifies rapidly upon contact with blood. Undiluted Histoacryl was studied in 80 patients with bleeding gastric, esophageal, and duodenal varices [19]. Distal embolization to distant abdominal sites occurred in two patients. Therefore, using undiluted Histoacryl does not preclude the risk of embolization.

Among the case reports on systemic Histoacryl embolism, echocardiographic study showed either patent foramen ovale [7, 9] or no evidence of intracardiac shunt [8, 18]. Other authors did not report on echocardiographic findings and have presumed that the paradoxical embolization occurred via an arteriovenous pulmonary shunt [16, 17]. In the case series, no echocardiographic study was mentioned [1–6].

The most common form of intracardiac communication in earlier reported cases of paradoxical embolism unrelated to Histoacryl is patent foramen ovale [20]. Ventricular septal defect and patent ductus arteriosus are rarely found in cases of paradoxical embolism [20].

The detection rate of patent foramen ovale is 27.3% [21] on direct inspection during cardiac surgery and 9.2% [22] on transesophageal echocardiogram in general population. More studies are needed before routine screening for patent foramen ovale can be advocated in patients with portal hypertension.

In our patient, excessive retching during upper gastrointestinal endoscopy might have caused transient rise in right atrial pressure, causing right-to-left shunting. As a general precaution, adequate sedation is important to prevent patients from retching excessively during upper gastrointestinal endoscopy because this may prevent right-to-left shunting in an undiagnosed patent foramen ovale.

Finally, we did not screen this patient for hypercoagulopathy to rule out hypercoagulable state as a predisposing factor to the cerebral infarction.

To our knowledge, this is the first reported case of cerebral embolism following Histoacryl injection for a postbanding ulcer bleed. Care should be taken to minimize the risk and patients undergoing Histoacryl injection should be informed of the potential risk.

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