Pulmonary embolism due to injection of Histoacryl and Lipiodol during endoscopic sclerotherapy of fundic varices

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Abstract

Pulmonary N-butyl-2-cyanoacrylate embolism is one of the potential risks associated with endoscopic obliteration of fundic gastric varices. Due to its uncommon nature, especially in children, no consensus has been proposed on its optimal management.

Case report : **An 11-year-old boy with a longstanding history of lung- and liver fibrosis with portal hypertension causing haematemesis underwent endoscopic therapy for fundic varices. Shortly after injection of 0.5 ml of a N-butyl-2-cyanoacrylate (Histoacryl®) and lipid soluble ethiodized oil (Lipiodol®) mixture, he desaturated with secondary hypotension and bradycardia. Pulmonary embolism was confirmed on chest X-ray. The boy was successfully treated conservatively. Clinical symptoms subsided and he was discharged after three days. Pulmonary infiltrations persisted for two weeks.**

Conclusion : **Patients including children undergoing obliteration of gastric varices with Histoacryl and Lipiodol should be subjected to a close follow-up. Coexisting lung conditions may enhance the risk of pulmonary embolism and can also influence the outcome.** (Acta gastroenterol. belg., **2008**, 71, **387-389**).

Key words : pulmonary embolism, pediatric, endoscopic sclerotherapy, cyanoacrylates, Lipiodol.

Introduction

Pulmonary embolism has been reported in the literature as a potential risk of use of Lipiodol in clinical practice. Usually it occurs during transcatheter oily chemoembolisation which is widely used in the treatment of hepatic tumors, but can also be associated with endoscopic obturation of gastric varices. The clinical picture ranges from mild respiratory symptoms to cardiorespiratory insufficiency and death.

We report a case of pulmonary embolism in an 11-year-old boy suffering from complex I respiratory chain deficiency with concurrent lung and liver fibrosis who underwent endoscopic obliteration of fundic varices.

Case report

An 11-year-old boy was admitted to our hospital for elective endoscopic therapy of fundic varices. He was the second child of not related parents and had been diagnosed with a complex I respiratory chain deficiency. He had various facial dysmorphic features, epilepsy and failed to thrive. The boy also suffered from lung and liver fibrosis and developed portal hypertension with fundic varices causing life-threatening haematemesis with hypovolemic shock leading to admission on the Paediatric Intensive Care Unit 16 months earlier. He also had hypersplenism with a platelet count of 159 10^9/liter. There were otherwise no clotting disorders.

During endoscopy 12 weeks earlier two nodular midsized isolated fundic varices were visualized and oesophageal varices (stage 2) were treated with aethoxysclerol. The follow-up endoscopy revealed obliteration of the esophageal varices with persistent fundic varices, although their size decreased. The fundic varices were bilobulated and the fundus showed cherry red spots. Endoscopic obliteration of the fundic varices was performed under general anesthesia. Shortly after administration of 0.5 ml of a N-butyl-2-cyanoacrylate (Histoacryl) and lipid soluble ethiodized oil (Lipiodol®) mixture (0.8 ml Lipiodol : 0.5 ml Histoacryl) a sudden drop in saturation and secondary bradycardia occurred. The patient recovered after balloon ventilation and injection of intravenous atropine. He could be extubated and was subsequently transferred to the pediatric intensive care unit (PICU). On admission he was cyanotic and sedated. His heart rate was 54/min, blood pressure 86/47 mmHg and oxygen saturation 79%. Blood gas analysis revealed moderate respiratory acidosis. Chest X-ray showed the preexisting lung fibrosis as well as numerous fragments of the contrast medium in various bronchial segments, confirming the suspected diagnosis of pulmonary embolism (Fig. 1). Further therapy was conservative. The boy required no medical intervention other than oxygen and corticosteroids administration. Arterial blood gases returned to preexisting values one day later but pulmonary infiltration persisted for 14 days before final clearance. The boy was discharged after three days.

A follow-up chest X-ray after two weeks revealed almost complete resolution of the emboli. Endoscopy repeated after two months demonstrated a significant reduction of the fundic varices.

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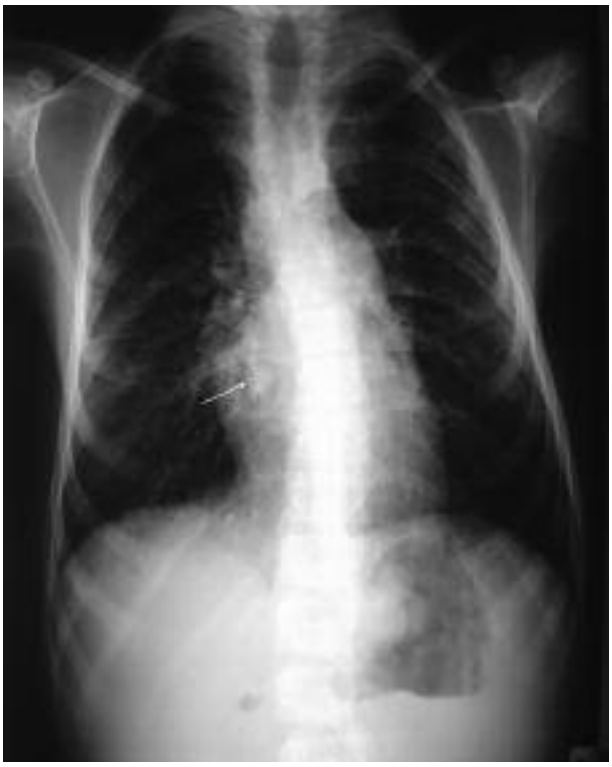

Fig. 1. — Pulmonary oil embolism and co-existing lung fibrosis.

Discussion

Cyanoacrylates (CA) are a class of synthetic glues that rapidly harden upon contact with weak bases, such as saline or blood. N-butyl-2-cyanoacrylate (Histoacryl®, Braun, Melsungen, Germany) or NBCA is the most commonly used cyanoacrylate glue for gastrointestinal applications. When injected, NBCA promptly solidifies, producing a cast of the vessel. Subtotal occlusion is immediate and total occlusion occurs within hours. Mixing CA with lipid soluble ethiodized oil (Lipiodol®, Guerbet GmbH) enhances radiopacity and retards the solidification, thereby facilitating endoscopic administration via needle injection, while reducing the risk of inadvertent adherence to catheters and endoscopes (1).

Various mixtures of NBCA and Lipiodol ranging from 1:1 to 1:1.6 have been recommended. Overdilution may increase the risk of embolization before the glue can solidify at the time of injection (1). CA injection is generally considered a safe technique : clinical studies published by Gotlib and Binmoeller have revealed no procedure- related mortality (2,3). Dysphagia, pyrexia and bacteremia appear to be the most frequent adverse effects. However, there are cases reported in literature attributing pulmonary and portal vein embolism, mediastinitis and intracerebral embolisation to the use of CA mixed with Lipiodol due to post injection embolization (4). In the study of Hwang *et al.* 4.3% of 140 patients who underwent endoscopic injection sclerotherapy with CA developed pulmonary embolism. Four out of six patients presented with respiratory symptoms, the remaining two had only radiological signs of embolism (5). To prevent these serious and potentially life-threatening complications, repetitive single injections of small amounts of CA in 0.5 to 1.0 ml aliquots are recommended. Methodology for access, injection and withdrawal from the lesion should be standardized (1).

Esophageal and gastric varices are rare in the pediatric population. They result from portal hypertension, usually due to hepatic cirrhosis secondary to biliary atresia. Cirrhosis can also be the result of hepatitis, cystic fibrosis and -as in our patient- hepatic fibrosis. If they cause gastrointestinal bleeding, the treatment of choice is injection sclerotherapy. In case of uncontrolled bleeding and sclerotherapy failure, surgery (distal splenorenal shunt) is an option (6,7). In case of esophageal varices endoscopic band ligation proved effective in the treatment of children with variceal bleeding, although there is no evidence if it can be used to prevent a bleeding (8). In adults the prevention of rebleeding can be achieved with beta-blockers combined with mononitrate or isosorbide. The endoscopic band ligation has shown to decrease the frequency of rebleeding and complications, compared with sclerotherapy and is currently the endoscopic treatment of choice. If this therapy fails transjugular intrahepatic portosystemic shunt or, in rare occasions, portosystemic shunt surgery might be beneficial (9). It is unclear is band ligation is as effective in case of gastric varices as opposed to esophageal varivces. The controlled trial of Lo *et al.* showed that cyanoacrylate injection was superior to gastric band ligation in terms of arresting acute bleeding and prevention of rebleeding (10).

Sclerotherapy of varices is generally considered a safe and effective management modality in children.

Gastric varices can be either isolated or accompany oesophageal varices. Their most common localisations include gastric fundus and the lesser curvature. The technique of conventional sclerotherapy does not apply to the treatment of fundic varices and the use of CA is prefered (2,11). There is a very limited number of reports in the pediatric literature on its potential adverse effects and the vast majority of described cases of PE are related to events such as lymphography and transcatheter oily chemo-embolisation (TOCE), the technique widely used in the treatment of hepatic tumors, but it can also be associated with endoscopic obturation of gastric varices (2-4,11-14). Although Lipiodol embolism often resolves without any sequel, it can lead to cardiorespiratory insufficiency and prove fatal in pediatric patients (17). Lung fibrosis poses an additional risk of pulmonary complications due to deranged gas exchange and restrictive lung disease (16,17).

In conclusion, endoscopic sclerotherapy of gastric varices with CA is a generally safe and effective therapy. It is cost-effective and usually provides a satisfactory long-term control of bleeding (4). However, due to the

low prevalence of gastric varices in the pediatric population and therefore limited experience in their management, clinicians should maintain a high index of suspicion while using this technique in children. As there are no clear recommendations for sclerotherapy in children, the guidelines for adult population are applicable. Underlying conditions – such as lung fibrosis – can influence the outcome. We strongly advocate the use of CA only by clinicians with a proven record of experience in this field (1).

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