Pulmonary embolism after histoacryl injection for bleeding gastric varices.
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Patient: 68 years, male

Clinical History:

Obturation of gastric varices with endoscopic injection of polymerizing agents mixed with lipiodol is an established treatment modality. Sometimes this mixture may accidentally lodge in nearby or remote vessels with various consequences. We report a case of uneventful renal vein and pulmonary embolism after intravariceal injection of the tissue adhesive Histoacryl.

Imaging Findings:

A 68-year-old man with hepatitis B virus cirrhosis and portal hypertension was admitted to our hospital after two episodes of upper GI haemorrhage. On endoscopy huge gastric varices (type II) with adherent blood clot were found at the fundus of the stomach and endoscopic injection sclerotherapy with N-butyl-2-cyanoacrylate (Histoacryl) as a 1:1 mixture with the contrast agent Lipiodol followed. On the following day the patient complained of pain over the left upper quadrant and flank; he also developed mild fever. The chest x-ray revealed multiple small opacities along the vessels at the apex and base of the left lung (Fig 1, 2a, 2b), which were not present on the pre-procedural x-ray and were attributed to pulmonary emboli. The lung perfusion scan did not show perfusion defects. On the abdominal CT scan, most of the injected mixture was present in the gastric fundus while a portion of it had flowed to splenorenal shunts and the left renal vein (Fig 3a, 3b); however, no deterioration in renal function was observed. The patient responded well to treatment with parenteral nutrition and antibiotics; pain and fever had subsided by the following day. On the subsequent chest x-rays the radiopaque emboli showed progressive resolution until their complete disappearance. Repeated abdominal CT scans revealed progressive disappearance of the lipiodol opacities and shrinkage of the gastric varices after the second year as well (Fig 4a, 4b). The patient remains alive and with compensated liver function 4 years after the procedure.

Discussion:

Endoscopic intravariceal injection of polymerizing agents is used as an alternative treatment for bleeding gastric varices [1-4] and is regarded as a highly effective first-choice therapy [1]; it is also considered cost-effective compared to other treatments [5,6]. N-butyl-2-cyanoacrylate (Histoacryl) and its analogues are characterized by their ability to polymerize on contact with weak bases such as blood. When injected into a varix, the glue hardens plugging the lumen and leading to varix obturation. The glue is mixed with polymerization altering agents in order to delay glue solidification and avoid gluing of the catheter into the vessel. Lipiodol is an oily contrast agent that not only renders the mixture radiopaque but has also the ability to delay the polymerization reaction [7]. Injection
sclerotherapy with these agents has been associated with acute and long term complications such as embolism,
bacteremia with infection, and development of oesophageal strictures [8]. Endoscopic glue injection has also been
associated with the formation of retrogastric abscess and visceral fistulae; the latter may be due to the ulcerogenic
effect of Histoacryl to tissue [9,10]. Embolism after glue injection is an infrequent complication; the most commonly
reported cases pertain to pulmonary embolism [11,12]. When not mixed properly with the glue, lipiodol may follow
the blood flow and lodge into the collateral vessels or pulmonary arteries. Lipiodol breaks down to free fatty acids
before it is completely expelled; these acids have chemotoxic effects and may cause chemical injury to the lungs
[13]. Although massive [11] or even fatal [14] pulmonary embolism have occurred, affected patients usually have mild
symptoms or are completely symptom-free and therefore embolism may remain undiagnosed [15,16]. In our case
although many tiny particles of lipiodol and a significant embolus was depicted in the chest x-ray the lung perfusion
was negative, a finding that is in accordance with other notices concluding that many emboli do not occlude the
pulmonary vessels [17]. In the most extensive study of pulmonary embolism after Histoacryl sclerotherapy, Hwang
and al. [15] found that radiographically evident pulmonary embolism was observed in 6 (4.3%) of 140 patients.
These patients received a higher volume of liquid acrylate, were either mildly symptomatic or asymptomatic and in
most of them the radiographic abnormalities showed complete or partial resolution. Systemic embolism has also
been described; reported cases include cerebral stroke [18], portal vein embolism [19] and splenic infarction [20].
Possible causes include inadvertent injection into pulmonary veins (when treating oesophageal varices) or systemic
arteries. This leak may also occur through a portopulmonary shunt, pulmonary arteriovenous shunt or atrial septal
defect. [21] Pulmonary embolism should be always considered when a patient who received intravariceal glue
injections present with respiratory symptoms. Use of contrast medium for thoracic CT should be avoided when a
PE is suspected as the contrast may mask the radiopaque emboli [16]. Clinicians should inform the radiologist about
the patient’s history and previous glue injections so that appropriate techniques are used to reach the correct
diagnosis of glue embolism.

**Differential Diagnosis List:** Pulmonary embolization of lipiodol after sclerotherapy for bleeding gastric varices

**Final Diagnosis:** Pulmonary embolization of lipiodol after sclerotherapy for bleeding gastric varices

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Description: Chest x-ray obtained on the first post-procedural day showing cylindrical opacity in the apex of left lung and many tiny others in the bases. Origin:
Description: Zoom image of the left apex shows the radiopaque emboli to better advantage (arrowheads). Origin:
Description: Contrast-enhanced CT of the abdomen after the procedure: lipiodol is seen into some of the gastric varices (V). Origin:
Figure 4

Description: Zoom image of the base of the left lung shows the radiopaque emboli to better advantage (arrowheads). Origin:
Description: Contrast-enhanced CT of the abdomen after the procedure shows lipiodol into the splenorenal shunt (SR) and the left renal vein (arrowhead). Origin:
**Description:** A CT scan obtained during the portal venous phase shows the varices (V) before the procedure. **Origin:**
Figure 7

Description: Contrast enhanced CT scan (portal venous phase) obtained at the same level as 4a, three years after the sclerotherapy with Histoacryl, shows complete disappearance of the varices.

Origin: