

Renal and Splenic Micro-Infarctions Following Bronchial Artery Embolization with Tris-Acryl Microspheres

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A bronchial artery embolization (BAE) is an important therapeutic method used to control acute and chronic hemoptysis. We report a case of multiple micro-infarcts involving both the kidneys and spleen, following a BAE with 500–700 μm crossed-linked tris-acryl microspheres (Embospheres) in a patient with bronchial artery pulmonary vein shunts. The superior penetration characteristics of the microspheres may have resulted in the greater tendency to cross the bronchial artery pulmonary vein shunts, which subsequently caused the systemic infarcts in our patient. We propose the use of larger sized microspheres (700–900 μm), which may aid in avoiding this complication.

A bronchial artery embolization (BAE) is a useful therapeutic method used to control acute and chronic hemoptysis, while maintaining a low rate of medical complications (1). We report a case of multiple micro-infarcts involving both the kidneys and the spleen following a BAE.

Index terms:

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CASE REPORT

In November 2007, a 28-year-old female patient presented at our hospital with acute onset of hemoptysis, characterized by the daily expectoration of 50 ml of fresh blood. The patient was a non-smoker with no prior history of chronic lung disease. Further, a physical examination performed upon admission revealed left lung basal crepitation with good air entry. In addition, the patient showed no signs of a fever and was hemodynamically stable. An initial investigation showed an abnormal chest radiograph with left lower zone haziness. The coagulation profile, renal, and liver function were normal. However, the patient developed another episode of massive hemoptysis, characterized by the expectoration of 100 ml of fresh blood a day later.

An urgent bronchial arteriogram and embolization (Siemens, Axiom Artis DBA, Germany) was arranged in view of the profuse hemorrhage. Next, the catheterization of the left bronchial artery was performed with a 4.1F SHK catheter (Bjaeverskov, Denmark), and demonstrated hypertrophied arteries in the lower lobe of the left lung with an arterio-venous shunt (Fig. 1A). After excluding the spinal medullary artery supply, an embolization of the left bronchial artery was performed with two vials of 500–700 μm crossed-linked tris-acryl microspheres (Embosphere) (Guerbet Biomedical; Louvres, France). Special care was taken to prevent reflux by injecting the Embospheres slowly, and under continuous fluoroscopic control. The hemoptysis subsided with a stable medical condition following the procedure.

Twenty four hours later, the patient developed a fever and generalized abdominal pain. A computerized tomography (CT) scan of the abdomen (General Electric

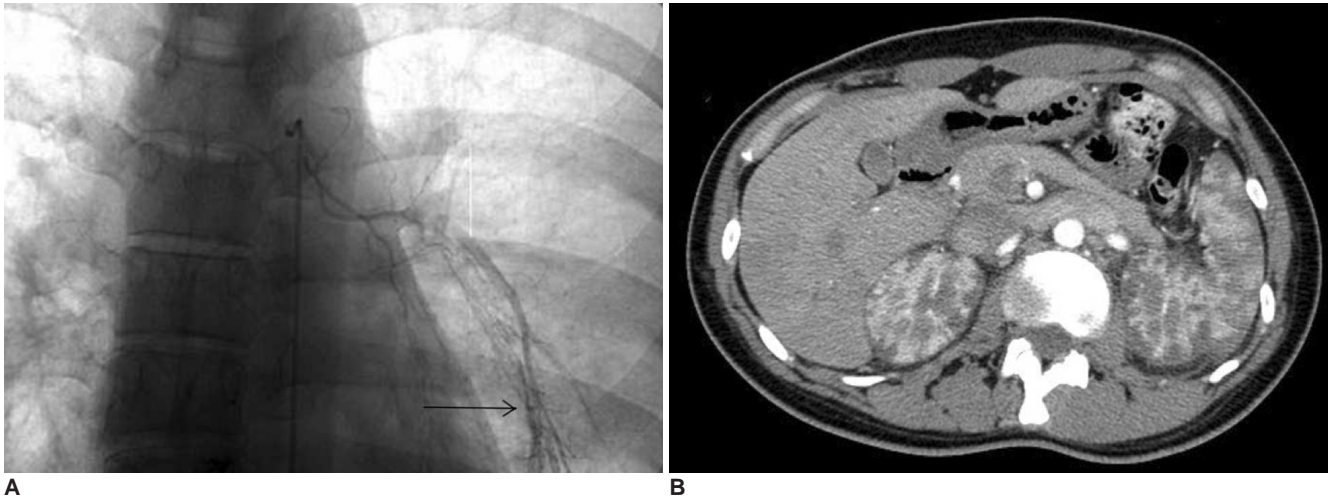


Fig. 1. Renal and splenic infarctions after bronchial artery embolization in 28-year-old female.
A. Left bronchial arteriogram demonstrating hypertrophied arteries in lower lobe of left lung with arterio-venous shunt (arrow).
B. Contrast CT abdomen showing bilateral renal and splenic micro-infarctions as multifocal hypodense non-enhanced areas.

LightSpeed VCT; Waukesha, WI) showed multiple micro-infarctions of the spleen and bilateral kidneys (Fig. 1B). The patient's renal function deteriorated with a serum creatinine level of $157 \mu\text{mol/L}$ (reference range: $60\text{--}120 \mu\text{mol/L}$). The patient was managed conservatively by intravenous fluid replacement therapy over 10 days. The treatment resulted in the complete resolution of abdominal pain and improved renal function (serum creatinine level: $132 \mu\text{mol/L}$). Since the patient was completely asymptomatic, she declined to undergo a follow-up CT scan of the abdomen.

DISCUSSION

A variety of embolic materials are used for BAEs. Namely, an absorbable gelatin sponge is inexpensive and simple to use. However, it has the disadvantage of causing the recanalization of the embolized artery, which may result in the recurrence of bleeding. Coils are generally not used for BAEs because they tend to occlude more proximal vessels and may preclude further embolization if hemoptysis recurs. Polyvinyl alcohol particles are a nonabsorbable embolic material with particles of $350\text{--}500 \mu\text{m}$ in diameter that are frequently used as smaller particles which can pass through the bronchopulmonary anastomosis which result in pulmonary or systemic infarctions (2).

A more recent introduction of the crossed-linked tris-acryl microspheres (Embospheres), have a more uniform size and better penetration than polyvinyl alcohol particles (3). Particle sizes of $300\text{--}500$ and $500\text{--}700 \mu\text{m}$ have been used for BAEs (4). However, the better penetration characteristics of the crossed-linked tris-acryl microspheres may

result in a greater tendency to cross bronchial artery-pulmonary artery shunts or bronchial artery-pulmonary vein shunts, which cause pulmonary infarctions or systemic infarcts as in our patient. To the best of our knowledge, only three other previous reports of systemic infarcts following BAEs with microspheres exist in the literature. Vinaya et al. (5) reported myocardial infarcts during a BAE with $500 \mu\text{m}$ Embosphere particles. The authors suggested that the Embosphere particles had crossed the bronchio-pulmonary shunt into the systemic circulation. Two other similar cases were also reported by FitzGerald et al. (6) and Sriram et al. (7).

The microinfarction of the kidneys and spleen were self-limited in our patient, which was consistent with Sriram et al. (7). Despite this, we have to be aware of this potential complication when using microspheres as the embolic material in BAEs. Since the Embosphere particles show better penetration than polyvinyl alcohol particles, choosing a size of Embosphere based on experience with polyvinyl alcohol particles could result in significant distal embolization as a result of shunting through the lesion (3). We propose that in the presence of bronchial artery-pulmonary artery shunts or bronchial artery-pulmonary vein shunts, the use of larger sized crossed-link tris-acryl microspheres ($700\text{--}900 \mu\text{m}$) may avoid this complication.

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