

Direct Percutaneous Glue Embolization of the Splenic Artery following Iatrogenic Puncture during CT-Guided Core Needle Biopsy: a Case Report

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ABSTRACT

Background: Direct percutaneous embolization, has been deliberately employed before on various occasions. However, to our knowledge, there is no report in the literature, of its use in order to achieve urgent hemostasis after iatrogenic erroneous arterial puncture.

Case presentation: A 75-year-old female patient underwent a CT-guided biopsy of a pancreatic body necrotic mass encasing the patent splenic artery and thrombosed splenic vein. Following the second biopsy needle pass, brisk arterial flow occurred through the 17G coaxial needle, raising concern for a splenic artery puncture. The central stylet was instantly repositioned into the coaxial needle in order to tamponade the bleeding, while a mixture of glue/lipiodol (1:3 ratio) was prepared. The mixture was injected through the coaxial needle while the latter remained in its position and while it was being withdrawn from the abdomen, in order to achieve track sealing. CT angiography revealed a hyperdense-embolic material in the course of the coaxial system throughout the lumen of the splenic artery/intrasplenic branches and in the gastrohepatic space. Additionally, reduced/absent flow was noted in the splenic artery, while almost no contrast enhancement was eminent in the splenic parenchyma. Importantly, no contrast extravasation or additional complications were noted. The patient remained hemodynamically stable, with no drop of the Hct/Hb counts and no clinical signs or symptoms of bleeding throughout the procedure and remaining hospitalization.

Conclusions: Percutaneous, direct glue embolization of the splenic artery following its erroneous puncture with a 17G coaxial needle was fast, safe and effective, resulting though in asymptomatic occlusion of a large volume of splenic parenchyma.

Keywords: percutaneous transarterial embolization, iatrogenic puncture, computed tomography biopsy, complication, case report.

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INTRODUCTION

Direct percutaneous embolization has been employed in the past in a variety of circumstances, including the treatment of aneurysms (1), pseudoaneurysms (2), endoleaks (3), and varices (4, 5). However, to our knowledge, it has not been previously utilized as a way to achieve urgent hemostasis in the case of life-threatening actively ongoing arterial hemorrhage. We report a case of direct percutaneous splenic artery glue embolization following iatrogenic puncture during CT-guided biopsy. Institutional review board approval was not required for this report.

CASE PRESENTATION

A 75-year-old female patient visited our hospital due to ongoing worsening abdominal pain, loss of appetite, and weight loss over the past few months. An abdominal ultrasound and subsequent CT scan revealed a necrotic mass on the pancreatic body encasing the patent splenic artery and thrombosed splenic vein. The patient was admitted, and a CT-guided biopsy was arranged. The pre-interventional platelet count and coagulation profile were within normal limits. Under CT guidance, a 17G coaxial needle was introduced into the aforementioned necrotic pancreatic lesion with an anterior abdominal approach and the patient in the supine position. Following the second biopsy needle pass, brisk arterial flow occurred through the coaxial needle, which raised concern for a splenic artery puncture due to the close proximity of the lesion to the encased splenic artery. The central stylet was instantly repositioned into the coaxial needle in order to tamponade the ongoing bleeding, while a mixture of glue (Glubran®; GEM SRL, Italy) and Lipiodol® (Guerbet; France) was prepared in a 1:3 ratio. Upon removal of the central stylet, the mixture (4 mL in total) was continuously injected through the coaxial needle, while the latter remained in its position and also while it was being withdrawn and removed from the patient's abdomen, in order to achieve track sealing. A new CT angiography was then obtained, revealing a hyperdense-embolic material in the course of the coaxial system, throughout the lumen of the splenic artery and intrasplenic

branches, and also in the gastrohepatic space (Figure 1a, b, c). Additionally, reduced and absent flow was noted in the splenic artery while, apart from a small parenchymal isle, no contrast enhancement was eminent in the splenic parenchyma (Figure 1d). Importantly, no contrast extravasation or additional complications were

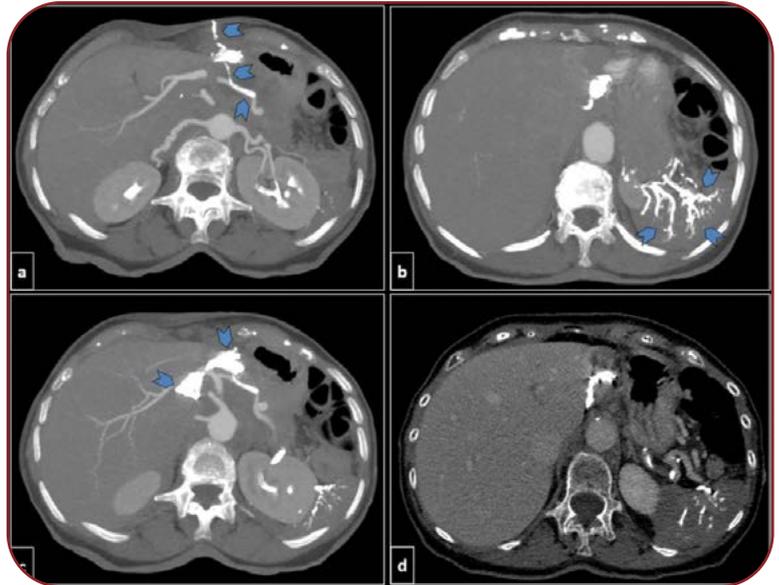


FIGURE 1. Arrowheads demonstrating hyperdense glue along the exit track of the coaxial system, throughout the lumen of the splenic artery (a), the intrasplenic branches (b), and also in the gastrohepatic space (c). Absence of contrast enhancement is noted in the splenic parenchyma (d).

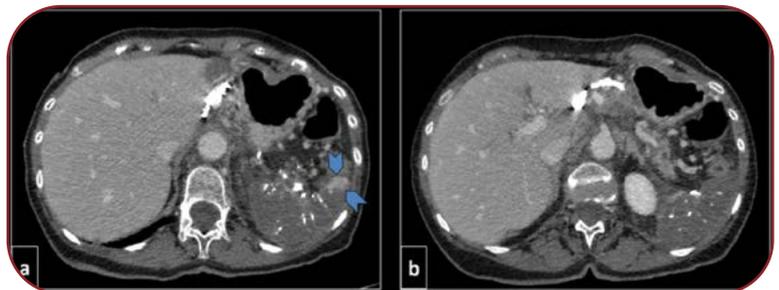


FIGURE 2. Follow-up CT, obtained prior to discharge three days later, displays no significant change. No contrast enhancement was apparent in the splenic parenchyma (a, b), apart from a small parenchymal isle (arrowheads) (a).

noted from this post-interventional CT. The patient remained hemodynamically stable, with no drop in the Hct/Hb counts and no clinical signs or symptoms of bleeding throughout the entire procedure and during the following days of hospitalization. Finally, prior to discharge three days later, another CT was obtained for preventive reasons, which showed no significant change (Figure 2a, b). Consequently, spleen functionality

was considered to be significantly impaired, and the patient was dismissed with instructions to receive vaccine prophylaxis (6). As a result, the patient died due to cancer progression after six months of follow-up. No spleen-related complications were noted.

DISCUSSION

Direct percutaneous embolization is a technique that has been utilized in the past in the management and treatment of various medical conditions. Heye et al have reported the successful direct CT-guided percutaneous embolization of internal iliac artery aneurysms in three different patients, a procedure which was attempted due to the internal iliac aneurysms' inaccessibility from the transarterial route (1). Aneurysm sac embolization was performed with the use of thrombin in one case and with a glue and Lipiodol mixture in two cases. Additionally, Krueger et al have reported a case of CT-guided direct percutaneous thrombin injection in a pancreatitis-induced splenic artery pseudoaneurysm which was impossible to selectively catheterize in the angiography suite (2). Furthermore, angiography-guided direct percutaneous aneurysm sac embolization has been proven to be a safe and effective technique for the treatment of endoleaks occurring after endovascular aneurysm repair (EVAR) procedures (3). Moreover, direct percutaneous glue embolization has been performed for the treatment of bleeding stomal varices (4), and direct percutaneous embolization with the use of coils and Gelfoam has been performed for the treatment of bleeding peristomal ileostomy varices (5), both of which were achieved under ultrasonographic and fluoroscopic imaging guidance. Nonetheless, to the authors' knowledge, direct CT-guided percutaneous embolization has not been reported as an emergency therapeutic technique in order to achieve urgent hemostasis of an actively ongoing life-threatening arterial bleed caused by vascular injury.

For many years, vessel ligation following surgical exploration has been the standard of care for vascular injuries (7). However, since the discovery of digital subtraction angiography (DSA), interventional radiology has evolved to include a variety of different endovascular procedures and treatment techniques. Among them, transcatheter arterial

embolization (TAE) is a procedure performed in the angiography suite under fluoroscopic guidance by gaining arterial access (usually through the common femoral artery) with the use of the Seldinger technique after making a small incision in the skin (7). In the setting of vascular injury, the physician performing the TAE procedure uses the above access to insert appropriate catheters and guidewires, which, following the diagnostic angiogram, will allow the detection of the site of vascular injury and the deployment of a variety of different embolic materials (i.e., glue, Lipiodol, Gelfoam, coils) in order to occlude the abnormal vessel and achieve hemostasis (7). Transcatheter arterial embolization has been proven to be a safe and effective technique in the achievement of urgent hemostasis (7) and it has justifiably evolved to become a very popular technique for the treatment of active bleeds.

The decision to conduct an on-the-spot CT-guided percutaneous embolization of the splenic artery through the previously positioned coaxial system instead of transferring the patient to the angiography suite for TAE was largely based on the brisk hemorrhage which was noted through the coaxial needle and the high risk of accidental needle displacement if the patient was to be relocated, since in this case, significant blood loss could have occurred due to the major vessel involved. Nevertheless, direct glue embolization resulted in significant loss of splenic parenchyma, increasing the risk of infection (8). The choice of 1:3 glue mixture was decided to achieve good distal penetration and adequate proximal sealing while retrieving the needle. In the retrospect, perhaps the loss of splenic parenchyma could have been reduced using a thicker 1:2 or even 1:1 mixture, but with an increased risk of inadequate occlusion, as the glue could have been stuck within the needle without sealing the proximal entry site.

CONCLUSION

To conclude, percutaneous, direct glue embolization of the splenic artery following its erroneous puncture with a 17G coaxial needle was a fast, safe and effective procedure, which nonetheless resulted in the asymptomatic occlusion of a large volume of splenic parenchyma. □

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