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Case Report

Short-interval recanalization after gelfoam occlusion ☆,☆☆

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ABSTRACT

Gelfoam® is a temporary embolization agent often used in trauma where permanent arterial occlusion is not desired. Gelfoam occlusions have been shown to resolve by 2 weeks, but shorter intervals have not been studied. We report a case of spontaneous arterial hemorrhage due to ruptured hepatic malignancy where treatment was Gelfoam slurry occlusion of the right hepatic artery. Repeat hemorrhage resulted in repeat CT and hepatic arteriography, which showed that recanalization of the occluded artery had occurred in less than 48 hours. Gelfoam arterial occlusion in some cases may last less than 2 weeks.

Background

Gelfoam® (Pfizer, New York, NY) is a temporary vascular embolization agent, but the duration of subsequent vessel occlusion is unclear as few patients have repeat angiography following Gelfoam embolization. Beginning in the 1970s, control of traumatic arterial hemorrhage utilizing Gelfoam has been reported [1]. We report a case of recanalization of an occluded right hepatic artery less than 48 hours after transcatheter embolization with Gelfoam slurry.

Methods

The patient, a 66-year-old male, had a past medical history including cirrhosis secondary to alcohol use and chronic hepatitis B. He initially presented to an outside hospital with a 1-2 day history of fatigue, malaise, and generalized weakness. He complained of right-upper-quadrant abdominal pain and increasing abdominal distention. A peritoneal aspirate was obtained which was frankly bloody and the patient was started empirically on antibiotics for spontaneous bacterial peritoni-

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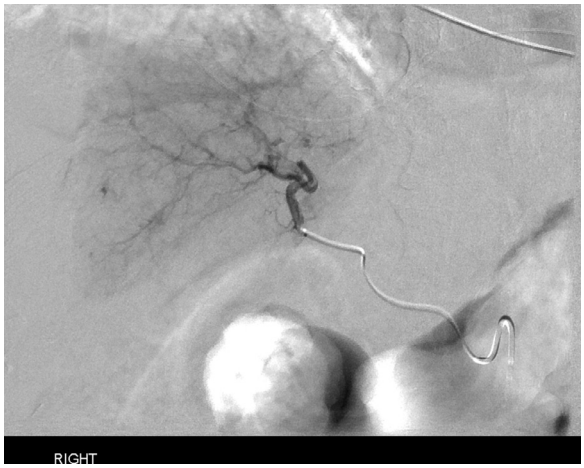

Fig. 1 – Initial angiogram – pre-embolization, showing bleed from tumor branches.

Fig. 2 – Post-Gelfoam embolization angiogram, showing pruning of the hepatic artery with no persistent extravasation.

Fig. 3 – Repeat angiogram, showing recanalization of the hepatic artery without active extravasation.

tis (SBP). He became hypotensive (systolic blood pressures in the 60-70 mmHg range) and was volume resuscitated with intravenous fluids. A CT of the abdomen and pelvis was performed, which demonstrated multiple liver masses and large-volume hemoperitoneum consistent with spontaneous rupture of right hepatic lobe hepatocellular carcinoma.

The patient was transferred to the intensive care unit under the trauma surgical service at our institution, and interventional radiology (IR) was consulted for hepatic angiography and possible embolization. At the time of transfer, hemoglobin was 9.3 gm/dL (baseline of 12.6), hematocrit 28.8%, platelets 138×10(3)/mcL, Prothrombin time (PT) 19.4 sec, international normalized ratio (INR) 1.7, and partial thromboplastin time (PTT) 40 sec.

After obtaining right common femoral artery access, the celiac axis was selected with a 5-Fr Sos catheter (AngioDynamics, Queensbury, NY). A 3-Fr High Flow Renegade catheter (Boston Scientific, Marlborough, MA) and a 0.018 guide wire were used to select the proper hepatic artery. Angiography showed tumor vascularity in the right lobe of the liver with 2 foci of active extravasation. The 3-Fr catheter and 0.018 wire were used to subselect the right hepatic artery (Fig. 1). Through the 3-Fr microcatheter, Gelfoam slurry (one Gelfoam sheet cut, suspended in 20 mL of 50% Omnipaque 350 and 50% normal saline, irrigated through a 3-way stop-cock 50 times) was injected to 5-beat stasis (Fig. 2) [2]. The angiography was completed by the afternoon of day of procedure.

Results

The patient initially improved, but became hypotensive by the evening of postoperative day 1. Hemoglobin was found to have dropped from 10.8 to 7.2 gm/dL (Hematocrit 21.2%, Platelets 41×10(3)/mcL, PT 25.3 sec, INR 2.2, and PTT 59 sec). Repeat CT Angiography (CTA) of the abdomen demonstrated active contrast extravasation from the previously embolized right lobe hepatic mass. Repeat angiography performed the morning of postoperative day 2 showed no active extravasation but a patent right hepatic artery (Fig. 3). The right hepatic artery was then embolized to stasis with 400 μm Embozene spheres (Boston Scientific, Marlborough MA).

Following the second embolization, the patient remained hemodynamically stable without vasopressor support. He opted for palliative treatment focusing on comfort and was discharged to home with hospice 10 days after admission.

Discussion/conclusion

Gelfoam (dehydrated gelatin sponge) is a temporary embolization agent derived from purified skin gelatin [3]. Gelfoam re-

sults in thrombosis by acting as a mechanical obstruction to blood flow; its porous structure creates a scaffold for platelet aggregation and clot formation [4].

Gelfoam embolization was first reported in 1964 in a cavernous carotid fistula, and in subsequent published case reports in 1971 and 1972, was used in combination with other embolic agents, such as muscle, for embolization of spinal and other CNS vascular malformations [5–7]. Uses expanded in the 1970s and 1980s, with use in intra-abdominal and intrapelvic hemorrhage, in malignancy-associated hemorrhage and traumatic injury [8,9]. Gelfoam is currently commonly used in trauma [10].

While believed to provide temporary vessel occlusion, there is limited literature on the duration of vessel occlusion produced by Gelfoam. In 1977, Barth et al. studied temporary embolization agents, comparing fresh autologous clot, oxycel, and Gelfoam in swine [11]. Transcatheter embolization of the distal gastrosplenic artery and the distal right renal artery was performed. Repeat angiography at 4 months demonstrated no trace of Gelfoam or any of the other embolization agents.

In 1981, Sniderman et al. compared Gelfoam and Avitene (Davol, Inc., Woburn, MA) embolization with or without Sotradecol (Mylan Teoranta, Galway, Ireland); they performed embolization of the profunda femoris arteries in dogs [12]. At 2 weeks, the vessels embolized with Gelfoam alone had completely recanalized. In 2017, Oishi et al. performed Gelfoam embolization via microcatheter of the left hepatic artery in normal beagle dogs; at 2 weeks postprocedure, CT findings were consistent with recanalization [13].

These studies reported that arteries occluded with Gelfoam can be patent at 2 weeks, however, shorter time periods were not studied. In our patient, the target artery was successfully occluded with Gelfoam; however, the patient re-bled from the same vessel. Follow-up angiography 2 days after initial embolization showed complete recanalization of the previously occluded right hepatic artery. Repeat embolization with a more permanent agent was needed to obtain hemostasis. Our experience suggests vessel occlusion with Gelfoam may last considerably less than 2 weeks, and may not be as durable as is sometimes needed. A degree of suspicion for rebleeding should be maintained even after successful vessel occlusion with Gelfoam.

Author Contributions

All authors have been involved in drafting and critical revision of the manuscript; all approved the final version to be published. Author **John M. Gemery** did literature searches; authors **John M. Gemery, David P. Munger, and Andrew R. Forauer** did writing and critical revision.

Patient consent

We note that we were unable to obtain consent for publication. The patient was deceased by the time of case report preparation, and exhaustive attempts were made to contact the next of kin but without success. Because of the public interest in publication, the anonymization of the patient, and that attempts had been made to contact the patient and their relatives, exceptional agreement for publication of the case report was given by the Editor-in-Chief of the journal *Radiology Case Reports*.

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