Letters to the Editor

Re: Contrast Media-induced Nephrotoxicity: Identification of Patients at Risk and Algorithms for Prevention

From: Brian Funaki, MD
Department of Radiology
University of Chicago Hospitals
5841 S. Maryland
Chicago, IL 60637

Editor:
I found the recent article by Waybill and Waybill (1) extremely helpful in the management of patients at risk for contrast-induced nephropathy. I have two questions for the authors. First, what are their recommendations regarding acetylcysteine? A recent report in the New England Journal of Medicine by Tepel et al (2) demonstrated decreased nephrotoxicity in patients undergoing infused computed tomographic examinations when treated with this drug. Second, recent American College of Radiology and Food and Drug Administration guidelines (3) suggest withholding metformin 48 hours after contrast administration (not 48 h before, as the authors and Committee of the Society for Cardiac Angiography and Interventions recommend). Is there any reason for the different recommendations?

References

Drs. Waybill and Waybill respond:
Thank you for the opportunity to comment in regard to the use of acetylcysteine for prevention of acute renal insufficiency in the setting of intravenous contrast procedures.

As we had noted in our paper, reactive oxygen species may play a role in contrast media–induced nephropathy. Acetylcysteine is a thiol-containing antioxidant with actions as a free radical scavenger and a reactive sulphydryl compound. Acetylcysteine had been used previously to treat acute acetaminophen intoxication and various bronchopulmonary diseases. In more recent experimental and clinical studies, it has been shown to diminish ischemic sequelae in the liver, lung, heart, and kidney (1–3).

Tepel et al (4) prospectively studied 83 patients with chronic renal insufficiency with and without diabetes (creatinine > 1.2 mg/dL, mean creatinine, 2.4 mg/dL ± 1.3) undergoing computed tomography with low-osmolality contrast material. Patients were divided into two groups. Both groups received 0.45% saline intravenously at a rate of 1 mL/kg/h for 12 hours before and 12 hours after admin-

istration of the contrast agent. One group (acetylcysteine group) also received acetylcysteine 600 mg orally twice daily; one group (control) received placebo. Ten patients in the study demonstrated a serum creatinine increase >0.5 mg/dL at 48 hours: one of 41 patients (2%) in the acetylcysteine group and nine of 42 patients (21%) in the control group. There were no adverse reactions to acetylcysteine reported.

This study had not been published at the time our paper was submitted. However, on the basis of these promising results and the low incidence of side effects associated with the drug, we would conclude that administration of acetylcysteine may be beneficial to patients at moderate or high risk for contrast nephropathy. Specifically, patients should receive acetylcysteine 600 mg orally twice daily the day before and the day of contrast administration, for a total of 2 days. It should be noted that patients should still receive hydration, as they did in this recent study. We look forward to further studies of this drug in larger groups of patients to verify the findings of this promising study.

Concerning metformin, there have been numerous published guidelines for use of metformin in patients at risk for contrast media–induced nephrotoxicity. It should be noted that metformin is now also available in an extended-release preparation (Glucophage XR; Bristol-Myers Squibb, Princeton, NJ) requiring once-daily dosage, as well as in combination with other oral hypoglycemics. The most recent package insert and Food and Drug Administration guidelines state that metformin should be temporarily discontinued at the time of the procedure or beforehand and withheld for 48 hours subsequent to the procedure, reinstated only after renal function has been found to be normal (5). These guidelines are similar, albeit not identical, to those we had cited; both underscore the importance of discontinuing the agent temporarily to prevent lactic acidosis.

References

Mary Montrella Waybill, MD
Peter N. Waybill, MD
Departments of Nephrology (M.M.W.) and Cardiovascular and Interventional Radiology (P.N.W.), Penn State University Hospital, Hershey, Pennsylvania
Re: Endovascular Treatment of Acute Carotid Blow-out Syndrome

From: Philip Chong-hei Kwok, FRCR
James Yuk-ling Cheung, FRCR
Kwok Wing Tang, FRCR
Wong Kan Wong, FRCR
Department of Radiology and Imaging
Queen Elizabeth Hospital
30 Gascoigne Road
Kowloon
Hong Kong

Editor:

We read with great interest the paper by Macdonald et al (1) on the use of a covered stent in treatment of carotid blow-out syndrome. The authors are to be commended on their success in this patient. However, we had a similar case with a totally different outcome.

A 63-year-old man was referred for acute carotid blow-out syndrome. He had history of T4NoMo carcinoma of the oropharynx treated with irradiation therapy 1 year earlier, followed by total laryngectomy, right radical neck dissection, and subtotal pharyngectomy with the pectoralis major flap 7 months before presentation at our hospital. Recurrence was detected 3 months before the incidence of carotid blow-out and he was undergoing conservative treatment. He presented with acute profuse oropharyngeal bleeding and angiography showed a pseudoaneurysm with a narrow neck at the common carotid artery just below the carotid bifurcation. The largest diameter of the common carotid artery measured 8 mm. We placed a 2.8-cm covered Jostent (Jomed, Helsingborg, Sweden) mounted on an 8-mm SMASH balloon (Schneider, Bülach, Switzerland). Immediately after stent deployment, angiography showed extravasation of contrast material above and below the stent margin and the profuse oral bleeding continued (Fig). We thought the carotid artery was ruptured and embolized it with stainless-steel coils, which stopped the bleeding. The patient died 2 months later.

Concerning the cause of rupture after stent placement, we postulated that it was related to the high pressure required to inflate the stent. It is not uncommon to use a pressure of 4–6 atm to fully inflate the stent, which is equivalent to 3,040–4,560 mm Hg, which is much higher than normal blood pressure. Carotid blow-out develops in a weakened artery and the normal blood pressure is high enough to create a tear. With use of a high-pressure balloon, the outcome may therefore be predictable.

In absence of cross circulation intracranially, it is tempting to use a balloon-expandable covered stent for treatment of carotid blow-out. We think it may be better to inflate the stent to match the diameter of the artery, use the minimal required pressure, and check the result angiographically through the guiding catheter. If there is persistent leakage through the pseudoaneurysm, it can be inflated to a slightly larger diameter. It is also possible to use a coil to embolize the pseudoaneurysm. However, these treatments are not always successful, and there is a risk of new leakage.

**Figure.** A pseudoaneurysm arose from the common carotid artery as shown in frontal (a) and lateral (b) projections. There was a narrow neck. A 1-cm metallic washer was placed on the lateral aspect of the neck for calibration purpose. The pseudoaneurysm disappeared after the deployment of a covered Jostent. However, there was extravasation above and below the stent as shown in frontal (c) and lateral (d) projections.
bigger diameter. In this situation, one may use a semicompliant balloon, the diameter of which increases slightly with increase in inflation pressure. Of course, coils for embolization should be ready before stent deployment.

Another potential alternative is use of a self-expandable covered stent, such as the Wallgraft (Boston Scientific, Minneapolis, MN) or other covered Nitinol stents. They still exert considerable pressure and the risk of rupture still persists.

In conclusion, one has to be meticulous and extremely careful if a covered stent is to be used for treatment of acute carotid blow-out syndrome.

Reference

Fatal Pulmonary Embolus after TIPS Revision

From: Eric K. Hoffer, MD
John J. Borsa, MD
Robert D. Bloch, MD
Arthur B. Fontaine, MD
Department of Radiology
Harborview Medical Center
325 9th Avenue
Box 359728
Seattle, WA 98104

Editor:
The transjugular intrahepatic portosystemic shunt (TIPS) is an effective treatment for variceal hemorrhage and ascites secondary to portal hypertension. However, active surveillance and shunt revisions are required to overcome the poor 1-year primary patency rates (20%–69%) and achieve secondary 1-year patency rates of 90% (1,2). Revision entails balloon dilation and possible additional stent placement at sites of stenosis or occlusion. Thrombolysis is infrequently used to recanalize the shunt tract, and mechanical (balloon) maceration of clot has not been associated with significant morbidity (1–3). In this letter, we report a case of an occluded shunt tract, lengthened by revisions, in which balloon dilation resulted in a fatal pulmonary embolus.

The patient was a 61-year-old woman with a history of alcohol-related liver disease. At another hospital, she presented with upper gastrointestinal bleeding and esophagogastroduodenoscopy demonstrated varices, gastropathy, and a duodenal ulcer. She was treated with TIPS creation. A year later, she returned with upper gastrointestinal bleeding and was transferred to our hospital. Portography showed that the two Wallstents (Boston Scientific/Medi-tech, Natick, MA) that comprised the original TIPS were separated and had a stenosis between them. After a 10-mm × 68-mm Wallstent was deployed across the two existing stents, the entire tract was dilated to 10 mm, with a resultant reduction in gradient from 13 mm Hg to 9 mm Hg. There was no further bleeding.

A year later, routine follow-up US revealed occlusion of her shunt. Transjugular portography confirmed the occlusion and, after placement of three additional Wallstents and dilation to 10 mm, the gradient was reduced to 2 mm Hg (Fig 1). There was no further filling of the coronary varix and inferior mesenteric vein flow was antegrade.

Five months later, the patient returned with a 2-week history of progressive, massive ascites and US showed an occluded shunt. Via right femoral access, the shunt tract was easily crossed with a guide wire, and contrast study confirmed the occlusion (Fig 2). Because of the length of the occluded tract and the likelihood of an acute component of the thrombus, a 5-F pulse-spray catheter (Angiodynamics, Queensbury, NY) was advanced over the guide wire and 250,000 U urokinase (Abbokinase; Abbott Laboratories, North Chicago, IL) in 10 mL saline was administered over a 15-minute period, lacing the length of the occluded stents. The shunt was then dilated with a 10-mm-diameter, 4-cm angioplasty balloon (Ultra-thin; Boston Scientific/Medi-tech), beginning at the portal end with sequential inflations at 3-cm intervals back to the hepatic vein. After inflation at the junction of the hepatic vein and inferior vena cava, the patient reported acute pain and became unresponsive and cyanotic. Her oxygen count fell rapidly despite immediate use of the nonrebreathing mask with 100% oxygen. She became bradycardic and went into electromechanical dissociation. She died despite full advanced cardiopulmonary life support arrest protocol. At autopsy, there was a large, acute thromboembolus in the right main pulmonary artery and multiple smaller emboli in peripheral pulmonary vessels. There were residual clots in the TIPS tract and no deep venous thrombi identified in the lower extremities.

Although some investigators use thrombolytic drugs in the setting of acute thrombosis, the day after shunt creation, recanalization of an occluded shunt is most often performed by balloon dilation with or without stent placement (1,2). LaBerge and colleagues (1) routinely performed repeat stent placement and balloon dilation in occluded shunts, except in one case with extensive infra- and extraportal vein thrombosis, in which fibrinolytic therapy was used. Evidence that longer shunt tracts may be declotted without
concern for clinically significant pulmonary emboli is found in a report by Blum and colleagues, who performed balloon dilation to recanalize occluded portal veins after creation of an intrahepatic shunt without pulmonary complication (3). This case raises a concern as to the safety of balloon dilation without thrombolysis in the revision of an occluded shunt.

The majority of TIPS shunt tracts are relatively short (<5 cm), and the amount of potential clot displaced in routine balloon recanalization is limited. Those that have been revised or involve stents through portal vein occlusions may be longer (3,4). Long shunt tracts, particularly those that are closed to branch venous inflow because of the use of a covered stent, pose an undefined risk for emboli.

Our cursory thrombolytic infusion was inadequate; we considered it prophylactic, but did not evaluate whether there had been any resolution of clot. When the occluded shunt length is greater than 6 cm, aggressive thrombolysis before dilation or stent placement without dilation may be warranted. Evidence of partial lysis warrants continuation to lytic stagnation or patency. To avoid the risks of systemic thrombolysis in the setting of recurrent or potential variceal hemorrhage, mechanical thrombectomy devices may be used (5).

References

Figure 2. Transfemoral CO₂ portogram 5 months later demonstrates reocclusion.