Stent-Graft Displacement during TIPS Reintervention

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Stent grafts have become the preferred endoprosthesis for transjugular intrahepatic portosystemic shunting (TIPS), replacing the uncovered stents that first enabled this procedure to be widely performed. Few complications associated with reintervention on stent-grafts have been reported to date.

CASE REPORT

A 56-year-old woman with recurrent variceal bleeding due to nonalcoholic steatohepatitis was referred to the Vascular and Interventional Radiology Section for TIPS. The procedure (Fig. 1) was performed in standard fashion with a 8 mm × 80 mm covered stent (Viatorr[®], Gore, Flagstaff, AZ). Initial portosystemic gradient was 20 mm Hg which was reduced to 8 mm Hg after TIPS.

The patient had no further bleeding but a follow-up Doppler ultrasound examination (Fig. 2) raised the question of poor flow due to stent stenosis. The patient returned to the Vascular and Interventional Radiology Section for venography and portal vein pressure measurements. After informed consent, conscious sedation was achieved with midazolam and fentanyl. The right neck was prepped and draped in usual fashion. The right internal jugular vein was accessed using ultrasound guidance and a 65 cm 10F vascular sheath was introduced over a 0.035-inch J guide wire into the superior vena cava. The right hepatic vein was catheterized with a 5F multipurpose catheter (Cook, Bloomington, IN) and a 0.035-inch guide wire. The stent graft was catheterized and a guide wire was advanced through the stent graft into

the portal vein. A shunt venogram was performed (Fig. 3) revealing shunt patency. To obtain pressure measurements, the sheath was advanced over the guide wire to the portal vein. During this maneuver, the stent graft was displaced inferiorly by the sheath. In retrospect, it was observed that the guide wire traversed one of the interstices of the bare portion of the stent graft. Thus, advancing the sheath pushed the stent graft into the proximal portion of the portal vein. Efforts to pull the device cranially were unsuccessful. A second device was inserted into shunt to maintain patency. The shunt remains patent at 1 year follow-up.

DISCUSSION

Covered stents have been shown to increase the patency of TIPS by limiting bile leaks, which may cause early thrombosis and neointimal hyperplasia, which causes late shunt thrombosis. Early surveillance (within first 1–2 weeks) of TIPS performed with covered stents is not possible due to air trapped within the stent graft and many institutions have abandoned baseline ultrasound examination after TIPS when covered stents are used.

The Viatorr[®] endoprosthesis was designed specifically for TIPS and is generally considered the favored device for this intervention. The stent graft is composed of both covered and uncovered segments. When properly deployed, the uncovered portion is deployed in the portal vein and extends to the portal vein entry site. The covered portion extends from the entry site to the junction of hepatic vein and inferior

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Figure 1 Transjugular intrahepatic portosystemic shunting (TIPS) insertion. (A) Digital subtraction study showing patent portal and hepatic veins. (B) Fluoroscopic image showing balloon angioplasty of deployed stent graft. (C) Final venogram showing patent shunt.

Figure 2 Ultrasound examination after transjugular intrahepatic portosystemic shunting (TIPS). Ringdown artifact due to air trapped in the stent graft precludes visualization of the shunt.

vena cava. TIPS with covered stents mandates careful measurement of track length. In my experience, I have found the most common error of inexperienced operators involves choosing a device that is too short. If the stent graft does not completely extend to the junction of the hepatic veins and inferior vena cava, early shunt thrombosis may occur.

Reintervention on covered stents used in TIPS has not been widely reported. This case highlights one pitfall of the Viatorr[®] endoprosthesis. The interstices of the uncovered portion of the stent graft are relatively large and allow inadvertent guide wire passage. If this is not recognized, a catheter or sheath advanced over a guide wire that has passed through the side of the stent graft may become entangled in the interstices and displace the graft caudally. The stent graft design prevents

Figure 3 Transjugular intrahepatic portosystemic shunting (TIPS) reintervention (A) Digital subtraction venogram demonstrates patency of the shunt. (B) Fluoroscopic image shows catheter traversing the bare portion of the graft (arrow). (C) Illustration showing mechanism of stent graft displacement. (D) Fluoroscopic image after sheath advancement shows displaced stent graft. (E) Final digital subtraction angiogram after failed attempts to reposition the displaced stent graft shows additional stents placed to elongate the shunt.

significant incorporation of the device into the hepatic tract. Although the bare portion of the device anchors it in the portal vein and prevents cranial migration, there are no anchoring struts on the covered portion of the graft. Thus, caudal dislodgement may occur during reintervention as in this case.

SUGGESTED READINGS

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