Temporary Endovascular Bypass: A Novel Treatment for Acute Stroke

SUMMARY: Intracranial stent placement is emerging as an effective treatment for acute stroke. As a means to avoid stent-associated complications and capitalize on stent-placement-related advantages, the concept of a “temporary endovascular bypass” (TEB) for stroke therapy was recently reported. In this technique, a stent is temporarily deployed for instant recanalization. Once sufficient flow is established to maintain vessel patency, the stent is recaptured and withdrawn. We report a second case to further characterize the merits of TEB.

CASE REPORT

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TEB appears to be a promising new technique to treat acute stroke. Technically, TEB is straightforward and restores flow immediately. The bypass can be left in place as long as needed or converted to a permanently implanted stent by completing the unsheathing maneuver. The stent recapture eliminates long-term stent-associated complications, such as in-stent stenosis and the need for aggressive antiplatelet therapy.

Discussion

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tenting is emerging as a promising treatment option for acute cerebral ischemia.1-4 The main advantage of stenting for acute stroke is rapid recanalization with high technical success rates.3,4 To capitalize on the advantages of stenting for acute stroke but avoid long-term complications, the “temporary endovascular bypass” (TEB) technique, recently described by Kelly et al,2 represents an interesting alternative to permanent device implantation. A stent is deployed and then recaptured after successful vessel recanalization has been achieved. To further characterize the merits of TEB, a second case is reported here.

Case Report

A 41-year-old man presented with a National Institutes of Health Stroke Scale (NIHSS) score of 19 nine hours after stroke onset. Diagnostic arteriography confirmed vertebrobasilar occlusion (Fig 1A). After access was obtained and intravenous heparin given (activated clotting time, 268 seconds), we prepared for TEB as the primary recanalization strategy.2 The lesion was crossed with a Synchro 0.014-inch microguidewire (Boston Scientific, Natick, Mass) and a Prower Select Plus microcatheter (Cordis, Miami Lakes, Fla). A long 4.5 × 37 mm Enterprise stent (Cordis) was partially deployed, spanning the entire occluded segment in the vertebrobasilar system. Partial unsheathing of the stent “propped” open the distal vertebral artery (VA) and the proximal basilar artery. Using the stent as a buttress device, we reconstituted and maintained sufficient flow (Fig 1B). The stent was recaptured and withdrawn 18 minutes later. Poststent arteriography (Fig 1C) demonstrated moderate residual stenosis. The patient then improved immediately (NIHSS score, 8). However, on postoperative day 2, the patient developed lethargy secondary to a cerebellar infarct. He then underwent ventriculostomy and surgical posterior fossa decompression. The patient continued to recover following surgery (NIHSS score of 2, thirty days postoperatively). Conventional angiography demonstrated patency of the vertebrobasilar system without change 8 weeks post-TEB.

Received December 18, 2008; accepted December 31.

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DOI 10.3174/ajnr.A1536
patient-years versus 1.49 per 100 patient-years.\textsuperscript{17} With dual antiplatelet therapy or antiplatelets plus anticoagulation, the risk is increased.\textsuperscript{18-21} Zaidat et al\textsuperscript{4} reported an 11\% hemorrhage rate associated with stent placement for acute stroke. Levy et al\textsuperscript{5} also reported lethal hemorrhage as a complication in 11\% of patients treated with stent placement for acute stroke. With TEB, the need for aggressive (dual) antiplatelet therapy is eliminated with recapture of the stent. Therefore, the risk of bleeding postoperatively might be decreased and emergent neurosurgical procedures, if indicated, might be safer.

**Conclusions**

TEB represents a novel interventional treatment option for acute stroke. The temporary use is technically feasible and takes advantage of the high success rate of intracranial stent placement for recanalization. Dual antiplatelet therapy postintervention is unnecessary, and the problem of in-stent stenosis is eliminated.

**Acknowledgments**

We thank Paul H. Dressel for assistance with preparation of the illustrations and Debra J. Zimmer for editorial assistance.

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**Fig 1.** A, Right vertebralbasilar arteriogram, dual-injection technique. Right VA occlusion distal to the posterior inferior cerebellar artery origin. A large vertebralbasilar thrombus is outlined by the dotted lines. B, Right VA angiogram, close-up view. The 4.5 × 37 mm Enterprise stent (Cordis) is partially unheathed. Close inspection of the image reveals 3 small dots marking the distal end of the stent (arrow). The proximal end is still within its sheath, allowing recapture. Recanalization is already successful but has not yet reached its full extent. C, Right VA angiogram, 10 minutes after B was obtained. The stent is still partially deployed. Recanalization continues to improve (relative to A). After this run, the stent was recaptured and withdrawn.