
Salvage of Flow-Directed Microcatheter after Hub Failure

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Summary: We describe the use of an epidural catheter adapter to salvage a flow-directed microcatheter in situ after fracture of the plastic catheter hub. This technique eliminates the need to remove the failed catheters prematurely and enables successful delivery of liquid embolic agent into arteriovenous malformations in the brain.

Index terms: Arteriovenous malformations, embolization; Catheters and catheterization, technique

Transarterial embolization with liquid embolic agents, either alone or in combination with radiosurgery or microsurgery, is an accepted treatment option for cerebral arteriovenous malformations (AVMs). To achieve effective and permanent obliteration of the AVM (1), a liquid embolic agent such as *N*-butyl cyanoacrylate (NBCA) should be injected within the nidus or in feeders as close to the nidus as possible via a microcatheter. Two types of variable stiffness microcatheters are available for this purpose: the over-the-wire systems (eg, Tracker, Transit, Jetstream), and the flow-directed systems (eg, Magic, Zephyr, Mini-Torquer). The former systems require considerable wire/catheter manipulations, which can stretch and potentially damage the intima of tortuous vessels. A prime example of the latter system is the Magic catheter (2), a flow-guided Pursil system that consistently allows rapid, atraumatic, and distal access into high-flow AVMs.

One drawback of the Magic catheter is its tendency to develop a longitudinal hairline fracture in the plastic catheter hub after repeated connection and disconnection with Luer-Lok syringes during prolonged flow-guided intracranial navigation. This type of hub failure occurs in approximately 5% of the Magic catheters used (personal experience) and it correlates directly with the number of Luer-Lok manipula-

tions performed. To prevent hairline hub fracture, a stopcock can be connected to the hub at the beginning of the procedure. The hub is then stressed only once, while the Luer-Lok syringe is connected and disconnected to the stopcock many times. However, even with the stopcock, hub failure still occurs occasionally. Because a Magic catheter with a fractured hub does not allow safe delivery of a liquid embolic agent, a catheter with a fractured hub has to be removed, which can significantly increase the time and the cost of the procedure.

Technique

We recently devised a method by which a Magic catheter can be salvaged in situ when the hub fails. The hub is cut off from the green 3F proximal shaft and the catheter is advanced into an epidural catheter adapter until it hits the insertion stop (approximately 5/8 of an inch). The two adapter halves are then tightened to provide a water-tight connection between the Luer-Lok syringe and the Magic catheter (Figs 1 and 2).

Currently, two types of epidural catheter adapters are available in our institution: the Safe Trak (Kendall Healthcare Products Co, Mansfield, Mass) and the Perifix (B Braun Medical, Bethlehem, Pa). Both types fit the 1.8F and 1.5F Magic catheter equally well. Because the Safe Trak adapter has teeth on its proximal half, the two halves once tightened cannot be disassembled. On the other hand, the two halves of the Perifix adapter can be disassembled. The compression bushing of the Perifix catheter that tightens against the proximal shaft of the Magic catheter is manufactured with latex; therefore, its use is not recommended for patients who are allergic to latex. We have not encountered any incompatibility between NBCA or absolute alcohol and either of the two types of epidural catheter adapters in clinical use. The cost of each adapter is in the range of \$1.50 to \$2.00; thus, the cost saving compared with a new Magic catheter is considerable.

Another method of salvaging the Magic catheter after a hub failure is to cut the hub and fit a blunt-tip needle into

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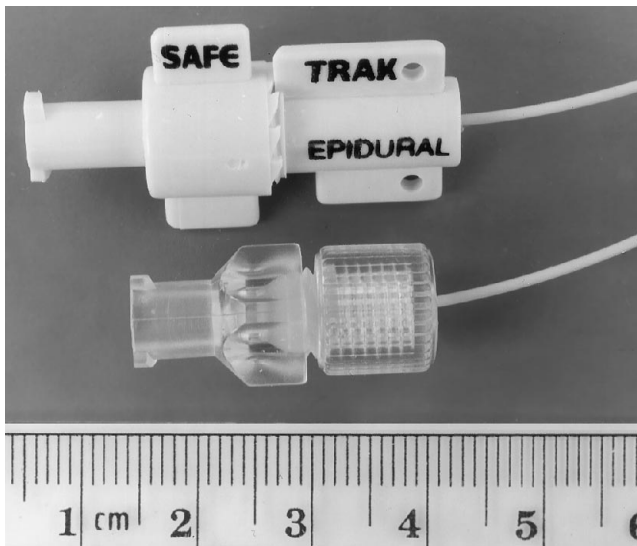


Fig 1. Safe Trak (*top*) and Perifix (*bottom*) epidural catheter adapters connected to 3F proximal shafts of Magic catheters following removal of fractured hubs.

the 3F proximal shaft; however, there is some question as to whether a water-tight connection can be maintained during a prolonged procedure.

In conclusion, this salvage technique eliminates the need to remove the Magic catheter prematurely when the hub fractures in situ during AVM embolization. The cost and time savings as well as the reduction in stress for the patient may be significant.

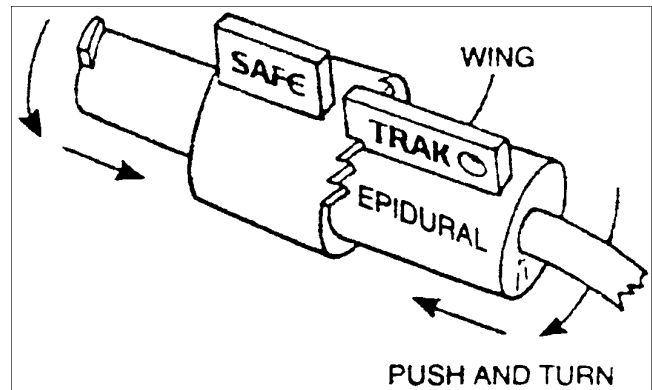


Fig 2. Direction for assembly of Safe Trak adapter. Push the two adapter halves together and turn until threads engage for connection. Continue to turn (three complete turns) until the wing hits stop and the adapter halves can no longer be turned. The label *Safe Trak* should now appear on the aligned wings.

References

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