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LETTER TO THE EDITOR

Embolization of an AVM with acrylic glue through a new microcatheter with detachable tip: an amazing experience

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Sir,

We recently treated a patient with a right temporal arteriovenous malformation (AVM) by injecting acrylic glue through a new microcatheter with a detachable tip (Sonic, Balt, France)—with unexpected results.

A 40-year-old male patient presented with epilepsy. Cranial computerized tomography (CT) and magnetic resonance examinations revealed a right temporal AVM that was 6×5×3 cm. Cerebral digital subtraction angiography (DSA) showed the presence of an AVM filling from the inferior truncus branches of the right middle cerebral artery and draining through multiple cortical veins. There were no arterial feeder aneurysms or venous drainage stenosis. Based on these DSA findings, we planned an embolotherapy.

We first catheterized the right internal carotid artery with a guiding catheter (Envoy Cordis, Miami, FL) and then navigated the new detachable flow-directed tip plus braided microcatheter (sonic) to the AVM nidus with its own microwire (model Steel007; Balt Extrusion, Montmorency, France). The microcatheter has three markers on its distal part, with the most distal one indicating the end of the microcatheter, the middle one indicating the detachment zone and the proximal one marking the maximum permitted reflux point. To evaluate the flow dynamics of the lesion and to confirm the ideal wedge position of the microcatheter, we carried out several intranidal injections through the microcatheter.

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A mixture of 0.5 ml n-butyl-2 cyanoacrylate (NBCA) (Histoacryl; B. Braun, Melsungen, Germany) diluted with 3.5 ml ethiodized oil (Lipiodol; Guebert Laboratories, Aulney-sous-Bois, France) was prepared (12.5% diluted glue). This mixture was injected as a 16-min-long single injection, with several reopenings of the different portions of the nidus following waiting intervals for backflows. Repeated flushings with a 5% dextrose solution were carried out during these waiting intervals to clean the inside of the microcatheter and consequently prevent premature polymerization that would lead to blockage of the microcatheter. After the glue reflux had reached the maximum permitted point at which the distal tip could be detached, we waited for approximately 3 min to ensure that the distal tip had been fully glued. The microcatheter was then retracted; however, the detachable distal tip did not detach but was removed together with the entire microcatheter.

Subsequent control cerebral angiograms showed an occlusion nearly 50% the size of the lesion without any complications, such as non-target embolization or drainage vein thrombosis. The patient was then transferred to the neurointensive care unit for monitoring. The mean arterial blood pressure was maintained at approximately 10–15% below baseline for 24 h to minimize the possibility of normal pressure breakthrough. A control cerebral CT carried out after the procedure revealed no procedure-related hemorrhage.

The embolization of brain AVMs with liquid-embolizing agents, such as cyanoacrylates derivatives or Onyx (ethylene vinyl alcohol copolymer), is a well-known and accepted treatment option [1, 2]. Cyanoacrylate derivatives are widely used to occlude the AVM nidus. However, they are far from being satisfactory embolic liquids due to the risk of gluing the catheter to the artery, which can result in serious complications [3]. It can be hypothesized that the new microcatheter with a detachable tip will solve this

problem. Although the microcatheter was manufactured for the injection of Onyx, it can also be used for injecting cyanoacrylate derivatives without fear of gluing the tip of the catheter to the artery.

Our experience with the case presented here shows that a prolonged injection of diluted acrylic glue through this new detachable tip microcatheter is a safe approach. We also show that the detachable tip can not be retrieved after the injection. However, our aim was to retain the detachable tip of the catheter inside the lesion following the injection of more diffusible, less concentrated glue for as long as possible using an exaggerated backflow technique. The duration of the injection in our case was long enough to allow gluing of the microcatheter for an acrylic derivative embolization, even in a diluted state. We allowed the embolizing mixture to backflow to the point needed to detach. Surprisingly, the detachable tip was not retained despite the very long injection time of 16 min.

By allowing for an prolonged injection time and using the exaggerated backflow technique described here, we achieved a multi-compartmental widespread embolization similar to that obtained with Onyx. This would otherwise not have been possible with a single catheter position and using acrylic glue. The final glue caste after the entire injection illustrates the extent of NBCA penetration (Fig. 1).

We do believe that separation of the whole catheter from the cast without detachment of the detachable tip presents a definite potential risk. The delayed tip detachment after separation of the microcatheter from the cast can cause non-target embolization because of the weakening of the detaching zone during manipulations and retractions.

Points requiring attention are the possibility of the distal tip becoming unglued due to manufacturing differences between this new catheter and the old models and isolated production errors in the catheter described here. The possibilities and potential uses of this microcatheter with diluted cyanoacrylate derivatives need to be verified by more clinical experience.

Fig. 1 Non-subtracted view of the glue cast after the treatment shows the extent of n-butyl-2 cyanoacrylate penetration

Conflict of interest statement We declare that we have no conflict of interest.

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