Novel Use of the “Buddy” Wire

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Summary

During interventional procedures the tortuosity of the vasculature hampers catheter stability. The buddy wire may be used to aid and maintain vascular access. We describe a case of acute subarachnoid haemorrhage secondary to dissecting aneurysm of the vertebral artery. We discuss the value of the buddy wire during balloon occlusion of the vertebral artery not as it is typically used, but to actually prevent the balloon repeatedly entering the posterior inferior cerebellar artery during the procedure.

Introduction

In many cases of interventional radiology we encounter patients with tortuous vessels presenting us with difficulty in terms of vascular access, particularly during endovascular procedures. The use of a buddy wire has traditionally been a useful adjunct in increasing the stability of the guiding catheter in these situations allowing the successful completion of the procedure. In contrast to its normal role we report the novel use of a buddy wire, not to aid access but to prevent access to a vessel during a permanent balloon occlusion.

Case Report

A 52-year-old woman was referred to our institution. She had presented to another hospital with acute onset of headache and noncontrast CT confirmed the presence of subarachnoid haemorrhage. The distribution of this was quite

diffuse involving both suprasellar and posterior fossa cisterns. Cerebral angiography was then performed which revealed a fusiform dilatation of the right vertebral artery (Figure 1). This originated after the origin of the ipsilateral posterior inferior cerebellar artery (PICA). The remainder of the cerebral angiogram was normal and we attributed the patient’s subarachnoid haemorrhage to this dissecting aneurysm of the intradural right vertebral artery. After discussion with the patient and primary care team we decided that the best endovascular treatment would be to occlude the right vertebral artery permanently.

The procedure was performed under general anaesthetic and systemic heparinisation. Permanent occlusion was performed using a 0.7 ml Golden Balloon (BALT, Montmorency, France). Standard access was gained to the right vertebral using a 6Fr guide catheter. A 0.7 ml golden balloon was placed on a flow dependent Magic microcatheter (BALT, Montmorency, France). This was then placed in the right vertebral via the guide catheter. A left femoral arterial puncture was also made and a 5Fr catheter placed in the left vertebral artery.

The balloon whist in a deflated position was advanced through the guide catheter into the vertebral artery. On entering the intradural portion the balloon became wedged in the orifice of the PICA (Figure 2) and failed to continue up the vertebral artery. Multiple attempts were made to pass the PICA origin with the balloon slightly inflated (Figure 3) but to no avail. A 0.14 Transcend wire (Boston Scientific, Miami, Florida) was then easily placed through

Figure 1 Right vertebral angiogram demonstrates a fusiform supra-PICA aneurysm of V4 (arrow). The PICA can be seen to originate below (arrowhead).

Figure 2 On attempting to advance the balloon (arrow) is now wedged in the origin of the right PICA.

the right sided guide catheter and placed easily distal to the PICA origin (Figure 4). This 'buddy' wire was used to try and aid the stability of the Magic microcatheter and hence aid its advance to the aneurysm. Despite repeated attempts the PICA origin continued again to obstruct our system. The buddy wire was next placed in the PICA itself and during this attempt the balloon passed beyond the PICA on the first pass (Figure 5). This allowed successful completion of the procedure with inflation of the balloon distally (Figure 6) without compromise to the PICA (Figure 7).

Discussion

Vertebral artery dissection is an uncommon but important cause of subarachnoid haemorrhage, the incidence in the order of 2.3%¹ and 7%² of all acute subarachnoid presentations. However the natural history of vertebral artery dissection with a significant rate of re-haemorrhage up to 58%³ dictates early intervention. The method of endovascular treatment varies depending on the relationship of PICA, collateral supply, configuration of the aneurysm and other parameters. In our case, a fusiform supra-PICA aneurysm, we chose to perform a proximal balloon occlusion.

The balloon occlusion system is flow directed and features a detachable 0.7 ml balloon placed on a 1.2 French catheter. The disadvantages are that the ability to place, steer and direct the catheter is limited by the lack of rigidity in addition to the precarious nestling of the balloon on the catheter tip. In this instance we encountered the repeated entering of the balloon and catheter into the smaller PICA rather than advancing toward the aneurysm. The buddy wire was then introduced in through the guide catheter and distal to it to aid the passage of the balloon utilising the wire as it is traditionally used, though this failed. The success of the procedure was ultimately due to the fact that we then placed the wire in the PICA impeding the entrance of the catheter to the vessel and allowing the completion of the procedure.

Failure of the balloon to advance was likely due to the close proximity of the origin of the PICA to the turn in the V4 segment of the vertebral artery and the wider profile of the balloon tip. Furthermore the success is in part due to the fact that PICA artery is quite narrow in

Figure 3 On further attempts the balloon continues to enter the PICA even with the balloon slightly inflated.

Figure 4 The buddy wire is passed distal to the PICA origin to the level of the aneurysm but on this attempt the balloon continues to insert into the PICA.

Figure 5 Now with the buddy wire in the PICA itself the balloon easily passes the PICA origin to advance toward the aneurysm.

Figure 6 The balloon is placed in the correct position proximal to the aneurysm and inflated to occlude the vessel.

Figure 7 The post-procedural angiogram without the buddy wire shows complete vertebral occlusion with preservation of the PICA.

calibre and it may well not have been of value in a larger bore vessel.

The value of a buddy wire is much appreciated by those in interventional endovascular work. It is used extensively in cardiology as a

lesion protector during initial experience with fixed wire angioplasty⁴. This secondary wire assists in many of the challenges that are faced in percutaneous cardiology techniques going beyond simply issues of accessing tortuous vessels⁵.

Since the original concept began there have been a number of alternative uses of the buddy wire in cardiology including its use in the deployment of migrated stents⁶ and the use of two simultaneous buddy wires⁷, retrograde deployment among others. Within neuroradiology the buddy wire is almost solely used for the maintenance of a stable guide catheter position. From our literature review only two articles are published which describe the use of the buddy wire technique in interventional intracranial procedure. Both these are related to the guide catheter positioning, either by remaining within the guide catheter lumen⁸ or passing distal to it⁹ and both relate to the coiling of intracranial aneurysms.

In neurointerventional procedures, as illustrated in our case, we often find that the catheter consistently enters smaller calibre vessels that obstruct its advancement. We have shown that the introduction of a buddy wire in these cases can aid in blocking access to these vessels. Whilst this additional wire may increase the risk of dissection and thrombotic complications we do feel that this novel use of the buddy wire can be certainly well utilised in the appropriate procedural setting.

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