Endovascular treatment of wide-necked aneurysms is a challenge in itself, especially, if branches are incorporated in the neck or base of the aneurysm. The problem is greater if the availability of technical resources and expertise is limited. Difficult endovascular treatment options in such cases include the use of double balloon remodeling and bilateral intracranial stents with associated higher complication rates. However, with availability of a new neck bridging device, treatment of such aneurysms is becoming relatively easy. We present a case of the ruptured basilar top aneurysm with incorporated bilateral posterior cerebral artery origins treated with pCONus stent-assisted coiling. We intend to draw the attention of neurointerventionists to newly available neck bridging device which has lower thrombogenicity than stents, requires a shorter learning curve, are compatible with routine delivery catheters, can be deployed quickly and can be performed even on a single plane digital subtraction angiography equipment with minimal expertise.

**Keywords:** Assisted coiling, neck bridging device, pCONus stent, wide-necked aneurysms

## Introduction

Endovascular approach for intracranial aneurysms has become the preferred treatment when compared with microsurgical clipping primarily due to lower morbidity and mortality rates.[1](#) However, the treatment of wide-neck aneurysms (defined by neck diameters >4 mm or dome-to-neck ratio <2), is challenging. The difficulty is greater when incorporated branches need to be preserved while attempting complete exclusion of the aneurysm from circulation.

Over the past decade, many tools and techniques have been used to overcome the technical limitations. These include balloon remodeling technique,[2,3](#) multiple microcatheters,[4,5](#) and intracranial stents.[6,7](#) However, placement of additional hardware into small intracranial vessels is not only technically demanding but it also increases the risk of endothelial injury and thromboembolism. The pCONus stent (phenox, Bochum, Germany) is a newer neck bridging device which has been recently developed to occlude the complex-wide neck aneurysm with safety. Any new invention which reduces the complication rate is always welcome.

## Case Report

A 59-year-old male, nondiabetic, nonsmoker, known hypertensive on adequate treatment, presented with sudden onset of headache followed by vomiting, seizure, and loss of consciousness. The patient was not on any anticoagulants. On examination, the patient was disoriented (Glasgow coma scale 14/15), with pupils equal in size and reacting to light-grade 2 by Hunt and Hess scale. NCCT head revealed a 2.5 cm × 3 cm hyperdense round extraaxial lesion in the interpeduncular cistern with subarachnoid and intraventricular hemorrhage (Fisher scale Grade 4). However, there was no hydrocephalus. CT angiography revealed a 2.5 cm × 3 cm hyperdense round extraaxial lesion in the interpeduncular cistern with subarachnoid and intraventricular hemorrhage (Fisher scale Grade 4). However, there was no hydrocephalus. CT angiography revealed a 12 mm × 11.2 mm, wide neck saccular aneurysm from basilar top with incorporated origins of posterior cerebral artery (PCA), with surrounding...
clot. The Patient was considered for endovascular treatment with neck bridging (pCONus) device. Hence, we initiated dual antiplatelet medication with aspirin and prasugrel 3 h before the start of the procedure. We did complete angiogram of brain vessels which showed another aneurysm measuring 4 mm × 3 mm, arising from intermedial wall of cavernous segment of the left internal carotid artery (ICA) was noted which was presumed to be unruptured in view of localization of subarachnoid hemorrhage. Using 6F Neuron Max sheath placed in distal V2 segment of the left vertebral artery, three-dimensional runs were obtained to determine the exact morphology of the aneurysm, the parent vessel, and the incorporated PCA arteries. Using Vasco microcatheter, the device measuring 10 mm × 4 mm × 20 mm (diameter of the petals and shaft were 10 mm and 4 mm, respectively, length of the shaft-20 mm) was placed in situ with petals within the aneurysmal sac, at the level of the neck with the shaft in basilar artery. Using a microcatheter with the tip in aneurysmal sac eight micro coils were placed, downsizing from 12 mm. Postcoiling check run showed preserved flow into bilateral PCA arteries with good coil density in aneurysmal sac [Figure 1]. We took serial control angiographic runs for 30 min after the deployment of pCONus device to look for any thrombus formation and preservation of PCA flow. The patient was extubated in angiographic suite after the procedure. He was discharged with modified Rankin Score of 1 on the 14th day with advice to come for regular follow-up and planned treatment of ICA aneurysm.

**DISCUSSION**

Wide neck bifurcation aneurysms remain a challenge, both for surgical as well as endovascular techniques. Innovative techniques and hardware have been introduced to overcome the technical limitations associated with treating such wide-neck aneurysms, including three-dimensional coils, balloon remodeling technique, multiple microcatheters, intracranial stents, flow diverter devices and neck-bridge device. The aim is to exclude the aneurysm completely while preserving the branches. Ensuring safety of the branches during assisted coiling requires, preferably biplane digital subtraction angiography equipment and expert supportive staff that are not widely available in Indian setup.

With balloon remodeling technique, there is increased risk of intimal injury and vascular stretching due to balloon manipulation and higher chances of aneurysmal rupture because of higher intra-aneurysmal forces generated due to occluded aneurysm neck. Moreover, postdetachment, the coils may herniate into the parent vessel or branches.

Various patterns of placement of stents, viz., “X,” “Y,” “T” or crossover are used in stent-assisted coiling to preserve the involved branches. Stents provide possibility of complete obliteration of wide-necked aneurysms, but require long-term antiplatelet agents to prevent thromboembolism. Moreover in-stent stenosis, stent malposition and vascular dissection may occur during stent manipulation.

---

**Figure 1**: Three-dimensional (a) and digital subtraction angiography run (b) revealed a 12 mm × 11 mm basilar top aneurysm incorporating the origins of both posterior cerebral artery. (c and d) Lateral and anteroposterior digital subtraction angiography views to confirm pCONus device placement with petals (arrows) covering the neck of the aneurysm and the shaft of the device in the distal basilar artery. Coiling was started with a framing three-dimensional coil as per routine practice and completed with two-dimensional coils to achieve complete packing depicted on (e and f) anteroposterior and lateral digital subtraction angiography views.
Technical difficulty to wire the branches may preclude this option.

Flow diversion is not recommended in ruptured cases.[7]

Certain new devices are now available, such as barrel stent,[9] eClips,[9] woven endobridge,[10] pCONus,[8,11-14] and pCanvas.[14]

Neck bridging devices are a relatively new addition to the armamentarium of a neurointerventionist. The initial data from the Western literature of pCONus is very encouraging in complex aneurysms with good results, low thrombogenicity, and low complication rates.

The pCONus has a stem that is positioned in the parent vessel, the basilar, in our case. The petals are placed in the lumen of the aneurysm just distal to the neck, to prevent the coil mass from getting dislodged into the vessel lumen. There are various technical advantages, such as very low (<5%) ratio of metal to artery surface leading to lower thrombogenicity and compatibility with several catheters. It is easier to achieve complete packing of the aneurysm with no residual neck with this device than with two stents or balloons.

This device has recently become available on the Indian subcontinent. In our case, this neck bridging device (pCONus) was preferred overplacement of stents in both branches which was technically difficult and required exquisite monitoring preferably in two planes. At our center, a single plane digital subtraction angiography suite is available, making the procedure even more laborious. Additional benefits included lower cost and lesser requirement of antiplatelet therapy as compared to stents.

As per our experience, easy and quick deployment (takes far less time than placement of two stents or balloons) and possibility of complete redeployment so as to ensure optimum placement and good visualization on a single plane make the procedure simple even in a peripheral center with few supporting hands.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Molyneux A, Kerr R, Stratton I, Sandercock P, Clarke M, Shrimpton J, et al. International Subarachnoid Aneurysm Trial (ISAT) of neurosurgical clipping versus endovascular coiling in 2143 patients with ruptured intracranial aneurysms: A randomised trial. Lancet 2002;360:1267-74.
2. Cloft HJ, Joseph GJ, Tong FC, Goldstein JH, Dion JE. Use of three-dimensional guglielmi detachable coils in the treatment of wide-necked cerebral aneurysms. AJNR Am J Neuroradiol 2000;21:1312-4.
3. Moret J, Cognard C, Weill A, Castaings L, Rey A. The “Remodelling technique” in the treatment of wide neck intracranial aneurysms. Radiographie and clinical follow-up in 56 cases. Interv Neuroradiol 1997;3:21-35.
4. Kwon OK, Kim SH, Kwon BJ, Kang HS, Kim JH, Oh CW, et al. Endovascular treatment of wide-necked aneurysms by using two microcatheters: Techniques and outcomes in 25 patients. AJNR Am J Neuroradiol 2005;26:894-900.
5. de Paula Lucas C, Pietrin M, Spelle L, Moret J. Stent-jack technique in stent-assisted coiling of wide-neck aneurysms. Neurosurgery 2008;62:ONS414-6.
6. Yun JH, Cho CS. Experiences of neuroform stent applications for ruptured anterior communicating artery aneurysms with small parent vessel. J Korean Neurosurg Soc 2010;48:53-8.
7. Lubiez B, Collignon L, Raphaelli G, Pruvo JP, Druenceau M, De Witte O, et al. Flow-diverter stent for the endovascular treatment of intracranial aneurysms: A prospective study in 29 patients with 34 aneurysms. Stroke 2010;41:2247-53.
8. Fischer S, Weber A, Tischert A, Bence K, Kowoll A, Weber W, et al. Single-center experience in the endovascular treatment of wide-necked intracranial aneurysms with a bridging intra-extra-aneurysm implant (pCONus). J Neurointerv Surg 2016;8:1186-91.
9. Available from: http://www.veniceinterventionalcardiology.com/ ppt2016/2016_05_05_/Valvassori.pdf. [Last accessed on 2017 Oct 10].
10. Lubiez B, Mine B, Collignon L, Brisbois D, Duckwiler G, Strother C, et al. WEB device for endovascular treatment of wide-neck bifurcation aneurysms. AJNR Am J Neuroradiol 2013;34:1209-14.
11. Pérez MA, Bhogal P, Moreno RM, Wendl C, Bätzner H, Ganslandt O, et al. Use of the pCONus as an adjunct to coil embolization of acutely ruptured aneurysms. J Neurointerv Surg 2017;9:39-44.
12. Lubiez B, Morais R, Alghamdi F, Mine B, Collignon L, Eker OF, et al. The pCONus device for the endovascular treatment of wide neck bifurcation aneurysms. J Neurointerv Surg 2016;8:940-4.
13. Gory B, Aguilar-Pérez M, Pomero E, Turjman F, Weber W, Ficher S, et al. One-year angiographic results after pCONus stent-assisted coiling of 40 wide-neck middle cerebral artery aneurysms. Neurosurgery 2017;80:925-33.
14. Pérez MA, Henkes H, Bouillon P, Brina O, Slater LA, Pereira VM, et al. Intra-aneurysmal hemodynamics: Evaluation of pCONus and pCANvas bifurcation aneurysm devices using DSA optical flow imaging. J Neurointerv Surg 2016;8:1197-201.