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A BRIEF REVIEW ON pCONus DEVICE IN THE ENDOVASCULAR TREATMENT OF WIDE-NECK INTRACRANIAL ANEURYSMS

KEY WORDS:

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ABSTRACT

Endovascular treatment of wide-neck intracranial aneurysms poses serious challenges due to difficulty in achieving durable occlusion while preserving the parent and branch vessel patency. The pCONus device is a neck-bridging stent-like implant used in the endovascular management of wide-neck intracranial aneurysms so as to facilitate coil embolization of such aneurysms. This procedure has high technical success with low morbidity and mortality. This is a short review based on published literature on the pCONus device defining its role in the treatment and management of wide-neck intracranial aneurysms.

INTRODUCTION

Endovascular treatment of intracranial aneurysms are considered to be challenging as usually they have a wide neck and majority of them are located at one of the bifurcation of the Willis polygon.[1] The primary treatment for many aneurysms is endovascular coil embolization, however, because of broad necks and bifurcation anatomy treatment of intracranial aneurysms is difficult mainly due to coil instability and increased risk of coil protrusion into parent vessels. Ballon remodeling, stent-assisted coiling, Y-stenting, and intrasaccular flow disruptors are the traditional methods used in the treatment of wide-neck intracranial aneurysms. The pCONus has emerged as an effective neck-bridging device that facilitates coil support and improves technical feasibility for challenging aneurysms.[2-4] This brief review is an attempt to assess the safety and efficacy of pCONus device in the treatment of complex aneurysms based on published literature.

Usage

The pCONus device is widely used for wide-neck bifurcations aneurysms including both ruptured and unruptured aneurysms located at middle cerebral artery bifurcation, basilar apex, anterior communicating artery and internal carotid artery terminus.[5]

Clinical Significance

Some of the earlier studies have shown feasibility and safety of the pCONus device. As seen in a few cohort studies of treatment of wide-neck intracranial aneurysms with pCONus, device associated complications were rare and complete occlusion were achieved. Procedural deployment was successful in all patients.[6-7] In another multicentre retrospective study, major complications was extremely low with zero mortality. Follow up of the patients revealed consistency in occlusion.[8] In a systematic review and meta-analysis study, it was observed that the cases showed a 100 % technical success rate and a 0 % technical complication rate with a 0 % and 7 % perioperative mortality and morbidity respectively and a 2 % treatment related long-term neurological deficit. Complete occlusion rate was found to be 60 % with a retreatment rate of 14 % thereby showing reliability, durability, safety and effectiveness of pCONus device.[9] A prospective multicentric study that focused on wide-necked intracranial aneurysms showed 75 % and 65.6 % occlusion rates at 3-6 months and 7-12 months respectively. This study also revealed the potential advantages of second generation crowns in terms of complete occlusion as compared to first generation devices.[5] In another large retrospective multicentre study involving next-generation devices (pCONus2 and pCONus2-HPC) showed only four device related intra-procedural complications that included three cases of asymptomatic, temporary thrombus formation and one mortality associated with branch vessel occlusion and aneurysm re-bleeding in a ruptured case. Post-procedural device related complications were nil. In the same study, at the time of treatment occlusion was achievable in approximately 89.2 % of the cases and 73.3 % at 6 months thereby showing good short-term safety profiles.[10] A single centre prospective study involving ruptured and unruptured wide-necked intracranial aneurysms showed acceptable aneurysm occlusion in all cases with satisfactory occlusion in 81 % of the cases as revealed in the follow up angiography. No device migration or intimal hyperplasia was observed.[11] A retrospective analysis involving 43 wide-neck bifurcation aneurysms showed 0 % mortality rate with no post-operative neurological deficit or long term complications. However, procedural angiographic complications were noted in five cases. Satisfactory occlusion rate with complete and neck remnant was noted in 86 % and an aneurysm remnant rate of 14 %. Retreatment was needed in 9 % cases. There was no branch occlusion or in-stent stenosis.[12]

Safety And Complications

Thromboembolism, coil-related issues and device-specific technical difficulties are some of the common complications usually observed in this implant. However, as seen in published literature overall morbidity and mortality rates are quite low as compared to the traditional endovascular treatments. Follow-up imaging is necessary to prevent any long-term intimal hyperplasia and in-situ branch occlusion.

Advantages And Limitations

The pCONus implant offers significant advantages as compared to the traditional strategies. The pCONus provides less metal coverage at bifurcations thereby simplifying technical complexity and facilitates simpler deployment strategy as compared to stent assisted or Y-stenting. It allows both preservation of branch vessel patency and immediate occlusion in contrast to flow diverting stents. In comparison to balloon-assisted coiling, persistent neck coverage is seen in pCONus. However, this strategy has certain limitations that

includes dual antiplatelet therapy requirement and shallow or smaller aneurysms showing lesser or reduced effectiveness.[13-15]

Limitations

The limitation of this study is its retrospective study design and limited comparative data.

CONCLUSION

As per published literature, it can be concluded that the pCONus device is an emerging neurointerventional strategy which is effective and viable in the endovascular coiling of complex wide-neck intracranial aneurysms offering high success rates, safety and occlusion rates with low morbidity and mortality. Further prospective studies and long-term follow up shall enable to determine the comparative effectiveness and durability of pCONus device among the emerging endovascular neurointerventional treatments of challenging and complex intracranial aneurysms.

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