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Single stent transverse-configuration in assisted coiling treatment of a double anterior communicating aneurysm

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ABSTRACT

The stent-assisted coiling technique is more and more used for the anterior communicating aneurysms (AcomA) treatment due to the increasing incidence of complex and wide-necked aneurysms at this level. Different arrangements of a single stent for assisted coil embolization have been described. The transverse-configuration from A1-Acom-Contralateral A1 stent-assisted coiling procedure was previously reported as a feasible, effective, and relatively safe endovascular technique used to treat wide-necked complex AcomA aneurysms. In this article, we presented a technique involving transverse stenting through the AcomA via the dominant A1 and discuss some particular technical difficulties.

Keywords
transverse-configuration,
stent assisted coiling technique,
intracranial aneurysm

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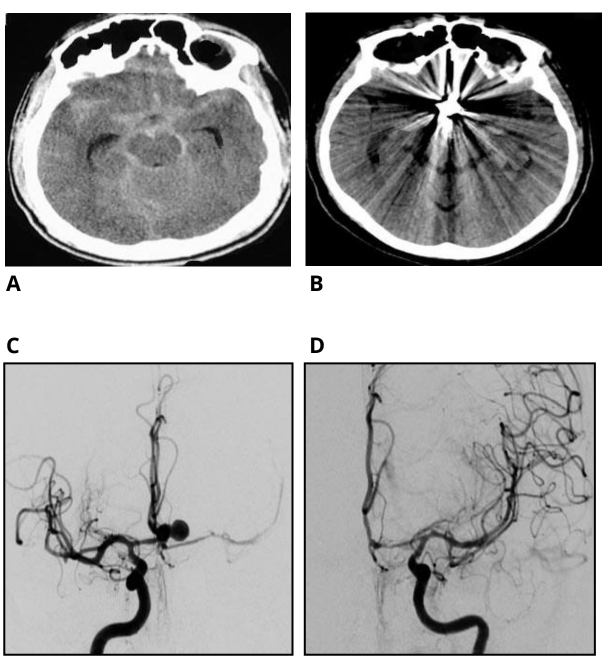
INTRODUCTION

The anterior communicating artery (AcomA) was reported to be one of the most common location of ruptured aneurysms over the last decades. These lesions are of significant importance due to their higher incidence but also to their complex anatomical features, often associated with a wide neck, difficult vascular angles and a variety of abnormalities. The use of self-expanding stents under various arrangements in coil assisted embolization technique can help to optimally treat aneurysms with this location and to achieve more long-term results. Also, due to the numerous disadvantages and technical difficulties specific to double stenting, the single stenting technique seems to be the first option considered in the case of anterior communicating artery aneurysms. In our study we describe the use of a single stent–assisted coiling technique in a transverse configuration for the treatment of double communicating artery aneurysm. The efficacy and limits of this technique were also discussed referring to the few cases already presented in the literature [1,2].

Case presentation

A 51-year-old male patient was transferred to our neurosurgical department from a local hospital for a subarachnoid haemorrhage revealed on cranio-cerebral CT scan. At admission he was conscious, confused, agitated, accusing severe headache. The family declare the onset of symptoms four days ago with progressive evolution and a history of medication-treated hypertension. The brain CT angiography demonstrated a double sac complex AcomA aneurysm as source of hemorrhage. The patient was proposed for an immediately endovascular aneurysm occlusion. A written informed consent was signed by patient family after discussions with the operating team.

The procedure was performed on a biplane angiography system (INFINIX, Toshiba, Canon Medical System) with the patient under general anesthesia. Both carotid arteries were evaluated and a large complex double AcomA aneurysm was angiographicaly documented. A slight right side A1 dominance with a better contrast enhancement of the two aneurysmal sac was noticed. The 3D DSA reconstruction image showed wide-neck involving the entire anterior communicating artery segment.
A single stent support technique in a transversal configuration was deemed necessary for a safe endosaccular coiling with all anterior communicating artery complex branches preservation (Fig 1).



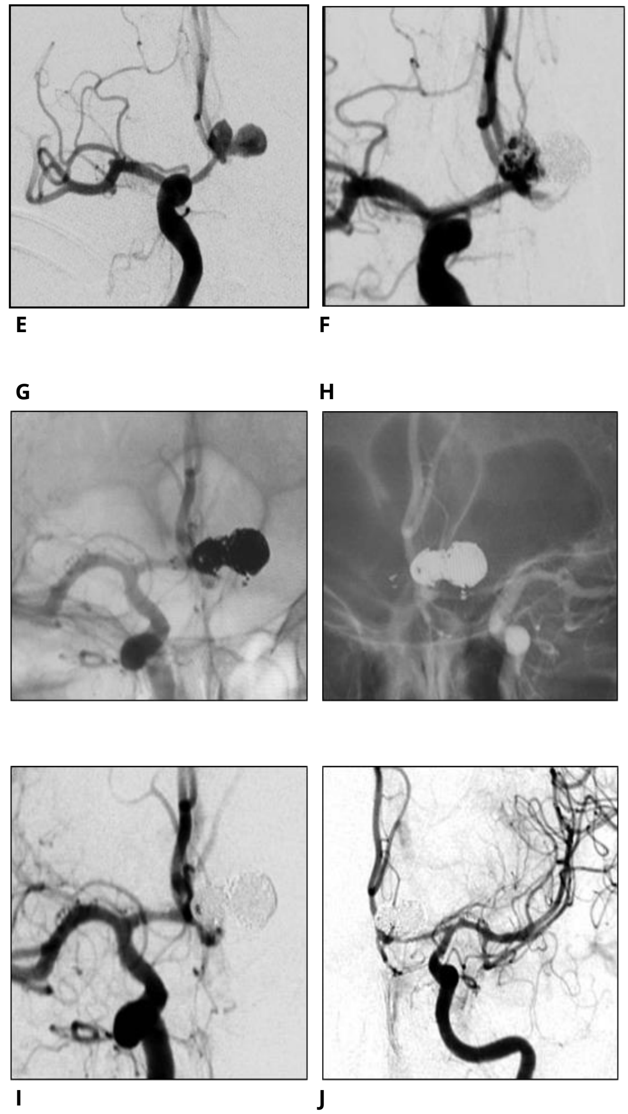


Figure 1. A,B - Brain CT diagnosis highlighting SAH and post interventional brain CT control; C,D,E - ; D,E –DSA from the right and left ICA showing the double AcomA aneurysm; F,G,H,I,J– Intraprocedural DSA images and the final DSA control from both ICA injection.

The patient received 150 mg aspirin before procedure and 5000 IU bolus dose of intravenous heparin was administered after 6F femoral sheath (Merit Medical) placement. A 6-Fr Chaperon guiding catheter was placed at the proximal cervical internal carotid artery carefully advanced over 0.035 glidewire. 3D angiographic imaging working projection was used for the guidance on roadmap images. We use a transvers-configuration stent–assisted coiling technique with step by step trans-stent catheterizing of both aneurysmal sac to avoid multiple catheter maneuvering through the right A1 arterial segment.

A Prowler Select Plus microcatheter (Codman J&J) was then very carefully advanced over a 0.014 Transed microwire (Boston Scientific) via the right A1 through the AcomA into the middle part of contralateral A1. A 4/30 mm Enterprise 2 stent is then deployed from the middle part of the left A1 over the aneurismal neck through the AcomA until the middle part of right A1. After the full deployment of the stents, a Prowler 10 microcatheter is placed through the stent into the large sac aneurysm. Its complete angiographic coil occlusion was followed by the microcatheter repositioning in to the smaller aneurysm and continued coiling until no further coils could be safely deployed within the aneurysm sac. The control DSA images demonstrated a "Raymond class I" complete aneurysm occlusion with no neck remnant, coil herniation, clot formation or branch occlusion, and with no perioperative or postopective complications. A bolus dose of 5 ml of nimodipine (Nimotop, Bayer Health Care AG) diluted in 15 ml of 0.9% NaCl solution was infused through the microcatheter in to the proximal part of right A1 for 10 minutes to combat procedural vasospasm. The patient evolution was favourable, and he was discarded home after 17 days of hospitalization.

Discussion

The large clinical trial studies showed that AcomA is the most common location of ruptured intracranial aneurysm. Treatment of wide-neck AcomA aneurysms with complex anatomy such as double sac aneurysm usually requires a stent assisted coiling technique for a safety and optimal occlusion. The difficulties and complications described for double stenting techniques as insufficient wall apposition and endothelialisation, and increased risk of acute or chronic thromboembolism have made the single stenting technique to be considered as the first option. However, the most used single stenting configurations through the dominant A1 to the ipsilateral or contralateral A2 may not provide sufficient neck coverage for a double wide-necked AcomA aneurysm, resulting in a coil protrusion and normal branches occlusion. For such particular anatomical cases an A1-AcomA-contralateral A1 stenting could be performed. This particular transverse stenting configuration may successfully prevent the aforementioned inconveniences with optimal results on long-term aneurysmal occlusion [2,3,4].

The few reports in the literature on the use of single transverse-configuration stent assisted coiling for AcomA aneurysms have mentioned beside the success of using this technique, the difficulties encountered in its implementation. The technical challenges with possible related complication such as suboptimal stent deployment, dissection and thrombosis may be increased by difficult navigation through even curved and smaller calibre arteries [3,4,5].

Rhoton's publications have shown a higher probability of AcoAnt aneurysm developing as bigger the diameter difference between the bilateral A1 segments. Thus, due to hemodynamic influence, most AcomA aneurysms appear to arise from the dominant A1 segment of the anterior cerebral artery and form as junction aneurysms between the dominant A1, AcomA and A2 ipsilateral. Yasargil reports that 81.3% of ACoAnt aneurysms usually occurred at the junction of the dominant A1 and AcomA and only 18.7% occurred in the middle of the AcomA. This correlate with the fact that only 22% of cases have comparable diameters of A1 segments of the bilateral anterior cerebral arteries, suggesting a relatively low percentage of patients with AcomA aneurysms who may benefit from the application of single stent assisted coiling technique with stent in a transverse A1 to A1 configuration [2,3,6].

Another aspect of the application of the single stenting technique in the transversal configuration is related to the need for a dual femoral approach with double guidance for a retrograde approach through AcomA. Even if there are many reports of this type of approach, we believe that the use of a single guide catheter and a single femoral puncture is sufficient in many of these cases for both stent and coils delivery and a clear view of the lesion and surrounding vascular shaft [2,3].

Conclusions

Any of the strategies for placing a stent for the treatment of an AcomA aneurysm are dependent on the configuration of the aneurysm, the feasibility of incorporating the neck of the aneurysm into the implant, the difficulty of microcatheter crossing of the AcomA channels, and the degree of hypoplasia of one of the A1 segments. The placement of a single transverse-configuration stent via the dominant A1 across the AcomA into the contralateral A1 can be a feasible, efficient and relatively safe endovascular technique for the treatment of a wide-necked double AcomA aneurysm. This could offer a good long-term occlusion rates with reasonable complication rate.

References

1. Ahmed, M. E., Lum, C., Lesiuk, H., Iancu, D., & dos Santos, M. (2014). Navigation of stents across communicating arteries for aneurysm embolization. Canadian Journal of Neurological Sciences, 41(2), 193-199.
2. Adeeb, N., Griessenauer, C. J., Patel, A. S., Foreman, P. M., Baccin, C. E., Moore, J. M., ... & Thomas, A. J. (2018). The use of single stent-assisted coiling in treatment of bifurcation aneurysms: a multicenter cohort study with proposal of a scoring system to predict complete occlusion. Neurosurgery, 82(5), 710-718.
3. Ban, S. P., Kwon, O. K., & Kim, Y. D. (2022). Long-Term Outcomes of Placement of a Single Transverse Stent through the Anterior Communicating Artery via the Nondominant A1 in Coil Embolization of Wide-Necked Anterior Communicating Artery Aneurysms. Journal of Korean Neurosurgical Society, 65(1), 40.
4. Choi, H. H., Cho, Y. D., Yoo, D. H., Ahn, S. J., Cho, W. S., Kang, H. S., ... & Han, M. H. (2019). Stent-assisted coil embolization of anterior communicating artery aneurysms: safety, effectiveness, and risk factors for procedural complications or recanalization. Journal of NeuroInterventional Surgery, 11(1), 49-56.
5. Kocur, D., Zbroszczyk, M., Przybyłko, N., Hofman, M., Jamróz, T., Baron, J., ... & Kwiek, S. (2016). Stent-assisted embolization of wide-neck anterior communicating artery aneurysms: Review of consecutive 34 cases. Neurologia i Neurochirurgia Polska, 50(6), 425-431.
6. Raslan, A. M., Oztaskin, M., Thompson, E. M., Dogan, A., Petersen, B., Nesbit, G., ... & Barnwell, S. L. (2011). Neuroform stent-assisted embolization of incidental anterior communicating artery aneurysms: long-term clinical and angiographic follow-up. Neurosurgery, 69(1), 27-37.