International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2015): 78.96 | Impact Factor (2015): 6.391

Endovascular Treatment of Wide Neck Brain Aneurysm – WEB Device

Sirakov S.[1], Popivanov P.[2], Sirakov A.[3], Sirakova K.[4]

[1, 3]UH St.IvanRilski – Sofia

[2, 4]UH Alexandrovska– Sofia

1. Introduction

For many years endovascular treatment is a method of choice in treating ruptured and unruptured aneurysms [1-4].Up till now many different endovascular devices to treat intracranial aneurysms have been designed and enhanced. This is needed due to the large diversity of the anatomy and structural specifics of brain aneurysms.The standard coiling as well as balloon- and stent assisted coil introduction, using flow diverters and other techniques aim at protecting the vital cerebral arteries, the performant branches by preserving their lumen passage and thus make the treatment of even complex aneurysm configurations efficient and safer.[5-9]

WEBdevice is an intra-secular ellipsoid of interwoven microscopic threads, envisaged for embolization of wide neck aneurysms, once its placement in the aneurysmal sac results in complete isolation of the aneurysm from blood circulation.There are several WEB devices already available for endovascular treatment: WEB-DL, WEB-SL and WEB-SLSin various sizes.

WEBimplants are delivered like all other systems and the techniques they use for endovascular treatment.These devices are introduced by microcatheters of inner diameter > 0,027". Placing such device type requires precise assessment of the aneurysm anatomy (morphology, cross-sectional diameter, height, and neck size)and for it the diagnostic methods of MRA, CT angiography and 3Dangiography are being used.The aim is to define as accurate as possible the device type, needed for a given aneurysmand also its proper sizing. The size defining is an important part of the procedure. Using smaller than a given aneurysm matching device may provoke potentially insufficient aneurysm neck coverage, which results in its incomplete treatment and increases the chance of rechanneling. On other hand if the device is larger than needed for the given aneurysm theoretically there is no potential risk of aneurysmal sac rupture, since the radial force is very low, but there is a risk part of the device to protrudeinto a vital vessel.(10-12)

2. Clinical Case

This case describes our first experience with WEB device as one of the first 5 countries worldwide, using this device.

51-year old female was hospitalized in our clinic due to incidentally discovered, not-bleeding aneurysm(4,9/4,4 mm) of the middle cerebral artery. She had no medical history of hypertension, diabetes mellitus or head trauma.

The patient was put under general anesthesia and preventively given 2500 units of heparin to increase the activated partial thromboplastin time (aPTT). Following Seldinger catheterization of the right femoral artery a preoperative pan-angiography and 3d-post processing was carried out to enable precise selection of the right device size.

Figure 1: Data on right middle cerebral artery aneurysm

The completed diagnostic and three-dimensional 3D angiography revealed presence of aneurysm of 5.2 mm diameter on the bifurcation of the right middle cerebral artery.

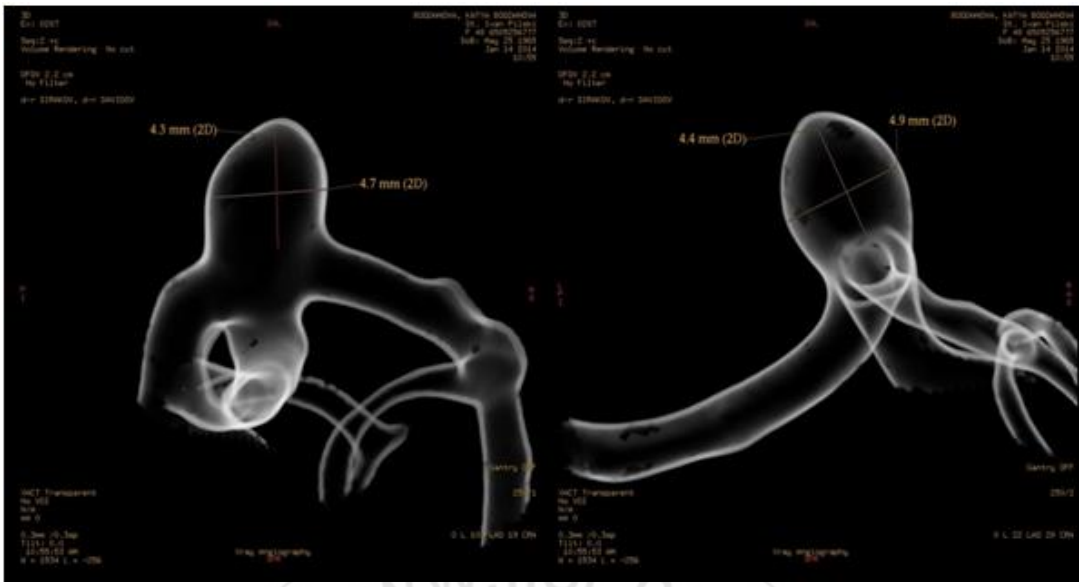

Figure 2: The 3Dangiography image, visualizing exact dimensions and anatomic characteristicsof the aneurysm

After defining the exact Web device size, we proceeded with selective catheterization of the aneurysmal sac.For this purpose micro-catheter Via 0,027" and micro-guidewire Syncro 2 0,014"were used. By roadmapangiography the aneurysmal sac was selectively catheterized placing the micro-catheter tip in its center.Then it was followed by delivery of the WEB device, being applying in the aneurysmuntil totally filling up its volume.The control angiography after detaching the WEB device didn't visualize filling out of aneurysmal sac by contrast matter – an image, corresponding to total obliteration of the brain aneurysm.Also there was no visualization of prominence of the device to the lumen of the right middle cerebral artery.

Figure 3: WEB placement using micro-catheter; The proximal device marker is clearly seen in the aneurysmal sac

Two control contrast injections were applied (at 15 and 30 minute)not indicating any change in the image of the aneurysm treated.

Figure 4: The final angiography result demonstrates complete isolation of the aneurysm from the patent vital vessels.

The patient had no postoperative complications or added neurological deficit. 5 days later she was discharged from the clinic.

The follow up control angiography held 3 months later does visualize any data for rechanneling of the treated aneurysm.

Figure 5: Control angiography with no data of rechanneling of the treated aneurysm

3. Discussion

The WEB device is a new, innovative endovascular technique, dedicated to the treatment of ruptured or unruptured wide neck aneurysms. The initial clinical practice reveals high applicability of this treatment with a good safety profile (no mortality and low chance of rechanneling). The efficacy is still to be precisely analyzed with an assessment of the long-term treatment stability, yet the initial results prove promising in case of the right choice and assessment of the device.

4. Conclusion

Our initial experience using the innovative WEB creates the impression of technically easy to use low-risk treatment of ruptured and non-ruptured wide neck cerebral aneurysms.

References

[1] Molyneux A, Kerr R, Stratton I, et al., International Subarachnoid Aneurysm Trial (ISAT) Colaborative Group; International Subarachnoid Aneurysm Trial (ISAT) of neurosurgical clipping versus endovascular coiling in 2143 patients with ruptured intracranial aneurysms: a randomised trial; *Lancet*. 2002; 360:1262-1263.
[2] Mc Dougall CG, Spetzler RF, Zabramski JM, et al.; The Barrow Ruptured Aneurysm Trial; *J Neurosurg*. 2012; 116:135-144.
[3] Cognard C, Pierot L, Anxionnat R, et al.; Results of embolization used as the first treatment choice in a consecutive non selected population of ruptured aneurysms: clinical results of the Clarity GDC study; *Neurosurgery*. 2011; 69: 837-841.
[4] Pierot L, Spelle L, Vitry F, for the ATENA investigators; Clinical outcome of patients harbouring unruptured intracranial aneurysms treated by endovascular approach: results of the ATENA trial; *Stroke*. 2008; 39: 2497-2504.
[5] Pierot L, Wakhloo A; Endovascular treatment of intracranial aneurysms: current status; *Stroke*. 2013; 44: 2046-2054.
[6] Pierot L, Spelle L, Leclerc X, et al.; Endovascular treatment of Unruptured Intracranial Aneurysms: Comparison of Safety of remodeling technique and standard treatment with coils; *Radiology*. 2009; 251: 846-855.
[7] Pierot L, Cognard C, Anxionnat R, et al.; The remodelling technique for endovascular treatment of ruptured intracranial aneurysms had a higher rate of adequate occlusion than did conventional coil embolization with comparable safety;*Radiology*. 2011; 258: 546-553.
[8] Pierot L, Cognard C, Spelle L, et al.; Safety and efficacy of balloon remodelling technique during endovascular treatment of intracranial aneurysms: Critical review of the literature; *AJNR Am J Neuroradiol*. 2012; 33:12-15.
[9] Pierot L; Flow diverters stents in the treatment of intracranial aneurysms: Where are we? *J Neuroradiol*. 2011;38 :40-46.
[10] Klisch J, Sychra V, Strasilla C, et al. The Woven EndoBridge cerebral aneurysm embolization device (WEB II): initial clinical experience. Neuroradiology. 2011;53:599–607.
[11] Ding YH, Lewis DA, Kadirvel R, et al. The Woven EndoBridge: a new aneurysm occlusion device. Am J Neuroradiol. 2011;32:607–611.
[12] Moret J, Cognard C, Weill A, et al. The 'Remodelling Technique' in the Treatment of Wide Neck Intracranial Aneurysms. Angiographic Results and Clinical Follow-up in 56 Cases. Interv Neuroradiol.1997;3:21–35.
[13] S. Sirakov, B. Kamenov, M. Penkov, K. Romansky, Internal carotid artery blister aneurysm embolization Roentgenologia & Radiologia , 2015 , LIV:184-186
[14] S.Sirakov, M. Penkov, A. Sirakov, K. Minkin, Y. Todorov etal. Endovascular embolization of mirror brain aneurysmsRoentgenologia & Radiologia, 2016, LV: 200-202
[15] S.Sirakov, M. Penkov, A. Sirakov, K. Minkin, Y. Todorov etal.Balloon assisted coiling of wide neck ruptured brain aneurysms.Roentgenologia &Radiologia, 2016, LV: 203-205