Editorial

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Brain aneurysms: isn't time to review the strategy for its detection and screening in limited clinical environment and in the new robotic era?

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Editorial

Sophisticated medical technology including computer-assisted diagnosis softwares to improve the accuracy diagnostic imaging during the screening and investigation of unruptured brain aneurysms might benefit early diagnosis and population health outcomes.[1-3] This is because the increased of disponibility of new technological advances in the neuroimaging has made intracranial aneurysms screening easier and fashionable and at the same time allowing the increased number of brain aneurysms being diagnosed. However, based on literature data, the real prevalence of unruptured brain aneurysms varies tremendously from study to study and the current consensus regarding screening and detection is still very limited and certainly requires review.[1-5]

Despite challenging task, a reasonable brain aneurysm visualization can be performed by noninvasive methods as magnetic resonance angiography (which identifies small aneurysms between 3 to 5 mm size) with up to 95% sensitivity and high accuracy when special sequences as volume rendering and 3D time-of-flight are performed or CT angiography which has good sensitivity for aneurysms larger than 3 mm.[5] This is making the DSA is no longer considered essential for establishing the diagnostic of brain aneurysms.[1] Non-invasive methods are particularly recognised for screening of the high-risk brain aneurysmal populations e.g patients with genetic or collagen diseases, familiar occurrence or with history of multiple aneurysms or "minor" neurological symptoms including e.g chronic or recent headache or migraines like headache, visual acuity loss, cranial neuropathies, pyramidal tract dysfunction, pituitary clinical manifestations, atypical facial pain among others. Also, it has been used specially angioCT as routine after subarachnoid haemorrhage or follow-up of treated brain aneurysm.[7-15]

Nevertheless, the main challenges still remain the correlation of imaging diagnosis within clinical symptoms and further understanding the aneurysm evolution history. In other words, the limited clinical environment is a reality in the most of the cases when it still not possible to measure the clinical symptoms impact associated with a lack of imaging biological markers. In addition, there is a true lacuna and lack of established strategies when an aneurysm is detected. New guidelines are needed in order to curtail inappropriate investigations once most of the cases doctors follows their own clinical medical judgment criteria which many times cause reflect problems of confidence in the protocols. After all, the aneurysms detection can cause levels of anxiety to the patient, confiability problems and therapy gap. As sometimes the clinical and radiological diagnosis are not made in the same time. We should think that not enough make the diagnosis but we should find think about implication on its treatment, prevention, identifying risk factors. So probably there is something else missed in the process that we need to review and still do not know well.

In the research environment, the study of aneurysmal biology has been highlighted particularly studies correlating the new endovascular treatments and investigating the role of hemodynamics and aneurysms morphology to assess the future risk of rupture has been designed.[16-19] Hemodynamic vascular tools have been used experimentally as markers for assessment of the aneurysmal biological process. Abnormality of intra-aneurysmatic blood flow patterns and arterial wall impingement zones as fragile points of the cerebral vasculature appear to be directly related to intracranial aneurysms and its natural history[18,19] and formation processes involved in the development and progression of intracranial aneurysms: its initiation; its growth; the inflammatory and degenerative processes related to the aneurysm's rupture; and perhaps with its eventual recurrence.[20,21] Abnormal flow patterns have been demonstrated at flow bifurcation vascular angles or also associated with pathological conditions such as acquired or congenital asymmetry and anomalies of the circle of Willis, high flow arteriovenous malformation or after unilateral carotid artery ligation.[22-25]

Morphological and geometrical factors have been recently identified and have been correlated with increased risk of aneurysm rupture. Dhar et al.,[25] colleagues analysed 45 patients with sidewall aneurysms (25 unruptured and 20 ruptured) and morphological parameters as vessel and aneurysm angles and it was founded eighty percent of all ruptured sidewall brain aneurysms had aneurysm angles greater than 112 degrees (the optimal threshold distinguishing the two groups), whereas 81.8% of all unruptured sidewall brain aneurysms had aneurysm angles less than 112 degrees to be statistically significant for rupture and to have good predictability was aneurysm angle, which is defined for sidewall aneurysms only. Other parameters are size ratio, carotid-ophthalmic location, multilobular ACA-accompanied (> bleeding risk), bony contact….The most known geometrical parameters are the size ratio and location which was described in the ISUIA.[22-26]

The consolidation of robotic, research tools and clinical environment is perfectly feasible and could improve the detection and screening. New strategies aiming the improvement of clinical judgment including reviewed criteria should be considered in order to understand functionally the aneurysm and give confidence to the doctors. New insights are expected to dramatically and allow their use in the clinical settings.

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Conflicts of interest

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