

Endovascular coiling of ruptured cerebral aneurysm: Report of the first case in Nigeria

A Ogungbemi¹, OE Idowu^{2,3}, A Johnson⁴, H Ninalowo⁵, B Oyesola⁶,
CN Okoro⁶ and JM Vitowanu²

Atkinson Morley Hospital¹, United Kingdom, Department of Surgery², Division of Neurological Surgery, Lagos State University Teaching Hospital (LASUTH), Ikeja, Lagos, Department of Surgery³, Division of Neurological Surgery, Faculty of Clinical Sciences, College of Medicine, Lagos State University, Ikeja, Lagos, First Cardiology Hospital⁴, Ikoyi, Lagos, Nigeira, Geisinger Medical Centre and Geisinger Wyoming Valley Medical Centre⁵, Danville, Pennsylvania, USA and The Reddington Multispecialist Hospital⁶, Victoria Island, Lagos, Nigeria

Abstract

Endovascular coiling (EVC) of ruptured cerebral aneurysms is associated with low mortality and dependent patients compared to surgical clipping. This procedure is still not readily feasible in many sub-Saharan African countries including Nigeria, due to the non-availability of diagnostic tools, equipment, and expertise. We present a report of the first patient treated for a ruptured anterior communicating artery (AcomA) aneurysm by EVC in Nigeria. A 43-year-old male presented with clinical and radiological features of ruptured AcomA aneurysm. Coil embolization of the AcomA aneurysm was done using tri-axial technique. To the best of our knowledge, this is the first time this procedure has been performed in Nigeria and the case is presented to describe our experience. The treatment of cerebral aneurysms by EVC is feasible and can be performed safely in Nigeria despite its current facility challenges.

Keywords: *Aneurysm, Aneurysmal coiling, subarachnoid haemorrhage*

Résumé

L'enroulement endovasculaire (EVC) des anévrismes cérébraux rompus est associé à une faible mortalité et des patients dépendants par rapport au clip chirurgical. Cette procédure n'est toujours pas facilement réalisable dans de nombreux pays d'Afrique subsaharienne, dont le Nigéria, en raison de la non-disponibilité des outils de diagnostic, de l'équipement et de l'expertise. Nous présentons un rapport du premier patient traité pour une rupture d'anévrisme de l'artère communicante antérieure

d'anévrisme de l'artère communicante antérieure (AcomA) par EVC au Nigeria. Un homme de 43 ans s'est présenté avec les caractéristiques cliniques et radiologiques d'une rupture d'anévrisme AcomA. L'embolisation par coils de l'anévrisme AcomA a été réalisée en utilisant la technique triaxiale. À notre connaissance, c'est la première fois que cette procédure est pratiquée au Nigeria et le cas est présenté pour décrire notre expérience. Le traitement des anévrismes cérébraux par EVC est faisable et peut être effectué en toute sécurité au Nigeria malgré les défis actuels de ses installations.

Mots clés : *Anévrisme, enroulement anévrismal, hémorragie sous-arachnoïdienne*

Introduction

Aneurysmal subarachnoid haemorrhage (aSAH) is a devastating disease. It is associated with high morbidity and mortality. It has an aftermath risk of rebleeding in about 3 to 4% in the first 24 hours and 1 to 2% extra risk each day over the first month [1]. The consequences of a rebleeding are severe, with reported mortality rates of 60% [2]. The complications of aSAH include vasospasm, obstructive hydrocephalus, hyponatraemia from hypothalamic injury, cardiac arrhythmias and death.

The definitive treatment of cerebral aneurysm has evolved over the last three decades. The approach can be by surgery (clipping with or without wrapping, or bypass), endovascular approach (coiling, balloon-assisted coiling, stent-assisted coiling, liquid embolic material, flow-diverting stent) or a combination of both. Improvements have been noted in the microsurgical clipping of cerebral aneurysms, but endovascular therapies have undergone considerable greater technological improvements since the first procedure was done [3]. Data from randomised trials in patients in good clinical condition

with ruptured aneurysms of either the anterior or posterior cerebral circulation showed that coiling is associated with a better outcome if the aneurysm is considered suitable for both neurosurgical clipping and endovascular coiling [4]. Many large study series have shown that endovascular coiling (EVC) of ruptured cerebral aneurysms is associated with low mortality and dependent patients than surgical clipping within a year and a significantly greater probability of disability-free survival in EVC group at 10 years [5]. It is currently the first choice of treatment for ruptured aneurysms amenable to either surgery or EVC modality in many western centres.

The procedure-related complications of EVC include ischemic (e.g., thrombo-embolic, spasm during treatment), haemorrhagic (e.g., aneurysm rupture), and technical (e.g., coil in the vessel and aortic dissection) complications. Clipping can be complicated by haemorrhagic events, brain swelling, cerebral infarction, hypotension and cardiac arrhythmias.

EVC of ruptured cerebral aneurysm is performed in many centres worldwide, including some hospitals in sub-Saharan Africa. This mode of treatment was not available in Nigeria prior to this case being reported. This non-availability meant that patients had to travel abroad for the procedure. We present a report of the first treatment of a patient with ruptured anterior communicating artery (AcomA) aneurysm using the technique of EVC in Nigeria.

Case report

A 43-year-old right handed male presented with a 2-day history of sudden onset severe pan-cranial

headaches. There was associated photophobia but there was no history of fever or antecedent head trauma. The patient had a background history of

poorly controlled hypertension. There was no history of diabetes, kidney disease, smoking or family history of aneurysm. Examination revealed a conscious man who was in painful distress with significant photophobia. His respiratory rate was 15/min; blood pressure was 210/110mmHg, pulse 94/min, temperature 37°C and oxygen saturation was 99% in room air. He was well oriented in time, place and person with a Glasgow coma scale score of 15. There was severe neck stiffness with positive Kernig's sign. Fundoscopy revealed bilateral haemorrhages with findings suggestive of malignant hypertension. There was no focal neurological deficit. Plain cranial computerized tomographic scan showed subarachnoid haemorrhage (modified Fischer grade 1) with an old pontine infarct. Computerized tomographic angiogram showed a 4mm AcomA with an irregular fundus. A clinical diagnosis of ruptured AcomA (Hunt and Hess scale grade 2 and WFNS grade 1) was made.

The procedure was performed in a single plane Angio suite with digital subtraction angiography capability in Lagos, Nigeria (First Cardiology Hospital, Ikoyi), by the first Author (AO). The procedure involved collaboration between two different hospitals in Lagos, Nigeria. The managing team consisted entirely of Nigerian medical professionals locally and in the diaspora. The procedure was conducted under general anaesthesia by the 1st Author (OA). The technique used was a right common femoral artery puncture under ultrasound guidance with a 6Fr

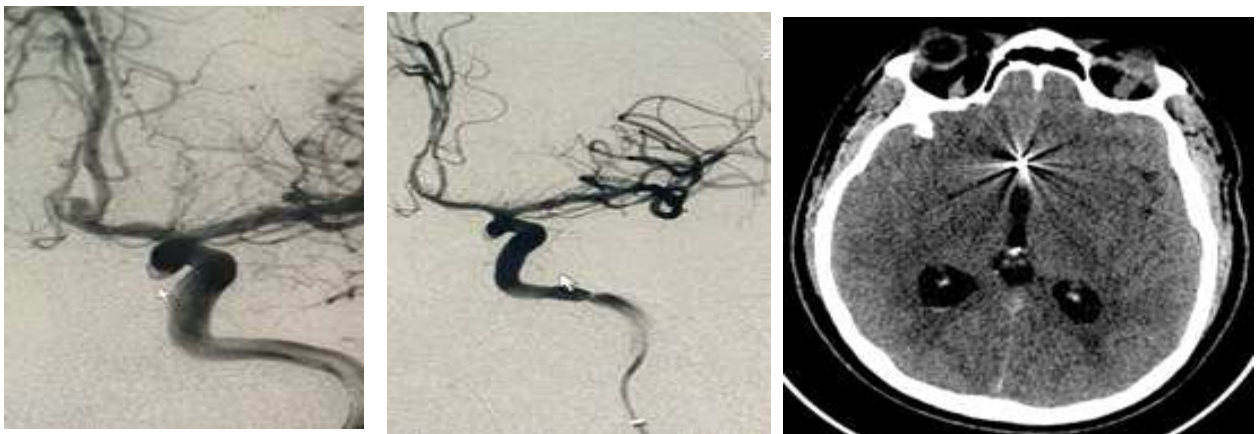


Fig. 1: Angiogram pre (A) and post (B) endovascular repair of AcomA aneurysm and post operative CT (C) confirmed AcomA aneurysm. A 6Fr shuttle guider to introducer sheath. The initial angiography (5Fr Sim2) confirmed AcomA aneurysm.

the left internal carotid artery under 5000IU of Heparin cover was inserted via the left femoral artery. Navien 072 distal access catheter was used with Echelon 10 microcatheter and Sceptre C dual lumen balloon catheter was used to catheterise the artery. The aneurysm was catheterised uneventfully and a 3x8mm framing coil (Microvention, Cosmos) deployed and aneurysm protected. The final loop of coil was noted to protrude through the rupture point. The patient was haemodynamically stable without the need to give the prepared protamine. There was no neck residuum post procedure (Figure 1). Angioseal (Terumo) was used to seal the right CFA puncture site and the anaesthesia was reversed. He developed bronchospasm, which was successfully resolved with naloxone. The patient was transferred to the ward on the sixth day after the procedure and discharged home shortly after.

Discussion

Aneurysmal subarachnoid haemorrhage is a subset of haemorrhagic stroke with an incidence of around 9 per 100,000 population per year [6]. The rupture of an intracranial aneurysm accounts for 85% of SAH. Close to 15% of patients with aneurysmal SAH die before reaching the hospital [6]. Of those who survive in the United Kingdom, 42% will be dependent, 46% will have some form of disability, and 12% will be left severely impaired [7].

Although since the late 1990s the time delay to occlusion of the aneurysm has decreased considerably, around 15% of people still rebleed in the hospital. Patients who survive the initial hours after the haemorrhage are at risk of rebleeding until the aneurysm is occluded; hence, the need to ensure definitive treatment of the aneurysm as soon as possible.

In the United Kingdom, 85% of ruptured aneurysms are coiled. Although EVC is routinely performed in many parts of the world, sub-Saharan Africa lags behind due to its prevailing diagnostic tools, equipment and expertise challenges. The decision to offer EVC or not is dependent on aneurysm location, accessibility, geometry (multilobulated, snowman, long and skinny, daughter lesions), aspect ratio, arterial branches close by, collateral flow, intraluminal thrombus, vasospasm, age of patient, severity of grading (EVC for higher grades), need for additional procedures (ventriculostomy, evacuation of haematoma) and patient's choice [8]. After presenting our index patient with the treatment options of clipping or EVC, including its attendant pros and cons, the patient opted for EVC due to its lower risk profile in a patient with malignant hypertension. With the need to respect

patient's autonomy in line with standard medical practice, an EVC was done.

To the best of our knowledge, this is the first reported case of coiling of a cerebral aneurysm in Nigeria. Before now, patients with cerebral aneurysm in Nigeria have been unable to achieve definitive non-surgical treatment locally. They often have to face the severe financial burden of seeking this mode of treatment abroad. Such patients can now benefit from this definitive treatment in their natural environment at a much lower cost. Another advantage of being treated in their home country while been close to their loved ones is the prompt care afforded to them by reducing the risk of re-rupture. The stress and danger of travelling to another medical centre many kilometres away is also avoided.

The provision of EVC in Nigeria is feasible despite the current challenges, which include deficient suitable facilities (angiosuite, Neurointensive care units, endovascular consumables) and trained support staff. In the index case, the personnel, consumables and facilities were pulled from four different centres to accomplish the procedure.

It is also hoped that patients with arteriovenous malformations, dural arteriovenous fistulas, caroticocavernous fistulas, pre-resection tumour embolization, carotid stenting and other forms of complex endovascular management of intracranial aneurysms will similarly soon begin to benefit from endovascular management locally.

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