

Middle Cerebral Artery Aneurysm Coiling without Assisted Techniques – A Good Alternative, Single Venture Experience

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ABSTRACT

Objective: To evaluate the result of a coiling of middle cerebral artery aneurysms without auxiliary techniques.

Material and Methods: This study was conducted from June 2010 to September 2019 in the Department of Neuroradiology, Punjab Institute of Neurosciences, Lahore. There were a total of 500 patients with unilateral and bilateral cerebral aneurysms at the MCA level that have been included in this study which comprise of both sexes.

Results: There was a total of 500 patients, which comprised of 200 (40%) men and 300 (60%) women. Their ages ranged from 22 to 65 years. The majority number of patients was in their fifth 180 (30%) and sixth decade 150 (30%) of life. In our study, a successful coiling was performed in 490 (98%) patients with minimal recanalization of MCA aneurysms. In 10 (2%) procedure was unsuccessful due to vasospasm.

Conclusion: The conventional coiling in middle cerebral artery aneurysms can be effective and safe without auxiliary techniques.

Keywords: Cerebral aneurysm, endovascular coiling, Middle Cerebral Artery.

INTRODUCTION

The goal of treating an un-ruptured aneurysm is to prevent the aneurysm from rupturing, while ruptured intracranial aneurysms are intended to prevent further bleeding. Several technical approaches can be chosen adapted to the specific anatomy, from “simple” coiling (conventional) to very composite stent or balloon assisted coiling: multi-catheter technique or Flow Diverter (FD). These “assisted techniques” are not only more difficult and have higher risk, but are very expensive too; the cost represents a serious managerial difficulty. Moreover, MCA aneurysms pose a unique threat & challenge due to location, peri aneurysmal architecture & supply to eloquent and vital areas of the brain. In this article we have described our encounter in the endovascular treatment of MCA aneurysms based on “simple coiling”.¹⁻³

MATERIAL AND METHODS

Study Setting

It is a retrospective study of five hundred patients, which were selected for conventional coiling treatments, i.e. without any assistant technique, from June 2010 to September 2019 at the Department of Neuro-Interventional Radiology, Punjab Institute of Neurosciences (PINS) Lahore General Hospital, Lahore.

Inclusion Criteria

All aneurysm were coiled with detachable (framing, filling and finishing) coils. Only aneurysms situated in middle cerebral artery are taken into account, even if the patient had several aneurysms in other intracranial arteries.

Exclusion Criteria

Patients with mycotic or distal MCA aneurysms with Glasgow coma scale less than 8 were excluded from this study.

Data Collection

Clinically, patients were classified according to Hunt and Hess and WNFS grading (world federation of neurological surgeons sub arachnoid hemorrhage grading system). Adult patients of both genders with MCA aneurysms were selected. Informed written consent was obtained from each patient. Prior to coiling procedure, DynaCT 3D angiography was performed using AXIOM Artis (Siemens Medical Solutions, Erlangen, Germany) for detection and elaboration of Angio-architecture of aneurysms & its topology and orientation. All information was recorded on Pre-designed Proforma.

Clinical Management

Nimodipine was given through continuous infusion throughout the procedure. Immediate Post procedural DSA was done to confirm the residual sac or complete obliteration. Following the procedure, all the patients were awake, alert and oriented in person, place and time. Patients were kept under observation for 12 – 24 hours & vital signs were monitored.

RESULTS

Gender Distribution

Out of 500 patients, there were 200 males (40%) and 300 (60%) female patients (Table 1).

Table 1: Gender Distribution.

S. No.	Sex	Number	Percentage	Cumulative Percentage
1.	Male	200	40%	40%
2.	Female	300	60%	100%

Age Range

Their ages ranged from 22 – 65 years (Table 2).

Table 1: Age Range.

Age	Number	Percentage	Cumulative Percentage
10 – 20	-	-	-
21 – 30	35	7%	7%
31 – 40	100	20%	27%
41 – 50	180	36%	63%
51 – 60	150	30%	93%
> than 60	35	7%	100%



Fig. 1: Pre- and Post-Coiling Left MCA Bifurcation Aneurysm.

Outcome

In our study effective coiling was achieved in all patients with less recanalization, none required repeat coiling at 6 month follow up MRI (Table 3).

Table 3: *Clinical Presentation.*

Clinical Presentation	Number	Percentage
Headache	500	100%
Vomiting	500	100%

Drowsy	200	40%
Stupor	150	30%
Comma	50	10%
Neck Stiffness	500	100%
Heoiperesis	200	40%
Hemiplegia	10	2%
Cranial Nerves Defat	10	2%

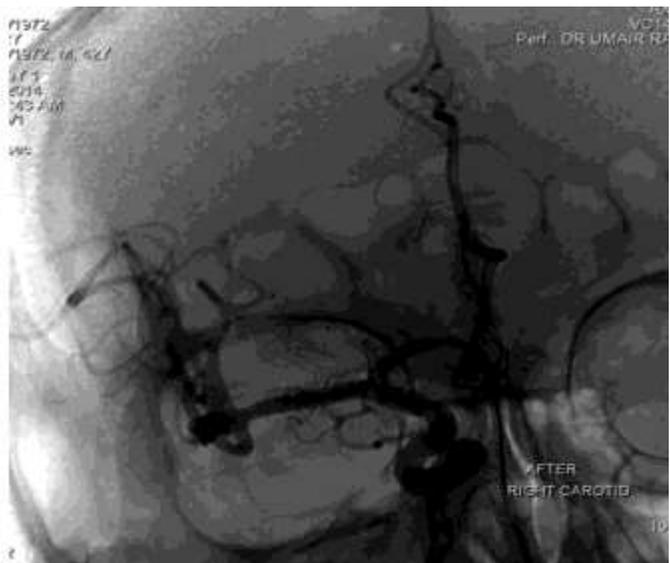


Fig. 2: *Right MCA Bifurcation Aneurysm Pre- and Post-Coiling.*

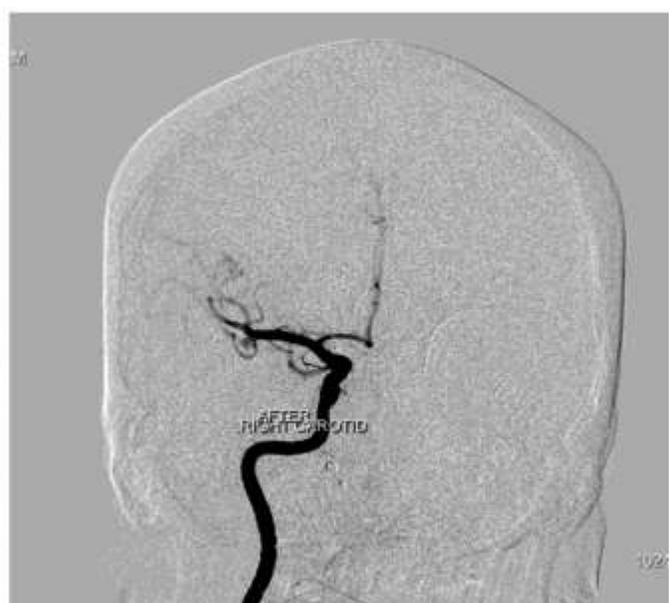


Fig. 3: *Right MCA Bifurcation Aneurysm Pre- and Post-Coiling.*

Clinical Presentation

All patients with headache, vomiting, loss of consciousness in 50% cases. Neck stiffness was present in 100% cases (Table 4).

Table 4: Procedure Success.

Clinical Presentation	Number	Percentage	Cumulative Percentage
Coils Successful	490	98%	98%
Coiling Failed	10	2%	100%

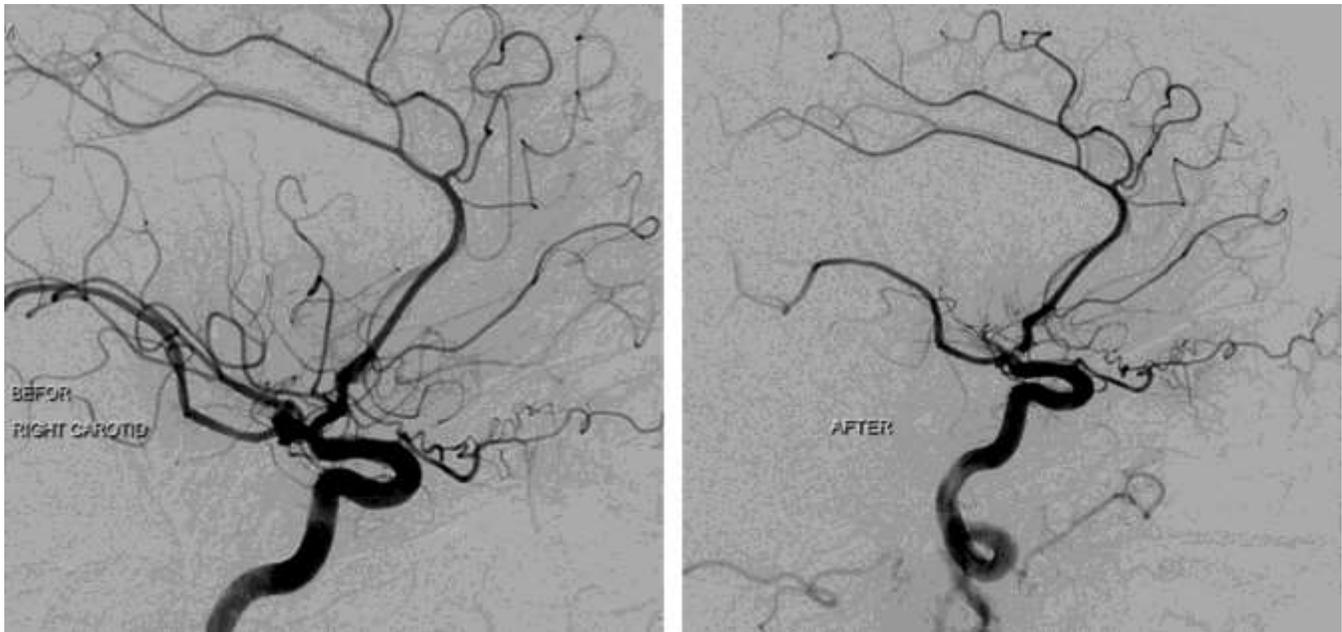


Fig. 4: Right MCA Bifurcation Aneurysm Pre- and Post-Coiling.



Fig. 5: Right MCA Bifurcation Aneurysm Pre- and Post-Coiling.



Fig. 6: Right MCA Bifurcation Aneurysm Pre- and Post-Coiling.

Complications

No significant complications like re bleed, stroke and death were observed in any case. Minor complications such as headache, visual field defects and vertigo were observed in 9%, 2% and 3% respectively. Intensive physiotherapy was required in 10% of the cases. In 10 (2%) patients the procedure was unsuccessful, due to a prolonged vasospasm phenomenon. These patients were referred to neurosurgery department (Table 5).

Table 5: Complication.

Complication	Number	Percentage
Headache	45	9%
Visual Field Defeat	10	2%
Vertigo	15	3%
Vasospasm	10	2%
Hemiparesis	10	2%
ICU Field Care	50	10%

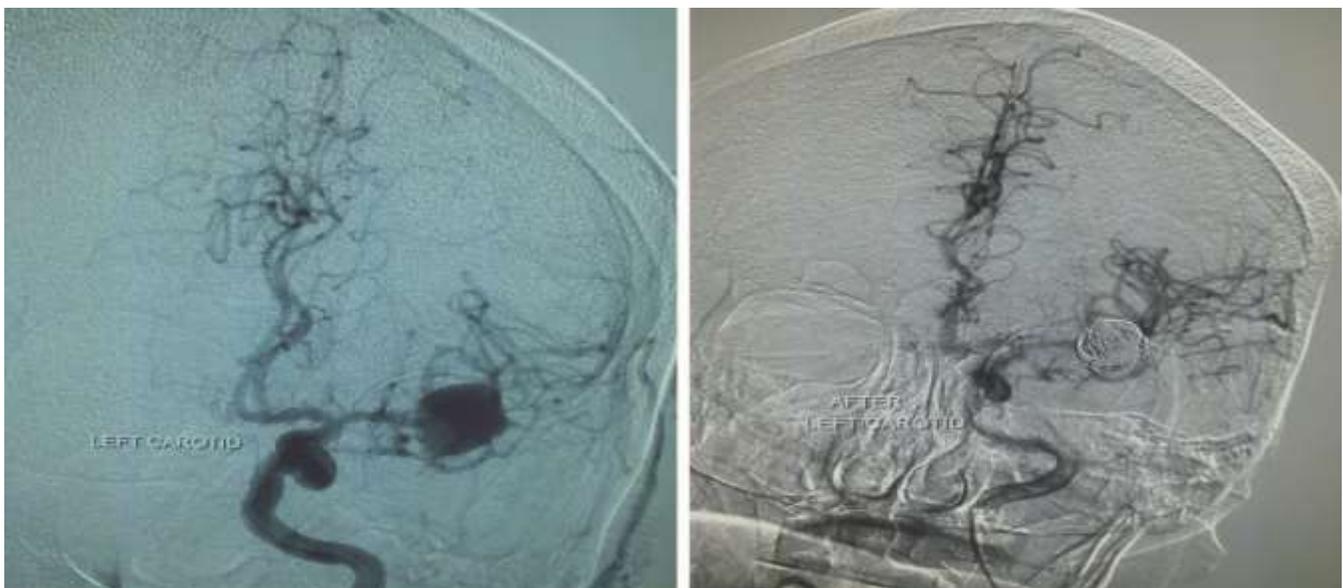


Fig. 7: Left MCA Bifurcation Aneurysm (Large) Pre- and Post-Coiling.



Fig. 8: Bilateral MCA Bifurcation Aneurysms Pre- and Post-Coiling.

DISCUSSION

In burst Middle cerebral artery aneurysms, subgroup analysis of ISAT in elderly patients (more than 65 years) disclosed mediocrity of coiling to clipping. But for MCA aneurysms, which are unruptured, coiling has been restricted, mostly due to the inimical aneurysm geometry (wide neck and/or incorporation of a branch into the neck).⁴⁻⁶ In the treatment of unruptured intracranial aneurysms, endovascular coiling has shown uniform and haughty results to clipping.⁷ Endovascular coiling of middle cerebral artery aneurysms has demonstrated higher procedure failure rate and less favorable results juxtaposed to the treatment of aneurysms at other locations⁸⁻⁹. MCA aneurysms, which show complex or non-geometrical shapes have a higher incidence of rupture rate. Peri-aneurysmal environment changes in size and shape because of acute ruptured aneurysms.¹⁰

Compartmentalization of basal cisterns, subarachnoid spaces such as arachnoid-Dural and Arachnoid-Pial influence the topology and orientation of aneurysms. This helps to avoid assisted techniques of coiling MCA.¹¹⁻¹³ Along with other endovascular treatments, surgical clipping is still preferred choice for MCA aneurysms due to its composite anatomy and hoisted long-term reappearance rate of MCA aneurysms.¹⁴⁻¹⁵ Some authors favors surgical clipping over coiling techniques with less recurrent rates of ruptures & complications.^{16,17} The presence of an intracerebral hematoma causing significant mass effect

and requiring rapid evacuation contraindicates the endovascular approach.^{18,19, 20} In our study coiling of MCA aneurysms, limited to cases with favorable anatomy, were performed successfully, except in ten patients who went in prolonged vasospasm, without any major complications and were shifted to neurosurgery for clipping.²¹⁻²²

Accurate evaluation of anatomy of the aneurysm on 3D imaging and selection of patients may allow the endovascular treatment with the “simpler” conventional coiling approach.

CONCLUSION

Usual coiling in small to large MCA aneurysms in selected patients can be effectual and prudent, methodologically unostentatious than with assisted techniques.

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Additional Information

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Human Subjects: Consent was obtained by all patients/participants in this study.

Conflicts of Interest:

In compliance with the ICMJE uniform disclosure form, all authors declare the following:

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Sr.#	Author's Full Name	Intellectual Contribution to Paper in Terms of:
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2.	Saima Ahmad	Paper writing, referencing, data calculations.
3.	Sohail Akhtar	Data collection and calculations.
4.	Abu Bakar Siddique Umair Rashid Ch	Analysis of data and interpretation of results etc.
5.	Amir Aziz	Literature review and manuscript writing.
6.	Umair Rashid Ch.	Analysis of data and quality insurer.
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