ABSTRACT

Giant saccular middle cerebral artery aneurysm is a rare vascular lesion and few cases have been reported in the literature. Microsurgical clipping is applied to treat a giant middle cerebral artery aneurysm. A 26 year-old male presented with complaints of severe headache, multiple episodes of vomiting and one episode of sudden loss of consciousness since few hours prior to admission at the emergency department. Cerebral Angiography showed a giant saccular middle cerebral artery (MCA) aneurysm. A standard right pterional approach applied to expose MCA and microsurgical clipping was performed. No any serious neurological complication was noted after surgery except right facial palsy. Patient was discharged at the 12th day of surgery. Endovascular therapy as well as STA-MCA bypass surgery and clipping are usually applied to manage the giant MCA aneurysm. However, alone microsurgical clipping is also effective and has better result.

KEYWORDS

Intracranial aneurysm, Giant, middle cerebral artery, surgical clipping, outcome
INTRODUCTION
Giant saccular middle cerebral artery aneurysms are rare lesion. Giant intracranial aneurysms are surgically complex and challenging lesion, with maximum diameter of 25mm or more and mortality more than 60% within 2 year. The most common location of giant aneurysms is in internal carotid artery (ICA) and middle cerebral artery (MCA) region (16%-32%). MCA region is one of the most common sites for rupture of giant aneurysm. Both endovascular and surgical management of giant MCA aneurysms are technically challenging issue due to its crucial natural history, unique anatomic features. The poor outcome or death in 30% of the patients has reported in direct surgical treatment of giant MCA aneurysm. We describe a patient who underwent direct surgical clipping without bypass for ruptured giant aneurysm arising from bifurcation of M1 segment of right MCA with maximum diameter 2.8cm.

CASE PRESENTATION
A 26- year old male presented with complain of severe headache, multiple episodes of vomiting and one episode of loss of consciousness (LOC) few hours prior to admission in emergency department. He was alert and neck stiffness without any neurological deficit, had past history right ear infection. Computer Tomography (CT) scan demonstrated a large high density mass with subarachnoid hemorrhage (SAH) in right Sylvian cistern (Figure A). Cerebral angiography disclosed aneurysm arising from bifurcation of M1 segment of right MCA measuring 2.8 x 2.4 cm having narrow neck at the origin measuring 2mm (Figure B). Surgery was performed on the third day of ictus. After performing right pterional craniotomy and opening dura, right MCA segment was then dissected in the Sylvian fissure to expose aneurysm beyond the origin of the lenticulostriate arteries. The MCA was persuaded distally to expose frontal, parietal and temporal segments were identified. The dome of aneurysm was punctured by a 25 gauze needle and 15ml bleed was aspirated. The aneurysm completely collapsed. The neck of aneurysm was seen and two fenestrated and one simple straight clipping were used after application of temporary clips over parent vessels. Temporary clip was removed. Indocyanine Green (ICG) was used to be sure occlusion of the blood flow to aneurysm dome or not. After being confirmed the complete occlusion of aneurysm, dome of aneurysm was cut off and sent for histopathology test. Patient developed right facial palsy and left upper and lower limb weakness as compared to right side of the body. Non-contrast CT was done after 48 hours of surgery and right basal ganglia infarction was noted (Figure C). Tab clopilot 75mg was started and improvement in power was noticed slowly. Histopathology test reported that tissue with dilated and congested thin walled blood vessels and small thrombus formation. Patient was discharged on the 12th day of surgery. Patient was followed up on 15th day of discharge with completely improved in power and facial palsy (Figure D).

DISCUSSION
Most of giant aneurisms are saccular variety and constitute approximately 5% of all intracranial aneurysm. Giant MCA aneurysms have always remained the most difficult lesion among cerebrovascular diseases to treat. Digital subtraction angiography still provides most pivotal information to select the best treatment option for complex aneurysm regardless of emerging 3D reconstruction techniques of CT angiography, MR-base flow modeling. Surgical therapy has grown up well with improvement in instrumentations, refinement of skull base microsurgical techniques, and application of anesthetic techniques like hypothermic circulatory arrest. Few giant aneurysms come to surgical management due to improved radiological imaging and earlier diagnosis of large aneurysm.

The combined surgical morbidity and mortality for giant intracranial aneurysms have remained in the 20% to 50% range in the recent years despite the MCA aneurysms have been described suitable for surgery. It may be due to cruel pathological anatomy, like aberrant arterial branches, intraluminal thrombus, wide aneurysm neck, atherosclerotic aneurysm neck, and adherent perforating arteries. The management for giant cerebral aneurysm including MCA aneurysm with direct surgical procedure requires 1) exposure of aneurysm, 2) trapping of the parent artery, 3) incision of the aneurismal dome and removal of the thrombus, 4) clipping of the aneurismal neck, 5) release of the trapping. Complex aneurysms of the MCA are special challenge, to treat by surgical clipping, due to multiple perforators that lead to difficult accessibility in M1 and M2 branches. A study done by Hideki et al reported that one case of ischemia was noted following clipping among four saccular giant MCA aneurysms. Ischemia is unavoidable complication. Therefore, intensive protective therapy for the brain as well
as pre and intra-operative studies need to do well to evaluate cerebral tolerance to probable ischemia.

Since the establishment of Guglielmi detachable coils in 1990, endless morbidity with surgical treatment and continuous advancement in endovascular therapy have inspired pursue at coiling of giant aneurysm. The indication for Open microsurgery has been changed due to endovascular option. However endovascular coiling is non invasive technique, complication has been reported of a 10.5% morbidity rate and an 8% mortality rate in the recent series of large and giant aneurysm treated with endovascular coiling and higher rate of recurrence (52%) and retreatment (47%) for giant aneurysm.

Only smaller series or case reports have been studied treatment of giant MCA aneurysm. Few researchers have reported large series of revascularization in patient with giant MCA aneurysm. A study done by Shi ZS et al that described application of endovascular coiling with bypass surgery for treatment of giant MCA aneurysm and preservation of perforator branches. There was no study discussed about ischemia well. Development of emboli at the occlusion site and inadequate flow from bypass may lead to ischemic events and rupture of aneurysm. A study done by Hashi K et al that described that the ischemic complications occurred in 12 of the 137 cases within 24hours, in 11cases within 24-48hours, in 6 cases later 48 hours and at unknown times in 5 cases; a total of 25% (34/137) of all cases.

In our patient, direct surgical clipping was essential for the giant MCA aneurysm, since it had ruptured and had a mass effect over middle cranial fossa. So temporary clipping of MCA was applied over parent vessels. The dome of aneurysm was punctured by 25 gauze needle and 15ml of blood aspiration was done. It collapsed and permanent clipping of the giant aneurysm was applied. The dome of aneurysm was excised to decrease mass effect and sent for histopathology report. Although perfect outcome achieved by direct surgical clipping without bypass for giant M1 segment of MCA aneurysm, ischemia is an undeniable complication encountered in treatment of giant MCA aneurysm similar to other studies. This challenging issue should be studied well and overcome with the application of pre and intra-operative monitoring system. Enough studies with large number of cases of giant MCA segment aneurysm need to be researched for evaluation of outcome and complications.

CONCLUSION

Endovascular therapy as well as STA-MCA bypass surgery plus clipping are usually performed to manage the giant MCA aneurysm. Ischemic event is inevitable problem encountered during giant MCA aneurysm treatment whatever the surgical procedures are applied. Alone direct surgical clipping with excision of aneurysm is safe and effective for management of giant M1 segment of MCA aneurysm.

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CONFLICT OF INTERESTS

There is no conflict of interests

REFERENCES

1. Barrow DL, Alleyne C: Natural history of giant intracranial aneurysm and indication of intervention. ClinNeurosurg. 1995;42:214-244

2. Darsaut TE, Darsaut NM, Chang SD, Silverberg GD, Shuer LM et al: Predictors of clinical and angiographic outcome after surgical or endovascular therapy of very large and giant intracranial aneurysms. Neurosurgery. 2011, 68:903-910. 10.1227/NEU.0b013e3182098ad0

3. Nurminen V, Lehecka M, Chakrabarty A, Kivisaari R, Lehto H, Niemla M et al: Anatomy and morphology of giant aneurysm-angiography study of 125 consecutive cases. ActaNeurochir (Wien).2014, 156:1-10. 10.1007/s00701-013-1933-4

4. Symon L, Vajda J: Surgical experiences with giant intracranial aneurysm. J Neurosurg.1984, 61:1009-1028. 10.3171/jns.1984.61.6.1009

5. Morley TP, Barr HWR: Giant intracranial aneurysm: diagnosis, course and management. In Ojemann RG, Tindall GT, Keener EB, Perot PL(ed),Clinical Neurosurgery. 1969, vol.16, Baltimore, Williams and Wilkins Co,1969,73-93,1969

6. Esposito G, Regli L: Surgical decision-making making for managing complex intracranial aneurysm. Trends Neurovascular Interv. Springer Wien. 2014, Cham,pp.3-31. 10.1007/978-3-319-02411_0_1

7. Hideki N, Hiroysaku K, Toshitaka N, Katsumi T, Joji T and Kenji O:Direct surgical treatment of giant middle cerebral artery aneurysm by microvascular reconstruction techniques. Neurol Med Chir(Tokyo). 2012, 52:56-61. 10.2176/nmc.52.56

8. Gobin YP, Vinuela F, Guriain JH, Guglielmi G, Duckwiler GR, Massoud TF et al:Treatment of large and giant fusiform intracranial aneurysm with detachable coils. J Neurosurg.1996, 84:55-62. 10.3171/jns.1996.84.1.0055

9. Chalouhi N, Tjoumakaris S, Gonzalez LF, Dumont AS, Starke RM, Hasan D, Wu C, Singhai S, Moukarzel LA, Rosenwasser R and Jabbour P: Coiling of large and giant aneurysms: Complication and long term results of 334 cases. Am J Neuroradiol.2014, 35:546-552. 10.3174/ajnr.A3696

10. Sanai N, Zador Z, Lawton MT: Bypass surgery for complex brain aneurysms: An assessment of intra-cranial- extracranial bypass. Neurosurgery. 2009,65:67-683. 10.1227/01.NEU.0000348557.11968.F1

11. Shi ZS, Ziegler J, Duckwiler ZR, Jahan R, Frazee J, Ausman JI, Martin NA, Vinuela F: Management of giant middle cerebral artery aneurysm with incorporated branches: Partial endovascular coiling or combined extracranial –intracranial bypass- A team approach .Neurosurgery.2009, 65:121-131. 10.1227/01.NEU.0000335173.80605.1D

12. Diaz FZ, Ausman JI, Pearce JE: Ischemic complication following after combined internal carotid artery occlusion and extracranial-intracranial aneurysm. Neurosurgery.1982, 10:563-570 10.1227/00006123-198205000-00003

13. Hashi K, Nin K: Complications following carotid ligation combined with EC-IC bypass. Neurosurgery.1985, 4:359-366 (In Japanese)

14. Huang L, Cao W, Ge L, Lug G, Wan J, Zhan L et al: Endovascular management of giant middle cerebral artery aneurysms. Int J ClinExp Med.2017, 8:7517-7525