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ENDOVASCULAR TREATMENT OF SACCULAR ANEURYSMS IN POSTERIOR CIRCULATION

Mustafa Najibullah MD[1,2], Atawula Tuersun[1], Nizamidingjiang Rexiati[1], ,Maimaitili·Aisha MD[1], GENG DangMurenJiafu MD[3]

[1]Department of Neurosurgery, The First Affiliated Hospital of Xinjiang Medical University,Urumqi,Xinjiang,China, [2]International Education College of Xinjiang Medical University, [3]Corresponding author: GENG DangMurenJiafu, Department of Neurosurgery, The First affiliated Hospital of Xinjiang Medical University ,Urumqi,China .Electronic address: 1591467218@qq.com, mailing address: Xinshi District, Urumqi,NO.39. Telephone:4366120, Fax numbers: 0991-4362974.

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Abstract:

Saccular aneurysms are very exceptional when we compare them with their saccular correspondents. They are really very difficult to be treated due to the high rating of rebleeding and morbidity. Many advanced techniques are in use now days like Bypass, stent only technique, stent-assisted coiling and more recently flow diversion. (JOHN HOPKINS Medicine, 2011)

Objective: *The objective of this article is to review various techniques used for the treatment of saccular aneurysms in posterior circulation implemented on Chinese patients. The various tables give detailed information about patient's condition, diagnosis and treatment.*

Material and methods: *During the time period of 2012 to 2017, 101 patients were identified and among them signs of PCSAs were observed in 37 patients. The age range was 12-74 years, 51% of the patients were males and remaining 49% were females. The percentage of the patients with subarachnoid hemorrhage (SAH) was 67 and 87% of the patients were suffering from severe headache. A few of the PCSA patients showed neural deficit and additional field deficits. (CG, 1979)*

Result: *A clinical improvement and a stable last result were observed in PCSA patients with the percentage of 90. After surgery 3 patients suffered from vegetative stage. One patient died eight hours after surgery due to the enterocelia bleeding and due to shock. 2 patients died due to the rebleeding after few hours of surgery. 1 patient died after 6 days of surgery, he was suffering from a fatal aneurysm having a giant size of P= 0.005. Angiographic treatment after surgery was given to most of the patients for several months. A few complications raised after surgery among the patients like Aneurysmal rebleeding, infarction, deterioration and neural deficit.*

Corresponding author:

GENG DangMurenJiafu
, Department Of Neurosurgery ,The First Affiliated Hospital Of Xinjiang Medical University ,Urumqi,China

QR code

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INTRODUCTION:

Aneurysms are basically the weak areas in the walls of blood vessels having a balloon shape with size more than 50 percent of the size of the vessel. Mostly it occurs in arteries. It could be present in brain vessels, heart vessels or might be in the neck area. Saccular aneurysms mostly affects the MCA (middle cerebral artery) after that ICA (internal carotid artery) and at last ACA (anterior cerebral artery). Such problems could be caused due to multiple reasons like due to smoking, family history, high blood pressure, diabetes and many other reasons. Saccular aneurysms have different underlying and overlying pathologies, hemodynamics and various other anatomical distributions, natural histories, and treatments compared to the saccular variety. The two principal causes for this type of aneurysm are dissection and atherosclerosis, disorders of collagen and elastin metabolism, by infections, very rarely by neoplastic invasion of the arterial wall and also iatrogenesis are other origins for this vasculopathy. Although the chances of saccular aneurysms are rare but in few passed years, the cases are increased mostly in young people. There was a perception that endovascular therapy is superior to the as compared to the microsurgical clipping for aneurysms in posterior circulation is not based on actual facts and figures. The main reason behind this is less related data of Endovascular treatment of saccular in posterior circulation. In this study we have tried our best to evaluate all of the related facts and figures. (Aoki N, 1990), (Byrne JV, 2010).

METHOD AND TREATMENT:

Open surgical treatment:

In the past, almost all of the patients of saccular aneurysms were treated with various open surgical treatment techniques that included (HL) Hunterian ligation, surgical bypass and methods like clip reconstruction. Whereas the emerging field of treatment is Endovascular therapy which provides primary treatment modality for saccular aneurysms in posterior circulation for more than ten years. It used to be a rarely used technique but in recent years the result outcomes are impressive and many patients are treated efficiently having great recovery ratio. (4) Sacho RH, 2014)

Microsurgical treatment:

Micro surgical treatment is used to be referred for the treatments that cannot be conducted using open surgery. Now a day's open surgery is becoming less practical and popular way of treatment in endovascular therapy. There are different treatment modalities in microsurgical treatments like bypass or trapping, flow reversal, stent only, clipping, stent assist coiling. Flow reduction is mainly used in the condition of poor collateral supply whereas flow reversal technique is used when adequate collateral supply. Bypass or trapping method is used with aneurysm decompression with mass effect for lesions. Drake with his co-workers published regarding their practical experience knowledge related to PCSA. They tried various techniques based on the patient presentation, their clinical status, and collateral supply. Their end results showed the 70 % treated patients were recovered with good health.

Kalani-et-al reported the latest experience at the Barrow Neurological Institute with giant aneurysms in the posterior circulation. He treated 8 patients having saccular aneurysms. The primary treatments used by him were (EC-IC) bypass. In 7 cases, (STA-SCA) superficial temporal artery cerebellar artery bypass were tried. The results were 60% successful. The complications and recurrent rates are high. That was a disappointment for the surgeons because the morality rate was 40% and the authors admitted that as well.

RESULTS:

101 patients were identified for treatment among them most of them treated (Clipping=22, Coiling= 54, Stent assisted coiling= 34, stent only=06). 37 out of 101 were suffering from saccular aneurysms in posterior circulation which was 34% of total identified patients. A clinical improvement and a stable last result was observed in PCSA patients with the percentage of 90. After surgery 3 patients suffered from vegetative stage. One patient died eight hours after surgery due to the enterocelia bleeding and due to shock. 2 patients died due to the rebleeding after few hours of surgery. 1 patient died after 6 days of surgery, he was suffering from a fatal aneurysm having a giant size of P= 0.005. Angiographic treatment after surgery was given to most of the patients for several months. A few complications raised after surgery among the patients like Aneurmyl rebleeding, infarction, deterioration and neural deficit. Most of the survived patients came for follow ups having different recovery periods from 6 months to 24 months with no reoccurrence. (PubMed-NCBI, n.d.), (Ajnrorg., 2019).**Figure 1** shows a patient with a saccular aneurysm (A). Pipeline embolization devices were placed in situ at the treatment point at the end of the procedure (B). A follow-up angiogram performed 4 months showing the results of no occurrence (C).

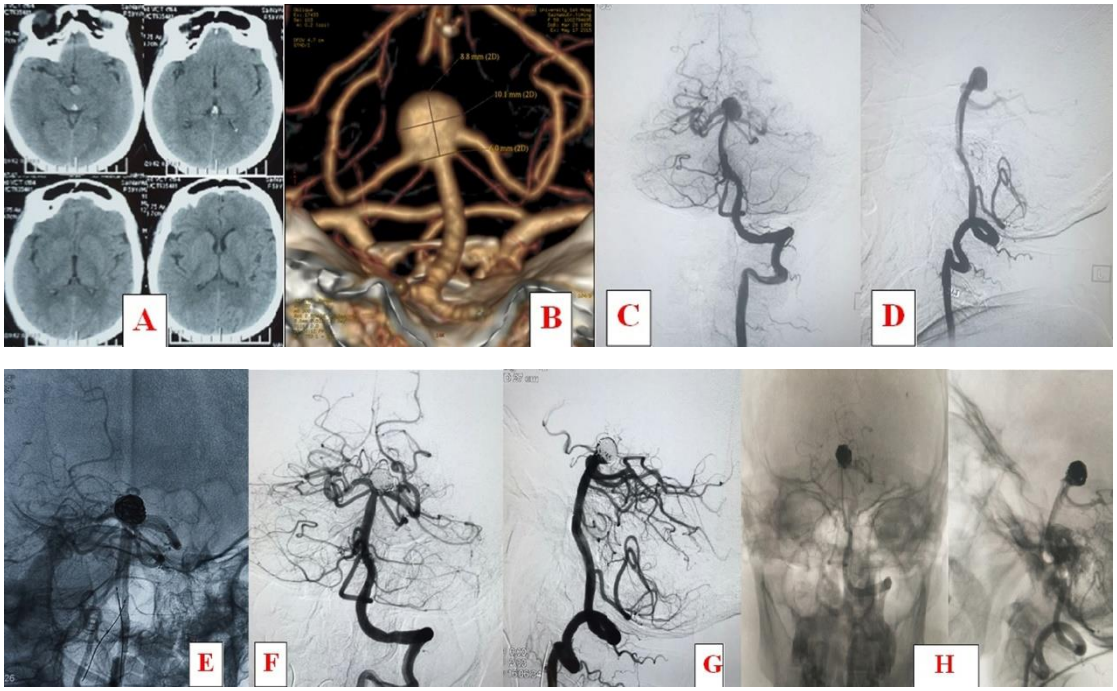

Figure 1 Treatment of Saccular aneurysms

The detailed result of the patients that are cured with the saccular aneurysm have been described in Table 1. Their clinical conditions along with the treatment techniques applied during the process are given below. The complications that were faced along with the surgery and the follow up session after successful surgery are given in the table.

Table 1 shows Clinical and aneurysm characters of 37 patients with saccular disease.

Table 1: Clinical and aneurysm characteristics of 37 patients with posterior circulation saccular aneurysms

Patient No	Clinical Presentation	Aneurysm Type	Treatment	Complications	Follow-up
1375230/M/74	IX, X, XII cranial N	Saccular		Nil	13 months, no recurrence
1245792/M/45	Nil	Saccular	Stent assisted Coiling	Nil	9 months over phone, no recurrence
1371254/F/49	SAH, Headache	Saccular	Stent assisted Coiling	Nil	4 months over phone, no recurrence
1350773/M/42	Headache	Saccular	Coiling	Nil	7 months over phone, no recurrence
1348447/F/54	SAH, Headache	Saccular	Coiling	Deteriorated	11 months over phone, no recurrence
1375279/M/42	SAH, Headache	Saccular	Coiling	deteriorated	Died 8 hour after surgery, enterocoelia bleeding, ,shock
1289249/F/69	SAH	Saccular	Coiling	Nil	13 months over phone, no recurrence
1332674/M/47	SAH	Saccular	Stent only	Nil	11 months over phone, no recurrence
1335004/M/62	Nil	Saccular	Stent only	Nil	3 months good recovery, no recurrence

Table 1: Clinical and aneurysm characteristics of 37 patients with posterior circulation saccular aneurysms					
1359699/M/43	SAH, Muscle weakness	Saccular	Coiling	Nil	5 months over phone, no recurrence
1371011/M/42	SAH, Headache	Saccular	Coiling	Nil	5 months over phone, no recurrence
1255106/F/48	SAH, Headache	Saccular	Coiling	Nil	rebleed 9days after procedure
1482401/M/42	SAH, Headache	Saccular	Stent assisted Coiling	deteriorated, Bleeding	8 months good recovery no recurrence
1510985/F/45	Nil	Saccular	Coiling	Nil	6 months good recovery no recurrence
1343502/M/42	SAH, Headache	Saccular	Stent only	Nil	12 months good recovery no recurrence
1479786/F/47	SAH, Headache, Coma	Saccular	Coiling	Neural Deficit	12 months slow recovery no recurrence
1375279/M/42	SAH, Headache	Saccular	Stent assisted Coiling	Nil	12 months good recovery no recurrence
1374215/F/67	SAH, Headache	Saccular	Coiling	Neural Deficit	vegetative state
1297850/F/37	SAH, Headache	Saccular	Clipping	Nil	12 months good recovery no recurrence
1240156/M/56	IX,X, cranial N	Saccular	Coiling	Nil	12 months good recovery no recurrence
1562608/M/33	SAH	Saccular	Coiling	Nil	12 months good recovery no recurrence
1667222/M/66	SAH	Saccular	Coiling	yes Right limb weakness	8 months good recovery no recurrence
1667923/M/51	SAH	Saccular	Coiling	Hydrocephalus, ventriculoperitoneal shunt	48 months good recovery no recurrence
1676427/M/69	SAH	Saccular	Stent assisted Coiling	Nil	4 months good recovery no recurrence
1697506/F/49	SAH, Headache	Saccular	Coiling	Nil	5 months good recovery no recurrence
1710423/M/55	Nil	Saccular	Stent assisted Coiling	Nil	4 months; Have ischemic stroke in 4month
1723433/F/51	SAH, Headache	Saccular	Coiling	Nil	14 months good recovery no recurrence
1739946/M/59	SAH	Saccular	Stent assisted Coiling	Nil	14 months good recovery no recurrence
1740018/M/65	left eye Vision decrease	Saccular	Stent assisted Coiling	brain stem, fore limb pain	11 months good recovery
1639503/M/63	right limb paralysis	Saccular	Stent assisted Coiling	brain stem, fore limb pain	vegetative state
1650774/F/59	SAH, Headache	Saccular	Stent assisted Coiling	Bleeding, patient died	Dead
1602003/M/45	SAH	Saccular	Stent assisted Coiling	Nil	6 months good recovery no recurrence

Table 1: Clinical and aneurysm characteristics of 37 patients with posterior circulation saccular aneurysms

1619373/M/59	Nil	Saccular	Flow Diversion	left limb paralysis right limb hemiparesis	vegetative state
1637753/M/37	VII cranial N, Unconscious	Saccular	Stent assisted Coiling	left limb paralysis right limb hemiparesis	poor recovery, no recurrence
1217392/M/37	SAH, headache, 9 cranial N	Saccular	Stent assisted Coiling	Nil	18 months good recovery
1328243/M/48	SAH, light coma, unconscious	Saccular	Coiling	Coma, parent A occlusion	dead 6 days later after procedure

Note: SAH indicates subarachnoid hemorrhage

DISCUSSION:

A detailed observation was conducted from year 2012 up to 2017 in which various patients were treated suffering from saccular aneurysms in posterior circulation.

2012

Up to the end of year 2012, 15 patients were identified; their ages were in between 32 years to 69 years. Among the identified patients, 8 were male whereas 7 were females. 5 of them were suffering from saccular aneurysms in posterior circulation. Among these identified individuals during clinical presentations, 9 were having subarachnoid hemorrhage (SAH) on CT scan, 12 were having headaches and none of them was showing any sign of Neurological deficit. The Keratic Precipitates were showing in between 50-90. During the diagnosis, fisher grading of the patients were between 0-4. Various techniques were applied on the patients for their recovery. 4 were treated with clipping, 7 with coiling by (PCAan, VAan, Acom, PICAan, RVAan), 3 were treated with Stunt assisted coiling whereas no one was treated with Stunt only technique. Various complications raised during the process like 4 patients were affected with deteriorated, 1 with Aneurmyl rebleed whereas 3 with N.Defecit. Most of the patients showed a good result with a good recovery in between 12 to 24 months with no reoccurrence. 1 person died after the surgery and a few went to vegetative stage.

2013

In the year 2013, 27 patients were identified; their ages were in between 34 years to 74 years. Among the identified patients, 12 were male whereas 15 were females. 15 of them were suffering from saccular aneurysms in posterior circulation. Among these identified individuals during clinical presentations, 20 were having subarachnoid hemorrhage (SAH) on CT scan, 23 were having headaches and one of them was showing sign of Nerve Pulses with IX, X, XII Cranial N. The Keratic Precipitates were showing in between 100-20. During the diagnosis, fisher grading of the patients were between 0-4. Various techniques were applied on the patients for their recovery. 4 were treated with clipping, 13 with coiling by (PCAan, VAan, Acom, PICAan, RVAan), 6 were treated with Stunt assisted coiling whereas 02 were treated with Stunt only technique. Various complications raised during the process like 5 patients were affected with deteriorated, 1 with Aneurmyl rebleed whereas 3 with N.Defecit. Most of the patients showed a good result with a good recovery in between 09 to 24 months with no reoccurrence. 1 person died after the surgery and no one went to vegetative stage.

2014

Up to the end of year 2014, 24 patients were identified, 3 of them were suffering from saccular aneurysms in posterior circulation. Among these identified individuals during clinical presentations, 20 were having subarachnoid hemorrhage (SAH) on CT scan, 22 were having headaches and 2 were showing signs of Neurological deficit. The Keratic Precipitates were showing in between 20-100. During the diagnosis, fisher grading of the patients were between 0-4. 02 were treated with clipping, 13 with coiling by (PCAan, VAan, Acom, PICAan, RVAan), 10 were treated with Stunt assisted coiling whereas 01 was treated with Stunt only technique. Various complications raised during the process like 1 patients was affected with deteriorated, no one with Aneurmyl rebleed whereas 1 with N.Defecit. Most of the patients showed a good recovery result with a good recovery in between 08 to 12 months with no

reoccurrence.

2015

In year 2015, 22 patients were identified and 2 of them were suffering from saccular aneurysms in posterior circulation. Among these identified individuals during clinical presentations, 16 were having subarachnoid hemorrhage (SAH) on CT scan, 11 were having headaches and 03 were showing signs of Neurological deficit. The Keratic Precipitates were showing in between 50-100. During the diagnosis, fisher grading of the patients were between 0-4. Six patients were treated with clipping, 09 with coiling by (PCAan, VAan, Acom, PICAan, RVAan), 05 were treated with Stunt assisted coiling whereas 02 were treated with Stunt only technique.02 patients arose with complication of N.Defecit. Most of the patients showed a good recovery result with a good recovery in between 08 to 12 months with no reoccurrence. 02 persons died after the surgery and a few went to vegetative stage.

2016

17 patients were treated; their ages were in between 36 years to 69 years. Among the identified patients, 10 were male whereas 7 were females. 07 of them were suffering from saccular aneurysms in posterior circulation. Among these identified individuals during clinical presentations, 4 were having subarachnoid hemorrhage (SAH) on CT scan, 09 were having headaches and 04 of them was showing signs of Neurological deficit. The Keratic Precipitates were showing in between 20-100. During the diagnosis, fisher grading of the patients were between 0-4. Various techniques were applied on the patients for their recovery. 4 were treated with clipping, 7 with coiling by (PCAan, VAan, Acom, PICAan, RVAan), 3 were treated with Stunt assisted coiling whereas no one was treated with Stunt only technique. Various complications raised during the process like 4 patients were affected with deteriorated, 1 with Aneurmyl rebleed whereas 3 with N.Defecit. Most of the patients showed a good result with a good recovery in between 12 to 24 months with no reoccurrence. 1 person died after the surgery and two of them went to vegetative stage.

2017

14 patients were identified, 8 were having subarachnoid hemorrhage (SAH) on CT scan, 06 were having headaches and four of them were showing signs of Neurological deficit. The Keratic Precipitates were showing in between 20-90. Six of them were suffering from saccular aneurysms in posterior circulation. During the diagnosis, fisher grading of the patients were between 0-4. Various techniques were applied on the patients for their recovery. 1 was treated with clipping, 6 with coiling by (PCAan, VAan, Acom, PICAan, RVAan), 6 were treated with Stunt assisted coiling whereas no one was treated with Stunt only technique. Various complications raised during the process like 3 patients were affected with deteriorated, 2 with Aneurmyl rebleed whereas 4 with N.Defecit. Most of the patients showed a good result with a good recovery in between 05 to 14 months with no reoccurrence. 4 patients showed vegetative stage. (Raphaeli G, 2011), (Y, 2003), (Ajnrorg., 2019),

This article does not contain any studies with animals performed by any of the authors.

CONCLUSION:

Endovascular treatment of saccular aneurysms may be treated by various techniques with satisfying clinical practical results. The mortality is being controlled by the techniques like clipping, coiling and stent assisted coiling. But a lot of work is needed to be done in this field as there are limitations for the treatments of the saccular aneurysm with huge size or mass effect presentations.

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Conflict of Interest

All the authors declare that they have no conflict of interest.

Informed consent

Informed consent was obtained from all individual participants included in the study.

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