

ORIGINAL RESEARCH

The Outcome of Aneurysm Clipping in Golden Aged – An Institutional Based Analysis

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ABSTRACT

Background and Aim: Aging is inevitable. The elderly patients have more underlying comorbidities, poor physical condition, and higher operative risk (1-3). It is commonly observed that the outcome of the patients is largely determined by the severity of the initial aSAH and subsequent complications associated with neurologic deficit. The aim of this study is to study the varied clinical picture, radiological and operative findings of patients with symptomatic, angiographically proven intracranial aneurysm in elderly population.

Materials And Methods: The present hospital based prospective analytical study was conducted from August 2021 To September 2022 among patients who were diagnosed to have intracranial aneurysm on ctangiography brain, and underwent surgery for the same.

Results: Hunt and Hess and the WFNS grading are still the most common grading system used to classify the patients of intracranial aneurysmal bleed with SAH. ACOM aneurysm is the most common location of intracranial aneurysm. Size of intracranial aneurysm, as well as intraoperative rupture has no effect on post-operative outcome. Period of temporary clipping and post-operative vasospasm affects post-operative outcome.

Conclusion: The process of ageing presents unique considerations and challenges, and management is currently individualized, requiring precise knowledge of natural history that must be weighed against an individual's comorbidities, life expectancy, treatment related risks and likelihood of treatment success. To improve outcomes in elderly patients, co-management by specialized neurointensivists who can handle patients with multiple conditions should be considered. The total treatment should be a holistic approach.

Keywords: Aneurysm, Ageing, Clipping, Outcome

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INTRODUCTION

Aging is inevitable. The elderly patients have more underlying comorbidities, poor physical condition, and higher operative risk (1-3). It is commonly observed that the outcome of the patients is largely determined by the severity of the initial aSAH and subsequent complications associated with neurologic deficit (4,5). Old age is reported to be one of the significant risk factors that affect the severity of aSAH (6,7). The elderly patients with poor cerebrovascular reserve function are more likely to suffer from severe neurological dysfunction after aSAH. Aneurysmal subarachnoid hemorrhage is a disastrous and fatal medical emergency requiring immediate intervention as approximately 12% of patients die before receiving medical supports, 33% within 48 hr and 50% within 30 days of a SAH and 50% of survivors suffer from permanent disability and

dependency. The first investigation when SAH is suspected is computed tomography (CT). Definitive neuroimaging techniques include CT angiography (CTA), Four vessel intra-arterial digital subtraction angiography (IADSA), Magnetic resonance angiography (MRA), Transcranial Doppler ultrasonography. Although IADSA is considered the gold standard, it is an invasive test. 3DCT Angiography is fast becoming a useful alternative in many centres and is noninvasive. There are multiple preoperative, intraoperative and postoperative parameters and events which influence the surgical outcome of clipping of aneurysms in elderly. By studying the outcome of these aneurysms and by investigating and assessing the factors which affect their respective outcomes, it will be easier to perform better by taking care of these factors and executing

better control for their prevention with better technical performance and postoperative care.

AIM& OBJECTIVES

- To study the varied clinical picture, radiological and operative findings of patients with symptomatic, angiographically proven intracranial aneurysm in elderly population
- To study the outcome of operated intracranial aneurysm in elderly population

MATERIALS AND METHODS:

STUDY DESIGN: Hospital based prospective analytical study

STUDY PERIOD: August 2021 TO September 2022

INCLUSION CRITERIA

1. Patients who were diagnosed to have intracranial aneurysm on CT angiography brain, and underwent surgery for the same.
2. Patients who were above 60 years of age

EXCLUSION CRITERIA

1. Patients of intracranial aneurysm who did not undergo surgery
2. Patients who did not give consent for the study.
3. Patients below age of 60 years

MODE OF EVALUATION

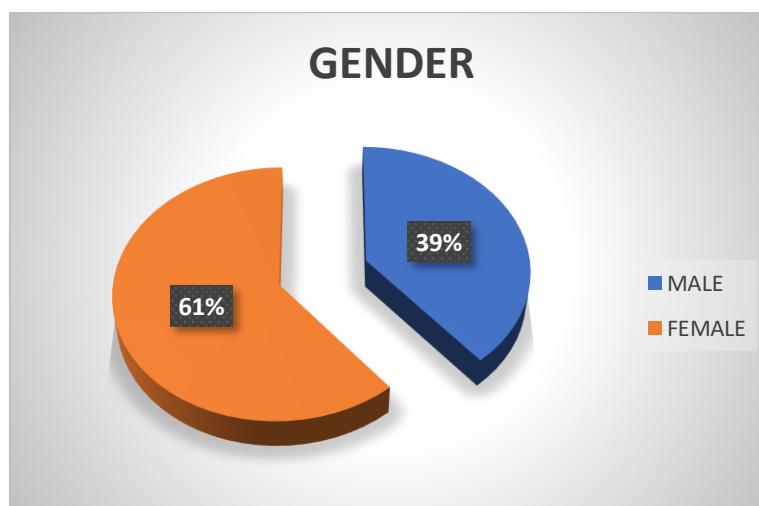
- History
- Clinical examination

IMAGING STUDIES

- NCCT BRAIN
- CT ANGIOGRAPHY BRAIN: VOLUME RENDERED VIEW
- MANAGEMENT:
 - General care
 - Fluid an electrolyte balance
 - Prevention of vasospasm
 - Antiepileptics
 - Blood pressure control and monitoring
 - Surgical treatment of the aneurysm

RESULTS AND OBSERVATIONS

AGE	NO. OF PATIENTS	PERCENTAGE
60-70	10	55.55%
70-80	6	33.33%
80-90	2	11.11%
TOTAL	18	



TIME OF PRESENTATION

TIME OF PRESENTATION	NUMBER OF PATIENTS
WITHIN 24 HOURS	8
24-48 HOURS	5
AFTER 48 HOURS	5

CLINICAL FEATURES

CLINICAL FEATURES	NUMBER OF PATIENTS	PERCENTAGE
HEADACHE	18	100%
NAUSEA/VOMITTING	10	55.55%
NECK PAIN/STIFFNESS	9	50%

ALTERED SENSORIUM	7	38.88%
LOSS OF CONSCIOUSNESS	10	55.55%
SEIZURE	4	22.22%
OPHTHALMIC SIGNS	2	11.11%
APHASIA	1	5.55%
HEMIPARESIS	3	16.66%

ANEURYSM LOCATION

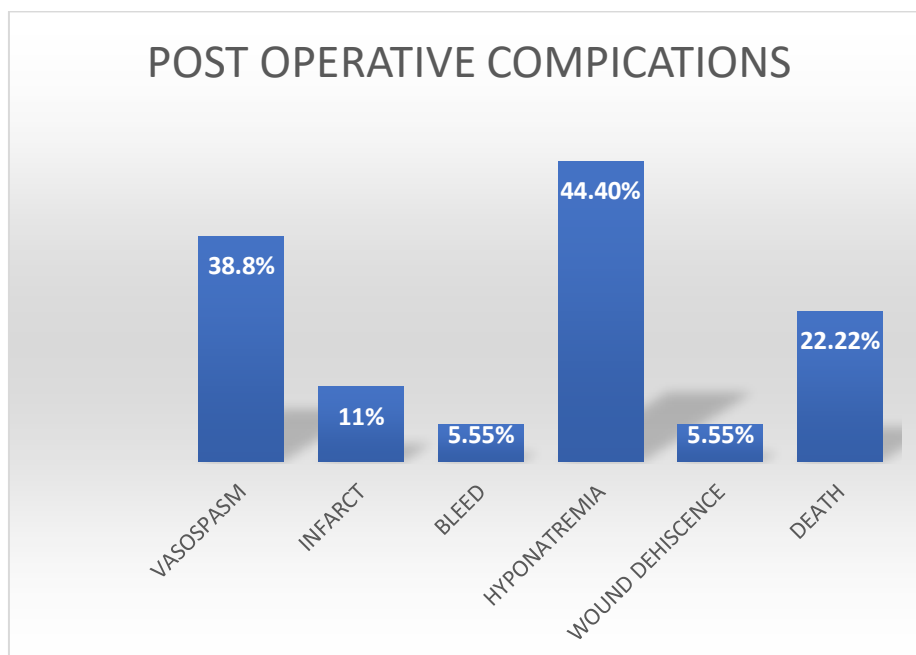
ANEURYSM LOCATION	NUMBER OF PATIENTS	PERCENTAGE
AcoM	7	38.88%
MCA	5	27.77%
A1 PERFORATOR	3	16.6%
ICA	1	5.55%
BASILAR	1	5.55%
P.COM	1	5.55%

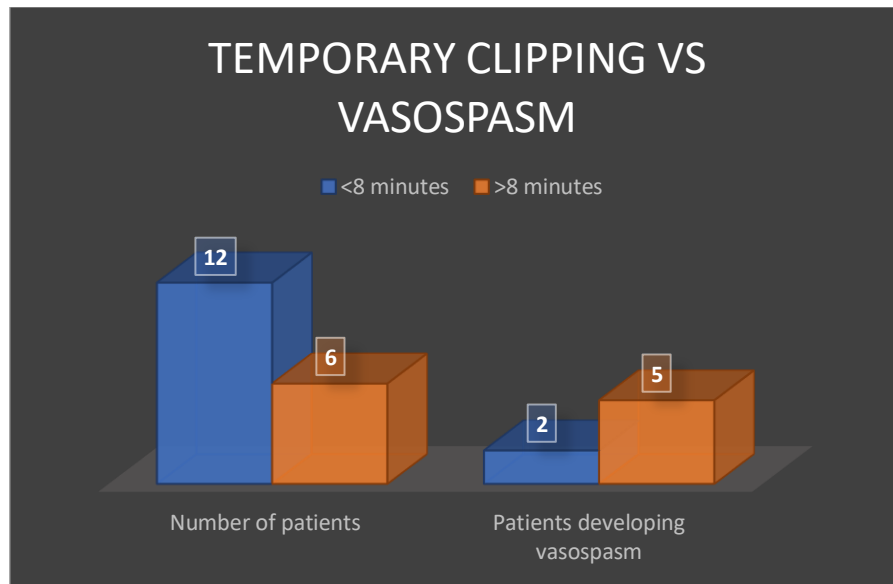
CO-MORBIDITIES AND RISK FACTORS:

RISK FACTOR	NUMBER OF PATIENTS	PERCENTAGE
HYPERTENSION	6	33.33%
DIABETES	4	22.22%
SMOKING	5	27.77%
HYPERLIPIDEMIA	6	33.33%
FAMILY HISTORY	1	5.55%
HISTORY OF CVA	1	5.55%
ALCOHOL	3	16.66%

PRE-OPERATIVE CLINICAL GRADING

Hunt n hess	Number of patients	Percentage	Wfns	Number of patients	Modified fischer scale	Number of patients
1	8	44.44	1	8	0	1
2	5	27.7	2	2	1	0
3	3	16.66	3	4	2	10
4	2	11.11	4	4	3	5
5	0	0	5	0	4	2





POST-OPERATIVE ICU STAY

DURATION OF STAY	NUMBER OF PATIENTS	PERCENTAGE(%)
<7 DAYS	12	66.66%
>7 DAYS	6	33.33%

DISCUSSION

In the present study, 18 cases of Intracranial aneurysms above the age of 60 years attending the Department of Neurosurgery, SCBMCH CUTTACK, ODISHA, during the study period were included. 61.11% were female in our study. Brillstraet al⁸ Nieuwkamp⁹, Kumar¹⁰ In these studies, also similarly female sex was most prevalent up to 69%. Headache was the most common presenting complaint in our study followed by nausea/ vomiting, loss of consciousness and neck pain/ stiffness. Headache is reported in the literature to occur in a range of 50-97% of the patients with SAH. Up to 56% patients with SAH can present with loss of consciousness as mentioned in literature. A prevalence of 13-50% of neck pain and stiffness is reported in the literature. Hypertension and smoking has been long associated with the increased risk of intracranial aneurysms. Hypertension was found in 33.33% cases in our study and smoking in 22% cases. Prevalence of hypertension in SAH patients have been reported as 21-54% in the previous literature. Sorenson et al.¹², in their study found that patients over 80 years had a significantly higher incidence of hypertension and a significantly lower incidence of smoking history and familial aneurysm history. Diabetes was seen in 22.22% cases and Hyperlipidemia is seen in 33.33% in our study which is not considered as a risk factor by the authors. Ikawa et al.¹³ mentioned in his study the risk factors for morbidity at discharge were basilar artery aneurysm compared with internal carotid artery (ICA), diabetes mellitus, antiplatelet drug, and anticoagulation drug. The initial clinical presentation of patients is the highest predictive power of the outcome. Most of the

patients in our study presented in H&H grade I and WFNS grade I. Patients with H&H grade II are most commonly found by Juvela et al¹⁴ and Jakkobson et al¹⁵. But Richard et al and Ramachandran et al found 50% and 62% patients in H&H grade I respectively. In regard to the WFNS score, most of the previous studies represent the prevalence of grade I patients at presentation with SAH at a rate of 32-63%. Fisher's scale shows the severity of SAH in CT scan. We found 55.5% cases in Fisher's grade 2 and 27.7% in grade 3. In the present study, no significant association was found between Fisher's grading and presence of vasospasm. In a study by Browers et al the total amount of subarachnoid blood on the initial computed tomogram has been shown to have independent predictive value for the occurrence of delayed cerebral ischemia. Most common location of aneurysm in our study, as found in angiography, is the anterior communicating artery in 38.8% cases. Jakobson¹⁵ and Naganuma¹⁶ also mentioned the ACA-ACOM complex to be the most common site of origin of aneurysms.

In our study in 55.55% size of the aneurysms was less than 10mm. Jang EW et al found in his study that the mean size of the aneurysms was 7.19mm.¹⁷ In this study temporary clipping was done in all cases and average duration of clipping was 8 mins and 7(38.8%) patients developed postoperative vasospasm. In literature, intraoperative temporary main artery occlusion lasting longer than 8-10 minutes was seen to significantly affect the outcome. The outcome of the study by Lai et al.¹¹ is consistent with our results that older women are at obviously greater risk of cerebral vasospasm, cerebral infarction, and clinical deterioration. In this study 6 patients (33.3%) stayed in

ICU in postoperative period for >7 days and 4 patients (22.2%) expired. These findings infer that the patients lying in ICU for more time needed long monitoring which may be in view of vasospasm or other complications. Clinical care of elderly patients is challenging because of a greater chance of pharmacological complications, cardiopulmonary dysfunction, and so on. Elderly patients who survive SAH often face prolonged management in an intensive care unit (ICU), including treatment for multiple potential neurological and medical complications.¹⁸ Therefore, for proper co-management of these patients, in order to handle multiple issues, it is necessary to employ a more specialized neurointensivist dedicated to the ICU.¹⁹

It should be noted that a more aggressive treatment performed after the rupture status of cerebral aneurysms may reduce the mortality, but older age also needs to be considered, which is a very important factor affecting the incidence of complications associated with functional outcome.

CONCLUSION

Headache is the most common presenting symptom of intracranial aneurysm. Hunt and Hess and the WFNS grading are still the most common grading system used to classify the patients of intracranial aneurysmal bleed with SAH. ACOM aneurysm is the most common location of intracranial aneurysm. Size of intracranial aneurysm, as well as intraoperative rupture has no effect on post-operative outcome. Period of temporary clipping and post-operative vasospasm affects post-operative outcome. The process of ageing presents unique considerations and challenges, and management is currently individualized, requiring precise knowledge of natural history that must be weighed against an individual's comorbidities, life expectancy, treatment-related risks and likelihood of treatment success. To improve outcomes in elderly patients, co-management by specialized neurointensivists who can handle patients with multiple conditions should be considered. The total treatment should be a holistic approach.

REFERENCES

- Ryttlefors M, Howells T, Ronne-Engström E, Nilsson P, Enblad P. Neurointensive care is justified in elderly patients with severe subarachnoid hemorrhage—an outcome and secondary insults study. *Acta Neurochir.* (2010) 152:241–9. doi: 10.1007/s00701-009-0496-x
- Degos V, Gourraud PA, Tursis VT, Whelan R, Colonne C, Korinek AM, et al. Elderly age as a prognostic marker of 1-year poor outcome for subarachnoid hemorrhage patients through its interaction with admission hydrocephalus. *Anesthesiology.* (2012) 117:1289–99. doi: 10.1097/ALN.0b013e318267395b
- Bekelis K, Gottlieb D, Su Y, O'Malley AJ, Labropoulos N, Goodney P, et al. Surgical clipping versus endovascular coiling for elderly patients presenting with subarachnoid hemorrhage. *J Neurointerv Surg.* (2016) 8:913–8. doi: 10.1136/neurintsurg-2015-011890
- Zheng J, Xu R, Guo Z, Sun X. Small ruptured intracranial aneurysms: the risk of massive bleeding and rebleeding. *Neurol Res.* (2019) 41:312–8. doi: 10.1080/01616412.2018.1563737
- De Marchis GM, Lantigua H, Schmidt JM, Lord AS, Velandar AJ, Fernandez A, et al. Impact of pre-morbid hypertension on haemorrhage severity and aneurysm rebleeding risk after subarachnoid haemorrhage. *J Neurol Neurosurg Psychiatry.* (2014) 85:56–9. doi: 10.1136/jnnp-2013-305051
- Brawanski N, Kunze F, Bruder M, Tritt S, Senft C, Berkefeld J, et al. Subarachnoid hemorrhage in advanced age: comparison of patients aged 70–79 years and 80 years and older. *World Neurosurg.* (2017) 106:139–44. doi: 10.1016/j.wneu.2017.06.056
- Da Silva IR, Gomes JA, Wachsmann A, Rodriguez de Freitas G, Provencio JJ. Effect of age on transcranial doppler velocities in patients with aneurysmal subarachnoid hemorrhage. *Eur Neurol.* (2016) 76:261–6. doi: 10.1159/000452273
- Nieuwkamp DJ, Setz LE, Algra A, Linn FHH, de Rooij NK, Rinkel GJE. Changes in case fatality of aneurysmal subarachnoid haemorrhage over time, according to age, sex, and region: a meta-analysis. *Lancet Neurol.* 2009;8(7):635–42.
- Brilstra EH, Rinkel GJE, Algra A, van Gijn J. Rebleeding, secondary ischemia, and timing of operation in patients with subarachnoid hemorrhage. *Neurology.* 2000;55(11):1656–60.
- Kumar S, Goddeau RP, Selim MH, Thomas A, Schlaug G, Alhazzani A, et al. Atraumatic convexal subarachnoid hemorrhage: Clinical presentation, imaging patterns, and etiologies. *Neurology.* 2010;74(11):893–9.
- Lai PMR, Gormley WB, Patel N, Frerichs KU, Aziz-Sultan MA, Du R. Age-dependent radiographic vasospasm and delayed cerebral ischemia in women after aneurysmal subarachnoid hemorrhage. *World Neurosurg.* (2019) 130:e230–5. doi: 10.1016/j.wneu.2019.06.040
- Sorenson TJ, Vine R, Lanzino G. Unruptured intracranial aneurysms in patients over 80 years: Natural history and management implications. *Acta Neurochir (Wien)* 2018;160:1773–7.
- Ikawa F, Michihata N, Akiyama Y, Iihara K, Matano F, Morita A, et al. Treatment Risk for elderly patients with unruptured cerebral aneurysm from a nationwide database in Japan. *World Neurosurg* 2019;132:e89–98
- Juvela S. Minor leak before rupture of an intracranial aneurysm and subarachnoid hemorrhage of unknown etiology. *Neurosurgery.* 1992;30(1):7–11.
- Jakobsson K-E, Säveland H, Hillman J, Edner G, Zygmunt S, Brandt L, et al. Warning leak and management outcome in aneurysmal subarachnoid hemorrhage. *J Neurosurg.* 1996;85(6):995–9.
- Naganuma M, Fujioka S, Inatomi Y, Yonehara T, Hashimoto Y, Hirano T, et al. Clinical characteristics of subarachnoid hemorrhage with or without headache. *J Stroke Cerebrovasc Dis.* 2008;17(6):334–9.
- Jang EW, Jung JY, Hong CK, Joo JY. Benefits of surgical treatment for unruptured intracranial aneurysms in elderly patients. *J Korean Neurosurg Soc.* 2011 Jan;49(1)
- Smith M. Intensive care management of patients with subarachnoid haemorrhage. *Curr Opin Anaesthesiol.* 2007 Oct;20(5):400–7.

20. Josephson SA, Douglas VC, Lawton MT, English JD, Smith WS, Ko NU. Improvement in intensive care unit outcomes in patients with subarachnoid hemorrhage after initiation of neurointensivist co-management. *J Neurosurg.* 2010 Mar;112(3):626-30