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ANGIOGRAPHIC FEATURES OF RUPTURED CEREBRAL ANEURYSM IN SRINAGARIND HOSPITAL

Piyanan Kuysakorn, MD.
Benjaporn Nitinavakorn, MD.
Jitjaroen Chaiyakum, MD.
Eimorn Mairiang, MD.
Nittaya Chamadol, MD.
Vallop Laopaiboon, MD.
Jiraporn Srinagarind, MD.
Jaturat Kanpittaya, MD.

Department of Radiology, Faculty of Medicine, Khon Kaen University

ABSTRACT

Intracranial aneurysms are common. It is the most commonly encountered aneurysms in the human body. Rupture of an aneurysm producing intracranial bleeding is considered a medical emergency, and requires further investigation and management. Cerebral angiography is still the examination of choice to confirm the diagnosis of aneurysms.

In our study, 29 cases of ruptured cerebral aneurysm show no sex difference And 13 out of 29 cases are in the age range of 40-60 years. The most common location of cerebral aneurysm is the anterior communicating artery aneurysm, 11 out of 29 cases. No multiple aneurysm is seen in this study.

OBJECTIVE and BACKGROUND

The angiographic features of ruptured cerebral aneurysm in Thailand has not been reported. We studied a total of 29 cases in Srinagarind hospital during the past 7 years, from 1987-1993, and reviewed literatures on the topic. It is intended to serve as a baseline data when we collected more than hundred cases.

The study includes :

1. analysing demographic characteristics
2. the presenting history and physical findings
3. angiographic examination by conventional technique or Digital Subtraction Angiography.
4. the details of ruptured cerebral aneurysm of all patients.

DESIGN : A retrospective review of the records (from the OPD card, admission charts, plus x-ray films and reports) of a consecutive series of 29 patients admitted to Srinagarind hospital, the 7 years of collection from 1987-1993.

SETTING : Srinagarind Hospital, Faculty of Medicine, Khon Kaen University. Thailand

PATIENTS AND METHOD : The total 29 cases with complete history, physical examination and angiograms were studied. Some of the other investigations and surgical finding have been mentioned.

RESULTS

Twenty-nine cases of ruptured cerebral aneurysm presented as clinical subarachnoid hemorrhage

GENDER

Gender	Cases	Projected Percentage
Man	15	51.7
Woman	14	48.3
	29	**100**

Either sex is predominant in this study.

AGE : Range 11-73 years
Mean 44.3 years

Age (years)	Case	Projected Percentage
≤10	1	3.4
11-20	2	6.9
21-30	4	13.8
31-40	3	10.3
41-50	7	24.1
51-60	6	20.7
61.70	4	13.9
71-80	2	6.9
	29	**100**

Almost half of the cases are in the age range between 40 and 60 years. Cerebral aneurysm is a disease more predominant in adults or elderly people and is uncommon in children under ten years of age.

CLINICAL PRESENTATION

Clinical Presentations	Cases	Projected Percentage
headache	27/29	93.1
loss of consciousness	15/29	51.7
seizure	2/29	6.9

Headache is present in nearly all of the patients. The onset of headache is sudden and severe, no pattern in location, being unlike any headache the patient has otherwise experienced. One case in this study developed headache for six weeks and was treated as chronic meningitis until sudden severe headache with loss of consciousness occurred.

Other clinical presentations accompanying aneurysmal rupture are transient nausea, vomiting and visual disturbances.

PHYSICAL EXAMINATIONS

Physical Examinations	Case	Projected Percentage
stiffness of neck	22/29	75.8
weakness of limbs	6/29	20.7
papilledema	2/29	6.9

Stiffness of the neck is the most frequent physical finding. It is a sign of menigeal irritation, due to menigism or meningitis by various causes.

Weakness of limbs is a physical finding in about one-fifth of the cases.

LUMBAR PUNCTURE

	Case	Projected Percentage
done	14	48.3
not done	14	48.3
not known	1	3.4

RESULT OF LUMBAR PUNCTURE

	Case	Projected Percentage
bloody CSF	10/14	71.4
xanthochrome	3/14	21.4
Normal	1/14	7.2

Lumbar puncture and CSF analyses are the examinations of choice to evaluate the signs of meningeal irritation either from menigitis or menigism

Result of lumbar puncture in cases of ruptured cerebral aneurysm showed bloody CSF in 71.4% of the cases. Other less common result was xanthochrome amounted to 21.4%. One case of normal CSF study was a case of a very large aneurysm of Rt. middle cerebral artery, about 2.4 x 3.0 cm. in size. His clinical presentations were headache with sudden loss of consciousness. Physical findings were coma and stiffness of the neck.

CT BRAIN SCAN

	Case	Projected Percentage
done	26/29	89.7
not done	3/29	10.3

RESULTS OF CT BRAIN SCAN

	Case	Projected Percentage
Subarachnoid hemorrhage	15/29	57.6
Suggestive aneurysm	8/26	30.8
Intraventricular hemorrhage	7/26	26.9
Intracerebral hematoma	5/26	19.2

It is generally accepted that the intracranial bleeding is considered a medical emergency, so cranial CT scan should be performed on admission. CT scan is an important diagnostic tool for assessment and management of patients with acute intracerebral hemorrhage. Cerebral aneurysm may rupture into the subarachnoid space (subarachnoid hemorrhage), into brain parenchyma (intracerebral hematoma) or into the ventricle (intraventricular hemorrhage). The CT scan will show the location, size and anatomical

extent of the intracranial bleeding as well as the status of the intracranial contents. (Taverus 1987)

Subarachnoid hemorrhage is the most common CT scan finding, 57.6% of cases. Suggestive aneurysm is shown in CT scan pre- and post- contrast material administration as an enhanced structure (Fig. 1 A-B-C-D), This must be differentiated from other enhanced mass lesions such as tumor (Fig 2 A-B-C).

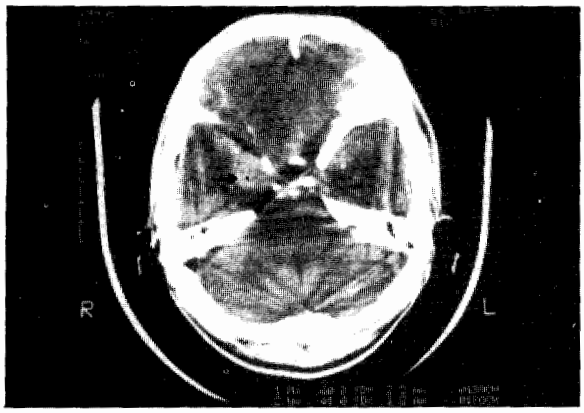

Fig : 1-A

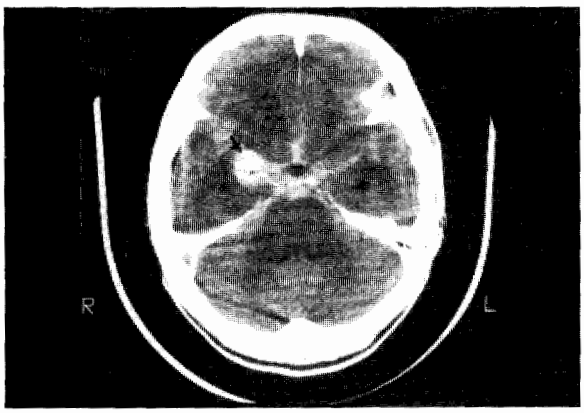

Fig : 1-B

Fig : 1-A NCCT axial scan at base of skull, 1-B CECT showa enhanced structure after contrast daministration. (arrow)

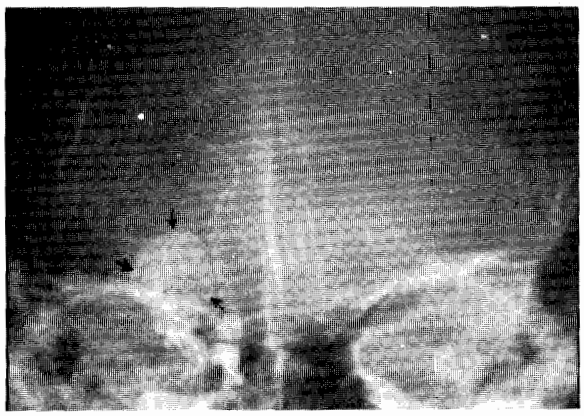

Fig : 1-C

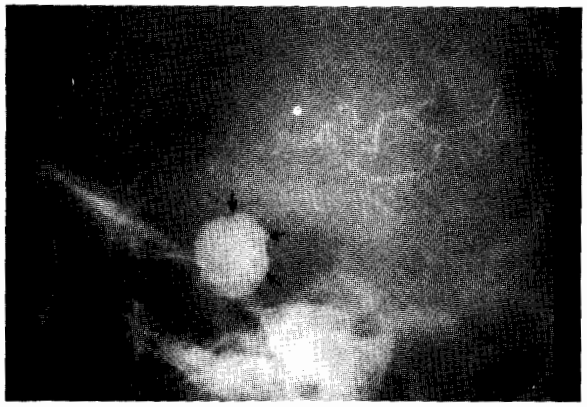

Fig : 1-D

Fig : 1-C, D; Conventional cerebral angiogram reveal giant cerebral aneurysm at Rt. Middle cerebral artery (arrow)

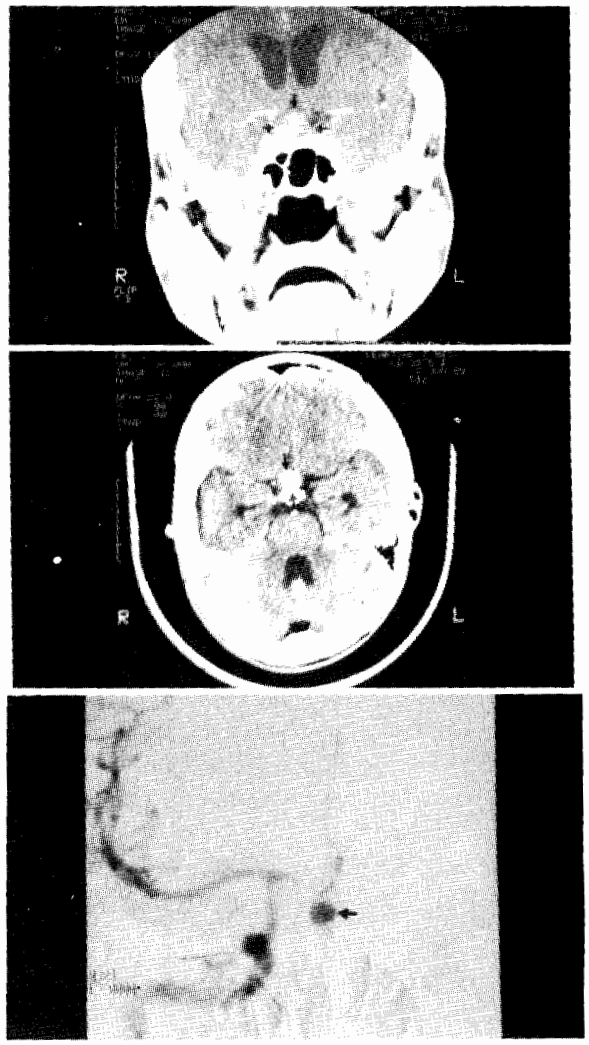

Fig 2-A

Fig 2-A CECT brain coronal vies, 2-B axial view, 2-C Digital subtraction angiogram shows anterior communicating artery aneurysm. It looks like a pituitary tumor in CT brain scan.

CEREBRAL ANGIOGRAPHIC FEATURES

Duration of performing examination after the first presentation

Time	case	Projected Percentage
1 week	14	48.2
2 weeks	8	27.6
3 weeks	3	10.3
4 weeks	3	10.3
6 weeks	1	3.5
	29	**100**

There is one case of delayed angiography for 6 weeks because the case was misinterpreted as chronic meningitis.

Type of cerebral angiogram

	case	Projected Percentage
Conventional technique	18/29	62.1
Digital Subtraction angiography	11/29	37.9

see Fig.3

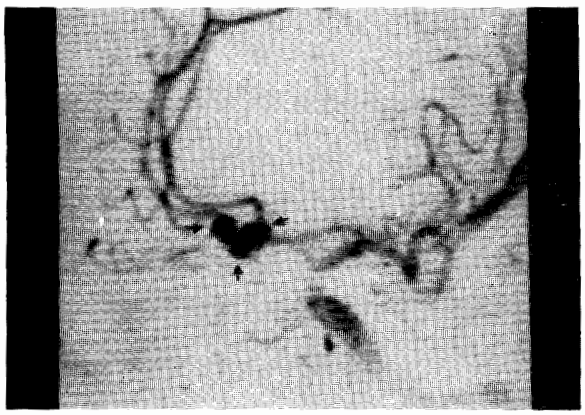

Fig 3 Anterior communicating artery aneurysm with three lobulations (Digital subtraction angiography technique)

Location of cerbral aneurysm.

	Case	Projected Percentage
Anterior communicating artery	11	37.9
Posterior communicating artery	4	13.8
Middle cerebral artery	4	13.8
Internal carotid artery	4	13.8
Basilar tip	3	10.3
Anterior cerebral artery	2	7.0
Posterior cerebral artery	1	3.4
	29	**100**
Multiple aneurysms	**0**	**0%**

see fig 3, 4, 5-A,B.

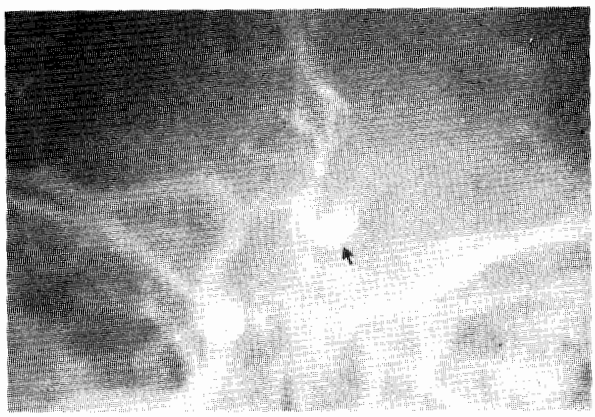

Fig 4 Conventional cerbral angiogram shows anterior communicating artery aneurysm, saccular shape with tenting

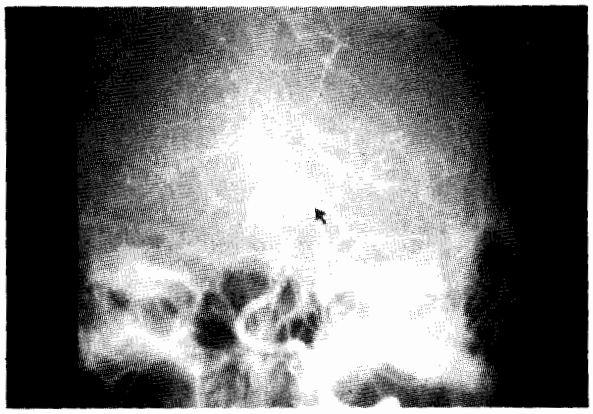

Fig 5-A

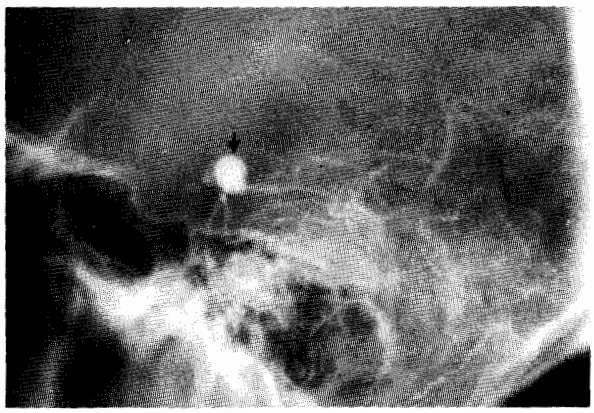

Fig 5-A B; Conventional cerebral angiogram shows Basilar tip aneurysm, fusiform with irregular contur.

SIZE of Aneurysm

Eleven cases can not be measured because they were done with digital subtraction angiography.

Analysis of 18 cases using conventional technique.

Size (mm.)	Case	Projected Percantage
≤5	7	38.9
6-10	7	38.9
11-12	3	16.7
21-30	1	5.5
	18	100

The rate of small aneurysm is high. Seventy-seven percent of the cases are 10 mm. or less in diameter.

SHAPE

Shape	Case	Projected Percentage
saccular	17	58.7
round	6	20.7
dum bell	3	10.3
multiple lobulations	3	10.3
	29	100

see fig : 1 C- D, 4, 5 A-B

EVIDENCE OF RUPTURED

Evidence of Ruptured	Case	Projected Percentage
lobulation	14	48.3
tenting	3	10.3
irregular shape	1	3.4

see Fig : 3, 4, 5 A-B

ASSOCIATED FINDING

Associated Findings	Case	Projected Percentage
arterial spasm	5	17.2
hydrocephalus	4	13.8
decreased circulation	1	3.5
arteritis	1	3.5

Post-operative cerebral angiogram were performed in 12/20 case = (60%.) And the result was totally successful as judged by the complete absence of aneurysm.

DISCUSSION AND REVIEW OF LITERATURES

According to Taverus, an arterial aneurysm is defined as a localized and persistent dilatation that result from the yielding of the component of the wall of an artery. Cerebral aneurysm is the most common aneurysm in the human body. Based on their etiology, intracranial arterial aneurysms may be classified as follow

1. Congenital (berry) aneurysm : in or near circle of Willis at bifurcation of medium-sized artery
2. Arteriosclerotic aneurysm
   fusiform aneurysm of larger artery
   common at basilar artery
3. Mycotic aneurysm from septic emboli
4. Traumatic (false) aneurysm
5. Neoplastic aneurysm
6. Dissecting aneurysm

Inagawa and Hirans (1990) observed in total of 10,259 autopsies including 84 patients with 102 unruptured aneurysms. They found that the pevalence was 0.8% and multiple aneurysm was 19% with the selected observations :

1. Incidence of "unruptured aneurysms" was higher in elderly patients aged 60 years or older, and the peak percentage was 1.2% in the seventh decade.
2. Aneurysms occurred more frequently in female than male, with a ratio of 1.7 :1
3. Most common site of aneurysm was the middle cerebral artery 36%.
4. The rate of small aneurysms was very high
   ≤4 mm. in diameter = 54%
   5-9 mm. in diameter = 35%

Rupture rate of unruptured aneurysm seems to be very low.

The same authors, studied 133 patients with ruptured intracranial aneurysm. The authors reported the sizes as follow :

≤ 4 mm. = 17%
5-9 mm. = 46%
≥ 10 mm. = 38%

For multiple aneurysms; the larger the size of aneurysms, the higher the risk of rupture as well as of initial rupture.

Comparing our study to Inagawa and Hirans findings, our study apparently showed high incidence of small aneurysm accordingly with a reservation that our sample size is rather small.

Rosenorn et al (1988) studied the autopay material and found that the prevalence of unruptured intracranial aneurysm was 0.5% in the general population. Incidence of aneurysmal subarachnoid hemorrhage revealed 10 cases per 100,000 inhabitants per year.

The same authors, studied 1,076 patients with aneurysmal subarachnoid hemorrhage, found a significantly higher seasonal in cidence of subarachnoid hemorrhage during spring and autumn compared to summer and winter.

Coyne and Stuart (1991) studied 102 patients with cerebral aneurysm showed female to male ratio of 62 : 38 percentage.

In our study, the highest incidence was of patients ranging between 40-60 years of age, 44.8% of cases. Many reports support this finding in adult or elderly people. And we found that headache is the presenting symptom (about 93% of cases).

Ostergaard (1991) defined that headache is a warning symptom of impending aneurysmal subarachnoid hemorrhage. He reported that about half of the aneurysm patients admitted to neurosurgical department experienced warning symptoms in the form of minor bleeding episodes days or even several months before a major hemorrhage occurred. Headache is the most common symptom of this warning leak, occurring in 9 out of 10 patients. If a warning headache was suspected, lumbar puncture should be the examination of choice, once the CT scanning has ruled out an intracranial mass lesion.

In reference to CT scan when cerebral aneurysm rupture, subarachnoid hemorrhage is the most common presentation. The CT scan of the head will show blood in the subarachnoid space in 80-100% of cases of fresh subarachnoid hemorrhage. Our study showed subarachnoid hemorrhage in 93% of the cases. The CT scans sometimes demonstrated the etiology of bleeding. Two reports supporting this are of 1) Newell et al (1989) who stated that CT infusion scanning for the detection of cerebral aneurysms are an easy and effective way to detect whether an aneurysm is the cause of spontaneous intracerebral hemorrhage, and, 2) Angtuaco et al (1986) also suggested the usefulness of high-resolution CT in intracranial aneurysm to determine the presence of subarachnoid hemorrhage, predict the location of aneurysms, identify and characterize saccular and giant aneurysms, assess the complication of aneurysm rupture, evaluate operative maneuver, and to assess post operative complications.

Cerebral Angiography is still the examination of choice to confirm the diagnosis of aneurysm and to diagnose multiple aneurysms. In our study, the highest incidence of common location was that of the anterior communicating artery (37.9%). The second most common locations were posterior communicating artery, middle cerebral artery, and internal carotid artery of the same order.

Other series, incidence of common location are

MCKissock (1960) Anterior communicting artery 33%

Locksley (1986) Anterior communicating artery, 36.1%.
Internal carotid artery. 31.1%.

Nakstad P. et al (1988) 594 patients, most common site is on the anterior communicating artery.

Taverus (1987) The most common location is on the middle cerebral artery and the second one is the internal carotid artery.

Inagawa and Hirano (1990)

Rupture : Anterior communicating artery, 30.1%.
Middle cerebral artery, 21.05%.

Unrupture : Middle crebral artery, 36%.

We are not able to present the incidence of multiple aneurysms because of the small number of cases. Incidence of multiple aneurysm varies in many series.

Nakstad et al (1988) studied 594 patients with subarachnoid hemorrhage from intracranial aneurysm. Multiple aneurysms = 8.6%.

Wilson et al (1989) : 254 cases with Multiple aneurysm; = 44.9%.

Sakoda et al (1989) : Multiple aneurysms = 13% of 215 cases

Inagawa and Hirano (1990) : Multiple aneurysms = 18%.

Regarding the evidence of rupture aneurysm in our series lobulation appeared in 48.3% of cases, so it is the most common sign when compared to tenting and irregular shape.

About the associate findings which is less than 20% in our series. It is not possible to draw any conclusion whether they are directly related to aururysm and how significant they are.

About surgical outcome, 12 cases with post operative cerebral angiogram show 100% complete absence of aneurysms.

Conclusion

The study of total 29 cases of ruptured cerebral aneurysms, 7 years in Srinagarind hospital revealed that most common clinical presentation is headache, 93% of cases; most common physical finding is stiffness of neck, 76% of cases ; most common CT brain scan finding is subarachnoid hemorrhage, 57% of cases ; most common site is the anterior communicating artery aneurysm, 37.9% of cases. We also noted high incidence of small sized aneurysm.

We hope that this topic will be further studied and reported the cases in Thailand. We also hope that this paper may be useful for the clinicians who deal with patients of ruptured cerebral aneurysms.

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