

systems, Milwaukee, U.S.A.)

(Independent Console, GE Medical systems, Milwaukee, U.S.A.)

180-400 HU (threshold level)

SSD (shaded-surface display) 3

(transorbital view)

(submentovertical view) 가

2

가 CTA

CTA CT (Hispeed Advantage, GE Medical systems, Milwaukee, U.S.A.)

3mm, 3mm 9mm, 9mm

150-180mL (Ultravist 370, 75.9% of Lopromide, Schering, Berlin, Germany) (antecubital vein) 2.3-3.5ml

(,)

C-

TA가 CA, 3

24-34

1mm,

1:1 35mm

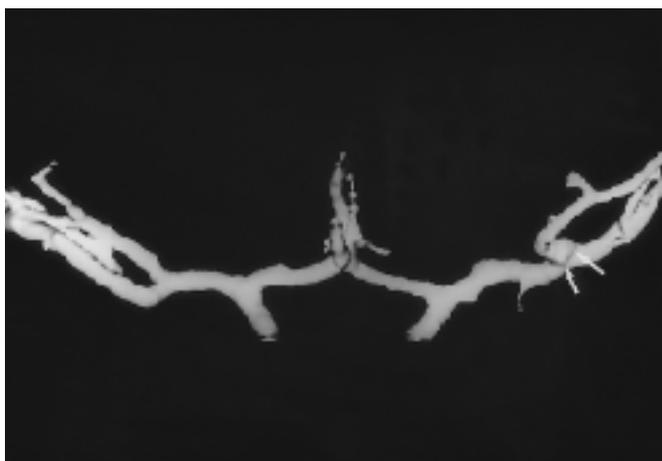
0.5mm

Table 1. Comparison of Aneurysm Numbers Detected by CT Angiography, Conventional Angiography and Operation

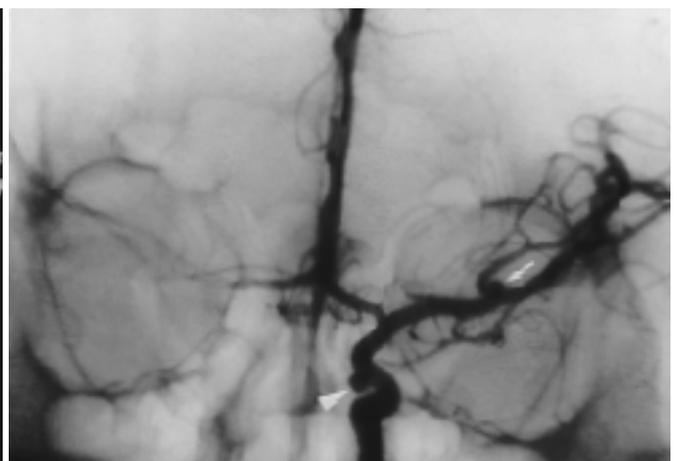
Location	CT Angiography	Conventional Angiography	Number of Aneurysms
Anterior communicating a.	38	36	40
Posterior communicating a.	18	18	18
Middle cerebral a.	13	13	13
Internal carotid a.*	5	8	8
Anterior cerebral a.	4	5	5
Anterior choroidal a.	2	2	3
Ophthalmic a.	1	2	2
Superior cerebellar a.	2	2	2
Post. inferior cerebellar a.	1	2	2
Hypophyseal a.	0	1	1
Total	84(89%)	89(95%)	94(100%)

Post.= posterior

a.= artery, * cavernous portion and proximal portion of internal carotid artery



A



B

Fig. 1. A 47 years-old-male patient with multiple aneurysms.

A. Anterior-posterior view of CT angiogram demonstrates an aneurysmal sac (arrows) at bifurcation site of left middle cerebral artery.

B. Anterior-posterior view of conventional angiogram shows an aneurysmal sac (arrow) at bifurcation of left middle cerebral artery and the other (arrow head) from internal carotid artery that was not depicted on CT angiogram.

1 77 94
 15 2 , 1 3
 가 CTA

Table 2. Comparison of Aneurysm Number Detected by CT Angiography and Operation findings with Follow up Conventional Angiography

Location	CT Angiography	Number of Aneurysms
Anterior communicating a.	21	21
Posterior communicating a.	1	1
Middle cerebral a.	19	19
Anterior cerebral a.	1	2
Internal carotid a.	1	1
Anterior choroidal a.	1	1
Posterior cerebral a.	0	1
Vertebral a.	0	1
Total	44(93%)	47(100%)

a.= artery

Table 3. Numbers of Detected Aneurysms according to the Size in Group 1

Size(mm)	CT Angiography(%)	Conventional Angiography(%)	Operation findings(%)
< 3	15(79)	17(89)	19(100)
3-9	60(92)	62(95)	65(100)
> 9	9(90)	10(100)	10(100)
Total	84(89)	89(95)	94(100)

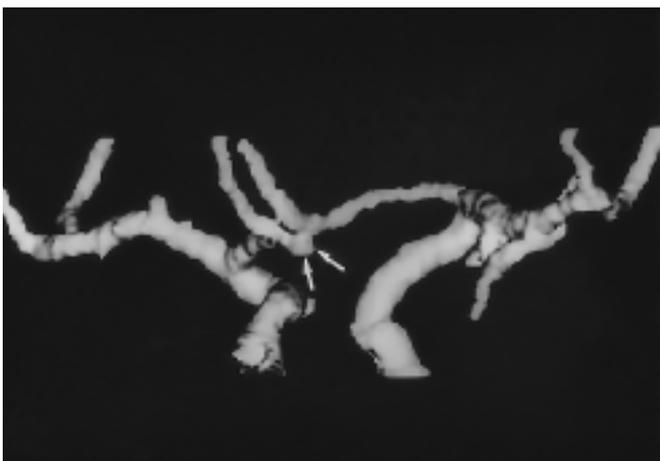
hypophyseal artery 84
 89% (Table 1).
 100%, CA
 2 CT 1
 가 3
 (Fig. 1).
 2 CA 39 47
 4 2 , 2
 (Table 2). C-
 3 가
 TA 44 (93%)
 100% CTA 3mm
 4 , 3mm 6
 CA (Table 3). 2 CTA 3
 3mm 1 가 , 3mm
 2 CA
 (Fig. 2 & Table 4).

Table 4. Numbers of Detected Aneurysms according to the Size in Group 2

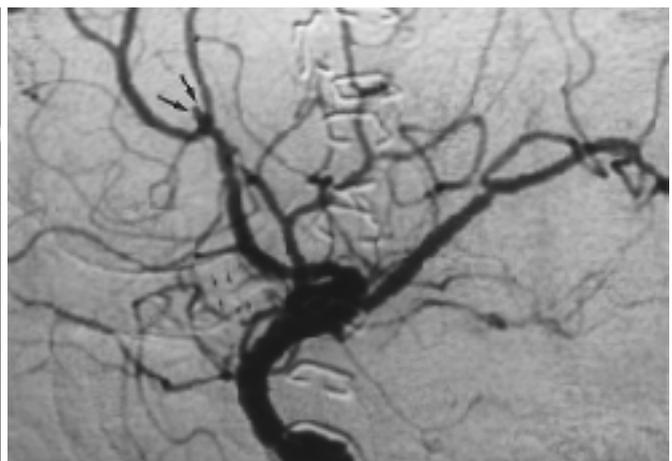
Size(mm)	CT Angiography(%)	Operation findings + Follow up CA(28)*
< 3	0(0)	1(100)
3-9	29(93)	31(100)
> 9	15(100)	15(100)
Total	44(93)	47(100)

CA= conventional angiography,

* = 28 patients were performed with postoperative conventional angiography



A



B

Fig. 2. A patient with recurred subarachnoidal hemorrhage following operation. A new aneurysm was diagnosed by conventional angiography.

A. Pre-operative oblique anteroposterior view of CT angiogram demonstrates an aneurysmal sac (arrow) from anterior communicating artery.

B. Post-operative oblique conventional angiogram shows an aneurysmal sac (large arrows) from distal anterior cerebral artery (A2 portion) that was not depicted on CT angiogram previously. Aneurysmal clip (small arrows) is faintly seen at anterior communicating artery.

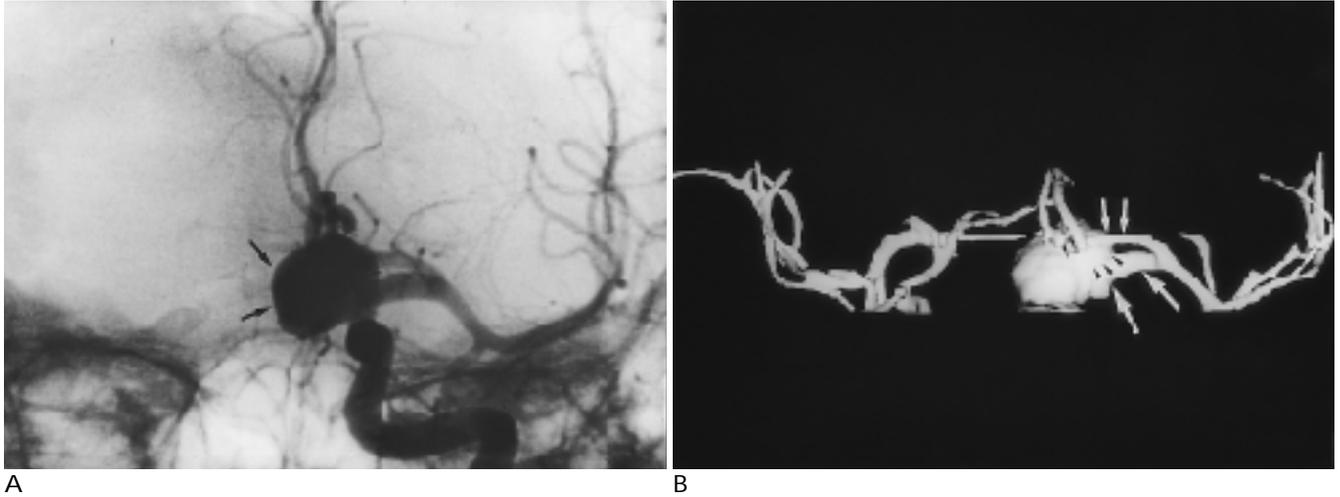


Fig. 3. Advantage of CT angiogram in delineation of giant aneurysm of left internal carotid artery.
 A. Anteriorposterior view of conventional angiogram demonstrates a giant aneurysm(arrow), but not accurately depicts the aneurysmal neck and parent artery.
 B. Oblique superior anteriorposterior view of CT angiogram delineates more clearly aneurysmal neck(arrow heads) and parent artery(left internal carotid artery, large arrows) and relation to adjacent left anterior cerebral artery(medium sized arrows) and anterior communicating artery(small arrows) than CA.

Table 5. Comparison between CT Angiography and Conventional Angiography in the Delineation of Aneurysms

Location	No. of aneurysm	CTA> CA	CTA= CA	CTA< CA
Anterior communicating a.	36	11	24	1
Posterior communicating a.	18	5	12	1
Middle cerebral a.	13	4	8	1
Internal carotid a.	5	1	2	2
Anterior cerebral a.	4	0	3	1
Anterior choroidal a.	2	0	2	0
Superior cerebellar a.	2	0	1	1
Ophthalmic a.	1	0	1	0
Post. inferior cerebellar a.	1	0	1	0
Total	82(100%)	21(26%)	54(66%)	7(8%)

CTA= CT angiography, CA= conventional angiography, Post.= posterior, a.= artery

CTA CA 91% (1).
 CTA 13 5 3mm 가
 8 CTA
 CTA CA 82 (12-17) 가
 CTA가 CA 가 21 (26%), 가 54 (66%), CA 가 가
 가 7 (8%) (Fig. 3, 4 & Table 5).
 (18).
 CTA (paramagnetic sub-
 stance) 가
 가 CA
 가 CTA

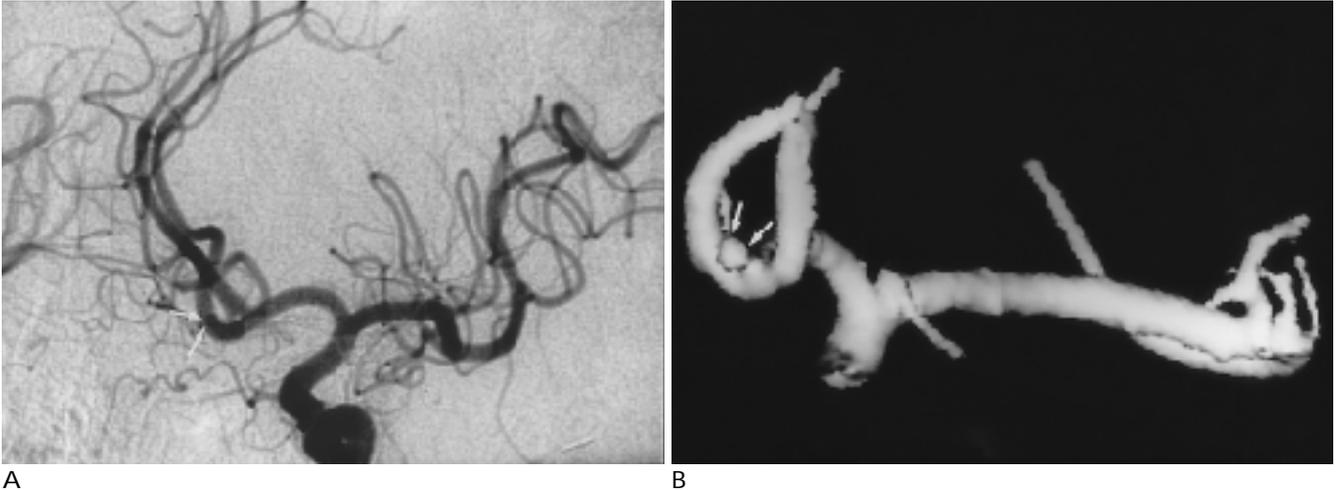


Fig. 4. Advantage of CT angiogram in detection of aneurysm less than 3 mm in diameter.
A. Oblique anterior-posterior view of conventional angiogram shows an aneurysmal sac from anterior communicating artery. It is overlapped by parent artery.
B. Oblique superior anterior-posterior view of CT angiogram demonstrates aneurysmal sac from anterior communicating artery less than 3 mm in diameter.

가가
 Vieco (12) CA CTA 77-
 97%, 87-100% , (10). CTA CA
 (7,8, 10-12). 82 CTA
 91% 가 CA 가 75 (92%)
 Liang (19) CA 가 가
 2mm , CTA CA 가
 2mm 2.4mm
 300mg I/ml(40.5g) 135ml
 가 (densely)
 150ml (8, 10-12).
 (higher amperage, 250-280mA) 1mm col-
 limation Velthuis (20)
 35mm 1 1.5mm
 collimation 60mm CTA
 가 Schwartz 141 CTA CA
 1mm collimation 3mm 8 CTA
 (11) CTA 13 CA 3 CTA
 141 1-3 CTA
 5 3mm 가 CTA CA
 가 가 가 CTA
 CA CTA 가 CTA 47 44 (93%) ,
 가 가 CA CTA CA 94 89 (95%)
 가 가 CA 가 CA
 CTA 가 CTA CA

가 CA 가

가 CTA 가

가 CTA 가 CA 가

CA 가

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Comparison of CT Angiography and Conventional Angiography in Detection of Intracranial Aneurysms¹

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Purpose: To evaluate the usefulness of CT angiography (CTA) for the detection and assessment of intracranial aneurysms, compared with the findings of conventional angiography (CA) and surgery.

Materials and Methods: Among 243 patients who underwent CTA because of suspected intracranial aneurysm, 116 who underwent surgery were studied. The patients were divided into two groups. Group 1 consisted of 77 patients (94 aneurysms) who underwent both preoperative CTA and CA, while group 2 comprised 39 patients (47 aneurysms) who underwent preoperative CTA only. The detection rate, size, shape and direction of the neck and its relationship to the adjacent vessel of the intracranial aneurysm seen during CTA were retrospectively compared with those seen during CA and surgery. Two radiologists worked in a blinded fashion without access to clinical information.

Results: In group 1, the detection rate of aneurysms seen during CTA was 89% (84 of 94 cases), and for CA was 95% (89 of 94 cases). Among ten undetected aneurysms, four cases were less than 3mm in size and six were out of the scanning area. In group 2, the detection rate of aneurysms seen during CTA was 94% (44 of 47 cases). Among three undetected aneurysms, one case was less than 3mm in size and two were out of the scanning area. For delineation of an aneurysm (the direction and shape of the neck, for example), CTA was equal or superior to CA in 75 of 82 cases (91%).

Conclusion: CTA is a useful technique for the evaluation of intracranial aneurysms in the circle of Willis, but cannot depict all vessels in the brain. CTA performed in conjunction with CA is useful for the detection of intracranial aneurysms.

Index words : Cerebral blood vessel, aneurysm
Cerebral blood vessel, CT
Cerebral angiography

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