

CT MR 1

(dolichoectasia) CT MR

: CT MR 28 (: =12:16 46-82
 , 65) CT(n=21), MR(n=22), MRA(n=11)
 , T1
), , , 1 ,
 2 , 3
 : 1 (43%), 3 (36%), 2 (21%) (79%)
 (57%)
 (87%), (82%), (68%),
 (68%) . (:7.4mm, :6.7mm),
 CT . T1
 MR 80%
 (53%) (37%) 87%
 3 (11%) 1 (16%)
 , , , 2 (7%)
 : CT MR ()
 , , , T1 MR)
 , , ,

(dolichoectasia) (4-12).
 (ectasia), (elongation) (tortuosity) 가 (13-17).
 (distal vertebral artery) (basilar artery) CT MR
 artery)
 (intracranial distal internal carotid artery)
 (proximal cerebral artery)
 (1-6).
 (internal elastic lamina) , ,
 (3-5).
 CT MR 28
 (: =12:16, 46-82 , , 65) CT 21 , MR
 22 , MRA 11 . CT MR
 15 , CT 6 , MR
 7 MR 11 MRA

CT GE High speed (GE, Milwaukee, U.S.A.), MR Signa Advantage 1.5T (GE, Milwaukee, U.S.A.)

(segment)
3
Smoker (1)
4.5 mm (),
(clivus) (dorsum sella)
7 (suprasellar
cistern plane) ().
5 mm
(), (, , MR
T1),
, , ,
,
1 (type 1),

2 (type 2),
3 (type 3)
mm
(lacunar infarct) 1+(),
cm (confluent lesion)
3+(), mm
cm 2+()
(intracerebral hemorrhage, ICH), cm (lobar)
(petechial ICH, PICH), mm (subarachnoid hemorrhage, SAH)
MR GE
(hemosiderin rim)

3 (foramen of Monro)
1+, 2+, 3+

Table 1
Table 2
, 4 , 2
(29%), (14%), (14%), (64%),
(11%) (14%),
1 (Fig. 1-3) 12 (43%),
2 (Fig. 4, 5) 6 (21%),
3 (Fig. 6, 7) 10 (36%) 1 , 3 , 2

: CT MR
(79%)
(57%)
Table 2 (Fig. 2, 4A, 5A, 6, 7),
(Fig. 2A, 7), (Fig. 1, 2, 6C)
1 6.4mm(4-9mm),
6.7 mm(4-12 mm) , 2
7.8mm(6-9mm), 5.7mm(4-7mm)
. 3 7.1 mm(6-8mm),
5.4 mm(4-7mm),
6.4mm(4-10mm), 6.8mm(5-11mm)
CT
(Fig. 1, 6B) 7 86% (18/ 21), (Fig. 5A)
76%(16/21) MR T1
(Fig. 2B) 1
91%, 2 0%, 3 50%, 88%
(18%
77%).
(Fig. 2B, 3, 6A). 1
75%, 2 100%, 3
90%, 80% 87%
(Fig. 4B).
2 (100%), 3 (90%), 1 (58%)
3 (80%), 1 (75%), 2 (33%)



Fig. 1. 63-years old male patient presenting dizziness (Type 1) Precontrast CT scan shows tortuous ectatic distal vertebral artery with dense arterial wall calcification (open white arrows). Prominent cerebral atrophy is also seen at the both temporal lobes (open black arrows).

Table 1. Summary of Clinical and Imaging Features in Patients with Intracranial Dolichoectasia

No	Age	Sex	Chief Complaints	Study				Artery diameter				Imaging Features						Atrophy					
				HTN	CT	MR	Type	dICA		pMCA		dVA		BA		Ca ⁺⁺			Slow Flow		Infarct	Hemor	Compression
								Ant	Post	Ant	Post	Ant	Post	Ant	Post	Ant	Post		Ant	Post			
1	52/M		Rt visual loss	+	+	+	1	N	N	6	N	6	N	-	1+	-	+	+	3+	PICH	medulla	2+	
2	54/M		Seizure, Lt hemiparesis	+	+	+	1	N	N	6	6	6	6	2+	2+	-	+	+	2+	ICH	thalamus	1+	
3	57/F		Vertigo, dysarthria	+	+	+	1	N	N	7	8	8	8	-	1+	-	+	+	2+	-	medulla	2+	
4	58/M		Dizziness, headache	+	+	+	1	N	N	9	12	7	7	NE	NE	-	+	+	2+	SAH	medulla, pons	2+	
5	61/M		Dizziness	+	-	+	1	N	N	7	7	7	6	-	3+	-	+	+	2+	ICH	medulla, pons, midbrain	2+	
6	63/M		Dizziness	+	+	+	1	N	N	7	6	6	6	-	2+	-	+	+	1+	-	pons	2+	
7	64/F		Drowsy, vertigo, dysarthria	+	+	-	1	N	N	6	6	6	6	2+	2+	NE	NE	1+	2+	-	pons	1+	
8	71/M		Dysarthria, Lt FP, dizziness	+	+	+	1	N	N	5	10	10	10	1+	1+	-	+	+	3+	PICH	pons, CPA, thalamus	3+	
9	71/M		General weakness, dizziness	+	-	+	1	N	N	6	6	6	6	NE	NE	-	+	+	1+	2+	PICH	pons	3+
10	71/F		Dizziness, vomiting	+	-	+	1	N	N	6	7	7	7	NE	NE	-	-	+	2+	1+	-	-	2+
11	72/M		Aphasia	+	+	+	1	N	N	7	7	7	7	-	1+	-	+	+	1+	2+	ICH	medulla, pons	2+
12	77/F		Dizziness, headache	+	-	+	1	N	N	7	7	7	7	NE	NE	-	+	+	1+	1+	ICH	medulla	3+
13	54/M		Dementia, facial palsy	+	-	+	2	8	7	N	N	N	N	NE	NE	-	-	+	2+	2+	-	-	2+
14	60/F		Vertigo, dizziness	+	+	+	2	6	5	N	N	N	N	2+	-	-	-	-	2+	1+	PICH	-	2+
15	62/F		Dizziness	+	+	-	2	8	6	N	N	N	N	2+	-	NE	NE	3+	1+	ICH	-	3+	
16	67/F		Vertigo, gait disturbance	+	+	+	2	8	5	N	N	N	N	2+	-	-	-	3+	2+	PICH	-	2+	
17	72/F		Drowsy mentality	+	+	-	2	8	7	N	N	N	N	2+	1+	NE	NE	3+	1+	-	-	3+	
18	74/F		Dizziness, Lt hemi, dysarthria	+	+	-	2	9	7	N	N	N	N	3+	2+	NE	NE	3+	1+	SAH	-	2+	
19	46/M		Dizziness	+	+	+	3	7	7	7	9	11	11	1+	1+	+	+	2+	2+	ICH	medulla, thalamus	2+	
20	60/F		Lt hemi, dizziness, HA, FP	+	+	+	3	7	7	7	10	10	10	2+	1+	+	+	2+	2+	ICH	medulla, CPA, pons, thal	1+	
21	63/M		Rt hemi, Lt FP, dysarthria	+	+	+	3	7	6	5	7	7	7	1+	1+	-	+	+	2+	PICH	medulla, pons, CPA	2+	
22	64/F		Dysarthria, gait, vertigo	+	+	+	3	7	5	6	5	6	5	2+	1+	+	+	3+	2+	ICH	-	2+	
23	64/F		General weakness, dementia	+	+	-	3	8	6	8	6	6	6	3+	3+	NE	NE	2+	2+	-	medulla, pons	3+	
24	70/M		General weakness	+	-	+	3	6	5	5	6	5	6	NE	NE	-	-	2+	1+	ICH	-	1+	
25	73/F		Headache, dizziness	+	+	+	3	7	5	5	N	6	6	2+	1+	-	+	1+	1+	ICH	pons	1+	
26	75/F		Dementia	+	-	+	3	7	7	N	6	5	5	NE	NE	+	+	3+	2+	PICH	medulla	3+	
27	75/F		Dizziness, nausea	+	+	+	3	8	5	5	N	5	5	1+	1+	-	+	2+	2+	-	pons	2+	
28	82/F		Ataxia, dementia	+	+	-	3	7	7	N	7	7	7	2+	3+	NE	NE	3+	3+	-	medulla, CPA	3+	

Note: Ant: anterior circulation system, Post: posterior circulation system, dICA: distal internal carotid artery, pMCA: proximal middle cerebral artery, dVA: distal vertebral artery, BA: basilar artery, Ca + + : wall calcification, Hemor: hemorrhage, hemi: hemiplegia or hemiparesis, FP: facial palsy, NE: not evaluable, ICH: intracranial hemorrhage, PICH: petechial intracranial hemorrhage, SAH: subarachnoid hemorrhage, thal: thalamus, CPA: cerebellopontine angle.

Table 2. Summary of Clinical and Imaging Features according to the Dolichoectasia Types

Group	No	Clinical Symptoms	Ca++		Slow flow		Infarct(2+)		Hemorrhage	Compression	Atrophy (2+)				
			Ant	Post	Ant	post	Ant	Post							
Type1	11(39%)	Dizziness(73%) Dysarthria(36%)	3/8 (38%)	8/8 (100%)	0/11 (0%)	10/11 (91%)	7/12 (58%)	9/12 (75%)	ICH	4(33%)	medulla	50% 6/12			
									PICH	3(25%)	8/12	pons	6/12 (67%)	11/12 (50%)	10/12 (92%)
									SAH	1(9%)		thalamus	2/12 (17%)		
											CPA	1/12 (8%)			
Type2	6(22%)	Dizziness(67%) Acute stroke(17%)	5/5 (100%)	2/5 (40%)	0/3 (0%)	0/3 (0%)	6/6 (100%)	2/6 (33%)	ICH	1(17%)	PICH	2(33%)	4/6 (67%)	0/6 (0%)	6/6 (100%)
									SAH	1(17%)		medulla	6/10 (60%)		
									ICH	5(50%)		pons	5/10 (50%)	8/10 (80%)	7/10 (70%)
									PICH	2(20%)	7/10 (70%)	CPA	3/10 (30%)		
Type3	11(39%)	Dizziness(55%) Dysarthria(27%) Dementia(27%)	8/8 (100%)	8/8 (100%)	4/8 (100%)	7/8 (100%)	9/10 (90%)	8/10 (80%)			thalamus	3/11 (27%)			
Total		Dizziness(64%) Dysarthria(29%) Dementia(14%) Headache(14%) Hemiplegia(14%)	16/21 (76%)	18/21 (86%)	4/22 (18%)	17/22 (77%)	22/28 (79%)	19/28 (68%)			19/28(68%)	23/28 (82%)			

Note: Ant.:anterior circulation system, Post.: posterior circulation system, Ca++ : wall calcification, ICH: intracranial hemorrhage, PICH: petechial intracranial hemorrhage, SAH: subarachnoid hemorrhage, CPA: cerebellopontine angle.

19 (68%)
(Fig. 7A) 10 , (Fig. 4B) 7 ,
3 . 1
3 1 (n=3, 11%)
가 (Fig. 5) 1 (dissecting 0.05%
aneurysm) (Fig. 3).
19 (68%) 3% CT MR
(1-4).
(43%, Fig. 6C), (39%, Fig. 2C), (18%, Fig. 7A),
(14%, Fig. 2B) 가 가 , (1-5). Milandre 60%
2 (7%) (6). 3 65
(Fig. 2A). 가
82%
(Fig. 1, 7A) . 4 (14%) 3가 가 가 (3).

(inter-

nal elastic lamina)

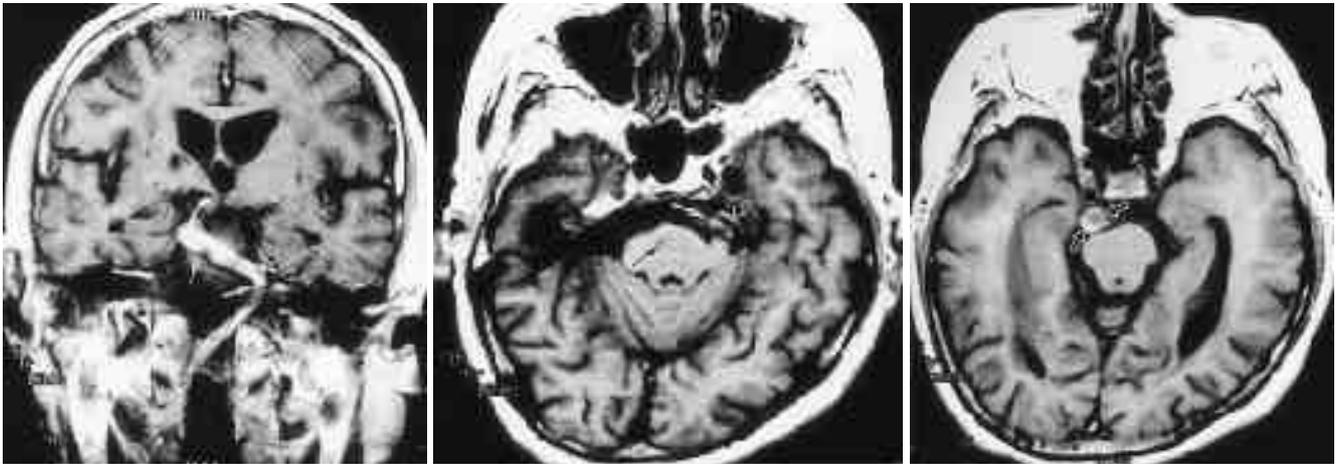


Fig. 2. 71-years old male patient presenting with dizziness and left. facial hemispasm(Type 1)
 A. Postcontrast T1-weighted coronal MR image shows markedly tortuous and S-shaped dolichoectatic vertebrobasilar artery(white arrows) compressing left cerebellopontine angle cistern(open black arrow). Note intraluminal enhancement of vertebrobasilar artery and mild hydrocephalus due to either brain atrophy or obstructive hydrocephalus or both.
 B. T1-weighted axial MR image shows tortuous ectatic basilar artery(open white arrow) compressing left cerebellopontine angle cistern. Note intraluminal high signal intensity(white arrow) in the basilar artery, which suggests slow flow or intraluminal partial thrombosis. Focal lacunar infarct is delineated in the right pons(black arrow).
 C. T1-weighted axial MR image of same patient shows ectatic basilar artery with slightly hyperintense wall(open arrows). Note mild indentation of the pons by the ectatic basilar artery.

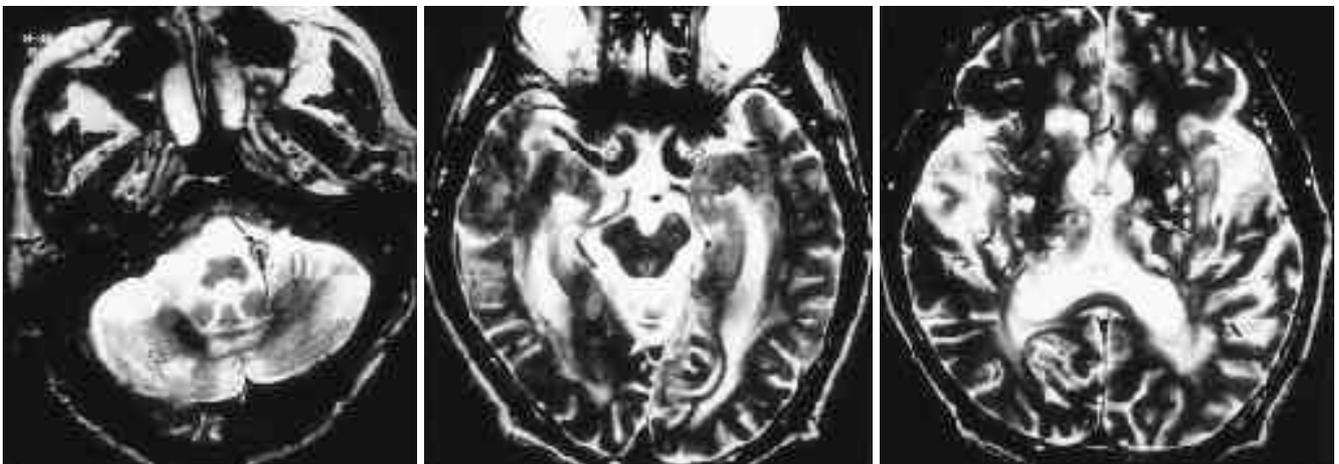


Fig. 3. 60-years old male patient presenting with sudden dizziness(Type 1)
 T2-weighted axial MR image shows intraluminal high signal intensity(arrow) mixed with central low signal intensity(dotted arrow) in the ectatic left distal vertebral artery, which is target appearance and suggests vertebral arterial dissection. Note focal infarct area at the right cerebellar hemisphere(open arrow). In the vertebral angiogram of same patient(not shown) showed segmental ectasia with tapered stenosis in the left distal vertebral artery.

Fig. 4. 54-years old male patient presenting with dementia and facial palsy(Type 2)
 A. T2-weighted axial MR image shows dolichoectasia of both supraclinoid internal carotid arteries(open arrows) and right proximal middle cerebral artery(arrow).
 B. T2-weighted axial MR image of same patient shows severe multifocal infarcts with high signal intensity in the both basal ganglia and thalami. Note multifocal hypointense foci(arrows), which suggest previous minor petechial hemorrhage resulting from hypertensive microangiopathy.

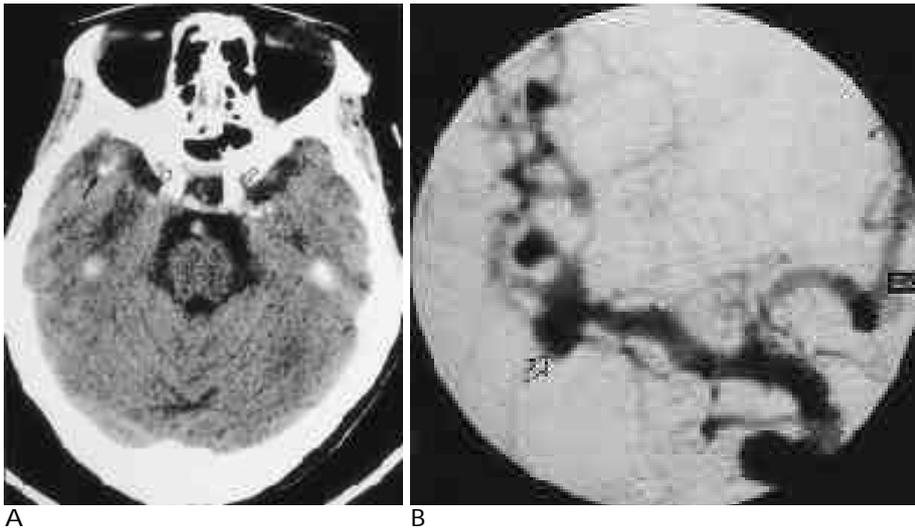


Fig. 5. 74-years old female patient presenting with acute subarachnoid hemorrhage(Type 2)
 A. Precontrast CT scan shows dolichoectatic both supraclinoid internal carotid arteries with dense arterial wall calcification(open arrows). Note another focal calcification(arrow) at the genu portion of the right middle cerebral artery.
 B. Right internal carotid angiogram shows wide-neck aneurysm(open arrow) with inferior projection at the genu portion of the right middle cerebral artery.

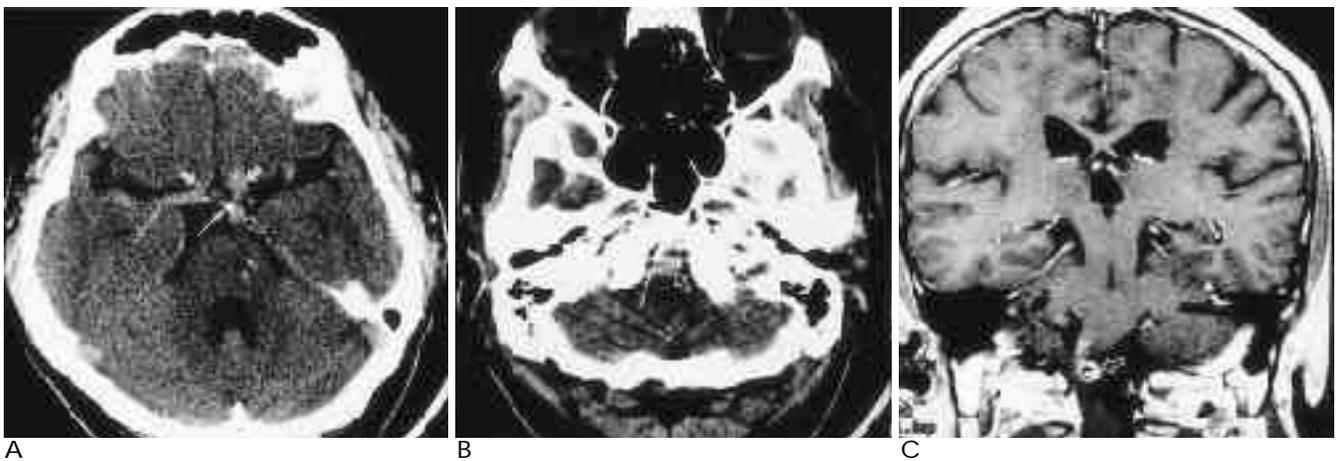


Fig. 6. 46-years old male patient presenting with progressive dizziness(Type 3)
 A. Precontrast CT scan shows moderate dolichoectatic both supraclinoid internal carotid arteries(closed arrows), right proximal middle cerebral artery(dotted arrow) and basilar artery(open arrow). Note focal arterial wall calcification(arrow) in the basilar artery and focal infarct area(small arrows) at the left pons.
 B. Precontrast CT scan at the medulla level shows marked ectatic proximal basilar artery(open arrow) with focal dense arterial wall calcification(arrow).
 C. Postcontrast T1-weighted coronal MR image of same patient shows markedly compressed medulla by the dolichoectatic left distal vertebral artery(open arrow).

가 (3-12).
 가 (64%) (14%), (14%), (29%), (14%), (11%) 가 (36%), 2 (21%) (1-4). 1 (43%), 3 (79%)
 (57%)
 CT MR 가 (sympathetic innervation)가

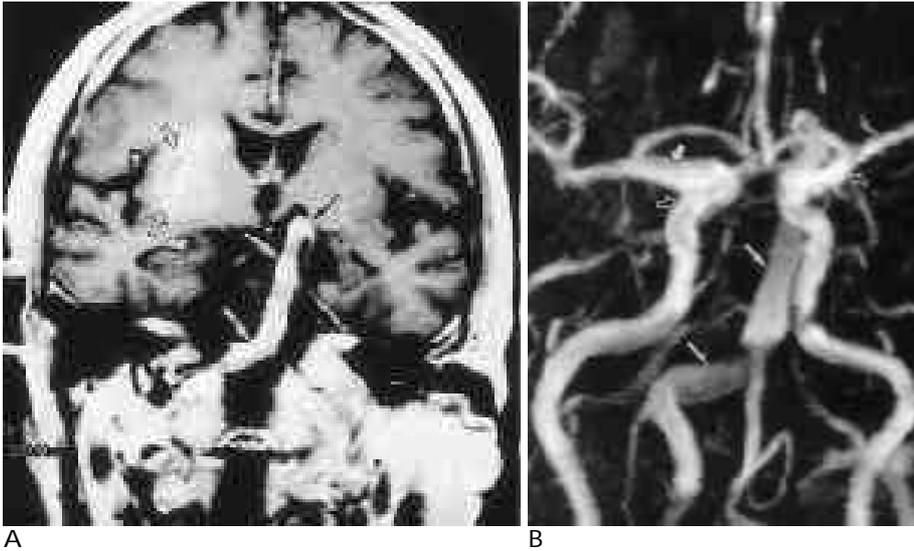


Fig. 7. 60-years old male patient presenting with headache and dizziness (Type 3)

A. Postcontrast T1-weighted coronal MR image shows J-shaped dolichoectatic vertebasilar artery (white arrows) compressing left inferior thalamus(black arrow). Note subacute lobar intracerebral hemorrhage (open black arrows) at the right putamen.

B. MR angiogram of same patient shows dolichoectatic vertebasilar artery(arrows), both distal supraclinoid internal carotid arteries(open arrows) and right proximal middle cerebral artery(closed arrow)

가 (1-4). scranial Doppler, TCD) (8). T1
 가 1 91%, 2
 0%, 3 50%, 88%
 Smoker (1) 가
 (1). 4.5mm
 5mm (penetrating artery)
 가 (lipohyalinosis)
 가 (artery-to-artery embolism)
 (4).
 1 75%, 2 100%, 3
 90%, 80% (75%)
 가 MR 가 S, J
 C 가 S, J
 (3).
 6 J 3 (50%) 가
 S (2), C (1)
 가 CT
 76% 86%,
 (1-4).
 (transient ischemic attack, TIA)
 가
 가 (1- 4, 13-17). (64%), (29%)가
 (vertebrobasilar insuf- 4
 ficiency, VBI) (1-4). Passero 가
 (3) (distor-
 tion) 가
 . Rautenberg
 (tran- 가

CT
(18) MR T1, T2

MR
가
(gradient recalled echo, GRE)

가
(CT angiography),
가
MR
(15-17).
가
CT
(MRA)

(13-17).

(cavernous ICA) 3, 6
(diplopia),
(cluster)
(10).

MR 17 (61%)

(cerebromalacia) 3
"waterhammer"
(13).
가

(3-8).

(3, 4).

(microangiopathy)

2 (7%)

(11%)

2 1

3
(PICA)

가

(1-4).

1

2

82%

4

. Parera

7%

(5).

(14%)

CT, T2 MR
(centrum semiovale)

(string sign)

. CT

(Bingswanger)
(4-7).

T1, T2

MR
(false lumen)
(intimal flap)

MR

(

CT

(patent true lumen)

(target appear-

T1

)

ance)

. MR

(87%)

(82%),

(18-20).

Rabb

(68%)

가

(20).

(13-20). CT MR

68%

2/3

가

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CT and MR Imaging Features in Patients with Intracranial Dolichoectasia¹

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Purpose : To describe the CT and MR imaging features in patients with intracranial dolichoectasia.

Materials and Methods : The CT(n= 21), MR(n= 20) and MRA(n= 11) imaging features seen in 28 patients (M:F= 12:16 aged between 65 and 82 (mean, 65) years with intracranial dolichoectasia were retrospectively reviewed with regard to involved sites, arterial changes(maximum diameter, wall calcification, high signal intensity in the involved artery, as seen on T1-weighted MR images), infarction, hemorrhagic lesion, compression of brain parenchyma or cranial nerves, hydrocephalus and brain atrophy. Involved sites were classified as either type 1 (involvement of only the posterior circulation), type 2 (only the anterior circulation), or type 3 (both).

Results : In order of frequency, involved sites were type 1(43%), type 3(36%) and type 2(22%). Dolichoectasia was more frequently seen in the posterior circulation(79%) than in the anterior (57%). Arterial changes as seen on T1-weighted MR images, included dolichoectasia(mean maximum diameter 7.4mm in the distal internal carotid artery, and 6.7 mm in the basilar artery), wall calcification(100% in involved arteries) and high signal intensity in involved. Cerebral infarction in the territory of the involved artery was found in all patients, and a moderate degree of infarct was 87%. Hemorrhagic lesions were found in 19 patients(68%); these were either lobar(53%), petechial(37%), or subarachnoid (16%), and three patients showed intracranial aneurysms, including one case of dissecting aneurysm. In 19 patients(68%), lesions were compressed lesions by the dolichoectatic arteries, and were found -in order of descending frequency- in the medulla, pons, thalamus, and cerebellopontine angle cistern. Obstructive hydrocephalus was found in two patients (7%), and 23 (82%) showed a moderate degree of brain atrophy.

Conclusion : In patients with intracranial dolichoectasia, moderate degrees of cerebral infarction and brain atrophy in the territory of involved arteries, as well as hemorrhagic lesions and compression of the brain stem or cranial nerves, were not infrequently seen on CT and MR images. These changes were in addition to the basic arterial change(dolichoectasia, arterial wall calcification and intraluminal high signal intensity) seen on T1-weighted MR images.

Index words : Cerebral blood vessels, abnormalities

Cerebral blood vessels, MR

Cerebral blood vessels, CT

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