Arch Jpn Chir 65(3), 120~125, Juli., 1996

症　　例

CT Findings of Extravasation of Contrast Medium from a Ruptured Aneurysm during Cerebral Angiography —A Case Report and Six Others from the Literature—

Akifumi Izumihara, Tetsuji Orita and Tohru Tsurutani

Department of Neurosurgery, Shuto General Hospital, Kogaisaku 1000-1, Yanai, Yamaguchi 742, Japan

Received for publication, January, 22., 1996

Abstract

We present a case of ruptured aneurysm in which extravasation of contrast medium was suspected during cerebral angiography and confirmed by computed tomography. In cases of ruptured aneurysm, post-angiographic computed tomography before operation (measurement of the Hounsfield unit numbers and grading by them) is necessary for establishing the diagnosis of extravasation of contrast medium and for grasping its degree and extent.

Introduction

More than one hundred cases of extravasation of contrast medium from a ruptured aneurysm during cerebral angiography have appeared in the literature since the first case report by Jamieson in 1954[1]. However, case reports of extravasation during cerebral angiography with confirmation by computed tomography (CT) are rare, and only six cases have been described[2-7]. We recently experienced a case of ruptured aneurysm in which extravasation of contrast medium was suspected during cerebral angiography and confirmed by CT. In addition, for the first time, we clarified the degree and extent of extravasation of contrast medium by grading using Hounsfield unit (HU) numbers. We discuss the necessity of post-angiographic CT before operation in cases of ruptured aneurysm.

Case report

The patient, a 64-year-old woman, suddenly fell unconscious on the pavement and was transferred to our hospital immediately. On admission, she was in a comatose state (Glasgow coma scale, 5 points) with a dilated right pupil and left hemiparesis. She required intratracheal intubation and controlled ventilation with sedation. A CT scan revealed massive subarachnoid hemorrhage and

Present address: Department of Neurosurgery, Yamaguchi University School of Medicine, Kogushi 1144, Ube, Yamaguchi 755, Japan

索引用語: 造影剤血管外漏出，破裂脳動脈瘤，コンピューター断層撮影，脳血管撮影
Key words: Extravasation, Ruptured aneurysm, Computed tomography, Cerebral angiography

hematoma in the right Sylvian fissure (Fig. 1). Therefore, 2 hours after admission, transfemoral cerebral angiography was performed. Contrast medium (13 ml of iopamidol) was injected at a rate of 10 ml/sec. The right common carotid angiogram revealed a saccular aneurysm at the trifurcation of the right middle cerebral artery with a small area of possible extravasation of contrast medium around the aneurysmal sac from the early arterial phase to the capillary phase (Fig. 2A, B). However, the possibility remained that the contrasted area was an aneurysm. The venous phase was not taken because of marked delayed circulation. We could not find her neurological deterioration because of sedation. Immediately after the cerebral angiography, she underwent CT scan, which revealed an increase in the extent of the hyperdense area in the right Sylvian fissure and a marked midline shift to the left (Fig. 3). The CT findings seemed to reveal enlargement of the hematoma and extravasation of contrast medium. Accordingly, we measured the HU numbers of the hyperdense area in order to confirm extravasation of the contrast medium. Since the HU number of pure hematoma is between 26 and 94[8], we classified points of more than 100 HU in the hyperdense area into four grades (Fig. 4). This allowed us to grasp the degree and extent of extravasation of contrast medium more clearly. We judged no surgical indication. She died 4 days after admission. No postmortem examination was performed.

Discussion

Extravasation of contrast medium from a ruptured aneurysm during cerebral angiography has

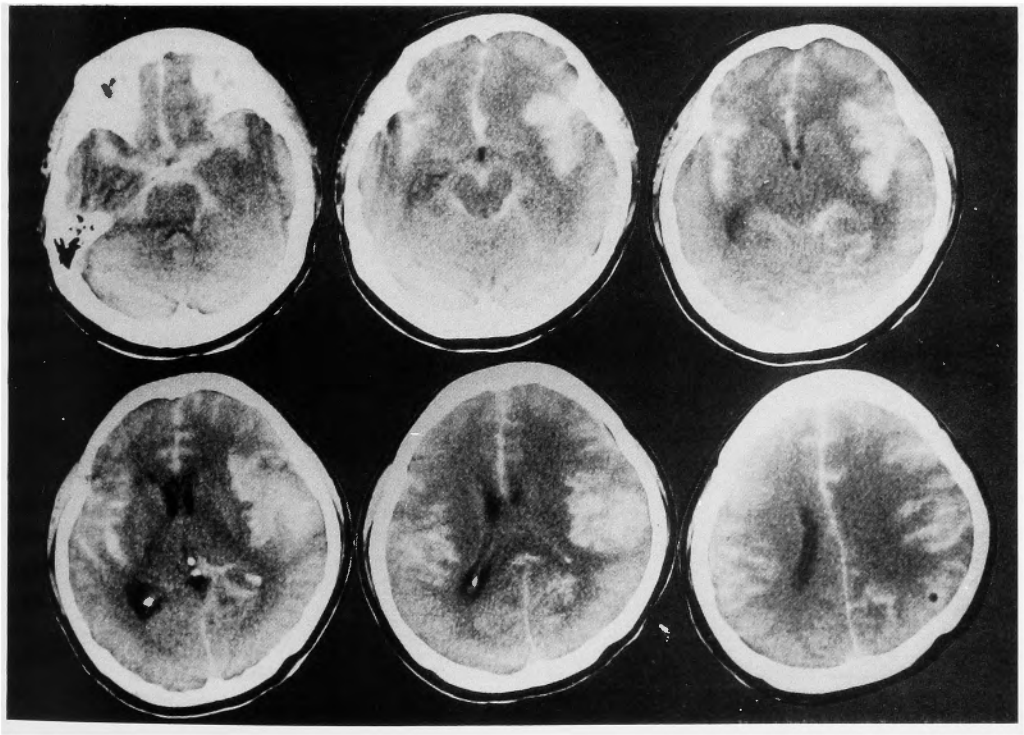

Fig. 1 CT scan showing massive subarachnoid hemorrhage and hematoma in the right Sylvian fissure.

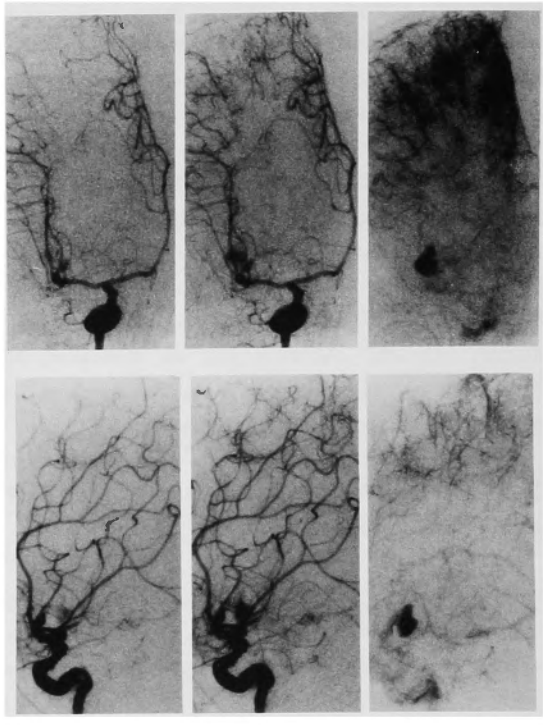

Fig. 2 Right common carotid angiogram showing a saccular aneurysm at the trifurcation of right middle cerebral artery with a small area of possible extravasation of contrast medium around the aneurysmal sac. It is difficult to discriminate between an aneurysmal shadow and extravasation of contrast medium. A: A-P view, B: Lateral view.

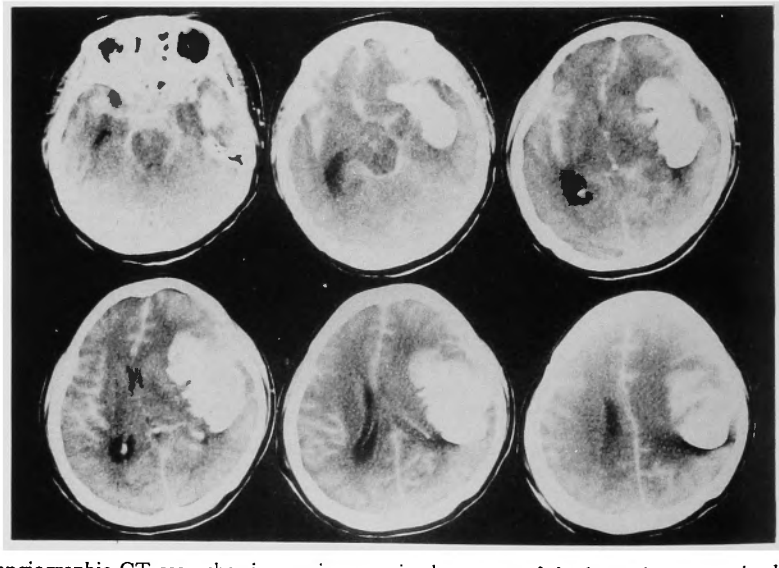

Fig. 3 Post-angiographic CT scan showing an increase in the extent of the hyperdense area in the right Sylvian fissure, due to enlargement of the hematoma and extravasation of contrast medium.

not been recently an unusual event, since it is normal practice to perform cerebral angiography at the acute stage of aneurysmal rupture. However, as far as we know, there have been only six previous case reports of extravasation during cerebral angiography with confirmation by post-angiographic CT (Table 1)[2-7]. In all cases, post-angiographic CT detected extravasation of contrast medium more clearly than cerebral angiography. The reason for this is thought to be mainly the difference in the capacity to discriminate variations in X-ray absorption value.

In fact, in our present case, it was difficult to establish the diagnosis of extravasation of contrast

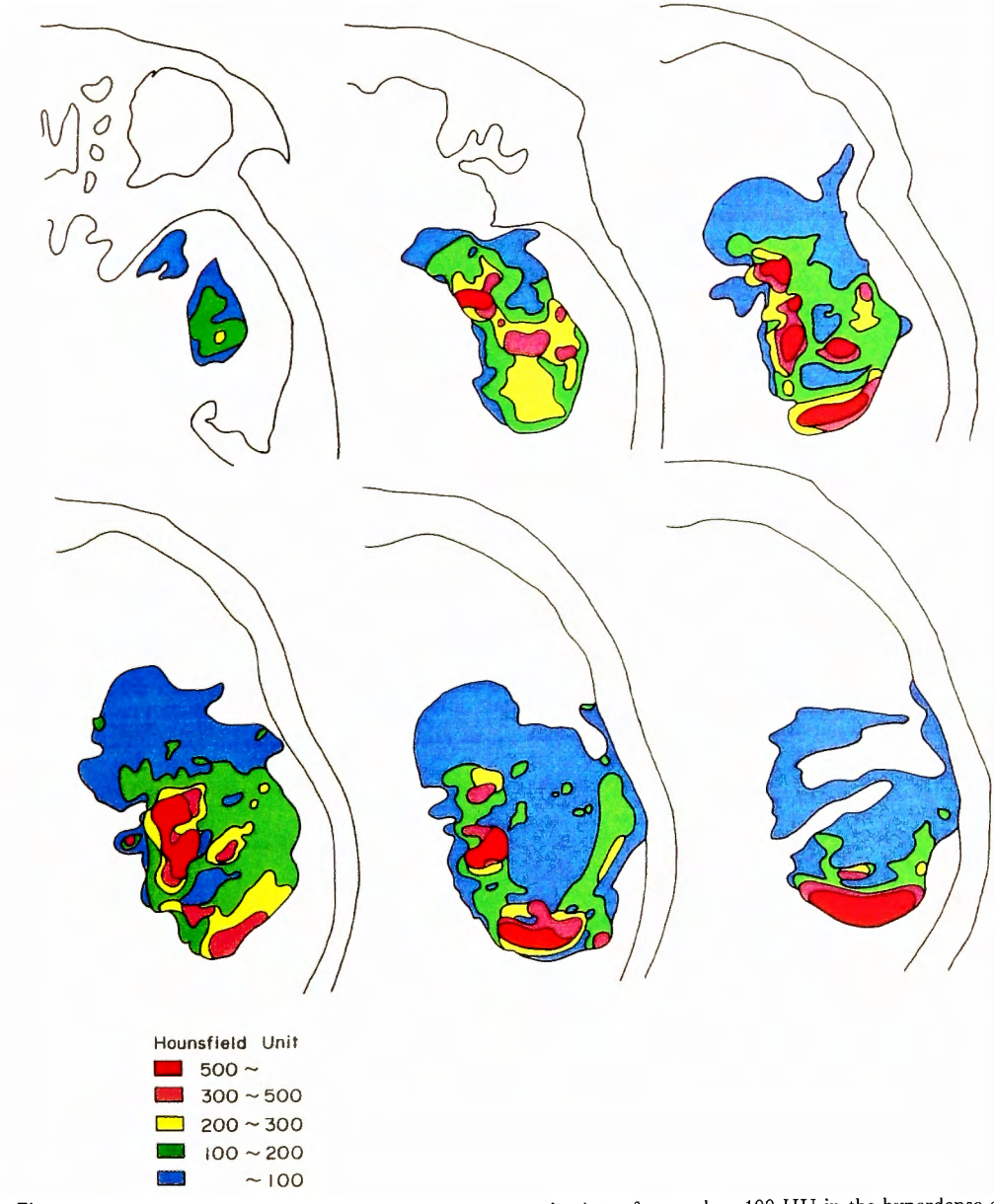

Fig. 4 Figure showing the classification into four grades of points of more than 100 HU in the hyperdense area.

Table 1 Cases of extravasation of contrast medium during cerebral angiography with confirmation by computed tomography

Author (Year)	Age Sex	Site of AN	Time	HU Number	Extent of EV	Outcome
Dublin and French (1980)	46F	BA	14 days	165	CT>AG	death
Suda et al. (1982)	53M	Acom	30 days	more than 100	CT>AG	good
Yoshino et al. (1983)	33M	MCA	4.5 hours	more than 120	CT≫AG	death
Sugawara et al. (1983)	53M	MCA	4.5 hours	n.m.	CT>AG	death
Katada et al. (1985)	38M	MCA	2 hours	n.m.	CT≫AG	death
Murata et al. (1987)	56F	MCA	1 hours	n.m.	CT≫AG	death
Izumihara et al.	64F	MCA	2 hours	more than 100	CT≫AG	death

AN. ruptured aneurysm, Time: time interval from last rupture to angiography, HU: Hounsfield unit, EV: extravasation, AG: angiography, BA: basilar artery, Acom: anterior communicating artery, MCA: middle cerebral artery, n.m.: not measured

medium by cerebral angiography. In addition, there may be cases where cerebral angiography is unable to detect extravasation. Therefore, we consider that measurement of the HU numbers is necessary for establishing the diagnosis of extravasation of contrast medium, and that grading by the HU numbers is especially useful for grasping its degree and extent in cases of ruptured aneurysm. In cases of ruptured aneurysm, post-angiographic CT before operation at the acute stage should be performed routinely.

References

1) Jamieson KG: Rupture of an intracranial aneurysm during cerebral angiography. J Neurosurg 11: 625–628, 1954.
2) Murata J, Kaneko S, Imai T: Intraventricular extravasation of contrast media from ruptured aneurysm during cerebral angiography. J Medical Imagings (Japan) 7: 1410–1414, 1987.
3) Katada K, Sano H, Kanno T, et al: Extravasation of blood and contrast media from a ruptured aneurysm during CT. Progress in Computerized Tomography (Japan) 7: 647–654, 1985.
4) Sugawara A, Kowada M, Hirayama A, et al: Extravasation of contrast media from intracranial aneurysm. Report of a case. Jpn J Clin Radiol 28: 151–154, 1983.
5) Yoshino E, Yamaki T, Higuchi T: Extravasation of contrast medium demonstrated during cerebral angiography in the giant aneurysm. Case report. Neurol Surg (Tokyo) 11: 875–880, 1983.
6) Suda K, Sato M, Matsuda M, et al: Extravasation from an aneurysm during angiography. Report of a case with survival. Arch Jpn Chir 51: 1032–1039, 1982.
7) Dublin AB, French BN: Cerebral aneurysmal rupture during angiography with confirmation by computed tomography. A review of intra-angiographic aneurysmal rupture. Surg Neurol 13: 19–26, 1980.
8) New PFJ, Aronow S: Attenuation measurements of whole blood and blood fractions in computed tomography. Radiology 121: 635–640, 1976.

和文抄録

脳血管撮影中の破裂脳動脈瘤からの造影剤血管外漏出のCT像
—1自験例と6文献例—

泉原　昭文，織田　哲至，鶴谷　　徹

来院時のCTで強いクモ膜下出血と右シルビウス裂の血腫を認めた64才の女性（半昏睡）に体して緊急手術を行うべく，発症2時間後に鎮静下に脳血管撮影を行ったところ，右中大脳動脈分岐部に瘤陰影とそれに連続して軽度の造影剤の貯留を認め，血管外漏出も疑われた．鎮静のために神経学的所見の変化ははっきりしなかった．このため手術前に再度CTを行ったところ，著明な右シルビウス裂の高吸収域の増大を認め，Hounsfield unit (HU) numberの計測により血腫増大と造影剤血管外漏出がわかった．さらに100 HU以上の部分を段階表示すると造影剤血管外漏出の程度と範囲が明瞭になった．破裂脳動脈瘤の緊急手術のための脳血管撮影後のCTは脳血管撮影にて診断が難しいあるいは診断できない造影剤血管漏出があるので手術前にルーチンに行うべきであると思われた．