Multiple Intracranial Aneurysms in Songklanagarind Hospital

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Abstract

We retrospectively reviewed the 107 patients on whom direct surgery was performed for intracranial aneurysms between December 18, 1984 and July 25, 1996. The incidence of multiple intracranial aneurysms in our hospital is 6.5 per cent (7/107 cases). There were 16 aneurysms in 7 cases with multiple aneurysms. There were 2 and 5 patients with 3 and 2 aneurysms respectively. The most common site was at the junction of posterior communicating artery (PCoA) and internal carotid artery (ICA). The preoperative conditions of the patients were closely related to the operative results. We performed direct surgery on bilateral aneurysms by bifrontal approaches. There was no mortality.

There are some controversies in the management of multiple intracranial aneurysms. These controversies consist of how to identify which aneurysms bled and whether to perform direct surgery on the remaining silent aneurysms. The surgery would involve a one stage operation in which the ruptured aneurysms were clipped. Fortunately, these problems are gradually being resolved by extensive, world-wide studies. The results of these studies help to guide neurosurgeons to the appropriate management of multiple aneurysms. Important keys to the solutions of these problems are knowledge about the natural course of unruptured aneurysms, after the ruptured aneurysms are clipped, and the surgical outcome of multiple intracranial aneurysms. Our report is aimed at relaying the experience in the management of multiple intracranial aneurysms from the south of Thailand. The incidence of multiple intracranial aneurysms in our series is very low when compared with the literature.

MATERIAL AND METHOD

From December 18, 1984 to July 25, 1996 we operated on 107 cases with intracranial aneurysms including 7 cases with multiple aneurysms,

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Table 1. Summary of the details from 7 cases with multiple aneurysms.

Case No.	Age	Sex	Preop. grade	Aneurysm site	Timing@ (days)	FU (months)	Results#
1	45	M	3	ACA(L), ACoA	47	2	MD
2	42	M	1	PCoA(L), AChoA(L), MCA(R)	13	29	GR
3	65	F	3	PCoA(L), PCoA(R)	81	60	MD
4	52	F	1	PCoA(R), ICA(R)	6	25	GR
5	45	M	3	ACoA, PCoA(R)	35	14	MD
6	46	F	1	ACoA, 2MCA(R)	8	1	GR
7	64	F	3	ACoA, PCoA(R)	7	4	SD

@ Timing means the time interval between the onset of SAH and the day to perform operation.
# GR=good recovery, MD=moderate disability, SD=severe disability
ACoA = Anterior communicating artery
ACA = Anterior cerebral artery
AChoA = Anterior choroidal artery

comprising 6.5 per cent of the total cases. All of them presented with subarachnoid hemorrhage (SAH) of different grades according to Hunt and Hess classification[1]. All of the patients had been managed initially by the way of standard treatment as described elsewhere[2,3]. Aneurysms were identified preoperatively including their sites and which aneurysms had bled, by CT scan and routine four-vessel angiography. Angiographic signs of the site of rupture are focal spasm, focal mass effect, changes in aneurysm shape on repeated angiograms (if available), larger size, more irregular or nipple[4]. Pterional or unilateral subfrontal approaches were used in the unilateral situated aneurysms. The cases with bilateral aneurysms (case no. 2 & 3) were approached by bicoronal scalp flap and bifrontal craniotomy for the purpose of clipping all aneurysms in a one stage operation. The ruptured aneurysm site was attacked first, followed by the intact one. All of our cases underwent complete treatment of the aneurysms in a one stage operation, except case no. 4 who required a second operation to clip a second aneurysm.

RESULTS

The incidence of multiple aneurysms in our series is 6.5 per cent (7/107). There were 7 cases with 16 aneurysms. The details of the 7 cases are summarized in Table 1. Two cases had 3 aneurysms in each (case no. 2 and 6): PCoA (L) + MCA (R) + AChoA (L), and ACoA + 2MCA (R). Two cases (case no. 2 and 3) had bilateral aneurysms. Incidence among males and females was nearly equal (F=4, M=3). Age of patients was between 42-65 years old. The aneurysm sites were PCoA (6), ACoA (4), MCA (3), ACA (1), AChoA (1), and ICA (1). The timing of surgery after the onset of SAH were 81, 47, 35, 13, 8, 7, and 6 days. The lengths of hospital stay were 72, 45, 43, 34, 33, 27, and 16 days. The complications included hydrocephalus (2 cases), deep vein thrombosis (2 cases), incomplete occlusion (1 case), and urinary tract infection (1 case). The follow-up periods were 60, 29, 25, 14, 4, 2, and 1 months. The end results were good recovery (GR) in 3 cases, moderate disability (MD) in 3 cases, and severe disability (SD) in 1 case. The end results were related to the preoperative grade. All three patients with grade 1 had a good recovery. But four patients with grade 3 had MD in 3, and SD in 1. There was no mortality.

DISCUSSION

Yasargil collected 27 reports and found that the incidence of multiple aneurysms identi-

fied by variable diagnostic studies was 12.9 per cent when studied angiographically and 22.7 per cent when examined at autopsy[5]. We further collected another 8 reports and found that the incidence of multiple aneurysms identified by angiography, was between 8 - 34 per cent[4,6-12]. The lowest and highest incidence (8.1 per cent - 33/409, 34 per cent - 39/114) were from Taiwan and Finland consecutively[8,10]. The study of 3,521 cases with the diagnosis of intracranial aneurysms or SAH conducted by the International Cooperative Study on the Timing of Aneurysm Surgery showed multiple aneurysms in 19 per cent of the cases[12]. The two consecutive studies of Rinne et al showed a decrease in the incidence from 34 to 23 per cent when the number of cases was increased from 114 to 1314[8,9]. Our three consecutive studies also showed a decrease of the incidence from 9.1 (2/22) to 7.1 (5/70) and to 6.5 (7/107) per cent when the total number of cases was increased from 22 to 70 and to 107 in this present report[13,14].

When dealing with multiple aneurysms, we should know 3 important aspects. First, we should know the natural course of the unruptured aneurysms, especially the risk of rupture, which is derived from the study of patients with multiple intracranial aneurysms who had direct surgery on the ruptured aneurysms only. We can conclude from the 3 studies that the rebleeding rate of the unruptured aneurysms is 1 to not more than 2 per cent per year[15-17]. The rebleeding rate is significant and not much different from the cumulative rebleeding rate of an untreated ruptured aneurysm after 6 months (approximately 3 per cent per year)[18]. This is one of the current topics of debate.

Second, it may be dangerous to leave the unclipped aneurysms. It has not been determined whether or not they are the real cause of catastrophe. There are no methods to identify with 100 per cent accuracy which aneurysm bled[19]. We used the appearance from the CT scan and angiography. Findings from CT scan may show a localized collection of an intracerebral or subarachnoid clot near the ruptured aneurysms. Angiographic findings are larger size, the proximal aneurysm, intra-aneurysmal clot, focal spasm, focal mass effect, changes in aneurysm shape on repeated angiograms, more irregular, or nipple[4,19-21]. We found that it was very difficult to determine clearly which aneurysms had bled.

Third, when we considered the operative mortality, we found that the operative mortality of multiple intracranial aneurysms varied from 6-16 per cent[6,7,9,11]. The findings of the morbidity and mortality rates of clipping on asymptomatic, unruptured intracranial aneurysms will help to determine whether clipping the remaining silent aneurysms should be performed after clipping the ruptured aneurysms. King et al reported a meta-analysis of the literature on morbidity and mortality from elective surgery for asymptomatic, unruptured intracranial aneurysms and found that the mortality and morbidity rate were 1 per cent and 4.1 per cent consecutively[22]. Nakagawa and Hashi showed no significant morbidity and no mortality on 26 patients with asymptomatic, unruptured aneurysm clipping[23]. These findings support the concept that surgery should be performed on all aneurysms with low or no morbidity and mortality. The low mortality rate and the danger of rupture of an unruptured aneurysm led to the opinion that direct surgery should be performed on all aneurysms. We now advocate a policy in our hospital that all aneurysms will be clipped in a one stage operation. We found that subfrontal approaches may be more convenient than pterional approaches. But large retraction force for frontal lobe lifting up should be avoided.

SUMMARY

Seven patients with multiple intracranial aneurysms were reviewed retrospectively regarding age, sex, aneurysm site distribution, clinical grading, timing of surgery, and long term results. The incidence of 6.5 per cent for multiple aneurysms is very low when compared to other series in the literature. The posterior communicating artery was the most common originating site. Bilateral aneurysms were clipped by bifrontal craniotomy. The results were closely related to the preoperative grade. From the literature, the finding of the rebleeding rate of unruptured aneurysms and its operative morbidity and mortality support operating on all aneurysms, which is the policy our hospital has instituted.

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REFERENCES

1. Hunt WE, Hess RM. Surgical risk as related to time of intervention in the repair of intracranial aneurysms. J Neurosurg 1968; 28: 14-20.
2. Day AL, Morcos JJ, Revilla F. Management of aneurysms of the anterior circulation . In : Youmans JR ed. Neurological Surgery vol.2, 4th edn. Philadelphia: W.B. Saunders 1996: 1272-309.
3. Friedman AH. Pre- and postoperative management of a patients with a ruptured aneurysm. In : Wilkins RH, Rengachary SS. eds. Neurosurgery vol.2, 2nd edn. New York : McGraw-Hill, 1996: 2261-70.
4. Nehls DG, Flom RA, Carter LP, Spetzler RF. Multiple intracranial aneurysms : determining the site of rupture. J Neurosurg 1985; 63: 342-8.
5. Yasargil MG. Microneurosurgery. (Vol.II). New York : Georg Thieme Verlag, 1984: 305-28.
6. Mizoi K, Suzuki J, Yoshimoto T. Surgical treatment of multiple aneurysms. Acta Neurochir (Wien) 1989; 96: 8-14.
7. Cervoni L, Delfini R, Santoro A, Cantore G. Multiple intracranial aneurysms: surgical treatment and outcome. Acta Neurochir (Wien) 1993; 124: 66-70.
8. Rinne J, Hernesniemi J, Puranen M, Saari T. Multiple intracranial aneurysms in a defined population : prospective angiographic and clinical study. Neurosurgery 1994; 35: 803-8.
9. Rinne J, Hernesniemi J, Niskanen M, Vapalahti M. Management outcome for multiple intracranial aneurysms. Neurosurgery 1995; 36: 31-8.
10. Howng SL, Hung TP, Kwan AL, Lin CL. Intracranial aneurysm in Taiwan. J Formos Med Assoc 1995; 94 Suppl 2 : S 73-80.
11. Orz Y, Osawa M, Tanaka Y, Kyoshima K, Kobayashi S. Surgical outcome for multiple intracranial aneurysms. Acta Neurochir (Wien) 1996; 138: 411-7.
12. Kassell NF, Torner JC, Haley C, et al. The International Cooperation Study on the Timing of Aneurysm Surgery. Part I: Overall management results. J Neurosurg 1990; 73: 18-36.
13. Phuenpathom N, Ratanalert S. Results of delayed operations for ruptured supratentorial aneurysms in 22 consecutive patients. J Med Assoc Thai 1992; 75: 495-501.
14. Phuenpathom N, Ratanalert S, Tussanasunthonwong S. Experiences in intracranial aneurysm surgery in southern Thailand. Thai J Surg 1994; 15: 40-6.
15. Winn HR, Almaani WS, Berga SL, et al. The long term outcome in patients with multiple aneurysms. J Neurosurg 1983; 59: 642-51.
16. Heiskanen O. Risk of bleeding from unruptured aneurysms in cases with multiple intracranial aneurysms. J Neurosurg 1981; 55: 524-6.
17. Wiebers DO, Whisnant JP, O'Fallon WM. The natural history of unruptured intracranial aneurysms. N Engl J Med 1981; 304: 696-8.
18. Winn HR, Richardson AE, Jane JA. The long-term prognosis in untreated cerebral aneurysms. I The incidence of late hemorrhage in cerebral aneurysms : a 10 year evaluation in 364 patients. Ann Neurol 1977; 1: 358-70.
19. Weir B, Macdonald RL. Intracranial aneurysms and subarachnoid hemorrhage: an overview. In : Wilkins RH, Rengachary SS, eds. Neurosurgery 2nd ed. New York : McGraw-Hill 1996: 2191-213.
20. Wood EH. Angiographic identification of the ruptured lesion in patients with multiple cerebral aneurysms. J Neurosurg 1964; 21: 182-98.
21. Crompton MR. Mechanism of growth and rupture in cerebral berry aneurysms. Br Med J 1966; 1: 1138-42.
22. King JT Jr, Berlin JA, Flamm ES. Morbidity and mortality from elective surgery for asymptomatic, unruptured, intracranial aneurysms : meta-analysis. J Neurosurg 1994; 81: 837-42.
23. Nakagawa T, Hashi K. The incidence and treatment of asymptomatic, unruptured cerebral aneurysms. J Neurosurg 1994; 80: 217-23.

หลอดเลือดโป่งพองหลายตำแหน่งภายในกะโหลกศีรษะ การศึกษาที่โรงพยาบาลสงขลานครินทร์

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ได้ทำการศึกษาย้อนหลังในผู้ป่วยที่ได้รับการผ่าตัดหลอดเลือดโป่งพองภายในกะโหลกศีรษะ 107 ราย ระหว่าง 18 ธันวาคม 2527 ถึง 25 กรกฎาคม 2539 ในจำนวนนี้พบมีหลอดเลือดโป่งพองหลายตำแหน่ง ในผู้ป่วยเพียง 7 ราย คิดเป็นร้อยละ 6.5 ของผู้ป่วยทั้งหมด โดยพบหลอดเลือดโป่งพองรวม 16 ตำแหน่ง, มีผู้ป่วย 2 รายที่มีหลอดเลือดโป่งพอง 3 ตำแหน่ง, ที่เหลือ 5 รายมีหลอดเลือดโป่งพอง 2 ตำแหน่ง ตำแหน่งของหลอดเลือดโป่งพองที่พบบ่อยคือ PCoA ลักษณะอาการทางคลินิกของผู้ป่วยก่อนผ่าตัดจะมีความสัมพันธ์อย่างใกล้ชิดต่อผลการรักษา, สำหรับวิธีการผ่าตัดหลอดเลือดโป่งพองหลายตำแหน่งที่อยู่คนละข้างนั้นได้ใช้วิธีเข้าทางสมองส่วนหน้าทั้งสองข้าง, จากการศึกษานี้ไม่มีอัตราตาย

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