

## 조기 뇌동맥류 수술전에 항섬유소용해제 치료의 이점\*

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= Abstract =

### Benefits of Antifibrinolytic Therapy before Early Aneurysm Surgery

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**Objective :** Antifibrinolytic treatment after aneurysmal subarachnoid hemorrhage has been shown to have no significant effect on outcome since a reduction in the rate of rebleeding was offset by an increase in the incidence of hydrocephalus and ischemic events. As the results of early aneurysm surgery and a change of strategy in the intensive medical treatment, outcome in patients with cerebral ischemia has been improved. On the other hand, rebleeding still remains as a major cause of death. A short course of tranexamic acid(TA) was tried to study its efficacy and safety in reducing the incidence of rebleeding before aneurysm surgery.

**Methods :** A total of 507 patients with ruptured cerebral aneurysm operated within 3 days after the attack from 1990 to 1999 were included in this study. Group A consisted of 302 consecutive patients treated from 1990 through 1995 served as control. Two hundred - five patients in group B were treated with TA from 1996 through 1999. Both groups were evaluated for comparability of demographic and clinical variables including age, Hunt - Hess grade, Fisher grade, aneurysm location, hypertension, day of surgery, and initial hydrocephalus. The relationships of TA with rebleeding, ischemia, and chronic hydrocephalus were also studied.

**Results :** There was no significant difference in patient demographics and clinical characteristics between group A and group B. Sixteen patients(5.3%) suffered a recurrent hemorrhage in group A and three(1.5%) in group B( $p < 0.05$ ). Chronic hydrocephalus requiring a shunt was found in a significantly greater proportion in group B than in group A( $p < 0.05$ ). The incidence of cerebral ischemia was not elevated in group B compared with group A.

**Conclusion :** Considering the fact that the reduction of fatal rebleeding outweighed the increased incidence of hydrocephalus, the authors believe that a short course of TA is beneficial in diminishing the risk of rebleeding prior to early surgical intervention.

**KEY WORDS :** Antifibrinolytic therapy · Subarachnoid hemorrhage · Rebleeding · Early aneurysm surgery.

서 론

50% 가

3)4)8)14)18)

Leipzig<sup>11)</sup>

3

epsilon - aminocaproic acid(EACA)

가 1990

Kassell (International Cooperative Study on the Timing of Aneurysm Surgery, ICSTAS)<sup>10)</sup>

2001

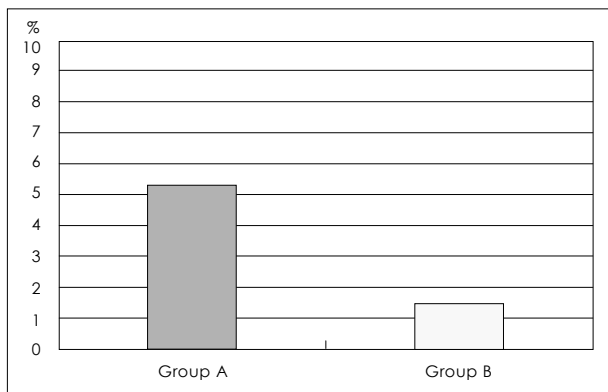
EACA tranexamic acid(TA)  
 1990~1999  
 , TA

### 대상 및 방법

1990 1 1999 12  
 3 507 TA  
 1990~1995 A 302 ,  
 TA B (1996~1999 ) 205  
 , Hunt - Hess , Fisher ,  
 , , ,  
 ,  
 가  
 (CT) 가

**Table 1.** Insignificant variables associated with distributions between 2 groups

Factor	Significance
Age	Student T, t=1.1, p=0.51
Aneurysm size	$\chi^2=4.52$
Hypertension	$\chi^2=0.03$
Hunt-Hess grade	$\chi^2=2.89$
Fisher grade	$\chi^2=1.96$
Initial hydrocephalus	$\chi^2=2.10$
Day of surgery	$\chi^2=4.12$

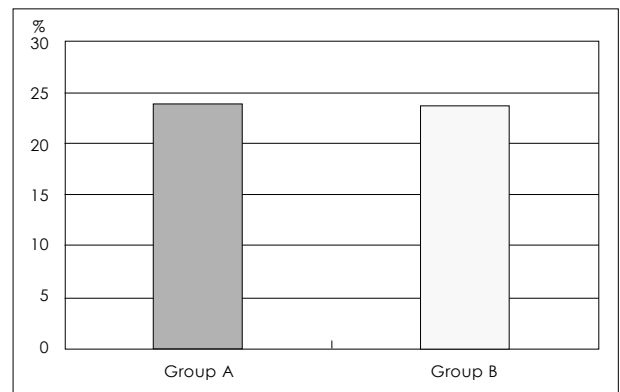


**Fig. 1.** Rebleeding rate. Fisher's exact test,  $p < 0.05$ .

(shunt) 3  
 TA 6g<sup>(3)(4)(18)</sup>  
 CT 24  
 40mmHg  
 가  
 Student T ,  $\chi^2$  , Fisher's  
 exact test p 0.05

### 결 과

, Hunt - Hess , Fisher ,  
 , ,  
 가 (Table 1). (A : 79.8%,  
 B : 77.1%)  
 0 (day 0)  
 1 A 16  
 (5.3%), B 3 (1.5%) A  
 (Fig. 1,  $p < 0.05$ ).



**Fig. 2.** Incidence of symptomatic vasospasm.

: p=0.25). A 72 (23.8%),  
 B 48 (23.4%)  
 (Fig. 2). A  
 23 (7.6%), B 31 (15.1%) 가  
 (Fig. 3, p<0.05).  
 B 59.6%(31/52)  
 A 39.0%(23/59)  
 (Fig. 4, p<0.05).

7) 90%  
 고 잘  
 (ICSTAS) 3  
 5.7%<sup>10)</sup>, 2 20~30%<sup>17)</sup>,  
 6 1 2~4%  
 9).  
 70~90%<sup>15)</sup>  
 가  
 1970 35%<sup>12)</sup>, 1980  
 15~20%<sup>9)</sup>, 10%<sup>6)</sup>

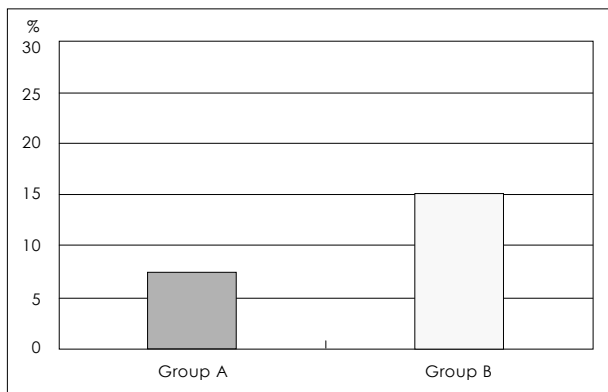


Fig. 3. Incidence of chronic hydrocephalus.  $\chi^2$  test, p<0.05.

50%  
 가  
 3)4)8)14)18)  
 EACA 1  
 Leipzig<sup>11)</sup>  
 3  
 IC-  
 STAS 5.7%<sup>10)</sup> 1.3%  
 Hunt - Hess  
 가  
 ICSTAS  
 가  
 EACA 20  
 48  
 2)16) Leipzig<sup>11)</sup>  
 5~10g 34~48g  
 24  
 70 94% 24  
 TA EACA 10  
 1)13)  
 가  
 3 TA 1.5%

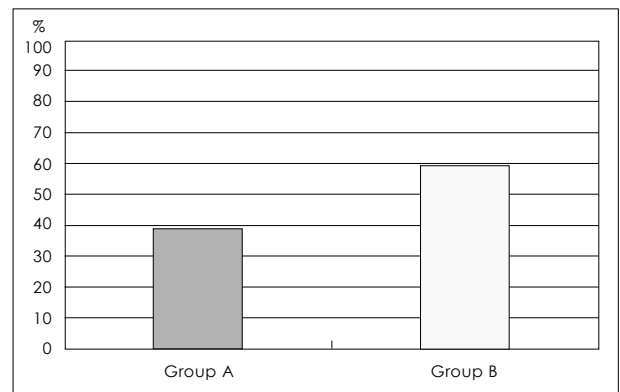


Fig. 4. Shunting rate.  $\chi^2$  test, p<0.05.

5.7%<sup>10)</sup> 5.3% ICSTAS (p<0.05). 23.8%

23.4% 7~10% 5)

15.1% A 가 7.6% B TA 가 90% 7)

TA 가

가 3)4) Shaffrey 17) 가

가

가 가

**결 론**

507 TA (1990~1995) (1996~1999) 5.3% 1.5% 가

2 (7.6% vs 15.1%). TA 3 가

CT 가

, TA 가

- : 2000 10 12
- : 2001 3 6
- : 570 - 711 344 - 2

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**References**

- 1) Andersson L, Nilsson IM, Colleen s, Granstrand B, Melander B : *Role of urokinase and tissue activator in sustaining bleeding and the management thereof with EACA and AMCA. Ann NY Acad sci 146 : 642-658, 1968*
- 2) Burchiel KJ, Hoffman JM, Bakay RAE : *Quantitative determination of plasma fibrinolytic activity in patients with ruptured intracranial aneurysms who are receiving E-aminocaproic acid : Relationship of possible complications of therapy to the degree of fibrinolytic inhibition. Neurosurgery 14 : 57-63, 1984*
- 3) Fodstad H, Forssell Å, Liliequist B, Schannong M : *Antifibrinolysis with Tranexamic Acid in Aneurysmal Subarachnoid Hemorrhage : A Consecutive Controlled Clinical Trial : Neurosurgery 8 : 158-165, 1981*
- 4) Fodstad H, Liliequist B, Schannong M, Thulin C : *Tranexamic Acid in the Preoperative Management of Ruptured Intracranial Aneurysm. Surg Neurol 10 : 9-15, 1978*
- 5) Graff-Radford NR, Torner J, Adams HP Jr, Kassell NF : *Factors associated with hydrocephalus after subarachnoid hemorrhage : A report of the cooperative aneurysm study. Arch Neurol 46 : 744, 1989*
- 6) Haley EC Jr, Kassell NF, Torner JC : *A randomized trial of two doses of nicardipine in aneurysmal subarachnoid hemorrhage. A report of the Cooperative Aneurysm Study : J Neurosurg 80 : 788-796, 1994*
- 7) Kang SD : *Efficacy of lumbo-peritoneal versus ventriculo-peritoneal shunting for management of chronic hydrocephalus following aneurysmal subarachnoid hemorrhage. Acta Neurochir 142 : 45-49, 2000*
- 8) Kassell NF, Torner JC : *Aneurysmal rebleeding : a preliminary report from the Cooperative Aneurysm Study. Neurosurgery 13 : 479-481, 1983*
- 9) Kassell NF, Torner JC, Haley EC Jr : *The international cooperative study on the timing of aneurysm surgery. Part 1 : Overall management results. J Neurosurg 67 : 329-332, 1987*
- 10) Kassell NF, Torner JC, Jane JA, Haley EC Jr, Adams HP : *The International Cooperative Study on the Timing of Aneurysm Surgery. Part 2 : Surgical results. J Neurosurg 73 : 37-47, 1990*
- 11) Leipzig TJ, Redelman K, Horner TG : *Reducing the risk of rebleeding before early aneurysm surgery : a possible role for antifibrinolytic therapy. J Neurosurg 86 : 220-225, 1997*
- 12) Ljunggren B, Saveland H, Brandt L : *Causes of unfavorable outcome after early aneurysm operation : Neurosurgery 13 : 629-633, 1983*
- 13) Maki M, Beller F, K : *Comparative studies of fibrinolytic inhibitors in vitro. Thromb Diath Haemorrh 16 : 668-686, 1966*
- 14) Ramirez-Lassepas M : *Antifibrinolytic therapy in subarac-*

- hroid hemorrhage caused by ruptured intracranial aneurysm. Neurosurgery 31 : 316-322, 1981*
- 15) Rosenorn J, Eskesen V, Schmidt K : *The risk of rebleeding from ruptured intracranial aneurysms. J Neurosurg 67 : 329-332, 1987*
- 16) Sawaya R : *Aminocaproic acid in the management of ruptured cerebral aneurysms. Contemp Neurosurg 6 : 1-7, 1984*
- 17) Shaffrey ME, Shaffrey CI, Kassell NF : *Early versus delayed surgery for ruptured aneurysms, in Awad IA (ed) : Current Management of Cerebral Aneurysms. Park Ridge : AANS, 1993, pp119-124*
- 18) Vermeulen M, Lindsay KW, Murray GD, Cheah F, Hijdra A, Muizelaar JP : *Antifibrinolytic treatment in subarachnoid hemorrhage. N Engl J Med 311 : 432-437, 1984*