

뇌경색 환자의 치료 및 예방에 있어서 우회로수술의 효과

Effectiveness of Bypass Surgery in Treatment and Prevention for Cerebrovascular Occlusive Disease

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Abstract

To study the effect of extracranial - intracranial(EC/IC) bypass on symptomatic patients with hemodynamic cerebral ischemia, we prospectively reviewed 76 patients who underwent EC/IC bypass surgery in patients with occlusive cerebrovascular disease. A series of 76 patients treated in a 7 years period met following criteria. symptomatic internal carotid artery(ICA) or middle cerebral artery(MCA) obstruction or stenosis over 80%. decrease in basal cerebral blood flow(CBF) over 10%. decreased reactivity of CBF in response to acetazolamide. Among these, the types of ischemic episodes were transient ischemic attack(TIA) or reversible ischemic neurological deficit(RIND) in 39, minor stroke in 22, and major stroke in 15. Based on our criteria, superficial temporal artery(STA) - MCA anastomosis was performed in 67 cases and EC - IC bypass grafting using saphenous vein or radial artery in 9. Average follow up period was 26 months(3 months~7 year). Patency of bypass was confirmed by post-operative angiography or magnetic resonance angiography(MRA) in all case except four cases. Of the 72 patients with patency of bypass, 68 patients(94%) have had an excellent to good outcome with improvement of preoperative neurologic or cognitive dysfunction, 3 patients showed no improvement of preoperative neurologic symptoms and remaining one patient had new developed deficit. All 72 patients with patency of bypass had experienced no further cerebral ischemic events during following period. Postoperative significant improvement of CBF to acetazolamide was showed in 68 cases(94%) of the 72 cases with patency of bypass, while the basal CBF showed significant improved in 31cases. Postoperative permanent neurologic deficit occurred only in one. In view of these finding, the author suggest that EC - IC bypass surgery is a reliable and resonably safe method for establishing new pathways of collateral circulation to the brain and to be considered as an appropriate therapy for improvement of the cerebrovascular reserve capacity in patients with hemodynamic cerebral ischemia, defined using the strict selection criteria employed in this study.

Keywords : Extracranial - intracranial bypass surgery; Occlusive cerebrovascular disease;
Cerebral blood flow; Hemodynamic cerebral ischemia; Cerebrovascular reserve capacity

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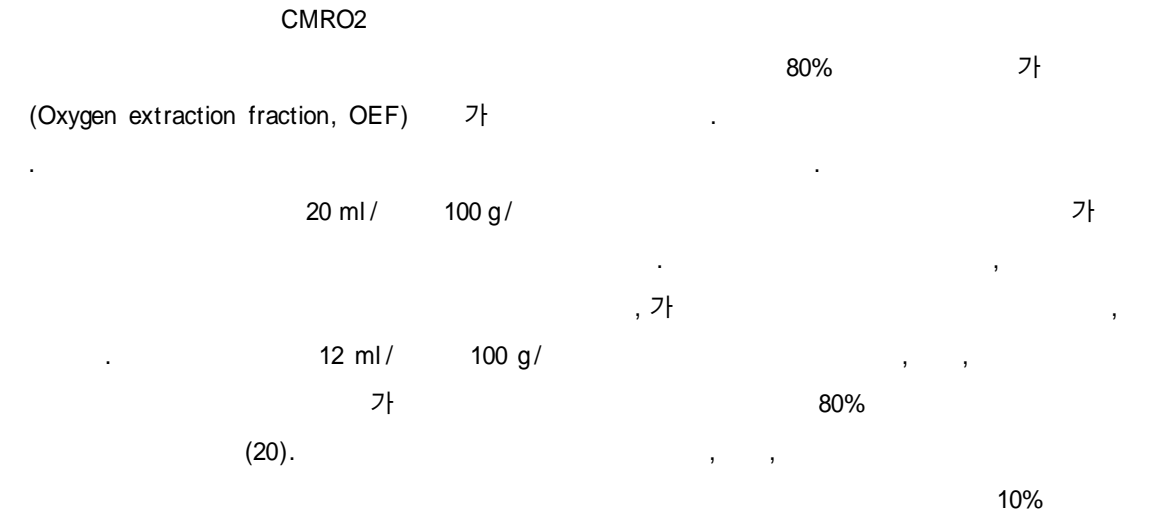
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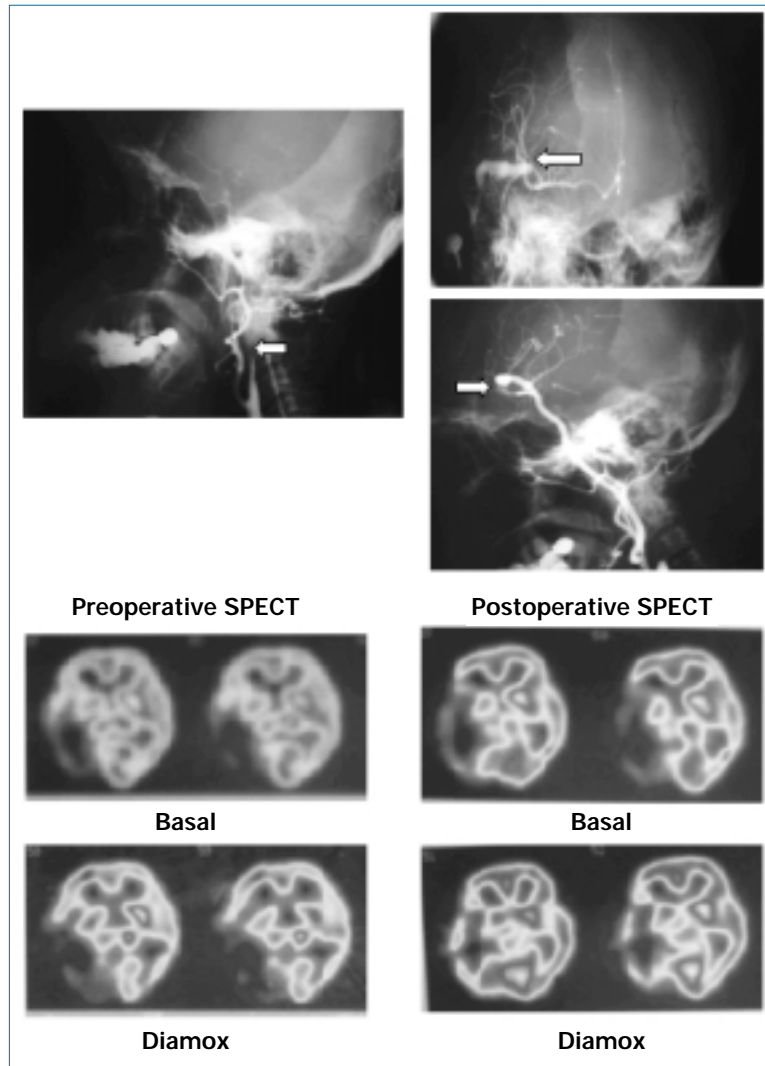
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	MCA Lesion(30)	ICA Lesion(27)	MCA + ICA Lesion(3)	Moyamoya (14)	Trauma (2)
Age					
Mean	56.5	58.2	69	21	60
Range	(45~68)	(49~70)	(65~72)	(6~35)	(58~62)
Sex(M:F)	19 : 11	20 : 7	3 : 0	4 : 10	0 : 2
Neurological Status					
Major deficit(15)	7	5	2		1
Minor deficit(22)	11	9	1	1	
No deficit(39)	10	15		13	1
MRI findings					
MCA infarct(13)	9	3			1
Boderzone infarct(16)	4	8	1	3	
Basal gangl infarct(15)	8	6	1		
Multiple lacunar infarct(13)	6	6	1		
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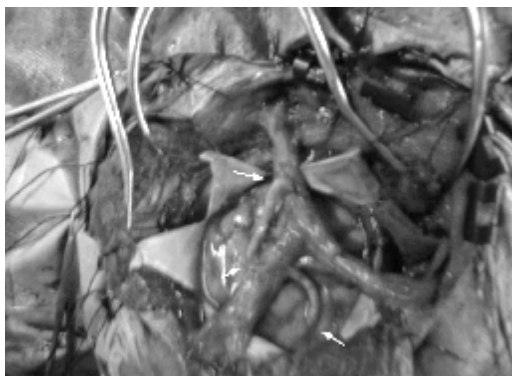
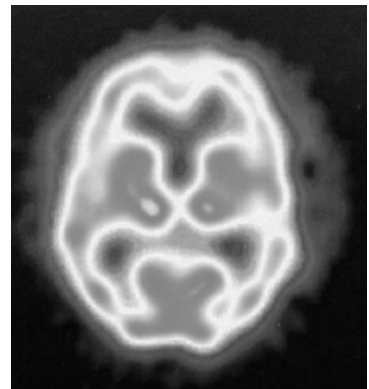
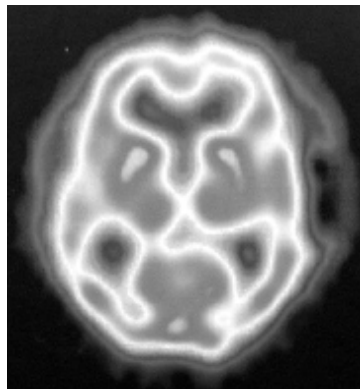
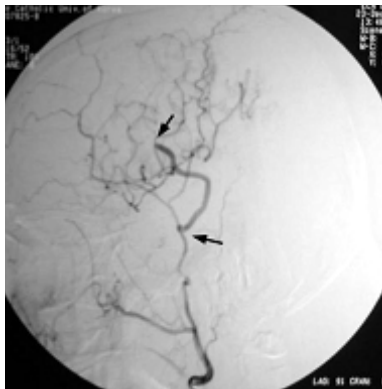
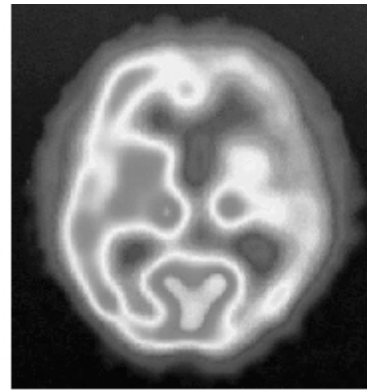
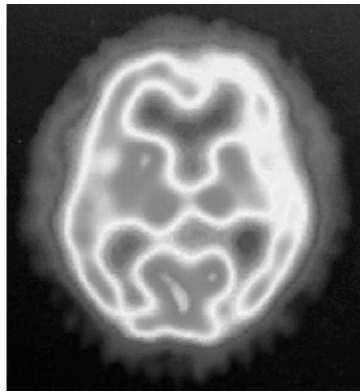
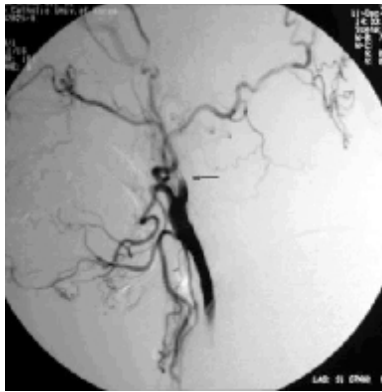
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1. Yasargil MG. Microsurgery Applied to neurosurgery. Stuttgart : georg Thieme Verlag 1969 ; 105 - 15
2. The EC/IC Bypass study group. Failure of Extracranial - intracranial arterial bypass to reduce the risk of ischemic stroke. Results of an international randomized trial. N Engl J Med 1985 ; 313 : 1191 - 200
3. Chollet F, Celsis P, Clanet M. SPECT study of cerebral blood flow reactivity after acetazolamide in patients with transient ischemic attacks. Stroke 1988 ; 20 : 458 - 64
4. Okudaira Y, Bandoh K, Arai H, Sato K. Evaluation of the aceta-

zolamide test. Stroke 1995 ; 26 : 1234 - 9

5. Schmidek P, Piepgras A, Leinsinger G, Kirsch CM, Einhaupl K. Improvement of cerebrovascular reserve capacity by EC - IC arterial bypass surgery in patients with ICA occlusion and hemodynamic cerebral ischemia. J Neurosurg 1994 ; 81 : 236 - 44
6. Hasegawa Y, Yamaguchi T, Tsuchiya T, Minematsu K, Nishimura T. Sequential change of hemodynamic reserve in patients with major cerebral artery occlusion of severe stenosis. Neuroradiology 1992 ; 34 : 15 - 21
7. McCormick P, Tomecek F, McKinney J, Ausmane JI. Disabling cerebral transient ischemic attacks. J Neurosurg 1991 ; 75 : 891 - 901
8. Widder B, Kleiser B, Krapf H. Course of Cerebrovascular reactivity in patients with carotid artery occlusions. Stroke 1994 ; 25 : 1963 - 67
9. Yonas H, Smith HA, Durham SR, Penhney SL, Johnson DW. Increased stroke risk predicted by compromised cerebral blood flow reactivity. J Neurosurg 1993 ; 79 : 483 - 9
10. Anderson DE, McLane MP, Reichman OH, Origiano TC. Improved cerebral blood flow and CO2 reactivity after microvascular anastomosis in patients at high risk for recurrent stroke. Neurosurgery 1992 ; 31 : 26 - 34
11. Batjer HH, Devous MD, Purdy PD. Improvement in regional blood flow and cerebral vasoreactivity after extracranialintra-cranial arterial bypass. Neurosurgery 1988 ; 22 : 913 - 9
12. Iwama T, Hashimoto N, Takagi Y, Tsukahara T, Hayashida K. Predictability of extracranial/intracranial bypass function : a retrospective study of patients with occlusive cerebrovascular disease. Neurosurgery 1997 ; 40 : 53 - 9
13. Powers WJ, Grubb RL, Raichle ME. Clinical results of extracranial - intracranial bypass surgery in patients with hemodynamic cerebrovascular disease. J Neurosurgery. 1988 ; 79 : 61 - 7
14. Spetzler RF, Hadley MN. Extracranial to intracranial bypass

- grafting. in Wilkins RH, Rengachary SS, eds. Neurosurgery ed 2 New York : McGRAW - Hill Health Professions Division. 1996 ; 2 : 2157 - 67
15. Vorstrup S, Brun B, Lassen NA. Evaluation of the cerebral vasodilatory capacity by the acetazolimide test before EC - IC bypass surgery in patients with carotid artery occlusions. Stroke 1986 ; 17 : 1291 - 8
16. Yasui N, Suzuki A, Sayama I, Kawamura S, Shishido F, Uemura K. Comparison of the clinical results of STA - MCA anastomosis and the medical treatment in the cerebral low perfusion patients with viable brain tissue. Neurological Research 1991 ; 13 : 84 - 8
17. 1999 ; 28 : 35 - 41
18. Rogers S, Sherman DG. Pathophysiology and treatment of acute ischemic stroke. Clinical Pharmacy 1993 ; 12 : 359 - 73
19. Loftus CM, Biller J. Acute cerebral ischemia. Part II Surgical management. Contemporary Neurosurg 1994 ; 16 : 1 - 6
20. Grubb RL, Powers WJ. Risks of stroke and current indications for cerebral revascularization in patients with carotid occlusion. Neurosurgery Clinics of North America 2001 ; 36 : 473 - 85
21. Eguchi T. How to select the candidate of Revascularization and How to evaluate the surgical benefit. J. Korean Neurosurg 1998 ; 27 : 47 - 51
22. Korbling M, Estro Z. Adults Stem Cell for Tissue Repair - A new Therapeutic Concepts? The new England Journal of Medicine 2003 ; 349 : 6, 570 - 82
23. Chen J, Sanberg PR, Li Y, Wang L, Lu M, Chopp M, et al. Intravenous Administration of Human Umbilical Cord Blood Reduces Behavioral Deficits After Stroke in Rats. Stroke 2001 ; 32 : 2682 - 8