체외순환 없이 시행한 관동맥우회술 후 발생한 척추신경경색

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Spinal Cord Infarction following Off-pump Coronary Artery Bypass Surgery

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A 62-year-old woman with ischemic heart disease, hypertension and hypercholesterolemia had developed spinal cord infarction after off-pump coronary artery bypass (OPCAB). The incidence of postoperative neurological complications is well known to be less in OPCAB than that of conventional coronary bypass surgery. Furthermore, spinal cord infarction is an uncommon clinical event after coronary bypass surgery. Here we report a case of spinal cord infarction following OPCAB, discuss possible mechanism of spinal cord infarction with relate literatures.

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Key words: 1. Spinal cord
2. Off-pump
3. Coronary artery bypass
4. Infarction

CASE REPORT

A 62-year-old woman was admitted with the diagnosis of unstable angina for recent two months. After preoperative evaluation, she was transferred to our department for coronary bypass surgery. She had prior history of hypertension, hypercholesterolemia. Six years ago, she underwent posterior lumbar interbody fusion for degenerative kyphosis of lumbar 3, 4, 5. She suffered from right pontine and left basal ganglia infarction two years ago, fully recovered one year later. A preoperatively evaluation revealed no neurologic deficit and well controlled blood pressure. Otherwise there were no abnormal clinical findings. We decided doing OPCAB because of previous history of cerebral infarction and risk factors such as hypertension and hypercholesterolemia. She was underwent OPCAB with the left internal mammary artery and composite radial artery grafts by aorta no touch technique. The left internal mammary artery was anastomosed to the left anterior descending coronary artery, and composite radial artery was fashioned to the posterior descending artery of the right coronary artery. During anastomosis of the posterior descending artery, blood pressure was down below 80 mmHg systolic for a while. At that time, cardiac anesthesiologist used norephinehrine as peripheral vasoconstrictor. We finished OPCAB uneventfully. On the first postoperative day, she was successfully extubated but she complained of sensory change and

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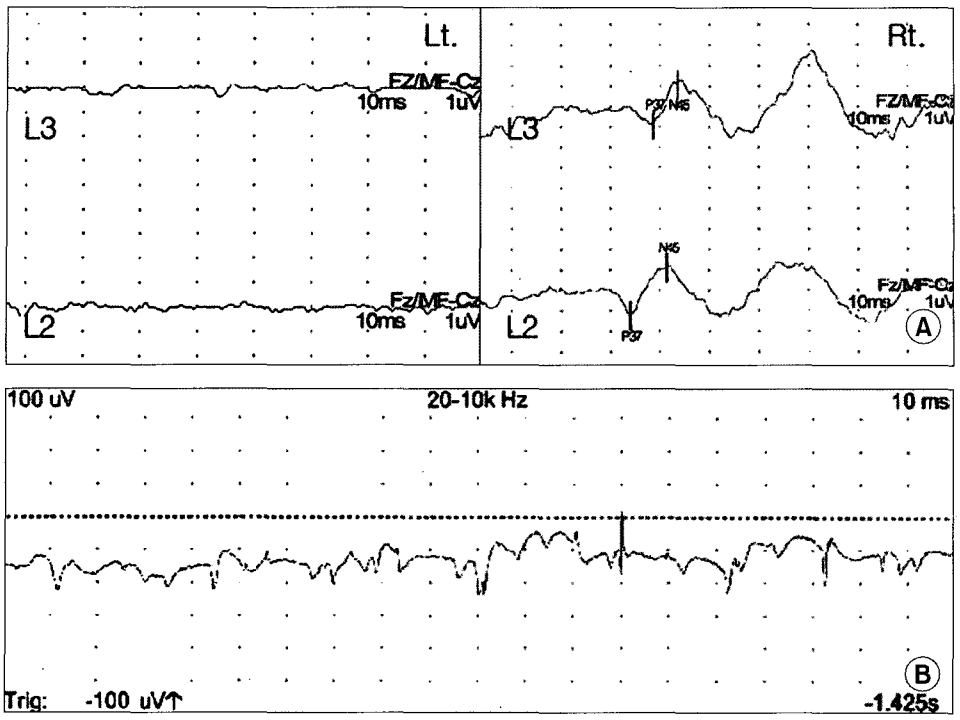

Fig. 1. (A) The dermatome sensory evoked potential was no response at the left L2, 3 levels, but intact at the right L2, 3 levels. (B) Needle EMG shows denervation potentials of left rectus femoris muscles.

motor weakness of her left lower limb. Neurological examination revealed an alert and intact cognitive function. The left hip flexor was G3/5, the left knee extensor was G2/5, the left ankle dorsiflexor was G4/5, the left ankle plantarflexor was G4/5. The sensory components were hypoalgesia of T11-L1, anesthesia of L2-S1, burning sensation on the left anterior thigh. The reflex knee jerk was absent, but the ankle jerk was well preserved. The dermatome sensory evoked potential was unresponsive at the left L2, 3 levels, but intact at the right L2, 3 levels (Fig. 1A). The finding of EMG of the left rectus femoris muscle revealed suggestive root injury on left L2-4 levels (Fig. 1B). An MRI scans with contrast enhancement of the thoracic and lumbar spine showed high signal intensity on spinal cord gray matter at T11-L1 levels (Fig. 2). Therefore She was diagnosed T11-L1 of spinal cord infarction. Now she is under regular follow-up and undergoing rehabilitation with slight improvement in motor power.

DISCUSSION

Spinal cord injury is rare after coronary bypass surgery, but occasionally occurs because of ischemia secondary to systemic hypotension or the occlusion of spinal arteries[1]. A few cases regarding spinal infarction associated with the use of an IABP after CABG[2], a hypertensive crisis[3], hypotension due to cardiac tamponade[4] were reported.

Spinal cord infarction resembles cerebral infarctions in its etiology. Risk factors for perioperative stroke include previous stroke history, hypertension, diabetes, smoking, obesity, and cardiac and peripheral vascular disease[5]. The mechanisms of spinal cord injury are various, but the two most plausible causes are embolization of atherosclerotic plaques and hypoperfusion[6]. The incidence of the postoperative neurologic complications after OPCAB is known to be less than that of CABG with cardiopulmonary bypass. Our case was performed without the bypass and with aorta no touch technique. While we performed OPCAB to the patient who had hypertension, preexisting atherosclerotic lesions, hypotension occurred during vertical lift of the heart apex and anastomosis of posterior lesion of the heart. At that time, cardiac anesthesiologist used peripheral vasoconstrictor for hemodynamic stabilization.

We hypothesize that, the single episode of hypotension was more detrimental to spinal cord perfusion in the patient who had hypertension and also decreased perfusion of the cord may be aggravated by the use of strong vasoconstrictor. Surgical risk of the patients with aortic atherosclerosis becomes

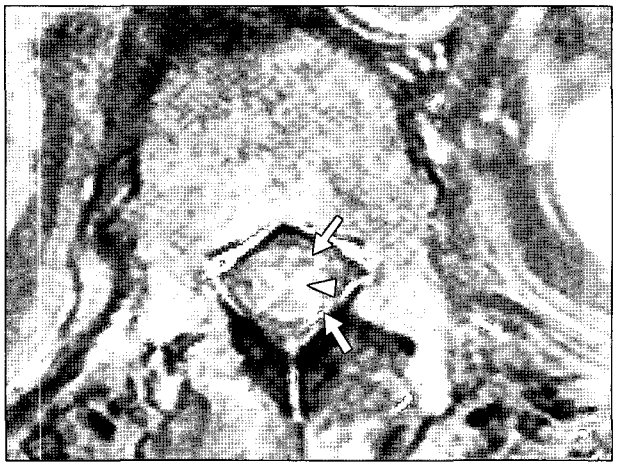

Fig. 2. T1-weighted axial image with contrast enhancement showed high signal intensity on spinal cord gray matter (arrow head) and left anterior (upper arrow) and posterior (lower arrow) nerve roots at T12 level.

greater when complicated by intraoperative hypotension. In particular, the lower spinal cord is more susceptible to systemic hypotension because of the lack of collateral blood supply[6].

Spinal cord injury after CABG especially OPCAB is very rare. However, the adequate intra and postoperative monitoring should be requested in patients with risk factors of perioperative spinal stroke, to detect and protect from it.

In conclusion, if patients with high risk factors complain of lower back pain, change of sensory and motor after CABG, we should consider the possibility of spinal cord infarction.

REFERENCES

1. Harris RE, Reimer KA, Crain BJ, Becsey DD, Oldham HN Jr. *Spinal cord infarction following intra-aortic balloon support.* Ann Thorac Surg 1986;42:206-7.
2. Gottesman MH, Saraya I, Centi F. *Modified Brown-Sequard syndrome following coronary artery bypass graft: case report.* Paraplegia 1992;30:178-80.
3. Thomas NJ, Harvey AT. *Paraplegia after coronary bypass operation: relationship to severe hypertension and vascular disease.* J Thorac Cardiovasc Surg 1999;117:834-6.
4. Geyer TE, Naik MJ, Pilla R. *Anterior spinal artery syndrome after elective coronary bypass grafting.* Ann Thorac Surg 2002;73:1971-3.
5. Kim JS, Ko SB, Shin HE, Han SR, Lee KS. *Perioperative stroke in the brain and spinal cord following an induced hypotension.* Yonsei Med J 2003;44:143-5.
6. Lin CC, Chen SY, Lan C, Shin TTTF, Lin MC, Lai JS. *Spinal cord infarction caused by cardiac tamponade.* Am J Phys Med Rehabil 2002;81 68-71.

=국문 초록=

고혈압과 고지혈증 그리고 허혈성심질환을 가진 62세 여자 환자가 심폐기를 이용하지 않는 관동맥우회술을 시행한 뒤 척추신경경색이 발생하였다. 심폐기를 이용하지 않는 관동맥우회술을 시행하는 경우 신경계 합병증의 발생 빈도는 통상의 관동맥우회술보다 낮다고 알려져 있다. 특히 관동맥우회술 후 척추신경경색의 발생은 매우 드물다. 심폐기를 이용하지 않는 관동맥우회술을 시행한 후 척추신경경색이 발생한 1예를 문헌 고찰과 함께 보고하는 바이다.

중심 단어 : 1. 척추신경
2. 무체외순환
3. 관상동맥우회술
4. 경색