LETTER TO THE EDITOR

What is an Efficient Emergency Medical Care System in a Medium-Sized City?

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CHALLENGES FOR JAPAN'S EMERGENCY MEDICAL CARE SYSTEM

Emergency medical care in Japan is divided into three levels: primary, secondary, and tertiary. Primary emergency care is provided by clinics that provide outpatient care. Secondary emergency care is provided by hospitals that provide initial treatment for emergency patients requiring hospitalization or surgery. Tertiary emergency medical care is provided by hospitals with center functions that accept severely ill patients and patients requiring special treatment that cannot be treated by secondary emergency hospitals. In Japan, anyone can call an ambulance, and the emergency medical services will contact emergency institutions by phone and find a place to transport the patient according to the degree of injury or illness based on vital signs. In large cities, such functional differentiation of emergency care is efficient because of the large number of severely ill patients, but it is not necessarily efficient in medium and small cities, where the frequency of tertiary emergency medicine requiring life-saving care is not extremely high. Different demographics make a hierarchical system of primary, secondary, and tertiary emergency care inefficient. It is also estimated that the system of emergency medical care will eventually cease to function due to future demographic changes[1)]. Investments in facilities and personnel for tertiary emergency centers should be devised to ensure that they can operate effectively in a health care economic manner, taking demographic trends into consideration.

In the first place, those diseases that require early specific treatment should be transported to tertiary emergency centers instead of through secondary ones, regardless of the severity of the vital signs. Functional prognosis of cerebral infarction improves with early thrombolysis and endovascular treatment. In emergency situations, direct transport to a tertiary stroke center, without going through a secondary facility, is one of the keys to functional prognosis. The importance of reversing the emergency hierarchy has already been pointed out in this journal[2)]. Similarly, in the case of cardiac and macrovascular disease, direct transport to a tertiary emergency center is necessary because secondary institutions cannot provide adequate treatment, even if vital signs are relatively well maintained. Two specific examples are given below to point out the dangers of distinguishing between secondary and tertiary transport based on vital signs.

CASE REQUIRING DIRECT TRANSPORT TO A TERTIARY CARE CENTER (CASE 1) TRANSIENT LOSS OF CONSCIOUSNESS: COMPLETE AV BLOCK

An elderly man with independent ADLs suffered a transient loss of consciousness while brushing his teeth early in the morning, recovered, but was still dizzy, and his family called for an ambulance. His vitals were normal except for bradycardia. The emergency medical services thought the patient had cardiovascular disease and contacted a tertiary care center, but because his vitals were stable, the tertiary refused to accept him and he was transported to a secondary care facility. However, upon arrival at the secondary care facility, the patient again lost consciousness and went into cardiopulmonary arrest. Cardiac massage was continued for more than 10 minutes, during which time the patient was intubated and ventilated with 100% oxygen; he did not respond to an AED, and repeated adrenaline administration restarted his heartbeat. The diagnosis of cardiac arrest with complete atrioventricular block was made (Figure 1). His level of consciousness improved, and he

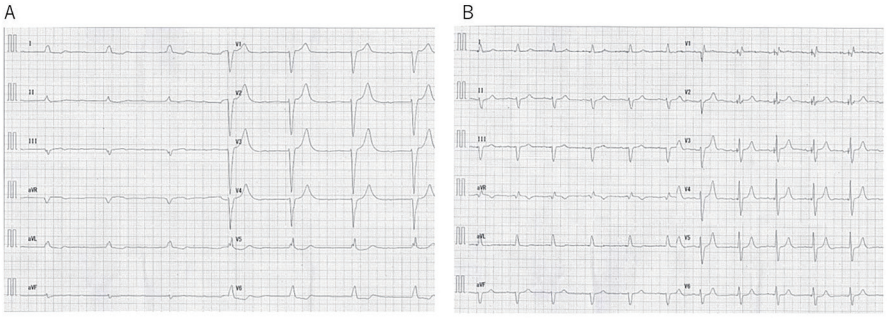

Figure 1: ECG of Case 1
Immediately after the heartbeat resumed, the ECG showed marked bradycardia and ventricular rhythm, suggesting cardiac arrest due to complete atrioventricular block (A). The patient was transported from a secondary facility to a tertiary facility for pacemaker implantation (B).

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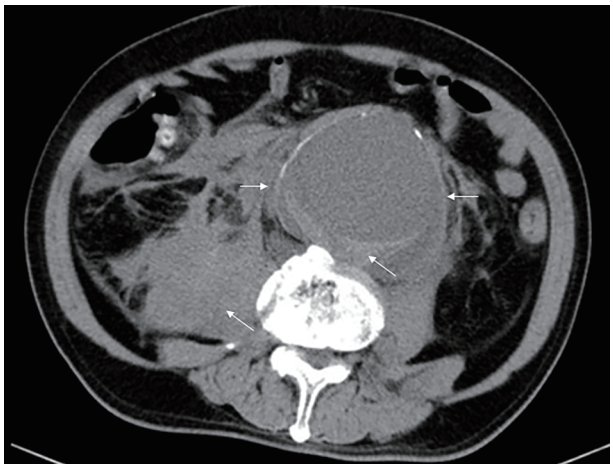

Figure 2: Abdominal CT of Case 2
The abdominal aorta is markedly dilated with calcification, and its maximum length exceeds 10 cm (indicated by horizontal arrows). The dorsal density of the dilated abdominal aorta is high and can be diagnosed as abdominal aortic rupture, and the retroperitoneum shows hemorrhage predominantly on the right side (indicated by diagonal arrows).

was transported to a tertiary care facility for pacing while on a ventilator. A permanent pacemaker was placed later that day after primary pacing.

(CASE 2) SEVERE LOW BACK PAIN: ABDOMINAL ANEURYSM

A middle-aged male patient with hypertension and a history of gallstones and kidney stones developed significant low back pain. He contacted his family physician as a primary emergency, but was instructed over the phone to call for an ambulance. Since he was conscious and his blood pressure could be measured, he was transported to a secondary medical facility. Upon arrival at the secondary hospital, the patient was in a cold sweat, systolic blood pressure was 112 mmHg, pulse was 120/min, and respiratory rate was 26 breaths/min. The patient was considered pre-shock and a tertiary care center was called, but the patient was instructed to be treated at the secondary level first. An abdominal computed tomography was performed and a diagnosis of the rupture of the abdominal aortic aneurysm was made (figure 2). The patient was again contacted to a tertiary care center and eventually transferred to the tertiary center, where emergency surgery was performed, but the patient was left with sequelae including renal dysfunction.

DISCUSSION AND CONCLUSION

In both cases, the emergency medical team contacted the tertiary medical center, but in accordance with the emergency medical hierarchy, the patient went through the secondary level, which delayed the transfer to the tertiary medical institution. Most secondary emergency facilities in Japan have inadequate systems and are not equipped or staffed to handle all emergency procedures[3]. In order to effectively utilize the medical resources invested in tertiary emergency facilities, it is necessary to integrate secondary and tertiary facilities in medium-sized cities. In Japan, it is not easy to find medical facilities that are open 24 hours a day, 365 days a year. In many medium-sized cities in Japan, there is often no direct involvement of primary or tertiary medical institutions with regard to accepting patients who call for emergency care. Secondary facilities respond to emergency calls on a rotating basis, but treatment is limited due to equipment and staffing. In a medium-sized city, efficiently providing secondary and tertiary care in the same facility would eliminate the time lag in emergency transport as described above and eliminate waste in terms of health care economics. The advantage of an integrated secondary and tertiary emergency system is not only cost-effective in the operation of the facility, but also in the training of emergency physicians who can provide a wide range of services.

The problem with this new emergency system, however, is the need to secure back-up beds, which can be made more efficient by establishing a system that allows for appropriate transport from a tertiary care center to a secondary facility. Now seems to be the time to build an emergency system based on the idea of reversing the hierarchy of emergency medicine[2].

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