Case report

Pace Maker Implantation for Elderly Individuals Over 90 Years Old

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Abstract

Objective: The aim of this report was to discuss validity of pacemaker surgery for elderly individuals over 90 years old.

Patient: We operated on 12 individuals over 90 years old who had syncope or congestive heart failure in association with bradycardia, between January 2005 and November 2012.

Methods: All 12 patients were referred to us by the cardiology department of our hospital for pacemaker surgery. We applied our routine technique: cutdown of the cephalic vein, creation of a subpectoral pocket, use of screw-in leads, and use of generators with an automatic output control system.

Results: All of the patients received a dual chamber system with atrial and ventricular leads and recovered uneventfully. The follow-up period was between 1 month and 7 years.

Conclusion: An advanced age over 90 years old is not a contraindication for pacemaker surgery.

Key words: elderly, pacemaker, indication, death with dignity

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Introduction

From January 2005 to December 2012, we performed 300 surgeries to implant pacemakers. We applied a technique involving creation of a subpectoral pocket, cutdown of the cephalic vein, use of screw-in leads (SJM Tendril series) and use of a generator with an automatic output system\(^2\). We use tumescent local anesthesia (TLA) in order to eliminate wound pain during and after the surgery\(^2\). Our surgical technique enables us to perform a day surgery or surgery with 1 night admission\(^2\). In our hospital, cardiologists see and examine most of patients when they first come to the hospital. The need for surgery is determined according to the guidelines of the American Heart Association (AHA)\(^3\). When they determine that pacemaker surgery is necessary, they refer the patients to us. The cardiologists obtained informal agreement from the patients or their relatives for the surgery before referring them to us and inserted temporal pacing leads when necessary.

Of the 300 cases operated on, there were 12 cases in which the patients were over 90 years old when the surgery was performed. The backgrounds of all 12 patients are shown in Table 1. We explained the benefits and risks of the surgery to the patients or their families as we do with all patients. We also advised them to apply for financial assistance for their pacemaker surgery from the local government. Usually, the

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local government pays the medical fees for pacemaker surgery when an appropriate application is submitted. Although the cardiologists obtained informal agreement for surgery, we asked the patients or their families to sign a consent form for the surgery. After submission of the consent form, we scheduled the surgery for as soon as possible.

**Results**

All 12 patients submitted a completed consent form. We implanted a dual chamber generator with atrial and ventricular leads into all of the cases. Three patients had temporal pacing systems. Some relatives of a patient with cognitive dysfunction initially refused the surgery and asked us to pull out the temporal pacing leads. The family wanted death with dignity because they were afraid of further deterioration in physical condition after the surgery. We discussed the surgery with them. First, we told them that she would be able to walk on her own just like before admission after the surgery. Second, we told them that removal of the temporal pacing leads is illegal, as it is considered to be discontinuation of mechanical ventilation, and a surgeon could be arrested if they forced removal of a lead\(^9\). In the end, they agreed with the surgery and signed the consent form.

The postoperative courses of all the patients were uneventful, and all patients were discharged or went back to the cardiology ward. There were no problems with wounds. Ten of the 12 patients were discharged from the hospital after the surgery, and 1 patient died 1 month after the surgery from aspiration pneumonitis. The longest observation period was 6 years and 10 months, and this patient died from carcinoma of the oral cavity. Another patient died from liver cirrhosis 2 years and 9 month after the surgery. Both of the patients who died had maintained a good quality of life until their final admission. Three patients had cerebral infarction and were bedridden before the surgery. After the surgery, these 3 patients entered or went back to a nursing home. Five patients are doing well, and their qualities of life are as good as before the surgery. The observation periods for these 5 patients are between 2 months and 5.5 years.

**Discussion**

Should we have operated on all of the patients over 90 years old? In particular, the 3 cases with cerebral infarction before the surgery may arouse much controversy. They

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### Table 1  Condition of before / after the operation

| Operation date | Age | Sex | Diagnosis       | ADL/symptoms before the operation                                      | ADL/symptoms after the operation                                      |
|---------------|-----|-----|-----------------|-----------------------------------------------------------------------|-----------------------------------------------------------------------|
| 10/14/05      | 94  | F   | SSS             | Syncope a couple of times a week                                       | Died as a result of carcinoma of the oral cavity on 8/27/12, maintained good ADL |
| 6/18/07       | 90  | F   | III             | Good ADL                                                              | Good ADL                                                              |
| 5/20/08       | 90  | M   | III             | Dyspnea on minor exercise                                             | Died as a result of liver cirrhosis on 2/22/10, maintained good ADL   |
| 2/4/10        | 94  | M   | III             | Cerebral infarction before the surgery but kept good ADL               | Become bedridden and entered a nursing home                           |
| 8/25/10       | 90  | M   | III             | Bradycardia                                                           | Good ADL                                                              |
| 3/23/11       | 92  | F   | III             | Bedridden because of cerebral infarction                              | No change of ADL                                                     |
| 8/17/11       | 91  | F   | III             | Pedal edema                                                           | No recurrence of cerebral infarction                                   |
| 3/13/12       | 95  | M   | SSS             | Minor cerebral infarction                                             | No change of ADL                                                     |
| 6/27/12       | 92  | F   | III             | Bedridden because of cerebral infarction                              | No change of ADL                                                     |
| 10/25/12      | 95  | F   | SSS             | General malaise                                                       | No recurrence of cerebral infarction                                   |
| 10/31/12      | 90  | M   | III             | Difficulty in moving because of general bad malaise                   | Entered a nursing home                                               |
| 11/15/12      | 90  | F   | III             | Difficulty in ejecting sputum                                         | Moved to a nursing home for therapy for dysphagia                    |

ADL: activities of daily living, SSS: sick sinus syndrome, III: third-degree atrioventricular block.
could not speak and did not leave a living will. All 3 patients were already bedridden and required tube feeding before the surgery. The surgery was performed to prevent any further attacks of cerebral infarction. The families wanted the surgery, and the purpose of the surgery was achieved satisfactorily. One of the reasons for their positive attitudes with respect to the pacemaker surgery may be due to the financial assistance provided for surgical fees by their local government. When a patient with a new pacemaker submits an application for financial assistance and a medical certificate describing the pacemaker surgery performed, the local government pays all of medical fees for the surgery and issues a first class certificate of physically disabled condition without exception. The holder of a first class certificate receives first priority for welfare services although there are minor differences among local governments. Indeed, Japan receives first priority for welfare services although there are without exception. The holder of a first class certificate receives a first class certificate of physically disabled condition, and the government pays all of medical fees for the surgery and is issued a first class certificate of physically disabled condition without exception. The holder of a first class certificate receives first priority for welfare services although there are minor differences among local governments. Indeed, Japan has one of the highest rates of new implants per million in the world. Faced with an aging society and budgetary shortages with regard to the health/security insurance system, our cardial social security system may collapse. If that happens, the current positive attitude with regard to pacemaker surgery for elderly patients may disappear behind “death with dignity.” As long as our health/security insurance system is working, however, we do not hesitate surgery because of mental disorder (such as cognitive dysfunction) of the patients as we reported before.

When looking at the 3 cases of death after pacemaker surgery, none of the deaths were related to cardiovascular disease. As shown Table 1, one patient died due to oral cavity cancer almost 7 years after the surgery. She was admitted 4 months before death but was doing well until her final admission. The second case was from liver cirrhosis nearly 3 years after the surgery. He was also doing well until his final admission into a local hospital. The third case was from cancer metastasis shortly 1 month after the surgery. His lung condition was not the best at the time of surgery, and was finished within 50 min. His lung condition recovered slowly after he began performing breathing exercises but died of suffocation in the middle of the night. We believe that the first and second cases who died absolutely had indications for pacemaker surgery, although the third case may be controversial.

It is important to be very careful to prevent wound infection in pacemaker surgery, especially for elderly patients. Elderly patients have a thin subcutaneous fat layer. Elderly patients with cognitive dysfunction may touch the wound after the surgery and thus have greater risk of wound infection than those without cognitive dysfunction. Our routine surgical technique, which includes creation of a subpectoral pocket for the generator, is quite tolerant of wound infection. Use of screw-in leads and cutdown of the cephalic vein allows us no restrictions of the patients just after the surgery. Therefore, we do not hesitate to perform pacemaker surgery on elderly patients, even those with cognitive dysfunction.

Since the era of Hippocrates, there have been 4 well-known principles of physicians. First, respect the autonomous will of the patients. Second, never take any action to harm the patient. Third, bring the maximum benefit to the patient. Fourth, divide the benefit and load of medical care fairly. Even now, these principles are respected by physicians, but they have no legal authority in Japan. As shown in this report, we sometimes cannot confirm a patient’s will due to cerebral infarction or dysfunction of cognition. Is performance of pacemaker surgery maximum benefit to elderly patients who are bedridden and fed by tube? “Death with dignity” is seriously discussed in Japan, but there are currently no laws for this or specific provisions. If a doctor withdraws further care under the banner of “death with dignity”, they might be arrested for suspicion of homicide. We frequently encounter such elderly patients who require pacemaker surgery, including patients who are less than 90 years old (note that the mean age of our patients at surgery was 79.2 ± 9.8 years old).

In conclusion, as long as the current social security system survives in Japan, pacemaker surgery is not contraindicated for elderly patients over 90 years old. We have to consider, however, death with dignity and the social security system in this country without delay.

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