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Long-term Follow-up of Retained Functionless Pacing Leads

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NAKAZATO ET AL.: *Long-term Follow-up of Retained Functionless Pacing Leads.* To investigate the clinical outcome of retained functionless leads, we retrospectively studied patients with one or more abandoned pacing leads over the period from 1987 to 1999. We identified 28 patients with abandoned leads (15 males and 13 females with an average age of 70) out of 720 total patients. The number of retained leads was 1 in 23 patients, 2 in 4 patients, and 3 in 1 patient. The mean follow-up period after lead retention was 64.5 months (range 3-216 months). The reasons for retention were as follows: lead fracture (17), infection (4), lead entrapment (3), threshold rise (2), and mode change (2). The residual sites of leads were in the right atrium (12), the right ventricle (18), the tricuspid valve (2), and the coronary sinus (1). During the follow-up period, 26 patients had no adverse complications requiring lead extraction. Only 2 patients had an infection with septicemia, and one of them underwent surgical removal of the infected lead. Anti-coagulation treatment was administered in 11 patients (39%), but symptomatic venous thrombosis or pulmonary thromboembolism were not recognized clinically in any patients. We concluded that the incidence of adverse complications for abandoned pacing leads is very low. Most retained leads are safe in the long-term and do not require extraction unless an infection is present. (*J HK Coll Cardiol* 2001;9:139-143)

Prognosis, residual leads

摘要

本文研究長期曠置的無功能起搏電極的臨床影響。我們對1987至1999年間有一個或多個曠置的起搏電極的病人進行了回顧性研究。我們從720個病人中篩選出28個有曠置電極的病人（男性15人，女性13人，平均年齡70歲）。其中23個病人有一個曠置電極，4個病人有2個曠置電極，1個病人有3個曠置電極。電極曠置後的平均隨訪時間為64.5個月（3-216個月）。曠置原因如下：電極折斷（17），感染（4），電極內陷（3），閾值增高（2），以及模式改變（2）。電極殘留位點：右房（12），右室（18），三尖瓣（2），冠狀竇（1）。在隨訪期間，26個病人無需要電極拔除的不良反應。只有2個病人患敗血癥，其中一個病人外科手術取出感染電極，11個病人（39%）給予抗凝治療，但在所有的病人中均未發現有癥狀的靜脈血栓和肺栓塞。我們認為曠置電極的不良反應發生率非常低。大多數長期曠置電極是安全的，除非存在感染，否則無需拔出。

關鍵詞：預後 曠置電極

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Introduction

If functionless pacing leads are abandoned and retained in the heart, they can potentially cause venous thrombosis or additional infection.¹⁻⁷ However, it is still questionable whether all abandoned leads should be extracted or not, despite the improvements in lead extraction techniques.⁸⁻¹⁰ The purpose of this study is to investigate the long-term clinical outcome of pacing leads abandoned for various reasons.

Patients and Methods

We performed a retrospective study from 1987 to 1999, and we found 28 patients with abandoned leads out of 720 patients. They were 15 males and 13 females with the average age of 70. Mean follow-up period was 64.5 months ranging from 3 to 216 months. Anti-coagulation medications were given in 11 patients (39%). One patient received warfarin post mitral valve replacement. Three cases were treated with ticlopidine due to a history of cerebrovascular accidents, and the remaining 7 patients were given only aspirin. These medications were not given for the prevention of venous thrombosis itself. Patient characteristics are described on Table 1. We investigated the clinical outcome of retained leads and the incidence of adverse complications.

Results

Number of abandoned leads and total implanted leads

The distribution of abandoned leads and total implanted leads for these 28 patients are shown in Figure 1. One lead was abandoned in 23 patients, 2 leads in 4 patients and 3 leads in 1 patient. In respect to the total number of implanted leads, two leads were implanted in 13 patients, 3 leads in 11 patients, 4 leads in 3 patients and 5 leads in 1 patient.

Retained site of abandoned leads

Figure 2 shows the sites of the abandoned leads. Eighteen leads were abandoned in the right ventricle, 13 leads in the right atrium, 2 leads in the tricuspid valve, and 1 lead in the coronary sinus.

Table 1. Clinical characteristics of patients with retained leads

Number of patients	28
Male / female	15 / 23
Age (years)	70±9.9 (range 47-87)
Follow-up period (months)	64.5 (range 3-216)
Anti-coagulation	11 (39%)
Warfarin	1
Ticlopidine	3
Aspirin	7

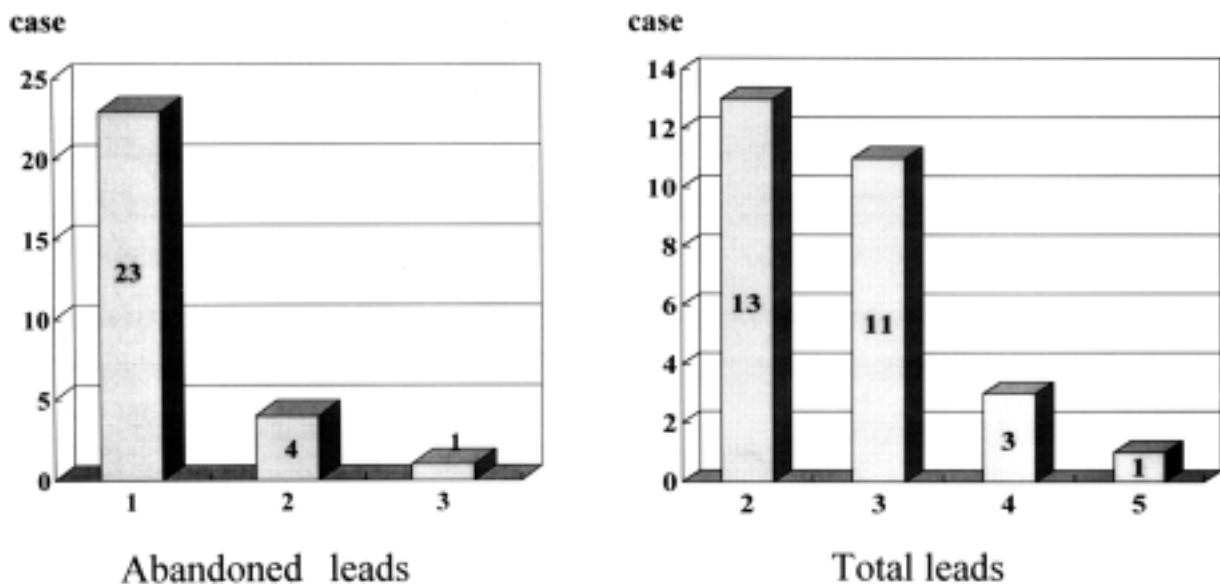


Figure 1. The number of abandoned leads and total implanted leads.

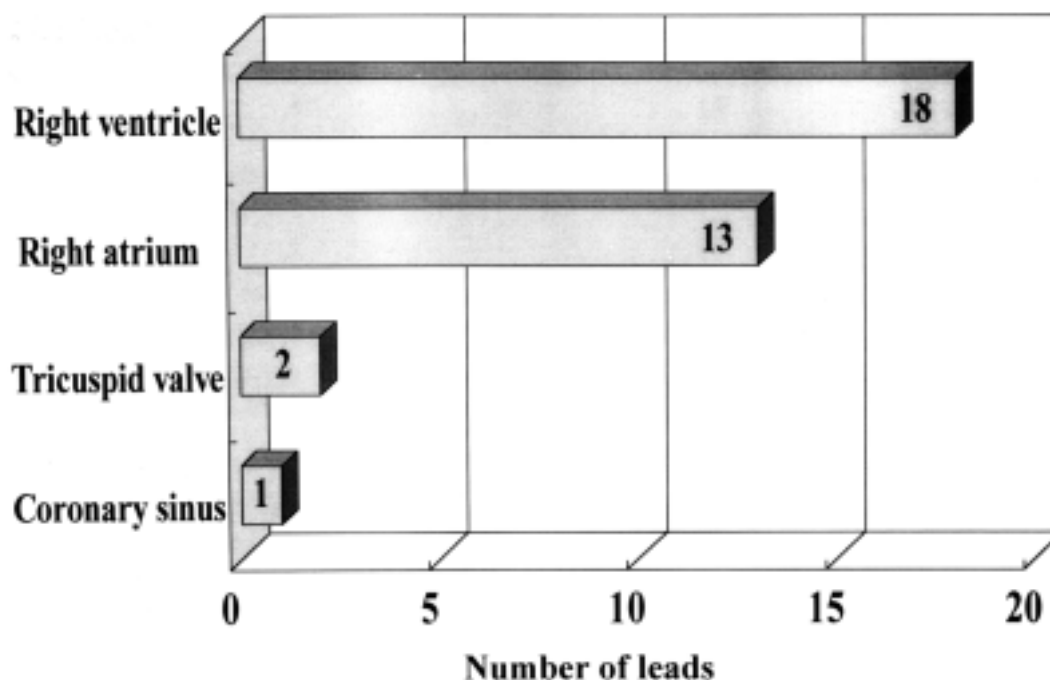


Figure 2. *The retained site of abandoned leads.*

Reasons for retention

Reasons for abandonment are indicated in Figure 3. The primary reason was lead fracture, which was seen in 17 patients (61%). Infection was the cause of lead abandonment in 4 patients (14%). Other causes were lead entrapment in 3 patients (2 in tricuspid valve and 1 in the right atrium), threshold rise in 2 patients, and the change of pacing mode in 2 patients.

Adverse complications

Clinical results of complications are shown in Figure 4. During the follow-up period, 2 patients had lead infection with septicemia. One patient had 2 implanted leads and required surgical removal of the entire infected lead system. The other patient had 3 leads, 1 abandoned ventricular lead and 2 functional atrial and ventricular leads, but was successfully treated by medical therapy.

In the remaining 26 patients, none had symptomatic venous thrombosis including pulmonary thromboembolism independent of anticoagulation medication.

Discussion

Amazing recent advances in lead extraction techniques and technology have led to attempts to remove many functionless pacing leads.⁹⁻¹¹ Driving these advances has been the concept that if abandoned leads were left in the heart, they would have the potential to cause thromboembolism or additional infection.¹⁻⁷ However, lead extraction has always presented potentially critical adverse complications such as cardiac perforation or massive bleeding.¹¹ Moreover, several studies have revealed that abandoned leads do not necessarily need to be extracted unless infection is present.¹²⁻¹⁴ Therefore, the long-term outcomes of retained leads are still controversial.⁸

Suga et al¹³ found in a study of 1,207 leads that 611 were functionless and 531 had been abandoned. Since pacemaker-related complications were seen in only 24 patients (5.5%), they concluded that the adverse outcome of abandoned pacing leads is small. However, they emphasized that patients with a large number of abandoned leads should be carefully observed because

FOLLOW-UP OF RETAINED PACING LEADS

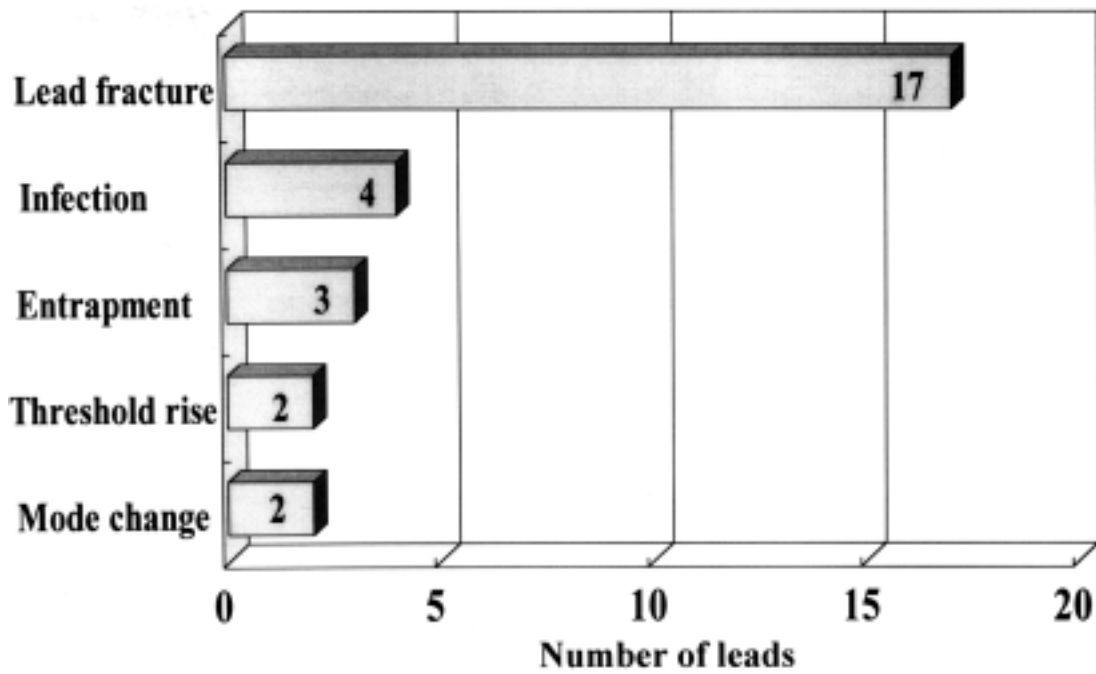


Figure 3. The reasons for retention.

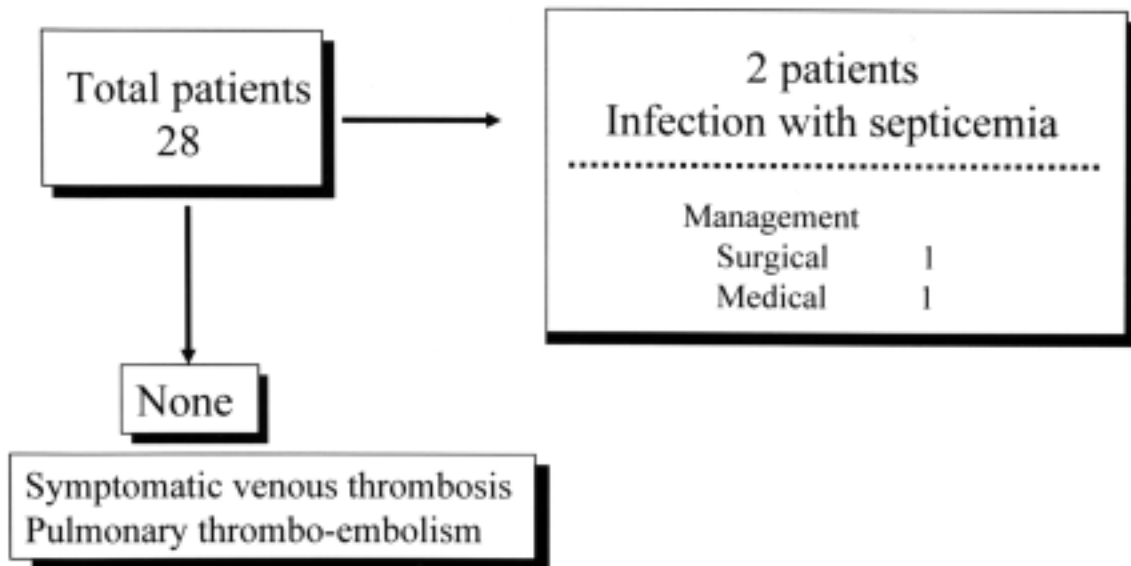


Figure 4. Clinical outcome of adverse complications.

of the greater possibility of adverse complications. DeCock et al¹⁴ also reported that the presence of multiple (≥ 3) non-infected leads was not associated with thromboembolic events during a follow-up period of 7.4 ± 2.2 years. No differences were found between the control and study groups with or without anti-coagulation medication.

In the present study, we found 28 patients with abandoned leads. While the cause of abandonment varied, lead fracture was the most common reason. For these 28 cases, most leads were retained unless infection was present. Nevertheless, multiple leads in the heart always give rise to the constant fear of thromboembolism.¹⁻³ Anticoagulation is sometimes recommended for preventing pulmonary thrombosis; however, no case was found with obvious venous thrombosis or pulmonary thromboembolism in this study. Asymptomatic thrombosis could not be sufficiently evaluated, but even in patients who had been confirmed for ipsilateral subclavian vein occlusion, symptomatic venous complications were not observed because of the development of collateral circulation. Only 2 patients suffer from general infection with septicemia. One of them required removal of the entire lead system by surgery. Although the other patient was able to be treated only with medication, abandoned lead removal via surgical therapy is recommended if infection is present. In conclusion, the incidence of adverse complications for abandoned pacing leads is very low, and most abandoned leads are safe over the long-term and do not always need to be extracted unless an infection is present.

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