



ELSEVIER

Contents lists available at [ScienceDirect](http://ScienceDirect.com)

Journal of Arrhythmia

journal homepage: www.elsevier.com/locate/joa

Case Report

Right-sided infective endocarditis as a potentially fatal complication in patients with long-term refractory severe bradyarrhythmia after cervical spinal cord injury: A case report



Naoki Miura^a, Hideaki Suzuki^{b,c,*}, Shota Maesawa^c, Tomoaki Koakutsu^c,
Yasuharu Matsumoto^b, Koji Fukuda^b, Yutaka Kagaya^a, Shigeki Kushimoto^c,
Hiroaki Shimokawa^b

^a Graduate Medical Education Center, Tohoku University Hospital, Sendai, Japan

^b Department of Cardiovascular Medicine, Tohoku University Graduate School of Medicine, Sendai, Japan

^c Division of Emergency Medicine and Critical Care, Tohoku University Graduate School of Medicine, Sendai, Japan

ARTICLE INFO

Article history:

Received 20 August 2014

Received in revised form

23 October 2014

Accepted 4 November 2014

Available online 6 December 2014

Keywords:

Cardiac arrest

Bradyarrhythmia

Cardiac pacing

Spinal cord injury

Infective endocarditis

ABSTRACT

Bradyarrhythmia is usually a spontaneously subsiding complication of cervical spinal cord injury. However, in severe cases, it can lead to cardiac arrest. We report a case of cervical spinal cord injury, complicated by right-sided infective endocarditis after the placement of a temporary pacing catheter in the right ventricle for severe bradyarrhythmia that led to cardiac arrest. Although the patient's condition was successfully treated by pacing catheter removal and pharmacological therapy, right-sided infective endocarditis would be a fatal complication in cases of cervical spinal cord injury where cardiac pacing is required for long-term refractory severe bradyarrhythmia.

© 2014 Japanese Heart Rhythm Society. Published by Elsevier B.V. All rights reserved.

1. Introduction

Bradyarrhythmia is usually a temporary complication of cervical spinal cord injury. In such cases, although the initial treatment involves pharmacological therapy and/or temporary cardiac pacing [1], for long-term refractory severe bradyarrhythmia, permanent cardiac pacemaker implantation may be considered [2]. We report a challenging case of cervical spinal cord injury, complicated by right-sided infective endocarditis after placement of a temporary pacing catheter in the right ventricle for severe bradyarrhythmia that led to cardiac arrest.

2. Case report

A 57-year-old man was transferred to our hospital for treatment of cervical spinal cord injury (Fig. 1A). He underwent spinal fusion surgery on day 3 of hospitalization. The patient was

quadriplegic, ventilator dependent and had lost complete sensation from the neck down. Cardiac pauses lasting for 3–5 s appeared on day 11 of hospitalization and cardiac arrest occurred suddenly on day 22 (Fig. 1B). Return of spontaneous circulation was achieved after chest compressions. A temporary pacing catheter was inserted into the right ventricle, and intravenous dopamine and oral theophylline were administered. The patient developed a fever on day 27; repeated blood cultures obtained on day 31 were both positive for methicillin-resistant *Staphylococcus aureus*. Echocardiography on day 33 showed a vegetation in the right ventricle (Fig. 2), confirming a diagnosis of right-sided infective endocarditis. The pacing catheter was removed immediately, and daptomycin was administered. Repeated blood cultures on day 36 were negative. Because of intractable diarrhea, daptomycin treatment was discontinued, and treatment with linezolid was initiated and continued until day 85. Dopamine infusion was discontinued on day 44, and intravenous isoproterenol treatment was initiated; on day 84, oral isoproterenol was replaced with intravenous isoproterenol. As no relapse of infective endocarditis or severe episode of bradyarrhythmia was noted after day 23, the patient was transferred to another hospital for rehabilitation 104 days after admission.

* Correspondence to: Department of Cardiovascular Medicine, Tohoku University Graduate School of Medicine, 1-1 Seiryō, Aoba, Sendai 980-6574, Japan.
Tel.: +81 227177153; fax: +81 227177156.

E-mail address: hd.suzuki.1870031@cardio.med.tohoku.ac.jp (H. Suzuki).

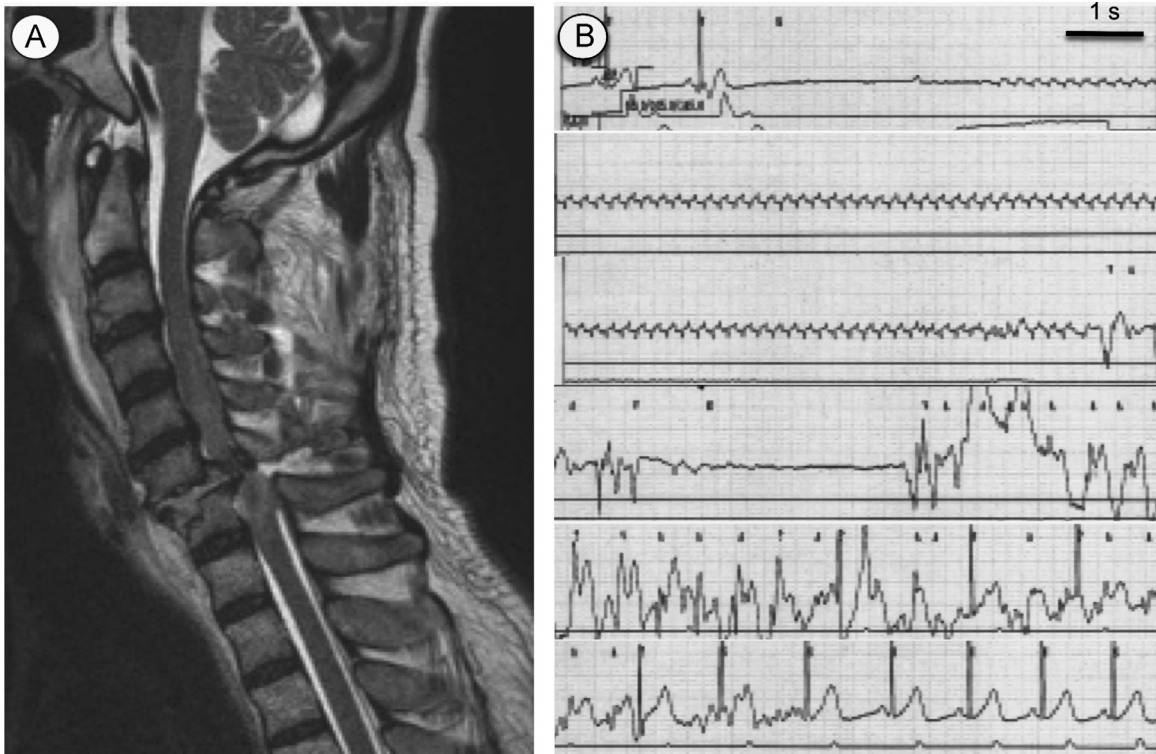


Fig. 1. Findings on a magnetic resonance image of the cervical spinal cord on day 2 of hospitalization (A) and findings of electrocardiographic monitoring during cardiac arrest (B).

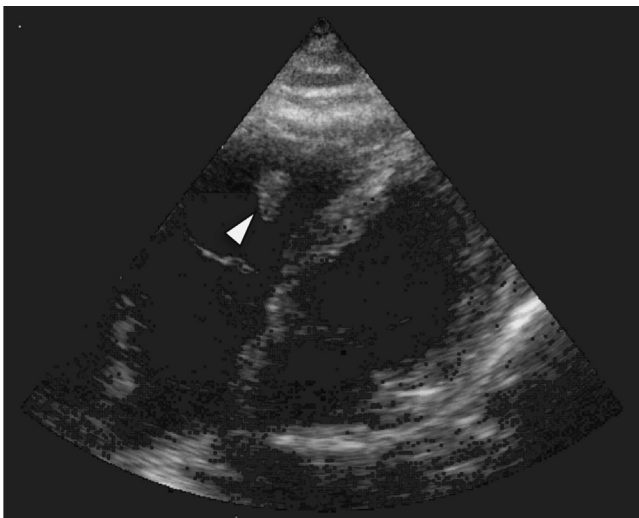


Fig. 2. Echocardiogram taken on day 33 of hospitalization. The white triangle indicates a vegetation.

3. Discussion

This case describes right-sided infective endocarditis during temporary cardiac pacing for severe bradyarrhythmia resulting in cardiac arrest. Several mechanisms involving immunodeficiency in acute injury of central nervous system, including spinal cord injury, have been proposed [3]. However, this condition successfully resolved after the pacing catheter was removed and pharmacological therapy was administered without recurrences of bradyarrhythmia or infection. Bradyarrhythmia can be explained by the occurrences of unopposed vagal reflex due to damage of the sympathetic trunk, which attenuates excitatory inputs from the sympathetic motor center in the medulla to the intact sympathetic preganglionic neurons innervating the heart

[1,2,4]. Cardiac arrest occurred in 16% of severe cervical spinal cord injuries (Frankel classification grade; A/B) versus in 0% of less severe cervical spinal cord injuries (C/D) [1]. Bradyarrhythmia persisted but spontaneously resolved within 6 weeks [1]; this may be associated with histologically observed atrophic changes in sympathetic preganglionic neurons in the acute phase of spinal cord injury that recover in the chronic phase [3]. Therefore, most cases of bradyarrhythmia due to cervical spinal cord injury can be treated with pharmacological therapy; however, temporary pacing may be necessary for the acute management of severe bradyarrhythmia as in this case.

Furthermore, permanent cardiac pacemaker implantation may be required when severe bradyarrhythmia recurs for a long period. Sympathetic preganglionic neurons innervating the heart may be damaged beyond recovery in such cases [2]. Since placement of new leads immediately after infected lead removal has been identified as a risk factor for subsequent device infections [5], epicardial pacemaker implantation may be considered if the leads had been inserted to avoid fatality from refractory severe bradyarrhythmia due to cervical spinal cord injury.

In conclusion, right-sided infective endocarditis would be a fatal complication in cervical spinal cord injury cases, where cardiac pacing is required for long-term refractory severe bradyarrhythmia.

Conflict of interest

None declared.

References

- [1] Lehmann KG, Lane JG, Piepmeier JM, et al. Cardiovascular abnormalities accompanying acute spinal cord injury in humans: incidence, time course and severity. *J Am Coll Cardiol* 1987;10:46–52.
- [2] Sanghvi AV, Chhabra HS, Nigam V, et al. Permanent cardiac pacemaker for cardiac arrest following cervico-dorsal spinal injury. *Eur Spine J* 2009;18:254–257.

- [3] Meisel C, Schwab JM, Prass K, et al. Central nervous system injury-induced immune deficiency syndrome. *Nat Rev Neurosci* 2005;6:775–86.
- [4] Teasell RW, Arnold JM, Krassioukov A, et al. Cardiovascular consequences of loss of supraspinal control of the sympathetic nervous system after spinal cord injury. *Arch Phys Med Rehabil* 2000;81:506–16.
- [5] Sohail MR, Uslan DZ, Khan AH, et al. Management and outcome of permanent pacemaker and implantable cardioverter-defibrillator infections. *J Am Coll Cardiol* 2007;49:1851–9.