



## Case report

## Tooth extraction in a patient after autologous skeletal myoblast sheet transplantation for severe dilated cardiomyopathy



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## HIGHLIGHTS

- Local disinfection with 3% hydrogen peroxide is useful to prevent oral wound infection.
- American Heart Association recommend the antimicrobial prophylaxis before dental surgery for high-risk of infective endocarditis.
- Perioperative continuous anticoagulant therapy is needed to support and ensure the success of regenerative heart therapy.

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## ABSTRACT

The authors describe the first case of tooth extraction in a patient treated with autologous skeletal myocardial sheet transplantation for severe dilated cardiomyopathy. This condition is associated with significant morbidity and mortality that may have identifiable causes or may be idiopathic or inherited. In addition to local disinfection, antimicrobial prophylaxis and continuous anticoagulant therapy during the perioperative period of tooth extraction were needed to prevent infective endocarditis and ensure the success of regenerative therapy of the heart.

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## 1. Introduction

Over the past 20 years, patients with severe chronic heart failure (HF) who do not respond well to standard drug therapies still have poor outcomes [1,2]. Recently, the autologous skeletal myoblasts sheet (ASMS) production technique was developed, and ASMS transplantation is a new therapeutic strategy that has improved the outcomes of severe chronic HF [1–3]. Now, clinical trials of ASMS transplantation for several cases of severe HF have been performed [4]. On the other hand, the American Heart Association (AHA) recommends antimicrobial prophylaxis before dental procedures in patients with a prosthetic heart valve or those who have undergone heart valve repair with prosthetic material, have a history of endocarditis, and have certain congenital heart defects to prevent

infective endocarditis (IE), a life-threatening disease, after tooth extraction [5]. However, there is no mention about the IE prevention in ASMS transplantation patients.

In this article, we describe a first case report of mandibular second molar extraction after antimicrobial prophylaxis in a patient who underwent ASMS transplantation for severe dilated cardiomyopathy and had a good postsurgical course.

## 2. Case report

A 69-year-old man visited our department because he required right mandibular second molar extraction due to deep caries (Fig. 1). We heard that ASMS transplantation had been performed for his severe dilated cardiomyopathy at Osaka University Hospital. The patient was transplanted a permanent pacemaker in situ at other hospital about 3 years ago. The patient also had undergone biological mitral valve replacement and ASMS transplantation 2.5 and 1.5 years ago, respectively. Although the left ventricular ejection fraction was 25%, the present status of the disease was stable

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**Fig. 1.** Preoperative panoramic radiograph. Only the roots of the right mandibular second molar remain.

with myocardial regeneration due to ASMS transplantation. The patient also had chronic kidney failure, diabetes mellitus (glycated hemoglobin level = 5.8%), paroxysmal atrial fibrillation, and ventricular tachycardia. Cautionary notes from the cardiovascular surgeon were to continue anticoagulant therapy during the perioperative period (warfarin, 1.5 mg/d), and to avoid an excessive infusion volume. In addition, amiodarone (200 mg/d), spironolactone (25 mg/d), furosemide (20 mg/d), pimobendan (5 mg/d), carvedilol (10 mg/d), and enalapril maleate (1.25 mg/d) were administered. From the viewpoint of the AHA recommendation, we considered that antimicrobial prophylaxis should be performed to prevent IE, and the cardiovascular surgeon advocated this decision. We decided to operate under hospitalized management with antimicrobial prophylaxis and continuous anticoagulant therapy. Preoperative laboratory values were as follows: prothrombin (PT) time, 47.4 sec; PT-international normalized ratio, 2.03; activated partial thromboplastin time, 38.62 sec; blood urea nitrogen, 21 mg/dL; creatinine, 1.44 mg/dL; and estimated glomerular filtration rate, 36 mL/min. One hour before extraction, we administered amoxicillin (2000 mg) in accordance with the AHA guidelines [3]. Tooth extraction was performed under electrocardiography and saturation monitoring. We used citanest-octapressin with 3% felypressin for local anesthesia. After the extraction, the socket was closed by suturing with 3-0 silk string, and adequate coagulation was confirmed. This strict local hemostatic procedure made us not to bridge with heparin instead of continuing warfarin. Postoperatively, amoxicillin (750 mg/d) was administered for an additional 3 days. The next day after the extraction, we disinfected and oxygenized the gingival wound with 3% hydrogen peroxide, as Marshall et al. recommended [6], and kept his oral hygiene well by perioperative oral care. The patient's perioperative course was good. Three months after the extraction, socket healing was good, and there was no evidence of local infection. Laboratory data were not significantly changed before and after extraction.

### 3. Discussion

This patient has numerous risk factors and have had multiple interventions. It is very difficult to confidently discuss cause and effect of ASMS transplantation alone. Sawa, et al. evaluated the myocardial regeneration due to ASMS transplantation by the several examinations included vital signs, body weight, laboratory tests, chest radiography, cardiac computed tomography (CT), echocardiography, resting standard 12-lead ECG, 24-hour Holter ECG monitoring, 6-minute walk test, cardiopulmonary exercise test, and gated equilibrium blood-pool scintigraphy. Moreover, myocardial perfusion single-photon emission CT and coronary angiography were performed for eligibility screening [3]. The

present patient is followed with these periodic total examinations, reveals the good clinical course. We had to control at least IE prevention, because there are no specific guidelines regarding the patients treated by ASMS transplantation to date and it is unknown how the ASMS transplantation would affect perioperative management.

IE is a type of distant site infection, implicating oral bacteria. The onset of IE may be fatal in patients with a prosthetic heart valve or those who have undergone heart valve repair with prosthetic material, those with a history of endocarditis, and those with certain congenital heart defects. The present patient underwent mitral valve replacement with a biological valve, which is recommended antimicrobial prophylaxis in dental surgery by the AHA. In addition, local disinfection with 3% hydrogen peroxide may be effective for preventing IE [6]. Cunha et al. reported on the importance of antibiotic prophylaxis after a dental procedure even in a patient with low-risk cardiac lesions [7]. Mougéot et al. also introduced a patient in whom poor oral hygiene caused IE at the same rate as tooth extraction [8]. Taken together, at least appropriate antibiotic prophylaxis and improvement of oral hygiene are effective strategies for preventing IE in the heart transplanted with ASMS. Moreover, for severe dilated cardiomyopathy and paroxysmal arterial fibrillation, continuous anticoagulant therapy is needed when dental surgery was performed. Although the degree of surgical invasion in the present case was mild, these procedures were needed during the perioperative period to prevent IE and ensure the success of regenerative therapy of the heart.

### Ethical approval

This study followed the Declaration of Helsinki on medical protocol and ethics and the regional Ethical Review Board of Nagasaki University approved the study. Appropriate consents, permissions, and releases of this case were obtained from the patient.

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none.

### Author contribution

Kohei Okuyama established study design and wrote paper, Yuki Sakamoto, Tomofumi Naruse, Souichi Yanamoto, and Masahiro Umeda related and advised the treatment of this case.

### Conflicts of interest

none.

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