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Case Report

Radiofrequency catheter ablation of supraventricular tachycardia in patient with deep brain stimulator

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ABSTRACT

Safety of radiofrequency ablation in patients with deep brain stimulation systems is not known. We report a patient with a deep brain stimulator who has undergone radiofrequency ablation.

1. Introduction

Deep brain stimulation (DBS) is a one of the emerging treatments for Parkinson's' disease [1,2]. DBS utilizes two intracranial leads and a pulse generator that is usually placed inside a thoracic pocket – all components that are potentially sensitive to electromagnetic interference (EMI). Transient, permanent dysfunction or, in extreme cases, neurological damage may occur as a of EMI [3] Currently there is a scarcity of evidence regarding safety of radiofrequency (Rf) ablation in patients with DBS.

Here we report the case of a 64-year-old patient with bilateral DBS for Parkinson's disease who underwent unipolar Rf ablation with no acute or chronic adverse outcomes.

2. Case-report

A 64-year-old woman with Parkinson's disease had received bilateral DBS Vercise Genus (Boston Scientific, Marlborough, Massachusetts, USA). The patient had recurrent symptomatic paroxysmal supraventricular tachycardia episodes which were not responsive to beta blockade and calcium channel blockers. A joint clinical decision was made to perform Rf ablation.

On the day of the EP study procedure, her DBS was interrogated and found to be working properly. The baseline lead impedances were measured as shown in Supplemental Fig. 1A. The device was switched off immediately before the procedure. Aiming to go as remotely as possible from the DBS generator, Rf ground patch was placed on patients' left thigh. During the EP study, a dual atrioventricular nodal physiology was observed, however, tachycardia could not be induced. Nevertheless, since clinical tachycardia was consistent with atrioventricular nodal reentrant tachycardia due to short VA interval, slow pathway ablation was performed with Marinr (Medtronic, Minneapolis, Minnesota, USA) Rf catheter in the temperature-control mode (limited to 55 °C) for 180 seconds in total (Fig. 1).

Following the procedure, DBS generator interrogation revealed normal function with lead impedance values similar to the pre-procedural interrogation (Supplemental Fig. 1). DBS was switched on and patient was discharged on the next without any adverse consequences.

3. Discussion

With aging population, DBS implantation has become a common treatment modality for a variety of neurologic diseases. Due to increasing prevalence, DBS may become increasingly present in elderly patients scheduled to undergo Rf ablation for tachycardias. EMI during Rf ablation may potentially damage DBS leads and

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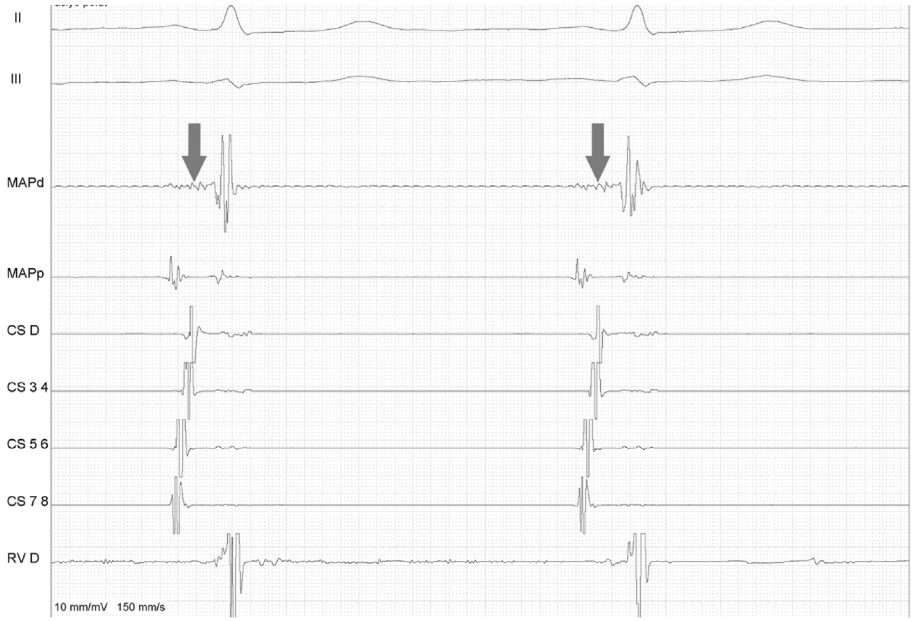

Fig. 1. Surface and intracardiac tracing depicting slow pathway potential (arrows). From top to bottom present are, surface DII and DIII recording, ablation catheter showing slow pathway potential (Mapd and Mapd), a decapolar catheter placed inside the coronary sinus (CSd to CS 7–8) and a tracing from right ventricular apex (RVd).

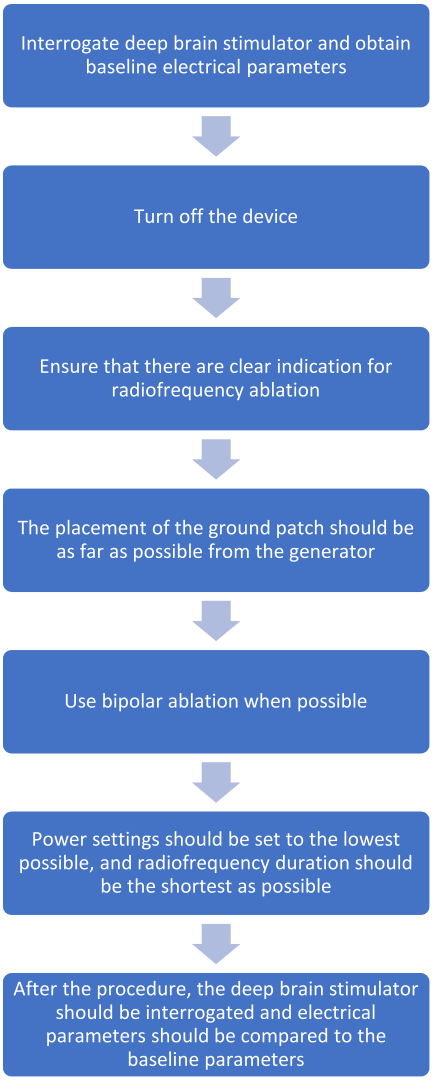

Fig. 2. A peri-procedural algorithm to increase safety and prevent adverse event on patients with deep brain stimulators scheduled to undergo radiofrequency ablation.

generator; furthermore, neurological damage may ensue due to convective heating [3]. Additionally, EMI may lead to inadvertent switch between 'on' and 'off' state that may lead to inhibition of all DBS functions due to a safety feature of the generator software [3]. On the other hand, EMI on cardiac implantable electronic devices may lead to inhibition of pacing functions which can be prevented by programing asynchronous pacing, or inappropriate defibrillation therapies due to noise sensing.

To best our knowledge, this is the fourth case in the literature in which Rf ablation was performed in DBS patients. None of the prior studies have reported any damage to the DBS system or patient. Kanagaratnam et al. performed RFA with programming the DBS from a unipolar to a bipolar mode [4]. Gunawardene et al. choose cryoablation [5], Grabie et al. performed RFA without turning the device off [6]. The security points for our case are as follows (Fig. 2).

- Monitoring the DBS parameters, before and after the procedure
- Temporarily turning off the device, under manufacturer support, as Parkinson disease is not life-threatening
- Placement the ground patch on the left leg of the patient,
- Choosing appropriate ablation targets, with as low as reasonably achievable Rf application duration.

4. Conclusion

We have reported that Rf ablation may be performed successfully for treatment of arrhythmias in DBS patients with no adverse effects.

Consent for publication

The patient was informed about the study procedure and provided written consent to participate.

Declaration of competing interest

We report no conflict of interest.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ipej.2023.01.004.

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