Case Report

Electroanatomic Mapping and Intracardiac Echocardiography-Guided Approach for Left-Bundle Branch Area Pacing With Zero Fluoroscopy

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ABSTRACT

An 81-year-old man with second-degree atrioventricular block was admitted to our centre for pacemaker implantation. Electroanatomic mapping and intracardiac echocardiography-guided left-bundle branch area pacing was performed, entirely without fluoroscopy. It is the first report to describe intracardiac echocardiography for guiding sheath movements into the heart. In conclusion, the combined use of intracardiac echocardiography and intracardiac navigation system allows us to perform left-bundle branch pacing without fluoroscopy.

RÉSUMÉ

Un homme de 81 ans présentant un bloc auriculoventriculaire du second degré a été hospitalisé dans notre centre en vue de l’implantation d’un stimulateur cardiaque. On a effectué une cartographie électro-anatomique et une stimulation de la branche gauche guidée par échocardiographie intracardiaque, entièrement sans fluoroscopie. C’est la première fois qu’on décrit l’utilisation de l’échocardiographie intracardiaque pour guider les mouvements de la gaine dans le cœur. En conclusion, l’utilisation conjointe de l’échocardiographie intracardiaque et d’un système de navigation intracardiaque nous permet d’effectuer une stimulation de la branche gauche sans fluoroscopie.

Case Report

An 81-year-old man with a history of high blood pressure and type 2 diabetes mellitus was admitted to our centre for pacemaker implantation because of syncope and second-degree atrioventricular block with narrow QRS.

We performed the procedure with an EnSite NavX navigation system (Abbott Inc, St Paul, MN) supported by intracardiac echocardiography (ICE). Three punctures, guided by ultrasound, were made in the left axillary and right femoral veins.

With a 52 cm lead (Tendril STS; Abbott Inc) connected to the navigator and the digital recording system (Bard Electrophysiology Lab System, Lowell, MA), a right atrium and right ventricle electroanatomic map were made without the use of any catheter or steerable sheath. A reshaped internal guidewire was used to facilitate lead movements. A total of 19,431 points were needed to create the electroanatomic map.

The point where the His electrogram was recorded was marked on the 3D anatomy (Fig. 1B1-2). Another lumenless lead (SelectSecure 3830; Medtronic, Minneapolis, MN) was used to facilitate lead movements. A total of 19,431 points were needed to create the electroanatomic map.

The sheath was removed without any incident and without the use of fluoroscopy. No left-bundle potential was registered.

Discussion

In our case, left-bundle branch area pacing (LBBAP) maintained narrow paced QRS with lower capture thresholds than expected with His-bundle pacing. Right-bundle morphology was obtained in the V1 lead with < 120 ms width; this finding may be due to retrograde activation of the right bundle or connections between both bundles. To achieve zero fluoroscopy in LBBAP, we combined an...
Figure 1. Intra- and postprocedure imaging tests. (A) ICE: sheath passing through the tricuspid valve oriented perpendicular to the IVS (orange arrow). (B) Electroanatomic map with the mark of the His electrogram (green ball) and position of the lead before penetration of the IVS: (B1) LAO; (B2) RAO; (B3) “W” morphology in the V1 lead. (C) Chest radiograph with normal location of leads (black arrow pointing the LBBAP lead). (D) V1-V3 lead ECG. Sinus rhythm with LBBAP. ECG, electrocardiogram; ICE, intracardiac echocardiography; IVS, interventricular septum; LAO, left anterior oblique projection; LBBAP, left-bundle branch area pacing; RAO, right anterior oblique projection.
intracardiac navigation system with ICE to monitor movements of the leads. Although some publications have demonstrated feasibility of navigator use in His-bundle pacing⁴ and LBBAP with minimal fluoroscopy, it has not been described entirely without fluoroscopy. Intracardiac echocardiography has already been used in conventional pacemaker implantation.⁵ This case is the first to describe its use to visualize correct sheath orientation in the interven-tricular septum. In conclusion, we have shown the feasibility of the zero-fluoroscopy approach. This is especially useful in young people and pregnant women in whom the lowest possible dose of radiation is strongly recommended.

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**Novel Teaching Points**
- Left-bundle branch pacing maintains physiological ventricular activation with stable low capture thresholds.
- The combined use of ICE and intracardiac navigation system is safe and feasible allowing the lowest (even zero) fluoroscopy use.