3. McClelland JH, Wang X, Beckman KJ, Hazlitt HA, Prior MI, Nakagawa H, et al. Radiofrequency catheter ablation of right atriofascicular (Mahaim) accessory pathways guided by accessory pathway activation potentials. Circulation 1994; 89: 2655-66. [CrossRef]
4. Bohora S, Dora SK, Namboodiri N, Valaparambil A, Tharakan J. Electrophysiology study and radiofrequency catheter ablation of atriofascicular tracts with decremental properties (Mahaim fibre) at the tricuspid annulus: Europace 2008; 10: 1428-33. [CrossRef]
5. Parvez B, Pathak V, Schubert CM, Wood M. Comparison of lesion sizes produced by cryoablation and open irrigation radiofrequency ablation catheters: J Cardiovasc Electrophysiol 2008; 19: 528-34. [CrossRef]
6. Silver ES, Silva JN, Ceresnak SR, Chiesa NA, Rhee EK, Dubin AM, et al. Cryoablation with an 8-mm tip catheter for pediatric atrioventricular nodal reentrant tachycardia is safe and efficacious with a low incidence of recurrence: Pacing Clin Electrophysiol 2010; 33: 681-6. [CrossRef]

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Near zero fluoroscopy radiation exposure during successful catheter ablation of atrial tachycardia from the non-coronary aortic cusp using 3-dimentional electroanatomic mapping system

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Introduction

Atrial tachycardia (AT) rarely originates from the paraHisian region (1). Catheter ablation of paraHisian AT carries a substantial risk of atrioventricular (AV) block. Cryoablation offers a safer ablation strategy for these patients (2). There is a small risk of AV block with cryoablation. Ablation of paraHisian AT from the non-coronary aortic cusp (NCC) is an option in these patients. We report a patient with paraHisian AT that was successfully ablated from the NCC by 3-Dimentional (3-D) mapping system with using near zero fluoroscopy (NZF).

Case Report

A 62-year-old woman, was referred to our institution due to symptomatic supraventricular tachycardia. She had undergone paraHisian AT ablation from right atrium at another center one year ago. She had recurrence of AT after 3 months. At the time of her admission, electrocardiogram (ECG) during tachycardia revealed AT. Echocardiogram showed mild mitral regurgitation and normal left ventricular function. An electrophysiological (EP) study was undertaken. Multi-electrode catheters were positioned into His bundle region and coronary sinus and an electroanatomic mapping system was used (EnSite NavX® system, St. Jude Medical, Inc., St. Paul, MN, USA). His region was tagged on the 3-D anatomy of the right atrium (RA). Supraventricular tachycardia was induced by programmed atrial stimulation. AT was diagnosed by using the EP maneuvers. The tachycardia was mapped by using the En-site system and the earliest activation was found at the His region. Cryoablation catheter was advanced to the His region. Then, cryoablation could not be performed due to transient AV block during cryomapping of the tachycardia at the point of earliest activation. There was AV block even during manipulation of the cryoablation catheter. Then, 3-D anatomy of the aorta and aortic cusps were constructed (Fig. 1). The earliest local activation was detected within the NCC. Here, local atrial activity preceded onset of the p wave by 53 msec (Fig. 2). Location of the radiofrequency (RF) catheter was confirmed using fluoroscopy and electro mapping system. A single application of RF energy (power: 30 Watts, maximum temperature 55 degree) completely terminated the tachycardia. Total fluoroscopy time was 1 min 38 seconds. The patient was asymptomatic, ECG and rhythm Holter recordings showed no recurrence of AT.

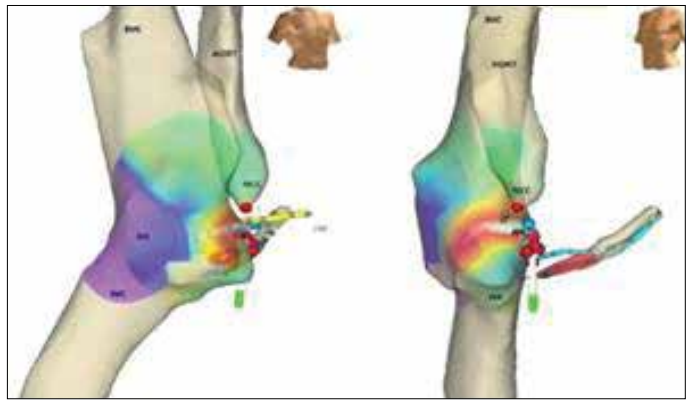

Figure 1. 3-D geometry of aorta was constructed by En-Site system
HB - his bundle; IVC - inferior vena cava; NCC - non-coronary cusp; RA - right atrium; SVC - superior vena cava

Figure 2. Local atrial activity preceded onset of the P wave by 53 msec

Discussion

Focal ATs may originate in the right atrium around crista terminalis, coronary sinus, paraHisian region, tricuspid annulus and right atrial appendage. In left atrium, they primarily originate from pulmonary veins, mitral annulus, left atrial appendage and left septum (3). ATs originating

from paraHisian region are rare (1). Origin of AT is an important factor for the success and the complication of ablation procedures.

Ablation near His region has potential risk of damage of AV nodal conduction system. For this reason, cryoablation is preferred over RF ablation. Cryoablation has the advantage of cryomapping and if there is no AV block during cryomapping then it is generally safe to freeze to lower temperatures until permanent ablation occurs. In our case, we have seen AV block during cryomapping period. The superior part of the interatrial septum has a close proximity to the NCC (4). Thus, ablation inside the NCC may terminate and cure ATs arising from this region. Actually, in certain patients, NCC offers the only available option for successful ablation.

Operator should be sure about the position of ablation catheter, because of the damage to aorta, aortic valve and coronary arteries during ablation in the NCC. Fluoroscopy and electro-anatomic mapping system may be used for this purpose. Also, 3-D mapping system facilitates ablation, reduces radiation exposure and fluoroscopic time (5, 6). This system allows reconstruction of geometry and provides a high resolution map of the region with earliest activation (7, 8). Also, if available intracardiac echocardiography may be helpful (9).

Ouyang et al. (10) performed RF ablation from NCC in 9 patients. Six of their patients had a history of failed ablation attempt. They reported that, all patients had successful ablation from the NCC. Our patient had RF ablation from the right atrium one year ago and had recurrence after 3 months.

Conclusion

We have described a successful catheter ablation procedure of focal AT originating from the NCC by using 3-D cardiac mapping system. Furthermore, very brief fluoroscopic use and low radiation exposure during the ablation procedure from the NCC is possible by using the electro-anatomic mapping system.

References

1. Poutiainen AM, Koistinen MJ, Airaksinen KE, Hartikainen EK, Kettunen RV, Karjalainen JE, et al. Prevalence and natural course of ectopic atrial tachycardia. Eur Heart J 1999; 20: 694-700. [CrossRef]
2. Pandozi C, Galeazzi M, Lavalle C, Ficili S, Russo M, Santini M. Navx-guided Cryoablation of Atrial Tachycardia Inside the Left Atrial Appendage. Indian Pacing Electrophysiol J 2011; 10: 556-61.
3. Roberts-Thomson KC, Kistler PM, Kalman JM, Atrial tachycardia: mechanisms, diagnosis, and management. Curr Probl Cardiol 2005; 30: 529-73. [CrossRef]
4. Raatikainen MJ, Huikuri HV. Successful catheter ablation of focal atrial tachycardia from the non-coronary aortic cusp. Europace 2007; 9: 216-9. [CrossRef]
5. Casella M, Pelargonio G, Dello Russo A, Riva S, Bartoletti S, Santangeli P, et al "Near-zero" fluoroscopic exposure in supraventricular arrhythmia ablation using the EnSite NavX™ mapping system: personal experience and review of the literature. J Interv Card Electrophysiol 2011; 31: 109-18. [CrossRef]
6. Jamil-Copley S, Linton N, Koa-Wing M, Kojodjojo P, Lim PB, Malcolme-Lawes L, et al. Application of ripple mapping with an electroanatomic mapping system for diagnosis of atrial tachycardias. J Cardiovasc Electrophysiol 2013; 24: 1361-9. [CrossRef]
7. Duru F. CARTO three-dimensional non-fluoroscopic electroanatomic mapping for catheter ablation of arrhythmias: a useful tool or an expensive toy for the electrophysiologist? Anadolu Kardiyol Derg 2002; 2: 330-7.
8. Casella M, Dello Russo A, Pelargonio G, Bongiorni MG, Del Greco M, Piacenti M, et al. Rationale and design of the NO-PARTY trial: near-zero fluoroscopic exposure during catheter ablation of supraventricular arrhythmias in young patients. Cardiol Young 2012; 22: 539-46. [CrossRef]
9. Banchs JE, Patel P, Naccarelli GV, Gonzalez MD. Intracardiac echocardiography in complex cardiac catheter ablation procedures. J Interv Card Electrophysiol 2010; 28: 167-84. [CrossRef]
10. Ouyang F, Ma J, Ho SY, Bänsch D, Schmidt B, Ernst S, et al. Focal atrial tachycardia originating from the non-coronary aortic sinus: electrophysiological characteristics and catheter ablation. J Am Coll Cardiol 2006; 48: 122-31. [CrossRef]

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