Case Report

Conventional Technique for Ablation of Upper Loop Reentry

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We present a 33 years-old smoker male with dyspnea on exertion, the cause of which was finally identified as atrial tachyarrhythmia after performing echocardiography, coronary angiography, right, and left sided cardiac catheterization During electrophysiology study; upper loop reentry (ULR) a rare form of atypical Atrial flutter was diagnosed and ablated by conventional technique. New mapping technology improved our understanding of the mechanism and pathways of arrhythmia, and allowed complex ablations made easier and more cost-effective.

Introduction

Typical atrial flutter is a macrorentry around tricuspid valve that has critical isthmus between inferior vena cava and tricuspid valve[1]. Atypical flutter contains all other macrorentrant circuit in atrium.[2]

Upper Loop Reentry (ULR) is a macrorentry around crista terminalis in right atrium (RA).[2]

The arrhythmia can be in clockwise or counterclockwise direction.[3]

Critical part of arrhythmia to ablate is a Gap in crista terminalis.[3] Although the precise circuit shown using three-dimensional mapping, entrainment mapping of crista can be another way to find the isthmus and terminate the arrhythmia more economically.[3]

We present a case of atypical atrial flutter. Entertainment map from multiple sites in RA and left atrium (LA) lead us to upper loop reentry diagnosis and then concealed entrainment from a point in low crista terminalis was done and showed the successful site of its ablation.

Case presentation

A 33 years old smoker male complaining of dyspnea on exertion for 6 months was visited by a pulmonologist. Pulmonary function test and early investigation confirmed mild obstructive lung disease, which seemed unrelated to the extent of dyspnea, but for presence of tachyarrhythmia, the patient was referred to cardiology department.

Considering atrial tachyarrhythmia, rate control strategy was tried and further work up started. Echocardiography showed right chamber enlargement and mild tricuspid regurgitation with pressure gradient about 20 mmHg. There was no significant shunt detected following right and left heart catheterization.

Medical therapy continued because selective coronary angiography showed long segment, mid-part, and moderate right coronary artery (RCA) lesion.

Electrophysiology consultation was done, since patient's dyspnea persisted despite using medications.

Ablation was planned as atypical atrial flutter did not respond to therapy. (Fig. 1)

In Electrophysiology study, pattern of halo catheter was observed and as the circuit was not around tricuspid valve it was not indicative of typical atrial flutter. (Fig. 2) The arrhythmia was entrained and so proved to be a macrorentry and by using post-pacing interval (PPI) we showed it not to be isthmus dependent. (Fig. 3)

Entertainment from multiple sites in RA and LA

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Figure 1. ECG shows atypical atrial flutter considering clear isoelecteric line between P waves. Clear p wave is seen in lead 1which is not seen in typical Atrial flutter.

showed the circuit to be in the upper part of RA. (Fig. 4)

Then pacing from midpart of crista terminalis showed concealed entrainment and linear lesion with 12 burns which interrupted the arrhythmia and made it non-inducible. (Fig. 5 and 6)

The follow up of the patient for 3 months showed no recurrence and his dyspnea improved dramatically.

Discussion

Yang first described the circuit of upper loop reentry but failed to identify the exact loop because by using conventional technique for mapping his success rate was only about 50%.[3]

He believed that ULR turned around fossa ovalis[3] but evidently it turned around crista terminalis indeed.[2]

Introducing electeroanatomical mapping and non-contact mapping, improved our understanding of atypical atrial flutter so that the exact route of arrhythmia was found and the best site for approach-

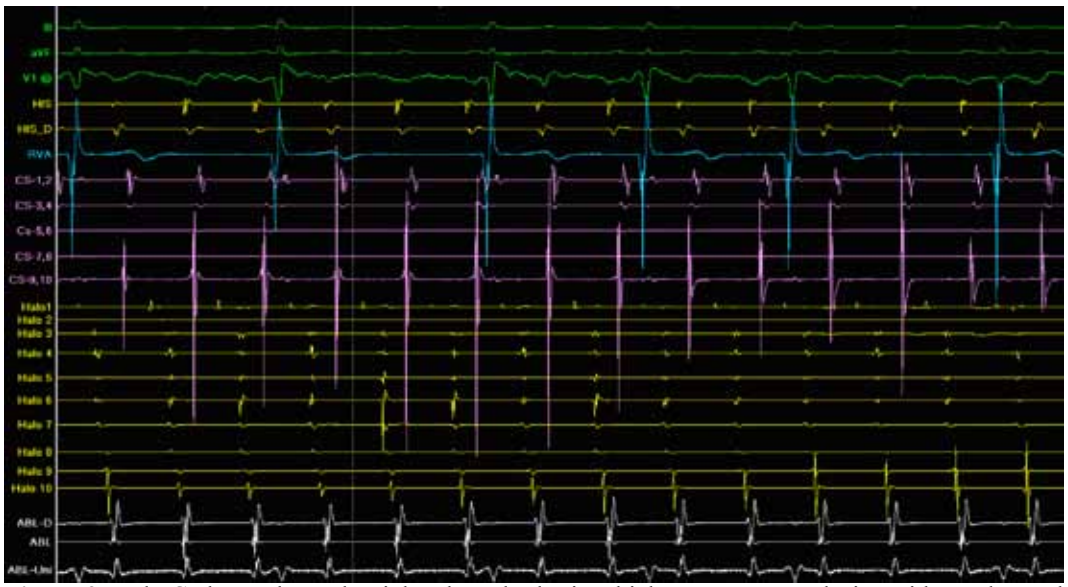

Figure 2. Halo Catheter showed atrial tachyarrhythmia which was not around tricuspid annulus and hence was not typical of atrial flutter.

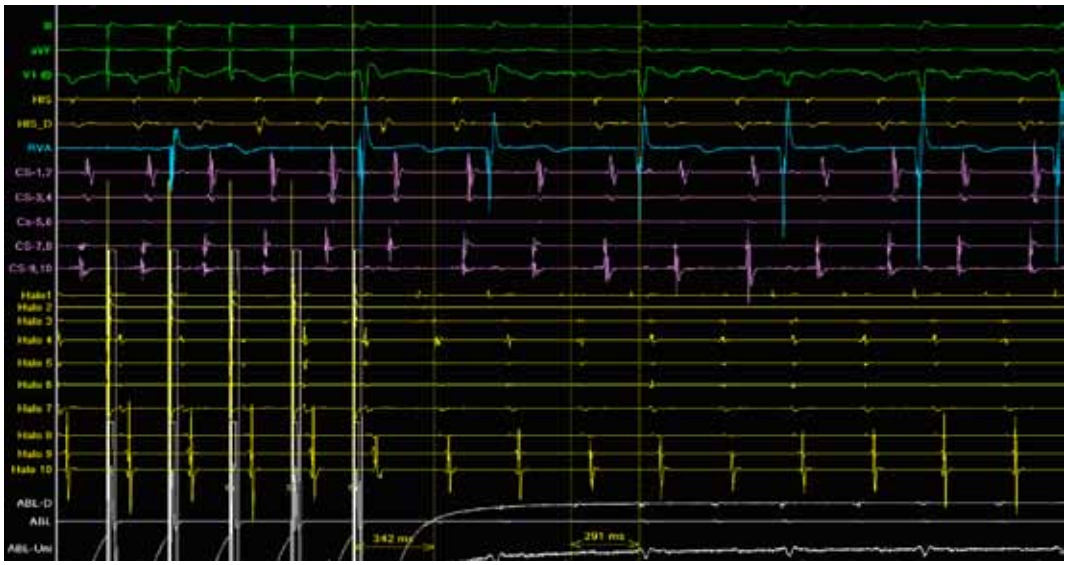

Figure 3. Entrainment from ablation catheter in cavotricuspid isthmus indicating that arrhythmia was macrorentry and independent of cavotricuspid isthmus.

ing was identified.[4,5]

Three dimensional mapping has its limitation and the best result may be obtained by using a combination of conventional and three dimensional mapping.[2]

Considering the high cost of three-dimensional mapping and better understanding of the route of arrhythmia, we can now use entrainment mapping for ULR management and be more hopeful of achieving better success rate than that of our predecessors.

Modern era of technology has provided new insight to delicate pathways of arrhythmia. In this regard, new mapping technology improved our understanding of the mechanism and pathways of arrhythmia, and allowed complex ablations made easier and more cost-effective.

Acknowledgement

This work was financially supported by Vice Chancellor for Research of Shiraz University of Medical Science. The authors declare that they have no conflicts of interest.

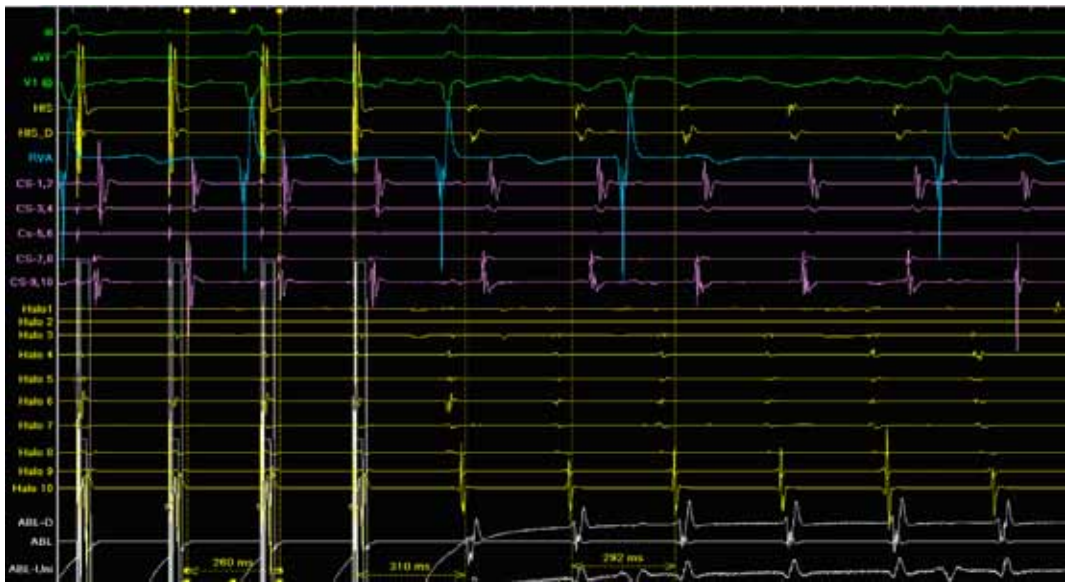

Figure 4. Pacing from ablation near His Bundle shows PPI around 18 msec, so that His Bundle is in the circuit and macrorentry on the roof of RA.

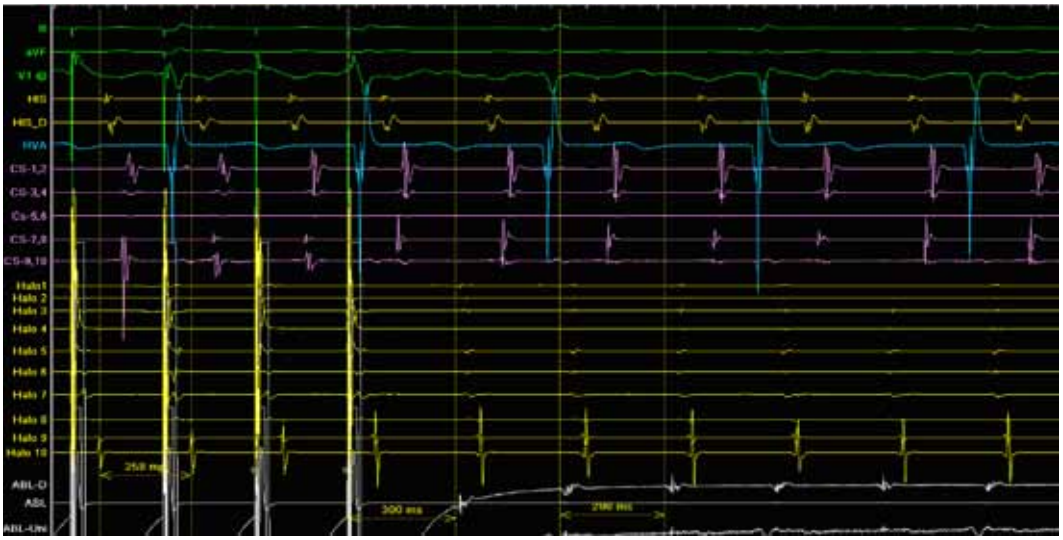

Figure 5. Pacing from ablation catheter, midpart of crista terminalis, indicating concealed entertainment with PPI about four msec. Intracardiac and ECG showed identical P wave morphology which is exactly within the circuit.

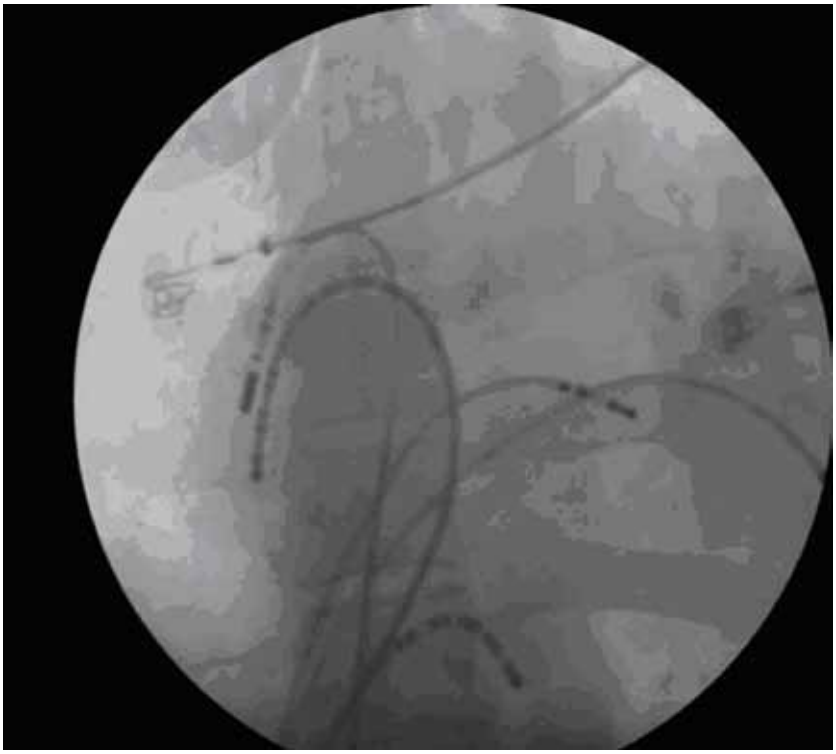

Figure 6. Flouroscopic view of approximate site of ablation in right anterior oblique view

References

1 Waldo Al. Atrial flutter: Mechanisms, clinical features, and management. In: Zipes DP, **ed**. Cardiac Electrophysiology: From Cell to Bedside. 4th ed. Philadelphia: WB Saunders; 2004. p. 490-9.

2 Issa ZF, Miller JM, Zipes DP. Clinical arrhythmology and electrophysiology: a companion to Braunwald's heart disease: WB Saunders Co; 2009. p. 192-207.

3 Yang Y, Cheng J, Bochoeyer A, Hamdan MH, Kowal RC, Page R, et al. Atypical right atrial flutter patterns. *Circulation* 2001;**103:**3092-8. [11425774]

4 Shah DC, Jais P, Hocini M. Catheter Ablation of atypical right atrial flutter. In: Zipes DP, Haïssaguerre M (eds). Catheter ablation of arrhythmias: Wiley-Blackwell; 2002. p. 153-68.

5 Kall JG, Wilber DJ. Ablation of atypical atrial flutter. In: Huang SK, Huang SKS, Wilber DJ (eds). Radiofrequency catheter ablation of cardiac arrhythmias: basic concepts and clinical applications: Wiley-Blackwell; 2000. p. 233-56.