Chapter 23
Case 12: A 56 y/o Man, with Typical AFL

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Abstract Any atrial flutter which is cavotricuspid isthmus dependent is typical AFL and creation a line of RFA in CTI is the ablation strategy.

Patient was a 56 y/o man, with Hx of PCI on LAD years ago, presented with two episodes of palpitation and documented ECG in favor of typical AFL.

LVEF about 50%, no significant valvular disease.

ECG: inverted saw tooth F wave in the inferior leads, low amplitude biphasic F wave in I, aVL, upright F wave in V1, and negative F wave in V6.

EPS

Activation mapping was done using multielectrode catheters introduced via right and left femoral vein.

Quadripolar catheters were positioned in HRA and RV and a decapolar catheter was positioned in CS. Some time we position a duo-decapolar catheter (Halo) in the right atrium around tricuspid valve annulus.

Patient was present to the EP lab in sinus rhythm, so induction of AFL was done by atrial programmed stimulation. A narrow QRS tachycardia with CL 280 ms was induced by electrical stimulation (Fig. 23.1).

The initial atrial activation was recorded at CS ostium for confirmation of the typical AFL using cavotricuspid isthmus entrainment mapping was done with pacing in the CTI and concealed entrainment revealed typical AFL with PPI and TCL difference less than 30 ms (Fig. 23.2).

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M. Maleki, A. Alizadehasl (eds.), *Case-Based Clinical Cardiology*,
https://doi.org/10.1007/978-1-4471-7496-7_23

Fig. 23.1 Sawtooth F waves without isoelectric interval, negative in the inferior leads, positive in V1

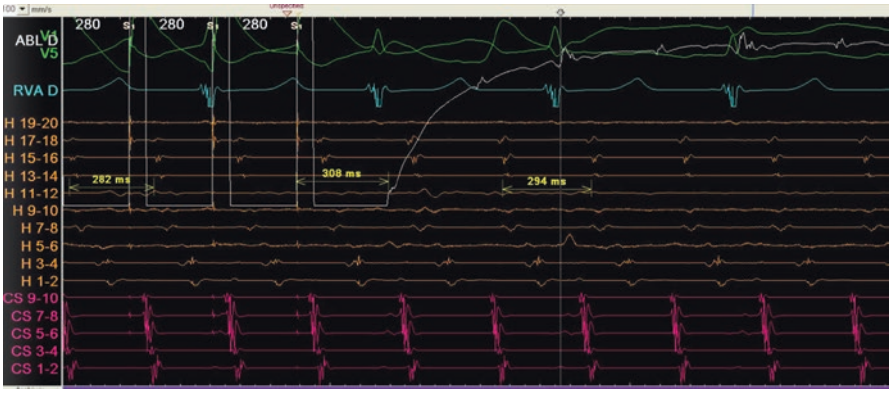

Fig. 23.2 Entrainment via ablation catheter positioned in CTI showed that arrhythmia is CTI dependent

Stimulus-to-F wave and stimulus-to-reference EGM interval and pacing EGM to F wave were the same during AFL and pacing.

For ablation of the CTI-dependent AFL, a line of RF ablation was created across the CTI and then bidirectional conduction block was checked across the CTI.

We usually use an external irrigated ablation catheter for ablation using a long steerable deflectable sheet (Agillis).

We commonly target the central isthmus for ablation, because is the narrowest site of CTI and also has a lower risk for AV block compared with the medial isthmus. In the case of the pouch in this site, lateral isthmus ablation is done, although it is thicker than central isthmus.

We usually use a maximal power of 35 W with a max temperature of 48 °C. Impedance drop about 10 Ω is acceptable (Fig. 23.3).

After the termination of flutter, bidirectional CTI block was checked, because of the persistence of CTI conduction, we tried to create a new line of RF ablation (Fig. 23.4 a, b).

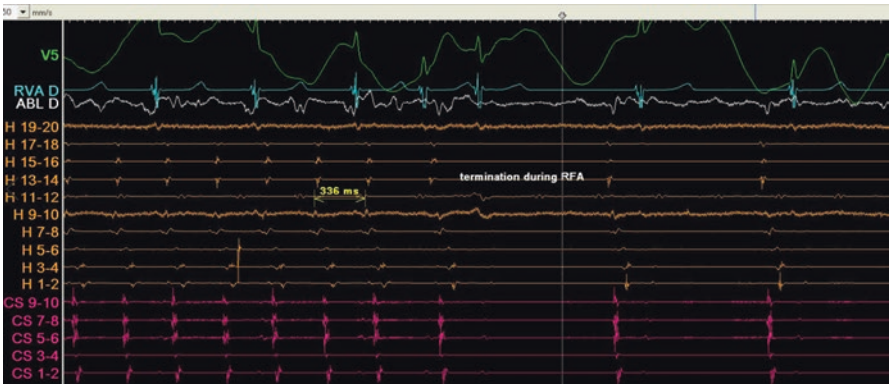

Fig. 23.3 Arrhythmia termination during RFA

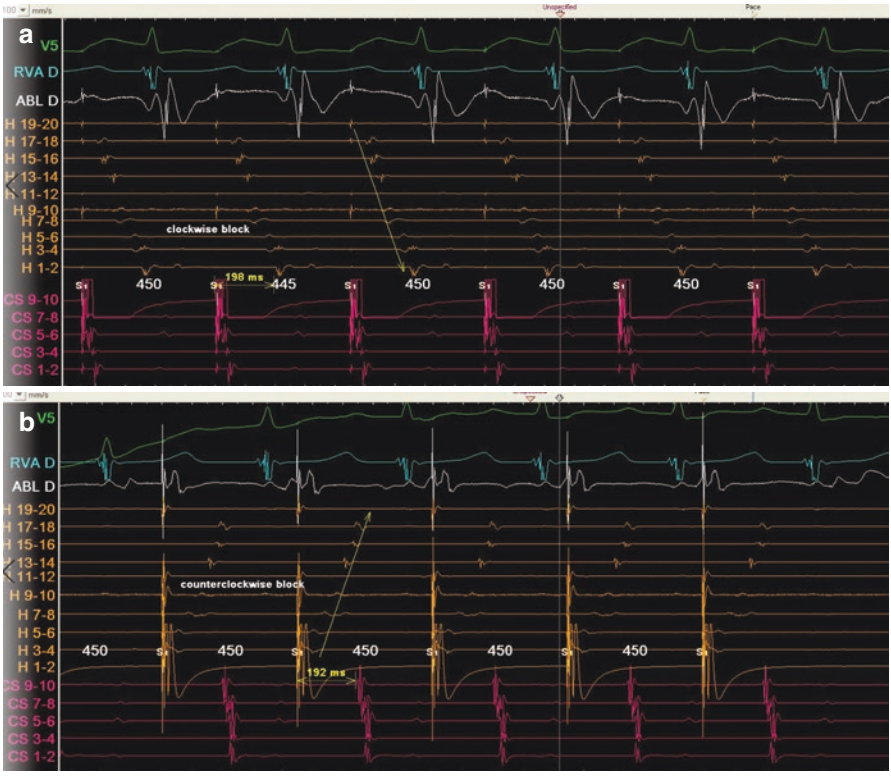

Fig. 23.4 (**a**, **b**) Bidirectional block across isthmus after ablation

Discussion

CTI-dependent atrial flatter is a common arrhythmia that often occurs in structural normal hearts. This arrhythmia often causes by a macro reentry in the right atrium around the tricuspid valve annulus and the slow conduction area at the lower posterior right atrium [1–3].

CTI is a portion of the right atrium between the TVA (tricuspid valve annulus) and IVC (inferior vena cava) and is anatomically bounded by the IVC and Eustachian ridge posteriorly and TVA anteriorly [3].

In about 80% of the patients, there is an inferior pouch in the CTI (sub-Eustachian pouch or sinus of Keith).

The posterior portion of the CTI is membranous part, near the IVC; the mid part is trabeculated portion and the anterior portion near the tricuspid valve is called vestibular (muscular portion) [3].

In the LAO view, CTI is divided into three portions: medical isthmus at 5 o'clock; central isthmus at 6 o'clock and lateral isthmus that is positioned at 7 o'clock. The central isthmus is the narrowest part and easy for ablation, but sometimes because of the presence of the pouches it may be difficult to do ablate at this site and lateral and then medial isthmus if need could be tried for ablation [2, 3].

There are three other macro reentrant tachycardias in this area:

Lower loop reentry, partial isthmus flutter, and intra-isthmus reentry.

Lower loop reentry is also isthmus dependent and in which the circuit is essentially around the ostium of the IVC in the right atrium and the direction of rotation may be clockwise or counterclockwise [4–7].

In this reentry caudal to cranial activation in the right atrium crosses over gaps in the crista terminalis in the low RA to middle RA. There is a collision in the lateral RA that results in a decrease in the inferior forces. In lower loop reentry there is evidence of concealed entrainment in the CTI and also inferior-posterior of the RA.

In partial isthmus flutter, reentrant wave short circuits through the Eustachian ridge to pass between the IVC and CS ostium. In this type of AFL, concealed entrainment is present in the lateral isthmus but not medical isthmus. There is also early activation of the CS ostium and collision in the medical CTI. Intra-isthmus reentry is a micro reentry localized within the septal region of the CTI.

We used a maximal power of 35 W with max temperature of 48 °C. Impedance drop about 10 Ω was acceptable [8].

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