Catheter inversion to achieve complete isthmus block in patients with typical atrial flutter

Katheterinversion: Eine Technik zum Erreichen eines vollständigen Isthmus-Blocks bei Patienten mit typischem Vorhofflattern


Schlüsselwörter Katheterablation – Katheterinversion – Vorhofflattern – Isthmus-Block

Summary Endocardial catheter ablation is now considered as the therapy of first choice in highly symptomatic patients with recurrent atrial flutter. Despite of primary success rates between 90 and 100% complete isthmus block is sometimes hard to achieve. We present ablation results of 100 consecutive patients suffering from typical right atrial flutter. After a mean of 18 energy applications persistent bidirectional isthmus block could not be achieved in 16 patients and right atrial angiography was performed in all of them. In 9 patients a large Eustachian valve was detected and considered responsible for failure of endocardial catheter ablation of atrial flutter. Catheter manipulation targeting the anterior region of the Eustachian ridge was successful in all patients after looping the ablation catheter within the right atrium.
With a mean of 3 additional RF applications, 6 of the 9 affected patients could be successfully ablated.

Large Eustachian ridges are not a rare finding in patients undergoing ablation of typical right atrial flutter. Inversion of the ablation catheter within the right atrium is a simple technique providing excellent tissue contact of the ablation electrode with the anterior region of the Eustachian Ridge. Using this approach, the creation of bidirectional isthmus block is possible in the majority of the respective patients.

Key words Catheter ablation – catheter inversion – atrial flutter – isthmus block

Introduction

Endocardial catheter ablation of recurrent isthmus-dependent right atrial flutter is associated with primary success rates between 90 and 100%, and long-term freedom of arrhythmia recurrence in up to 80% of patients. It is therefore considered as therapy of first choice in highly symptomatic patients [5, 8].

A continuous transmural lesion provides the anatomic substrate for the creation of a persistent bidirectional conduction block [7, 11]. Recurrence of isthmus-dependent atrial flutter is unlikely if stable bidirectional block across this area can be demonstrated by pacing maneuvers [1, 2].

In some patients, however, this goal can only be achieved with extensive energy applications. Common reasons for persistent conduction across the ablated isthmus are anatomical complexities such as pouches, Eustachian valves or hypertrophic/fibrotic myocardium found in this region [9]. In such a situation, alternative ablation strategies including the use of 8 mm ablation electrodes or cooled ablation tips may be reasonable [10]. The efficacy of respective approaches has been shown in the past by different groups and was correlated with larger and deeper lesions. In some instances, however, failure of creating a long transmural lesion is related to the inability to achieve close and stable tissue contact of the ablation electrode due to anatomical obstacles.

Thus, in the present study, we routinely performed right atrial angiography in patients seemingly resistant to conventional approaches for induction of complete isthmus block in search of potential causes.

Furthermore we describe a specific catheter technique that allows establishment of stable tissue contact of the ablation catheter in patients with a large Eustachian valve.

Methods

Patient characteristics

Radiofrequency catheter ablation was performed in 100 consecutive patients in the years 2003 and 2004 suffering from typical atrial flutter. There were 78 men and 22 women at a mean age was 59 ± 8 years and 45% of the patients were in atrial flutter at the beginning of the ablation procedure. Hypertension was diagnosed in 55 patients, coronary heart disease was the underlying disease in 36, cardiomyopathy was seen in 14, no structural disease was observed in 8. At the time of catheter ablation, 18 patients were treated with amiodarone at the time of catheter ablation.

Catheter ablation procedure

All patients were primarily ablated using a conventional 8 mm electrode ablation catheter (Blazer II XP Boston Scientific, Natick, MA USA). Ablation was performed in a temperature controlled mode using the EPT-1000 XP RF-generator (Boston Scientific, Natick, MA USA) with the following ablation parameters: temperature limit 65 °C, maximum power 80 W, duration of each energy application max. 60 s. Standard ablation procedure was terminated if at least 20 RF applications had failed to create a persistent bidirectional isthmus block or if the operator decided to use a long vascular sheath. Angiography of the right atrium in RAO and LAO projections was performed in all these cases to optimize the ablation procedure by the use of preshaped long vascular sheath (Fast Cath St. Jude Medical Minnetonka, MN, USA) or other ablation catheters which appeared more suitable to the specific anatomic situation.

Multipolar catheters were inserted into the coronary sinus and in the right atrium with parallel orientation to the tricuspid annulus (halo catheter). Stimulation was performed from the os of the coronary sinus and the inferolateral aspect of the tricuspid annulus. The procedure was considered successful if bidirectional isthmus block was recorded over a period of 30 min.