Peer reviewed article

Patient satisfaction and clinical outcome following outpatient radiofrequency catheter ablation of supraventricular tachycardia

Thomas Wolber[a,b], *Chol-Jun On*[a], *Corinna Brunckhorst*[a], *Christian Schmied*[a], *Jan Steffel*[a], *Thomas F. Lüscher*[a,b], *Firat Duru*[a,b]

[a] Cardiology, Cardiovascular Centre, University Hospital Zurich
[b] Centre for Integrative Human Physiology, University of Zurich, Zurich, Switzerland

Summary

Background: Catheter ablation is an effective and safe treatment for various arrhythmic disorders. Patients are frequently admitted for an overnight stay after the ablation procedure to monitor for possible postprocedural complications or recurrence of the arrhythmia. The aim of this study was to assess patient satisfaction in patients with supraventricular tachycardia following catheter ablation on an outpatient basis.

Methods: 243 consecutive patients (129 male, 53%; mean age 49 ± 17 years) underwent electrophysiological study and radiofrequency catheter ablation either on an outpatient basis or a hospitalisation that included at least an overnight hospital stay (inpatient) at a university hospital. All patients were asked to complete a specially designed questionnaire that addressed patient satisfaction as well as the clinical outcome after ablation at six months.

Results: The ablation procedure was performed on an outpatient basis in 119 patients (49%). The long-term procedural success rate was 99%. The overall patient satisfaction with the ablation procedure and with the clinical outcome at six months was 90%. There were no significant differences between outpatient and inpatient groups with respect to ablation results and patient satisfaction. Patients in the outpatient group returned to work after 2.8 ± 1.9 days as compared to 3.9 ± 2.2 days in the inhospital group (p = 0.001).

Conclusion: Overall patient satisfaction and self-reported clinical outcome are comparable for outpatient and inpatient catheter ablations. Patients undergoing outpatient procedures may return to work earlier. Therefore, outpatient ablation procedures may be considered for selected patients without significant comorbidities.

Key words: electrophysiology; catheter ablation; outpatient; arrhythmias; outcome

Background

Catheter ablation has become the first-line treatment strategy for most supraventricular arrhythmias as it is effective and safe and promotes cure in the majority of patients [1, 2]. In most studies reported to date, patients were typically admitted overnight after the ablation procedure to monitor for possible postprocedure complications or a recurrence of the arrhythmia. However, complications with these procedures are very infrequent, and when they occur, are usually readily apparent at the time of the procedure or shortly thereafter.

Earlier studies reported that radiofrequency (RF) ablation of the AV nodal slow pathway [3] and of accessory pathways [4, 5] can be performed safely on an outpatient basis. However, the impact of outpatient catheter ablation on postprocedural recovery and patient satisfaction is not well established. The aim of this study was to assess patient satisfaction and clinical outcome following catheter ablation on an outpatient basis in the setting of a university hospital.

This study has been supported by the Foundation for Cardiovascular Research, Zurich, Switzerland, and by an unrestricted research grant from BARD Medica SA, Switzerland.

Methods

Two hundred forty-three consecutive patients who underwent catheter ablation of supraventricular tachycardia between April 2006 and October 2007 either on an outpatient basis or during a hospitalisation including at least an overnight hospital stay (inpatient) at the University Hospital of Zurich were included in the study. The eligibility for an outpatient or inpatient catheter ablation was determined by the electrophysiology staff team, in particular taking patient choice into consideration. In general, the elderly and patients with comorbidities were not considered for the outpatient procedure. Patients scheduled for ablation of atrial fibrillation, ventricular tachycardia in the presence of a myocardial substrate and patients with arrhythmias in the setting of a congenital heart disease were also not included in the study, since all such ablations are presently performed on an inpatient basis at our institution. Patient information regarding indication, procedural details and possible complications of the ablation procedure was provided during an outpatient visit at our institution or at the referring institution prior to the planned procedure. During the preprocedural appointment, eligible patients were asked whether they consented to undergo an outpatient procedure. The final allocation to an inpatient or outpatient procedure was done by administrative staff on the basis of infrastructural factors, such as ward and outpatient clinic capacity.

All patients were taken to the electrophysiology lab in the non-sedated state and underwent an initial diagnostic study using three diagnostic catheters. In those patients, in whom the arrhythmia substrate was identified, ablation therapy was carried out using radiofrequency energy. Five thousand IU of heparin were administered intravenously in all patients following the ablation procedure. Procedural success was defined as non-inducibility of the tachycardia after ablation, including isoproterenol challenge in patients in whom a tachycardia had been induced after adrenergic stimulation before the ablation. In patients with atrial flutter, bidirectional block was confirmed using standard pacing manoeuvres. All patients in the outpatient group spent a minimum of six hours following the ablation in a postprocedure recovery room prior to their discharge, whereas those in the inpatient group stayed overnight before being discharged the next day. In all patients a predischarge ECG was recorded to confirm sinus rhythm, to exclude procedure-related bundle branch block or AV block as well as persisting block in case of an accessory pathway with antegrade conduction. Echocardiography was not routinely performed after the ablation procedure.

Patients who were previously on oral anticoagulants and those who required anticoagulant therapy after the procedure were not excluded from ablation on an outpatient basis. These patients were asked to contact their family physicians prior to the procedure and to pause anticoagulation therapy for several days prior to the procedure to enable INR values at 1.8 or lower at the time of the procedure. All patients requiring further anticoagulation were given subcutaneous low molecular-weight heparin for several days overlapping with oral anticoagulation until therapeutic INR levels were reached. Patients who underwent transseptal catheterization and ablation in the systemic circulation were given acetylsalicylic acid 100 mg / day for three months after the ablation.

All patients underwent clinical follow-up eight to twelve weeks after the ablation procedure at our outpatient clinic or at the referring institution. This follow-up visit included a 12-lead ECG in all patients and holter or event recorder recordings in patients with persisting symptoms. All patients were asked to complete a specially designed questionnaire that addressed questions about the outcome of the ablation at six months, procedure-related complications, time to return to work and patient satisfaction. As we intended to gather information on specific ablation-related issues, we chose to use a new and specifically designed questionnaire instead of using a validated patient satisfaction questionnaire. Additional information regarding long-term efficacy of RF ablation was obtained from hospital charts and by contacting family physicians for each patient.

Statistical analysis

Continuous variables are presented as mean ± standard deviation. Categorical variables are expressed as number and percentage and compared using a χ^2 or Fisher's exact test as appropriate. Procedural outcomes, complications, time to return to work, and patient satisfaction were assessed according to two patient groups based on inpatient or outpatient treatment. Continuous variables between groups were compared using an unpaired Student's *t*-test or the Mann-Whitney *U* test for not normally distributed variables. Multivariate analysis was performed to identify predictors of patient satisfaction. A P value less than 0.05 was considered significant.

The study was conducted in accordance with the regulations of the institutional ethics committee. Patients provided written informed consent for anonymised data analysis and publication.

Results

Two hundred and forty-three consecutive patients (129 male, 53%; mean age 49 ± 17 years) underwent electrophysiological study and radiofrequency catheter ablation. The procedure was performed on an outpatient basis in 119 patients (49%). The remaining 124 patients were treated during a one or two day hospital stay. Baseline characteristics of all patients are presented in table 1.

AV-nodal reentrant tachycardia was the most frequent diagnosis for catheter ablation, followed by cavo-tricuspid isthmus ablation for typical atrial flutter and ablation of accessory pathways. Overall, transseptal puncture and catheterization was required in 14% of the patients. Platelet inhibitors and oral anticoagulants were used in 14 and 23% of patients, respectively.

Table 2 shows an overview of all performed procedures on an outpatient vs inpatient basis. The primary success rate of all ablations was 94%. New arrhythmic symptoms were reported by 3% of the patients after the ablation. However, in none of these could a relevant arrhythmia be documented, and reintervention was not necessary. Minor groin haematoma resulting in consultation with a family physician was reported by 6% of the

patients in both groups. No major complication, including infection, cardiac tamponade or major bleeding requiring intervention or substitution of blood products occurred in either groups.

Patient responses to the survey on various aspects of patient care are presented in table 3. Patient information prior to the electrophysiological procedure was valued in both outpatient and inpatient groups. Similarly, satisfaction with physician and nurse care in the electrophysiology laboratory was high in both groups. Indication for RF ablation, concomitant disease, the need for multiple site ablation or transseptal puncture, duration of the ablation procedure, platelet inhibitor or anticoagulant use, primary success or need for reintervention, inhospital or outpatient treatment, room service and catering were not associated with patient satisfaction.

Time to resumption of regular work or everyday activities differed significantly between both groups. Patients in the outpatient group returned to work after 2.8 ± 1.9 days, whereas patients in the inhospital group did so after 3.9 ± 2.2 days (p = 0.001). Among patients in the outpatient group, 30% resumed regular activity the day following the electrophysiological procedure, compared to 14% in the inhospital group (fig. 1, p = 0.01).

Overall, 90% of the patients were satisfied with the ablation procedure and the clinical outcome at six months. Persisting symptoms after RF ablation, haematoma, physician and nursing care, as well as the perception of preinterventional information and patient scheduling were determining factors of patient satisfaction (table 4). However, these factors were highly intercorrelated. In the multivariate analysis, persisting symptoms after the ablation procedure was the only significant predictor of patient satisfaction (odds ratio 0.17; 95% CI, 0.05–0.53; p = 0.02). In case of a repeat procedure, 22% in the outpatient group would prefer inhospital treatment and 15% in the inhospital group would prefer an outpatient setting (p = ns). Patients were asked to give an explanation if they preferred another setting. However, only two patients in the outpatient group, stating logistic reasons for returning home late, and no patient in the inpatient group provided an answer to this question. There were no significant differences between patients who would prefer the same setting and those who would prefer the opposite setting in case of a repeat procedure.

Table 1

	Outpatient (n = 119)	Inpatient (n = 124)	Overall (n = 243)	P-value
Age (years)	45 ± 15	54 ± 17	49 ± 17	<0.001
Male Sex	54 (45%)	75 (61%)	129 (53%)	0.045
Diagnosis				<0.001
Right atrial tachycardia	4 (3.4%)	4 (3.2%)	8 (3.3%)	
Left atrial tachycardia	–	1 (0.8%)	1 (0.4%)	
Right and left atrial tachycardia	–	1 (0.8%)	1 (0.4%)	
AVNRT	82 (69%)	38 (30%)	120 (49%)	
AVNRT and AT	1 (0.8%)	2 (1.6%)	3 (1.2%)	
WPW	12 (10%)	27 (22%)	39 (16%)	
Concealed WPW	4 (3.4%)	2 (1.6%)	6 (2.5%)	
WPW and AVNRT	–	1 (0.8%)	1 (0.4%)	
Atrial flutter	14 (12%)	46 (37%)	60 (25%)	
Inappropriate sinus tachycardia	1 (0.8%)	–	1 (0.4%)	
Coronary artery disease	2 (1.7%)	21 (16%)	23 (9.3%)	<0.001
Hypertension	16 (15%)	40 (31%)	56 (24%)	0.003
Diabetes mellitus	3 (3%)	8 (6%)	11 (4.6%)	0.23
Platelet inhibitor use	9 (8%)	25 (20%)	34 (14%)	0.03
Oral anticoagulant use	9 (8%)	47 (36%)	56 (23%)	<0.001

Baseline characteristics of patients undergoing RF ablation in an outpatient or inpatient setting.

Table 2

	Outpatient (n = 119)	Inpatient (n = 129)	Overall (n = 248)	P-value
Procedure time (minutes)	168 ± 64	174 ± 66	171 ± 65	0.44
Fluoroscopy time (minutes)	20 ± 15	19 ± 14	20 ± 14	0.42
RF Ablation				
Cavo-tricuspid isthmus	14 (12%)	44 (36%)	58 (24%)	<0.001
Accessory pathway	17 (14%)	32 (26%)	49 (20%)	0.04
Slow pathway	84 (70%)	42 (34%)	126 (52%)	<0.001
Atrial tachycardia	5 (4.2%)	8 (7%)	13 (5%)	0.44
Transseptal puncture	10 (9%)	23 (14%)	33 (14%)	0.025
Multiple site ablation	2 (1.7%)	9 (7%)	11 (4.5%)	0.06
Primary procedural success	113 (95%)	115 (93%)	228 (94%)	0.47
Reintervention	6%	10%	8%	0.16
Long-term success (at 6 months)	99%	100%	99%	0.34

Electrophysiological study and catheter ablation

Figure 1

Time to resumption of work or regular everyday activities of patients undergoing radiofrequency catheter ablation in an outpatient (grey bars) or inpatient (black bars) setting.

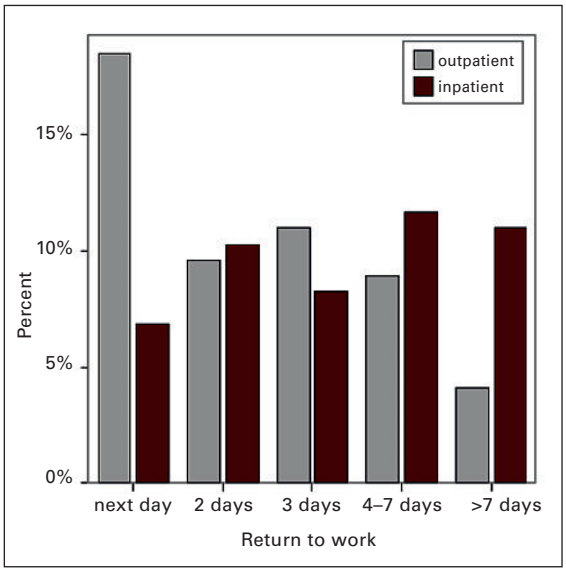

Table 3

	Out-patient	In-patient	Overall	P-value
Medical information prior to the procedure				0.38
excellent	97%	94%	95%	
comprehensible	1%	6%	3%	
difficult	1%	1%	1%	
Medical information after the procedure				0.04
excellent	92%	86%	89%	
comprehensible	4%	10%	7%	
difficult	4%	4%	4%	
Quality of physician care				0.4
excellent	95%	97%	96%	
good	5%	3%	4%	
standard	–	–	–	
should be improved	–	–	–	
Quality of nurse care (EP lab)				0.5
excellent	99%	97%	98%	
good	1%	3%	2%	
standard	–	–	–	
should be improved	–	–	–	
Quality of nurse care (ward)				0.04
excellent	94%	93%	93%	
good	1%	7%	4%	
standard	4%	–	2%	
should be improved	1%	–	1%	
Room service				0.5
excellent	81%	87%	84%	
good	12%	10%	11%	
standard	4%	1%	3%	
should be improved	3%	1%	2%	
Catering				0.06
excellent	64%	84%	75%	
good	21%	14%	18%	
standard	3%	1%	2%	
should be improved	11%	–	5%	
Patient scheduling and coordination				0.6
excellent	78%	84%	81%	
good	9%	7%	8%	
standard	13%	9%	11%	
should be improved	–	–	–	
Groin pain				0.03
none	71%	78%	74%	
minimal	27%	14%	21%	
minor	1%	9%	5%	
major	–	–	–	
Haematoma/Bruise				0.9
none	54%	46%	50%	
minimal	35%	38%	36%	
minor	12%	17%	14%	
major	–	–	–	
Symptoms after ablation				0.7
No symptoms	86%	87%	86%	
Persisting symptoms	11%	9%	10%	
New symptoms	3%	4%	3%	
Preference of other modality	22%	15%	19%	0.2
Overall satisfaction	90%	91%	90%	0.7

Patient-reported symptoms and satisfaction and long-term outcomes of outpatient and inpatient catheter ablation.

Table 4

	Odds ratio (95% CI)	P-value
Physician care	2.8 (1.2–6.7)	0.056
Nurse care	3.6 (1.5–8.4)	0.035
Preintervention information	3.43 (1.4–8.2)	0.02
Patient scheduling and coordination	4.8 (1.9–12.3)	<0.001
Persisting symptoms after ablation	0.1 (0.04–0.29)	<0.001
Haematoma / bruise after ablation	0.25 (0.87–0.70)	0.005

Factors influencing patient satisfaction after catheter ablation.

Discussion

This is the first study to report on patient satisfaction following catheter ablation procedures performed in selected patients on an outpatient basis. Our study is in line with a recent publication [6] which prospectively evaluated the feasibility and safety of same day home discharge after radiofrequency catheter ablation. We demonstrate that the primary and long-term success rates, complications, and patient satisfaction were comparable for both treatment modalities. If a repeat procedure were to be necessary, a comparable number of outpatients would prefer inpatient treatment and vice versa. Therefore, catheter ablation on an outpatient basis is a viable option to inpatient procedures for most arrhythmias in selected patients who have no significant comorbidities.

Improved technology and enhanced clinical expertise have allowed physicians to provide better outpatient care. Indeed, cardiological interventions such as coronary angiography with "ad hoc" angioplasty has been shown to be feasible and safe in selected patients on an outpatient basis [7, 8]. Similarly, the introduction of newer technologies and catheters has favourably influenced ease and safety of catheter ablation [9]. In our study, radiofrequency energy was used as the sole method for catheter ablation. However, other ablation technologies, such as cryoablation of supraventricular

tachycardias [10] may also be safely performed on an outpatient setting in selected patients.

Our outpatient cohort included patients who required a transseptal puncture and catheterization for ablation of left-sided accessory pathways or left atrial tachycardias. Transseptal catheterization was safely performed in all patients and did not adversely affect the clinical outcome or patient satisfaction after the procedure. In addition, oral anticoagulant use prior to or after the ablation added no safety risk in our cohort of ambulatory patients.

In our study, the vast majority of patients were satisfied with the quality of the physician and nursing care in the electrophysiology laboratory, medical information given prior to or after the procedure, as well as other hospital-related aspects, such as patient scheduling and coordination, room service, and catering whether they were treated on an outpatient or an inpatient basis. It is interesting to note that overall patient satisfaction was not only influenced by procedure-related issues (haematoma/bruise and persisting arrhythmic symptoms after ablation), but also by nursing care, information given prior to the procedure and patient scheduling and coordination. Physician care was not as significant as the above-mentioned factors in influencing overall patient satisfaction after catheter ablation. It seems that patients were satisfied with the care given by the physician regardless of procedural success. Hence, factors not directly related to the medical procedure itself have a considerable impact on the overall perception of the treatment.

Invasive procedures are increasingly being performed on an outpatient basis, particularly because of increasing health care costs and due to limited insurance coverage for inpatient procedures. The outpatient ablation procedure combines the advantages of increased convenience for the patient and lower costs. In addition, our study showed that patients who underwent ablation on an outpatient basis, as compared to inpatients, could return to work earlier, which is an important advantage of any interventional procedure. Apart from reduced hospital-related healthcare costs, early return to work has important societal, occupational and economic impacts given the large numbers of patients undergoing such interventional procedures. In our clinic, patient selection for outpatient ablation so far excludes patients with more complex anatomical substrates, such as atrial fibrillation and postinfarction ventricular tachycardia. Some centres offer outpatient catheter ablation for atrial fibrillation particularly if the patient's health insurance covers only outpatient procedures. It may be possible to safely perform complex ablations without an overnight stay. However, there is no reported safety and outcome analysis to date for ambulatory ablation for such patients; hence, further studies are needed to elaborate the selection criteria for such patients.

Limitations: This is a retrospective single centre study with inherent limitations typically associated with this type of trial design. Data were collected retrospectively from the medical charts, and were therefore dependent on the accuracy of clinical documentation. Patient selection was not randomised and may implicate bias towards an overestimation of the safety of the outpatient procedure. The questionnaire used was tailored to the specific requirements of the study and did not include a validated tool for anxiety assessment.

Conclusion

Radiofrequency catheter ablation procedures performed on an outpatient basis are feasible and safe. Primary and long-term success rates, occurrence of complications, and overall patient satisfaction are comparable for outpatient and inpatient ablations. Patients who undergo ablation procedures on an outpatient basis can furthermore return to work earlier. Therefore, outpatient ablation procedures may be considered for selected patients without significant comorbidities.

Correspondence:
Thomas Wolber, MD
Department of Cardiology
University Hospital Zurich
Rämistr. 100, CH-8091 Zurich, Switzerland
E-Mail: thomas.wolber@usz.ch

References

1 Nakagawa H, Jackman WM. Catheter ablation of paroxysmal supraventricular tachycardia. Circulation. 2007;116(21):2465–78.
2 O'Neill MD, Jais P, Hocini M, et al. Catheter ablation for atrial fibrillation. Circulation. 2007;116(13):1515–23.
3 Man KC, Kalbfleisch SJ, Hummel JD, et al. Safety and cost of outpatient radiofrequency ablation of the slow pathway in patients with atrioventricular nodal reentrant tachycardia. Am J Cardiol. 1993;72(17):1323–4.
4 Kalbfleisch SJ, el Atassi R, Calkins H, Langberg JJ, Morady F. Safety, feasibility and cost of outpatient radiofrequency catheter ablation of accessory atrioventricular connections. J Am Coll Cardiol. 1993;21(3):567–70.
5 Sorbera C, Dhakam S, Cohen M, Woolf P, Agarwal Y. Safety and efficacy of outpatient transseptal radiofrequency ablation of atrioventricular accessory pathways. J Interv Card Electrophysiol. 1999;3(2):173–5.
6 Marijon E, Albenque JP, Boveda S, et al. Feasibility and safety of same-day home discharge after radiofrequency catheter ablation. Am J Cardiol. 2009;104(2):254–8.
7 Knopf WD, Cohen-Bernstein C, Ryan J, Heselov K, Yarbrough N, Steahr G. Outpatient PTCA with same day discharge is safe and produces high patient satisfaction level. J Invasive Cardiol. 1999;11(5):290–5.
8 Chaumeil A, Beygui F, Collet JP, et al. Feasibility of outpatient coronary angiography with "ad hoc" angioplasty. Arch Cardiovasc Dis. 2008;101(6):383–90.
9 Lee KW, Badhwar N, Scheinman MM. Supraventricular tachycardia – part I. Curr Probl Cardiol. 2008;33(9):467–546.
10 Friedman PL. Catheter cryoablation of cardiac arrhythmias. Curr Opin Cardiol. 2005;20(1):48–54.