Radiofrequency catheter ablation of accessory pathways

Outcome and use of antiarrhythmic drugs during follow-up

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Aims The purpose of this study was to assess the acute and long-term success of accessory pathway ablation in a single large-volume centre, concentrating on long-term recurrences and the clinical use of antiarrhythmic drugs.

Methods and Results A total of 519 consecutive patients (mean age 40 ± 14 years) underwent radiofrequency ablation of manifest or concealed accessory pathways. The patients were seen in the hospital or by the referring physician at 6 and 12 months. Long-term follow-up information was obtained by questionnaire. Pathway conduction was abolished in 476 cases (91·7%). ‘Redo’ procedures, due to recurrence, were performed in 38 patients (7·3%) and were successful in 30 (78·9%). Follow-up data were obtained from 454 patients (87·5%) with a follow-up duration of 22·6 ± 12·4 months. Among the 398 patients with successful ablations who responded to the questionnaire, 340 (85·4%) were asymptomatic with only 10·6% taking antiarrhythmic drugs. An additional 20 patients (5·0%) had symptoms suspicious of recurrence. In total, 66 out of 398 successfully treated patients (16·6%) were taking antiarrhythmic drugs. Twenty-three out of 56 (41·1%) patients with failed ablations were asymptomatic, 12 of whom (21·4% of patients with failed ablations) had not been administered antiarrhythmic drugs. In the total group of 454 patients with ablation attempts and available follow-up data, 99 (21·8%) were still taking antiarrhythmic drugs during follow-up.

Conclusions Patients with successful ablation of accessory pathways show excellent long-term results. However, 17% of successfully treated patients were still taking antiarrhythmic drugs during the period of long-term follow-up. On the other hand, 21% of patients with failed ablations were symptom-free without antiarrhythmic drugs. On an intention-to-treat basis, 22% of the patients with ablation attempts were still taking antiarrhythmic drugs during follow-up.

Key Words: Accessory pathway, radiofrequency current, catheter ablation.

Introduction

Since the first description of radiofrequency catheter ablation of accessory pathways in humans[1], several studies have demonstrated the safety and efficacy of this method, with success rates exceeding 90% and low recurrence rates[2–11]. Radiofrequency ablation has therefore emerged as a curative treatment of first choice for symptomatic patients with the Wolff–Parkinson–White syndrome.

However, published series have had relatively short follow-up periods, and have been restricted to patients with initially successful ablations[6,12,13], with no emphasis on antiarrhythmic medication taken at follow-up. Therefore, this study was aimed at the assessment of (1) the long-term follow-up of patients with radiofrequency ablation of manifest or concealed accessory pathways in a large single-centre cohort, (2) the clinical course of patients with failed ablation attempts and (3) the necessity of drug use during follow-up.
The study group consisted of 519 consecutive patients who underwent radiofrequency catheter ablation of a manifest or concealed accessory atrioventricular pathway at the University of Münster, Germany, between October 1993 and May 1997 on an intention-to-treat basis. The clinical characteristics of the patient population are summarized in Table 1.

The mean duration of symptoms in symptomatic patients was 166·6 ± 145·4 months. Three-hundred and ninety-three patients (75·7%) had had one or more tachycardia episodes per month with a mean incidence of 11·1 ± 26·0 episodes per month, whereas 101 patients (19·4%) had had less than one episode per month. Before the procedure, a mean of 1·3 ± 1·1 antiarrhythmic drugs had been either ineffective at abolishing symptoms or had produced intolerable side effects. A list of antiarrhythmic drugs taken before the procedure is presented in Table 2. Associated cardiac diseases are shown in Table 3.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Clinical characteristics of 519 patients</th>
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<tbody>
<tr>
<td>Age (years)</td>
<td>40 ± 14 (range 6–82)</td>
</tr>
<tr>
<td>Men/women</td>
<td>296 (57%)/223 (43%)</td>
</tr>
</tbody>
</table>

Methods

Study patients

The procedures were performed in the fasting, drug-free, non-sedated state. Multipolar electrode catheters were positioned in the high right atrium, the His bundle region and in the right ventricular apex using the femoral vein approach. Details of the stimulation protocol have been described previously[16].

Left-sided pathways were almost exclusively approached retrogradely via the femoral artery; right-sided pathways were approached through the femoral vein. Standard catheters were: 7F bipolar (Cerablate®, Sulzer-Osypka, Germany) and quadripolar (RF Mariner® MC, Medtronic, U.S.A. and D-Type, Cordis Webster, Inc., U.S.A.) electrode catheters with a 4 mm distal electrode and a deflectable tip. The catheter position was monitored using biplane fluoroscopy with right anterior oblique 30° and left anterior oblique 60° standard views.

Bipolar and, for anterogradely conducting pathways, unipolar (between the distal electrode and an indifferent electrode) endocardial electrograms were obtained using the ablation catheter and were recorded with a filter bandwidth of 40–500 Hz. Surface ECG leads and endocardial electrograms were displayed and recorded simultaneously with a paper speed of 100 or 200 mm . s⁻¹. From November 1995, a digital computerized multichannel recorder was used (CardioLab®9, Prucka Engineering, Inc., Texas, U.S.A.) with a filter bandwidth of 30–500 Hz.

The identification of potential ablation target sites has been described elsewhere[17]. Radiofrequency energy was administered through the distal tip of the ablation catheter using a continuous sinusoidal unmodulated waveform of 500 kHz. Standard radiofrequency current generators were HAT 200S and HAT 300 (Sulzer-Osypka, Germany). Temperature guided energy application was used[18]. The standard pre-selected temperature was 70°C for left-sided and 60°C for right-sided pathways.

Electrophysiological study and radiofrequency ablation

Data are presented as number (%) of patients in the study group. Data are presented as number (%) of patients in the study group.
Follow-up evaluation

Patients were seen in the hospital 6 and 12 months after ablation. Patient reports concerning clinical course, symptoms and medication, as well as ECGs were regularly sent to us by the referring physicians. Since the majority of the patients were referred by regularly referring physicians, mostly cardiologists practising in Münster and its surroundings, such follow-up data could be obtained for most patients.

A questionnaire was sent to all patients asking: (1) whether the patients still had arrhythmias, (2) whether the arrhythmias after the ablation were the same as those experienced before and, if not, why not, (3) when these arrhythmias first appeared after the procedure, (4) how often they occurred, (5) how long the arrhythmia episodes lasted and (6) which drugs the patients were taking. Follow-up information from patients who did not respond to the questionnaire was obtained by telephone.

Statistics

Data are presented as mean value ± SD. Changes within individuals in frequency of tachycardia episodes were analysed by paired Wilcoxon test. To evaluate associations between dichotomous variables, the chi-square test was used for independent samples and the McNemar’s test for paired samples. A $P$ value of <0.05 was considered significant.

Results

Distribution of pathway location and conduction properties

The 519 patients had a total of 544 accessory pathways: 495 patients had one pathway and 24 (4.6%) had multiple pathways (two in 23 cases and three in one case). The distribution of pathway location is shown in Table 4. Anterograde conduction, leading to pre-excitation in the resting ECG, was present in 394 pathways (72.4%). The remaining 150 (27.6%) were concealed.

Procedural success

Successful pathway ablation was achieved in 447 of the 519 patients (86.1%). In four additional patients with multiple pathways only one pathway was successfully ablated. In 39 of the 72 patients with an unsuccessful ablation attempt, a second procedure was undertaken. This was successful in 25 patients, but in three patients, a redo procedure was conducted and was successful in all three. Thus, in total, initial success was achieved in 476 patients (91.7%).

During clinical follow-up (hospital or referring cardiologists), recurrence of accessory pathway conduction was documented (preexcited ECG, induction of atrioventricular reentrant tachycardia in follow-up electrophysiological study) or presumed (documented regular supraventricular tachycardia or identical symptoms before and after ablation) in 50 patients (9.6%) after an initially successful ablation. Up to three repeat procedures were performed in 38 patients (7.3%) and were successful in 30 (78.9%).

Procedure related parameters and complications

Between October 1993 and May 1997, 602 ablation procedures for accessory pathways were performed. The mean number of radiofrequency pulses was 4.7 ± 4.8, mean duration of fluoroscopy was 45.5 ± 41.2 min and mean procedure duration was 3.1 ± 1.6 h.

There were no procedure-related deaths. Major complications were noted in only 1.0% (n=6, Table 5).

Follow-up

Follow-up information was obtained from 454 patients (87.5%). Mean follow-up duration was 22.6 ± 12.4 months (range 3–47). According to the patients’ answers, patients were classified into (1) asymptomatic, (2) experiencing arrhythmias of a different character to those before ablation and (3) experiencing arrhythmias similar to the ones before ablation.

Symptoms in patients with successful ablations

Among the 454 patients who responded to the questionnaire, 398 (87.7%) had had a successful ablation (defined

<table>
<thead>
<tr>
<th>Table 4</th>
<th>Pathway location</th>
</tr>
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<tbody>
<tr>
<td>Left-sided</td>
<td>347 (63.8%)</td>
</tr>
<tr>
<td>Anterior</td>
<td>6 (1.1%)</td>
</tr>
<tr>
<td>Anterolateral</td>
<td>30 (5.5%)</td>
</tr>
<tr>
<td>Lateral</td>
<td>143 (26.3%)</td>
</tr>
<tr>
<td>Posterolateral</td>
<td>79 (14.5%)</td>
</tr>
<tr>
<td>Posterior</td>
<td>47 (8.6%)</td>
</tr>
<tr>
<td>Midseptal</td>
<td>7 (1.3%)</td>
</tr>
<tr>
<td>Posteroseptal</td>
<td>35 (6.4%)</td>
</tr>
</tbody>
</table>

| Right-sided | 197 (36.2%) |
| Anterior | 11 (2.0%) |
| Anterolateral | 12 (2.2%) |
| Lateral | 16 (2.9%) |
| Posterolateral | 11 (2.0%) |
| Posterior | 20 (3.7%) |
| Anteroseptal | 13 (2.5%) |
| Midseptal | 44 (8.5%) |
| Posteroseptal | 51 (9.4%) |
| Proximal coronary sinus | 5 (0.9%) |
| Mahaim (atriofascicular, nodofascicular and fasciculoventricular) | 14 (2.6%) |

Data are presented as number (%) of accessory pathways in the study group.
Digitalis 3 (0·9%) Class I drugs 2 (0·6%) Complete atrioventricular block with permanent pacemaker implantation (after ablation of right midseptal pathways) 2 (0·3%) Left ventricular perforation necessitating surgical repair 1 (0·2%) Cerebrovascular accident (left hemispheric infarction after ablation of a right lateral pathway) 1 (0·2%) Hemopericardium requiring drainage 1 (0·2%) Aortic dissection, treated conservatively 1 (0·2%) Minimal complications 62 (10·3%) Transient, completely reversible neurological episode (hemianopsia, central scotoma, paraesthesia, desorientation etc.) 19 (3·2%) Vascular complications (arteriovenous fistula, pseudoaneurysm) 14 (2·3%) Minor pericardial effusion, not requiring any treatment 11 (1·8%) New bundle branch block 9 (1·5%) Transient complete atrioventricular block 5 (0·8%) Extensive groin haematoma, treated conservatively 3 (0·5%) Retroperitoneal haematoma, treated conservatively 1 (0·2%)

Data are presented as number (%) of patients in the study group.

Table 6 Number of patients taking antiarrhythmic drugs during follow-up

<table>
<thead>
<tr>
<th>Antiarrhythmic drugs</th>
<th>Successfully treated patients</th>
<th>Failed ablations</th>
<th>Total n=454</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Success/ asymptomatic</td>
<td>Failed/ asymptomatic</td>
<td></td>
</tr>
<tr>
<td></td>
<td>n=340</td>
<td>n=38</td>
<td>n=56</td>
</tr>
<tr>
<td></td>
<td>Success/ recurrence</td>
<td>Failed/ total</td>
<td></td>
</tr>
<tr>
<td></td>
<td>n=20</td>
<td>n=33</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Success/ total n=398</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digitalis</td>
<td>3 (9·8%)</td>
<td>2 (6·1%)</td>
<td>4 (7·1%)</td>
</tr>
<tr>
<td>Class I drugs</td>
<td>2 (0·6%)</td>
<td>3 (0·6%)</td>
<td>4 (7·1%)</td>
</tr>
<tr>
<td>Flecaïnide</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Propafenone</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Prajmaline</td>
<td>1 (0·3%)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mexiletine</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Beta-blockers</td>
<td>23 (6·8%)</td>
<td>5 (15·2%)</td>
<td>12 (21·4%)</td>
</tr>
<tr>
<td>Class III drugs</td>
<td>10 (2·9%)</td>
<td>6 (18·2%)</td>
<td>9 (16·1%)</td>
</tr>
<tr>
<td>Sotalol</td>
<td>9 (2·6%)</td>
<td>2 (6·1%)</td>
<td>3 (5·4%)</td>
</tr>
<tr>
<td>Amiodarone</td>
<td>1 (0·3%)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Verapamil</td>
<td>2 (0·6%)</td>
<td>2 (6·1%)</td>
<td>3 (5·4%)</td>
</tr>
<tr>
<td>Total</td>
<td>36 (10·6%)</td>
<td>20 (52·6%)</td>
<td>22 (48·9%)</td>
</tr>
</tbody>
</table>

Data are presented as number (%) of patients with drugs during long-term follow-up in each group. ‘Total’ in the lowest horizontal row presents the total number of patients taking one or more antiarrhythmic drugs in each group. Thus, if a patient was taking, for instance, digitalis and a Class I drug, he appears in the field ‘Total’ as one patient.

Success/asymptomatic: successfully treated patients without symptoms during follow-up. Success/presumed AF: successfully treated symptomatic patients with different symptoms than prior to ablation, presumably due to paroxysmal atrial fibrillation (AF).

Success/recurrence: successfully treated patients with recurrences during long-term follow-up.

Success/total: group of all patients with successful ablations.

Failed/asymptomatic: asymptomatic patients with failed ablations.

Failed/symptomatic: symptomatic patients with failed ablations.

Failed/total: group of all patients with failed ablations.

Total (vertical column): group of all patients.

as successful initial or repeat ablation). In this group, 340 of 398 patients (85·4%) were asymptomatic at follow-up. Thirty-six of the 340 patients required antiarrhythmic medication (10·6%) with the great majority taking one drug (n=32), and a combination of two antiarrhythmic agents in the remaining four patients. Most prescribed drugs were beta-blockers (n=23, mainly bisoprolol and metoprolol) and sotalol (n=9). Antiarrhythmic medication is shown in detail in Table 6 (column: success/asymptomatic). Tachyarrhythmias described by the patients as being different from the symptoms prior to ablation were reported by 38 out of 398 successfully treated patients (9·5%) in 25 of these 34 patients, atrial fibrillation was documented during follow-up (n=16) or prior to ablation (n=9), so it is likely that atrial fibrillation was the cause of the symptoms in most cases in this group. Twenty of the 38 patients (52·6%) were taking antiarrhythmic drugs during follow-up: two drugs in seven cases and one drug in 13 cases. Most prescribed drugs were digitalis (n=8),
flecainide (n=6) and sotalol (n=6). Further antiarrhythmic medication in this group is shown in Table 6 (column: success/presumed AF).

Only 20 patients (5-6%) with successful ablations reported symptoms similar to the ones prior to ablation which were highly suspicious of recurrence of accessory pathway conduction. Time of recurrence of arrhythmias in these patients ranged from 1 day to 23 months after ablation (in 15 patients ≤6 months, in five patients >6 months). The frequency of arrhythmias ranged from 3/year to daily and episode duration ranged from 1 min to 2–3 days. Ten out of 20 patients (50%) with recurrences during long-term follow-up were taking antiarrhythmic drugs, with most patients taking one drug (n=9) and one patient taking a combination of two antiarrhythmic agents: class I agents in three cases (propafenone n=2 and flecainide n=1), beta-blockers in three cases, class III agents in four cases (sotalol n=4) and verapamil in one case (Table 6, column: success/recurrence). Thus, 66 of the 398 successfully treated patients (16-6%) were taking antiarrhythmic drugs with a mean of 1.2 ± 0.4 drugs per patient (12 patients taking a combination of two antiarrhythmic agents and the remaining 54 patients taking one drug). A list of antiarrhythmic drugs at follow-up is given in Table 6 (column: success/total).

**Symptoms in patients with failed ablations**

Among the 56 patients with finally failed ablation attempts (defined as failed initial or repeat ablations) and available follow-up data, 23 patients (41-1%) were asymptomatic during follow-up (vs 1/56 prior to ablation attempt, P<0.001). Eight of the 23 patients had undergone an initially successful ablation followed by recurrence, a modification of the conduction properties of the pathway was achieved in an additional four patients. Interestingly, these asymptomatic patients after failed ablation were not asymptomatic before the procedure: 17 of the 23 patients had had one or more tachycardia episodes per month with a mean of 9.3 ± 13.2 episodes per month and six patients had had less than one episode per month prior to ablation. Mean duration of symptoms before the procedure was 173.3 ± 149.5 months.

Twelve of the asymptomatic patients (i.e. 21-4% of the 56 patients with failed procedures) were drug-free at follow-up. The remaining 11 of the 23 asymptomatic patients after failed ablations were taking antiarrhythmics drugs during follow-up: a combination of two drugs in three cases and one drug in eight cases. Most antiarrhythmics were class I drugs (n=7, mainly flecainide) and sotalol (n=3). Antiarrhythmic medication is shown in detail in Table 6 (column: failed/asymptomatic).

Twelve out of 56 patients (21-4%) with failed procedures reported that their arrhythmias at follow-up were different from prior to ablation, whereas in 21 patients (37-5%) the symptoms at follow-up were similar to those that occurred initially. In these 21 patients, reporting the same symptoms after the procedure, the tachycardia incidence, initially and subsequently, was also similar (8.5 ± 11.5 episodes per month before 10.7 ± 11.4 after, not significant). Antiarrhythmic medication was used in 22 out of 33 symptomatic patients during follow-up: a combination of two drugs in six cases and one drug in 16 patients. Again, most antiarrhythmics were class I drugs (n=14, mainly flecainide) and sotalol (n=6). Antiarrhythmic medication in detail is shown in Table 6 (column: failed/symptomatic).

Thus, antiarrhythmic medication during follow-up was used in 33 of the 56 patients (58-9%) with failed ablations, with a mean of 1.3 ± 0.5 drugs per patient (a combination of two drugs, mostly flecainide together with another antiarrhythmic agent, in nine patients, and one antiarrhythmic agent in the remaining 24 patients). A list of the antiarrhythmic drugs during follow-up is given in Table 6 (column: failed/total). In total, more patients with failed ablations were taking antiarrhythmic drugs than patients with successful procedures (33/56 [58-9%] vs 66/398 [16-6%], P<0.001).

On an intention-to-treat basis, of the total 454 patients with (successful or failed) ablation attempts, as an attempt at non-pharmacological therapy, 99 patients (21-8%) still took antiarrhythmic drugs during follow-up (Table 6, column: Total). This was significantly less than prior to ablation (P<0.001).

**Discussion**

**Short-term results**

The overall success rate in this series was 91-7%, which is similar to that reported in a number of previous series[3,4,10,12,13,16–18]. All of these groups reported success rates ranging from 86 to 93%. In only a few studies has almost complete elimination of accessory pathway conduction been reported[2,6,19]. In order to achieve success rates exceeding 90%, 7-5% of the patients in our series had to undergo 1–2 redo ablation procedures, which is comparable to previous reports[8].

**Complications**

The safety of radiofrequency ablation of accessory pathways has been well established. In our series, there were no procedure-related deaths. Permanent complete atrioventricular block was induced in only two patients (0-3%). The Multicentre European Radiofrequency Survey reported a death rate of 0.13%, induction of complete atrioventricular block in 0.63% and perforation/tamponade in 0.72% in a series of 2,222 patients[11]. The rate of major complications was 1% in our single-centre study and, thus, much lower than the rate of 3% reported recently in a large multicentre study which included patients with ablation of accessory pathways,
atrioventricular nodal reentrant tachycardia and the atrioventricular junction\textsuperscript{[19]}. Although the retrograde route through the femoral artery was used for ablation of almost all left-sided pathways in our unit, only one aortic dissection and one retroperitoneal haematoma were observed. Both complications were treated conservatively. This demonstrates the safety of this approach and is consistent with previous studies reporting comparable complication rates using the transseptal method\textsuperscript{[20]}.

**Recurrences**

The recurrence rate of 9.6\% in our series (during hospital follow-up) is consistent with the 10\% rate in 217 patients reported by our laboratory for the period 1986–1993\textsuperscript{[13]} and that observed by previous groups. Recurrence was observed in 12\% of the patients in the series of Langberg \textit{et al.}\textsuperscript{[12]}, in 8\% in the reports of Twidale \textit{et al.}\textsuperscript{[6]}, 7–8\% in the reports of Timmermans \textit{et al.}\textsuperscript{[13]} and Calkins \textit{et al.}\textsuperscript{[10]} and 6\% in the series of Xie \textit{et al.}\textsuperscript{[10]}. Increased investigator experience and improvement of catheter technology do not seem to have influenced the recurrence rate. Accessory pathway conduction can be abolished in a great percentage of these cases\textsuperscript{[6,12]}, but up to three redo procedures may be required.

It is generally assumed that recurrences occur mostly in the first 6 months of follow-up. It is of note that 25\% of all occurrence during long-term follow-up in our study were seen after 6 months.

**Long-term follow-up**

Results at long-term follow-up were excellent in patients with successful procedures, with 340 patients (85.4\%) being asymptomatic during follow-up. However, 66 of the 398 successfully treated patients (16.6\%) were still taking antiarrhythmic drugs during long-term follow-up. Only 5.0\% of the successfully treated patients had recurrence of accessory pathway conduction during long-term follow-up.

It is noteworthy that a significant proportion of patients (41.1\%) with failed ablations were asymptomatic during follow-up, with less than half of them taking any antiarrhythmic medication. A possible explanation for this phenomenon would be a modification of the conduction properties of the pathway since an initially successful ablation (followed by recurrence) or a modification of the pathway conduction properties was achieved in approximately half of these patients (in 12 of 23 cases). A late effect of the radiofrequency energy delivery after the end of the procedure would be another explanation, but this conjecture remains speculative. Unfortunately, most patients refused to undergo a follow-up electrophysiological study so that follow-up electrophysiological data were available only in a small minority.

Interestingly, the drugs most used in asymptomatic patients with failed procedures were class I drugs, whereas in patients with successful procedures these were mostly beta-blockers. On the intention-to-treat basis, need for antiarrhythmic medication was still present in 21.8\% of the patients in the total group of the 454 patients, despite the non-pharmacological character of this form of therapy.

**Comparison with previous studies**

Several reports concerning follow-up after radiofrequency catheter ablation of accessory pathways have been published\textsuperscript{[5–7,12,13,18,21]}. However, almost all of these studies have focussed on predictors of recurrence and not on patients’ symptoms or antiarrhythmic medication at follow-up. Furthermore, follow-up duration was relatively short and did not exceed 14 months on average in most publications. The present study is based on one of the largest series of accessory pathway ablation with 519 patients and includes the longest follow-up duration reported up to now (22.6 ± 12.4 months) and is the first, to our knowledge, to investigate the clinical course of patients with initially failed ablation attempts and the clinical need for antiarrhythmic therapy at follow-up.

**Study limitations**

A limitation of this study is that the data for the short-term results (procedural success, complications, recurrence) were collected retrospectively. However, long-term follow-up was prospectively designed. Follow-up information was not obtained from all patients, mainly due to the mobility of younger patients, but the response rate of 87.5\% was satisfactory. Although all attempts were made to document any arrhythmia recurrence and to obtain ECG tracings, a minority of patients with no arrhythmia documentation had to be classified based on history. Since most patients refused to undergo a follow-up electrophysiological study, follow-up electrophysiological data were available only in a few patients not allowing statistical analysis.

**Conclusions**

(1) Radiofrequency ablation of accessory pathways has excellent long-term results with low recurrence rate.

(2) Major complications associated with the ablation procedure in a large-volume centre occur in only 1\%.

(3) Over 85\% of patients with successful ablations are asymptomatic during follow-up.

(4) However, on an intention-to-treat basis, need for antiarrhythmic medication is still present in 22\% of the patients treated by this non-pharmacological therapy form.

(5) Only 5\% of
the patients with successful ablations had recurrences during long-term follow-up, 25% of which occur after 6 months.

References


