LONG TERM FOLLOW-UP OF RADIOFREQUENCY CATHETER ABLATION IN PATIENTS WITH TYPICAL ATRIAL FLUTTER

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REZUMAT

Introducere: Ablatio prin radiofreqventă este larg utilizată în tratamentul pacienților simptomatici cu flutur atrial tipic, rezultatele pe termen lung fiind însă discutabile. Scopul studiului: De a investiga pe termen lung rezultatele ablației prin radiofreqventă la pacienții cu flutur atrial tipic și de a determina factorii prediciivi pentru recidiva acestei afecțiuni la un grup larg populational. Material și metode: 49 de pacienți succesiivi, 16 femei și 33 bărbați, cu vârsta medie de 54 ani, au fost supuși procedurii de mapping endocardiatic atrial și de ablație prin radiofreqventă în perioada iunie 2000-septembrie 2003. Succesul ablației a fost accepțat doar în cazul obtinerii blocului de conducere transitricm bidirectional la pacienții la care postprocedural nu s-a reușit inducerea ritmelor. Toti pacienții au fost urmăriți la o lună după procedură și apoi la 6, 12, 18, 24, 30, 36 luni. Rezultate: Fluturul atrial a fost între rupt la toți cei 49 de pacienți, cu un număr mediu de aplicări de 19 ± 11 și un timp mediu fluoroscopic de 24 ± 15 minute. Blocul de conducere bidirectional a fost confirmat la 42 de pacienți (85,71%). 6 pacienți au prezentat recidivă de flutur atrial tipic (în cazul a 5 dintre ei nu s-a putut realiza initial decât blocul de conducere unidirectional), în cursul primelor 6 luni după ablație. 5 dintre cei 8 pacienți cu flutur atrial și fibrilație atrială înaintea procedurii au prezentat ulterior recurența fibrilației atriale. Nu s-au semnalat complicații semnificative în cursul procedurii. Concluzii: Ablatio prin radiofreqventă a fluturului atrial tipic este o metodă eficientă, sigură, cu o rată redusă de recidivă. Obtinerea blocului de conducere bidirectional în cursul ablației și existența în prealabil a fibrilației atriale sunt factori predictivi de recidivă.

Cuvinte cheie: flutur atrial, radiofreqventă, ablație, bloc bidirectional.

ABSTRACT

Introduction: Radiofrequency (RF) ablation is widely used to cure symptomatic patients with typical atrial flutter. However, the long term results are debatable. Aims: To assess the long term benefit of RF catheter ablation in patients with typical atrial flutter and to analyze the predictors for late recurrence. Material and method: Forty-nine consecutive patients, sixteen women and thirty three men, mean age 54 years, referred for evaluation of typical atrial flutter, underwent endocardial atrial mapping and RF catheter ablation in the period between June 2000 and September 2003. Successful ablation was defined as achievement of bidirectional isthmus conduction block and no induction of atrial flutter after the procedure. All patients were consulted 1 month after the ablation, and then every 6 months up to 36 months. Results: Atrial flutter was interrupted in all 49 patients with a mean number of applications of 19 ± 11, a fluoroscopic duration of 24 ± 15 minutes. Bidirectional conduction block was confirmed in 42 patients (85.71%). Six patients had recurrence of typical atrial flutter (5 of them only with unidirectional conduction block), all of them during the 6 months period after ablation. 5 of 8 patients with atrial flutter and previous atrial fibrillation had recurrence of atrial fibrillation. There were no significant complications during or after the procedure. Conclusions: Radiofrequency catheter ablation of typical atrial flutter is a effective and safe procedure, associated with a low recurrence rate. Bidirectional conduction block and absence of previous atrial fibrillation are markers for positive prognosis. Key Words: atrial flutter, atrial fibrillation, radiofrequency, ablation, bidirectional block.

INTRODUCTION

Transcatheter RF energy applied to the region between the inferior vena cava and the tricuspid annulus for typical atrial flutter has achieved high success rates with low morbidity and mortality.¹³

Presently, the common practice is to interrupt conduction through the cavo-tricuspidian isthmus, with radiofrequency energy applications.

The aims of the present study are to investigate the
long-term results of radiofrequency catheter ablation in patients with typical atrial flutter and to examine the predictors for late occurrence of this arrhythmia in a large population group.

Typical atrial flutter is defined by a macroreentrant circuit, with clockwise or counterclockwise rotation around the tricuspid annulus, and conduction through the cavo-tricuspidian isthmus.

Typical atrial flutter is characterized on 12 lead ECG by the negative “sawtooth” atrial flutter waves in DII, DIII and AVF.

Appropriate application of radiofrequency energy via an electrode catheter can be used to cure atrial flutter, with an efficacy of 95%.

The technique involves electrophysiological study of the atrium during atrial flutter, to identify the location of the re-entrant circuit and then to confirm that the reentrant circuit includes the critical cavo-tricuspidian isthmus and to ablate it, using a anatomically based method.

Sometimes, this isthmus may be difficult to ablate completely, but combined entrainment pacing and mapping techniques have now evolved, which permit both the reliable demonstration that this isthmus is a part of the re-entrant circuit, and that the application of radiofrequency energy has produced complete bidirectional block in this isthmus.4,6

When the latter is demonstrated, successful ablation of atrial flutter has been accomplished.5

MATERIAL AND METHOD

a. Description of patient characteristics undergoing radiofrequency catheter ablation for typical atrial flutter.

Fourty-nine consecutive patients referred for evaluation of typical atrial flutter underwent endocardial atrial mapping and RF catheter ablation in the period between June 2000 and September 2003.

It was required that the patients have a history of typical atrial flutter, with P waves inverted in electrocardiographic leads II, III, and AVF, biphasic in leads I and V6 and upright in lead V1. (Fig. 1)

Sixteen women and thirty-three men with a mean age of 54.58 years were studied. All patients presented with persistent atrial flutter. Eight patients have a history of atrial fibrillation, documented by 24 hours Holter monitoring or induced during electrophysiological studies.

Antiarrhythmic drugs were withdrawn 24 to 48 hours before the study.

Figure 1. Twelve-lead EKG of a patient with typical atrial flutter, with inverted “F” waves in DII, DIII, AVF biphasic in leads I and V6 and upright in V1.

b. The radiofrequency catheter ablation technique.

Under light sedation and local anesthesia, standard 6F multipolar electrode catheters were positioned in the right atrium, His bundle region via the left or right femoral veins, and in the coronary sinus via the right internal jugular vein. A 8F, steerable 4-mm tipped quadripolar electrode catheter with 2-mm interelectrode spacing was inserted into the right atrium via the right femoral vein for mapping and RF ablation. (Fig. 2)

In typical atrial flutter, the narrowest passage way is the low atrial isthmus. The aim of the ablations in this area is to make a complete lesion from the tricuspid valve to the inferior vena cava or eustachian ridge, and to terminate atrial flutter without serious complications. (Fig. 3)

Successful ablation was defined as achievement of bidirectional isthmus conduction block and no induction of atrial flutter after the procedure. Ablation was performed using a RF generator Radonics RFG 3E or Biotronik AB Control, with applied energy in a range from 40 to 60 Watts, for 30 to 60 seconds, until a
impedance rise occurs. If atrial flutter was terminated during energy application, a full 60 second application was performed at that site.

Technically, the ablation catheter was positioned on the ventricular side of the tricuspid ring, 6 at hours in 45° left anterior oblique view, and was withdrawn step by step, by applying RF energy, till we reached the inferior vena cava, or eustachian ridge.

After successful ablation of atrial flutter, programmed stimulation was performed to determine if atrial flutter was noninducible. It was evaluated the presence or absence of bidirectional conduction bloc, as an prediction factor of recurrence of atrial flutter.

c. Long term patients follow-up.

All patients were consulted 1 month after the ablation procedure, and then every 6 months up to 36 months, at which time a history of recent symptoms, an ECG and physical examination were performed. In patients with symptomatic arrhythmia, 24 hours Holter EKG monitoring was indicated.

Patients were discharged on no antiarrhythmic medication, and with aspirin (250mg per day) for the first 3 months after ablation.

Statistical analysis.

Subgroup data were compared using an independent samples t-test for continuous variables. All results were expressed as mean ± SD. P < 0.05 was considered significant.

RESULTS

Atrial flutter was successfully ablated or interrupted in all 49 patients.

The mean number of applications was 19±11 (range 3 to 52).

Procedure mean time was 156±71 minute with a total fluoroscopic duration of 24±15 minutes. (Fig 4, 5)

Bidirectional block was confirmed after flutter interruption in 42 patients (85.72%) - subgroup A, whereas 7 patients (14.28%) - subgroup B, were noted to have only counterclockwise isthmus block, without clockwise block despite additional applications (2.6 ± 0.9; range 2 to 4). (Fig. 6)

There were no significant complications during or after the procedure.

Also, 4 of the patients were implanted with DDD pacemakers for sick sinus syndrome at the moment of RF catheter ablation. We could obtain an bidirectional block only in 2 of these 4 patients, using an important number of applications (26±20, range 16 to 46).

After a follow up 24±12 months, 6 patients had a recurrence of typical atrial flutter; 5 of these 6 patients had had previous unidirectional counterclockwise block, and 1 patient had had bidirectional block. Five
of these patients were successfully reablated, 4 at the same site as before, and one at a different site as the previous ablation. One patient refused to repeat the ablation.

It is interesting to mention that all those patients had recurrence of atrial flutter during the first six months after ablation.

Some patients with atrial flutter have atrial fibrillation before or after atrial flutter ablation. Eight of our 49 patients had a history of atrial fibrillation, documented by Holter EKG monitoring or during electrophysiological studies; five of them had recurrence of this arrhythmia after flutter ablation (62.5%).

Atrial flutter ablation can also terminate atrial fibrillation, that is a degenerative rhythm of primary atrial flutter.

Despite non-inductibility of atrial flutter and creation of bidirectional conduction block in all those eight patients, recurrence of atrial fibrillation was documented in 5 of them, providing significant symptoms (palpitations, asthenia, dyspnea, dizziness), a requiring antiarrhythmic therapy.

One patient died at 8 months after RF catheter ablation, possibly due to sudden cardiac death.

**DISCUSSIONS**

This is the first study in Romania, that analyzes the global benefit in atrial flutter ablation and compares long term results in patients by using subgroups based on bidirectional block achievement.

Our findings support those of others suggesting that ablation of typical atrial flutter caused by reentry in the cavotricuspidian isthmus using RF energy can terminate and prevent recurrence of the arrhythmia in a great number of patients.7-13

Complete isthmus block was assessed with the classic activation mapping technique, which could not exclude extreme slow conduction inside the cavotricuspid isthmus. This can be done by advanced mapping technique.14

Using anatomically and electrophysiologically ablation criteria, procedure mean time and total fluoroscopic duration was similar in our study to other reported results.15

The introduction of new non-fluoroscopic three dimensional mapping systems or cryoablation techniques markedly reduced the fluoroscopy exposure during ablation, with significant reduction of ablation time and number of RF applications.16

During the long term follow up period of 24±12 months, 43 of 49 patients had no recurrence of atrial flutter (success rate of 87.75%).

Patients with incomplete isthmus conduction block (subgroup B) had a significant higher incidence of recurrent atrial flutter than those with complete isthmus block (subgroup A) (5/7 vs. 1/42, P < 0.0001). Recurrence of the arrhythmia was noticed in all those patients during the first six months of follow up after successful ablation, possibly due to incomplete lesions without permanent scar.

Although successful ablation of atrial flutter eliminated atrial fibrillation in 37.5% of patients with a prior history of atrial fibrillation,11,12

Recent studies identified history of atrial fibrillation before ablation, low left ventricular ejection fraction
and diabetes as predictors for high risk recurrence in patients with atrial flutter ablation. In absence of these factors, the risk of atrial fibrillation is believed to be relatively low.

The question remained, whether transisthmic ablation for atrial flutter would alter the long term risk of atrial fibrillation.

Our study, like others authors, showed that despite a high periablation success rate of transisthmic catheter ablation, ablation of atrial flutter does not alter the long term risk of subsequent atrial fibrillation.

CONCLUSIONS

Radiofrequency catheter ablation of typical atrial flutter is a highly effective and safe method, associated with a low recurrence rate. Achievement of bidirectional conduction block during ablation and previous atrial fibrillation are long term predictors for patients undergoing this procedure.

REFERENCES