

Cryoablation of Cardiac Arrhythmias

av

Hamid Bastani

AKADEMISK AVHANDLING

Som för erhållande av medicine doktorsexamen vid Karolinska Institutet
offentligen försvaras i föreläsningssal 9Q Månen, Karolinska Universitetssjukhuset Huddinge

Fredagen den 11 november 2011 kl. 09.00



**Karolinska
Institutet**

Handledare

Professor Mats Jensen-Urstad
Karolinska Institutet
Karolinska Universitetssjukhuset

Fakultetsopponent

Professor Luc Jordaens
Thoraxcentrum, Erasmus MC
Rotterdam

Bihandledare

Docent Jonas Schwieler
Karolinska Institutet
Karolinska Universitetssjukhuset

Betygsnämnd

Professor Carina Blomström-Lundqvist
Institutionen för medicinska vetenskaper
Akademiska Sjukhuset, Uppsala Universitet

Medicine doktor Per Insulander
Karolinska Institutet
Karolinska Universitetssjukhuset

Docent Kenneth Pehrsson
Karolinska Institutet
Karolinska Universitetssjukhuset

Docent Hans Persson
Institutionen för medicinska vetenskaper
Danderyds Sjukhus, Karolinska Institutet

Cryoablation of Cardiac Arrhythmias

Hamid Bastani

Karolinska Institutet, Department of Medicine, Division of Cardiology,
Karolinska University Hospital
Stockholm, Sweden

Abstract

This thesis evaluates the safety and efficacy of cryoablation in supraventricular tachyarrhythmias.

In **Study I**, the acute and long-term outcome of cryoablation therapy of typical atrioventricular nodal reentrant tachycardia (AVNRT) was studied in a large series of patients (n=312). Acute procedural success in AVNRT with cryoablation was achieved in 99% of patients with a recurrence rate of 5.8% during a mean follow-up period of 22 months, which is similar to the expected outcome after radiofrequency ablation (RF). There were no long-term complications related to the use of cryoablation. Additionally, it was shown that further reduction of the recurrence rate may be achieved by using the endpoint of complete slow pathway elimination compared with residual slow pathway conduction.

In **Study II** the clinical usefulness of cryoenergy for the ablation of perinodal atrioventricular reentrant tachycardia (AVRT) was investigated. Cryomapping of substrates adjacent to the AV-node may improve safety of the procedure. Acute procedural success with cryoablation in superoparaseptal and septal accessory pathways was achieved in 96% of the patients with a recurrence rate of 27% during a median follow-up of 33 months. The total success rate was 89% after a second cryoablation. Thus, acute and long-term results were similar to those reported for RF but without any complications related to the conducting system.

In **Study III** the safety and efficacy of cryoablation of atrial tachycardia (AT) with high risk of ablation-related injuries was evaluated. AT foci originated from the para-hisian area, the vicinity of the sinus node, and the crista terminalis adjacent to the phrenic nerve were studied. Acute procedural success was achieved in 96% of patients with a recurrence rate of 12% during a mean follow-up period of 16 months. The total success rate after a second cryoablation was 92%, which is similar to that reported for RF ablation but without any permanent complications.

In **Study IV** cryoablation was compared to RF ablation for the treatment of cavotricuspid isthmus-dependent atrial flutter with emphasis on clinical success, safety, and procedure-related pain. The acute ablation success was 95% in the RF group and 92% in the cryoablation group (NS). The long-term success after six-month of follow-up was 92% for RF and 86% for cryoablation (NS). RF ablation caused significantly more pain compared to cryoablation both in terms of average and peak pain perception.

In **conclusion**, cryoablation of AVNRT, of high risk AVRT, and of AT are safe and effective alternatives to RF ablation without causing any permanent complication related to the conducting system and the phrenic nerve. Moreover, cryoablation of isthmus-dependent atrial flutter is not inferior to RF but with less procedure-related pain.

ISBN 978-91-7457-480-7