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Clinical Research

Comparison of Outcomes After Cardioversion or Atrial Fibrillation Ablation in Patients With Differing Periprocedural Anticoagulation Regimens

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ABSTRACT

Background: There is a paucity of data that compare traditional vitamin K antagonist (VKA) with novel oral anticoagulant regimens in periprocedural management of cardioversion or ablation of atrial fibrillation (AF). We sought to compare outcomes of use of VKA, dabigatran (DABI), and rivaroxaban (RIVA) anticoagulation around the time of intervention.

Methods: We studied consecutive patients undergoing cardioversion or ablation of AF at our centre from October 2010 to October 2013. There were 3 different anticoagulation groups: warfarin (VKA), DABI, and RIVA. Safety was assessed according to number of strokes, transient ischemic attacks (TIAs), and clinically important and not important bleeding events.

Results: Baseline characteristics were well balanced between the groups. Average follow-up was 6 months (± 4 months). A total of 901

RÉSUMÉ

Introduction : Il existe peu de données qui permettent de comparer l'administration d'antagoniste traditionnel de la vitamine K (VKA) avec celle de nouveaux anticoagulants oraux pour la prise en charge périopératoire d'une cardioversion ou d'une ablation de la fibrillation auriculaire (FA). Nous avons cherché à comparer les résultats de l'utilisation de VKA, du dabigatran (DABI), et du rivaroxaban (RIVA) au moment de l'intervention.

Méthodes : Nous avons étudié les patients successifs ayant subi une cardioversion ou une ablation de la FA dans notre centre d'octobre 2010 à octobre 2013. Les anticoagulants définissent trois groupes différents : la warfarine (VKA), le DABI, et le RIVA. L'innocuité a été évaluée en fonction du nombre d'accidents vasculaires cérébraux (AVC), d'ischémies cérébrales transitoires (ICT), et des épisodes hémorragiques majeurs ou mineurs.

Atrial fibrillation (AF) is a type of arrhythmia associated with advancing age and underlying heart disease, such as hypertension, heart failure, left ventricular systolic dysfunction, and valvular heart disease.[1] For patients who are symptomatic despite antiarrhythmic drugs, or who cannot tolerate antiarrhythmic drugs, cardioversion or catheter AF ablation can improve quality of life by reduction of symptoms.[2-4]

Although initial success in restoring sinus rhythm is high, long-term success strongly dependents on the previous duration of AF.[3,4] Oral anticoagulation with warfarin or dabigatran (DABI) is recommenced to reduce the risk of thromboembolism for 3 weeks before cardioversion and at least 4 weeks after cardioversion.[3,4]

The cornerstone of AF ablation is pulmonary vein isolation. In most cases of AF, the pulmonary veins are responsible for triggering the arrhythmia. AF ablation is very effective in treating AF, particularly in paroxysmal AF. The Canadian guidelines for the ablation of AF recommend anticoagulation with warfarin to reduce the risk of thromboembolism for 1-2 months before ablation and at least 3-6 months after ablation.[2,4]

For mitigating the increased risk of thromboembolic complications associated with the restoration of sinus rhythm,[5,6] warfarin is the traditional approach to anticoagulation before and after the procedure, although the novel oral anticoagulants (NOACs) are becoming the more recommended treatment for anticoagulation.[2-4,7,8] Compared with warfarin, there are relatively few data on the efficacy of

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patients who underwent cardioversion were studied (VKA [n = 471], DABI [n = 288] and RIVA [n = 141]). In these patients there were no strokes seen during follow-up and 2 TIAs in the DABI group. Bleeding rates were low, with no significant difference between the 3 groups. A total of 680 patients who underwent ablation were studied (VKA [n = 319], DABI [n = 220] and RIVA [n = 171]). There were no strokes reported during follow-up and 3 TIAs: 2 in the VKA group and 1 in the DABI group not resulting in a significant difference between the groups. Bleeding rates were low, with no significant difference between the groups.

Conclusions: Overall, there was a low incidence of adverse events for all anticoagulation regimens. Warfarin, DABI, and RIVA use around the time of the procedure are safe and reasonable options for patients who undergo cardioversion or AF ablation.

Résultats : Les caractéristiques initiales étaient bien équilibrées entre les groupes. Le suivi moyen était de 6 mois (± 4 mois). Un total de 901 patients ayant subi une cardioversion ont été étudiés (VKA [n = 471], DABI [n = 288] et RIVA [n = 141]). Chez ces patients, aucun AVC n'a été répertorié au cours du suivi tandis que 2 ICT l'ont été dans le groupe DABI. Les taux de saignements étaient faibles, sans différence significative entre les 3 groupes. Un total de 680 patients qui ont subi une ablation ont été étudiés (VKA [n = 319], DABI [n = 220] et RIVA [n = 171]). Aucun AVC n'a été rapporté au cours du suivi alors que 3 ICT l'ont été : 2 dans le groupe VKA et 1 dans le groupe DABI, insuffisant pour établir une différence significative entre les groupes. Les taux de saignements étaient faibles, sans différence significative entre les groupes.

Conclusions : Dans l'ensemble, il y avait une faible incidence des effets indésirables pour tous les régimes d'anticoagulation. L'usage de warfarine, DABI, et RIVA au cours de la procédure sont des options sûres et raisonnables pour les patients qui subissent une cardioversion ou une ablation de la FA.

the NOACs for periprocedural anticoagulation. There are also very few studies that compared the 3 main NOACs with each another. There is a high heterogeneity concerning the anticoagulation regimes especially around the time of ablation,[9] showing the need for reliable data about the safety and efficiency of different approaches.

The goal of this retrospective study was to compare the safety of periprocedural warfarin, DABI, and rivaroxaban (RIVA) around the time of elective cardioversion or pulmonary vein isolation procedure (PVI) in a large number of patients.

Methods

Study design and participants

Patients who underwent electrical cardioversion or PVI from October 2010 to October 2013 at our institution were retrospectively analyzed. Patients were divided into 3 groups: vitamin K antagonist (VKA), DABI, or RIVA according to the used anticoagulant.

Anticoagulation with VKA before the procedure was confirmed according to weekly international normalized ratios (INRs) between 2.0 and 3.0. Compliance with NOACs (DABI or RIVA) was assessed according patient self-report.

Cardioversion protocol

For all 3 anticoagulation groups, it was recommended that they have a minimum of 3 weeks of therapeutic anticoagulation before cardioversion and a minimum of 4 weeks after cardioversion. Anticoagulation was continued uninterrupted. Anticoagulation was maintained > 4 weeks in patients with thromboembolic risk according to their **C**ongestive Heart Failure, **H**ypertension, **A**ge, **D**iabetes, **S**troke/Transient Ischemic Attack ($CHADS_2$) score. For patients with < 3 weeks anticoagulation before cardioversion, a transesophageal echocardiogram (TEE) was performed to rule out left atrial thrombus. In the absence of a thrombus, cardioversion was performed.

Ablation protocol

For all 3 anticoagulation groups, patients needed a minimum of 4 weeks therapeutic anticoagulation before ablation and a minimum of 3 months after ablation. All patients underwent preprocedural TEE to rule out left atrial thrombus. In absence of a thrombus ablation was performed.

For the VKA group, warfarin was stopped 4 days in advance of ablation. Before ablation, 2 days of full-dose low molecular weight heparin (LMWH) bridging was given, with the last dose the night before the procedure. Starting at 8 hours after sheath removal, patients were bridged for 2 days with half-dose LMWH. Warfarin was restarted the same day of ablation at double- dose for 2 days, returning to full-dose on the third day, and continued for a minimum of 3 months.

For the NOAC groups (DABI and RIVA), NOACs were stopped 24 hours before the procedure with the last dose in the morning of the day before the procedure. Anticoagulation was resumed 8 hours after sheath removal, and continued for a minimum of 3 months.

For the procedure, two 8-French (F) right femoral sheaths were used for transseptals, one 11-F left femoral sheath was used for intracardiac echocardiogram, and one 5-F internal jugular sheath was used for the coronary sinus catheter. During the procedure, patients were given intravenous heparin to maintain activated clotting time (ACT) > 350 seconds. After the procedure, a maximum of 30 mg protamine sulfate was given if the last ACT was > 350 seconds (typically none if ACT was < 300 seconds, 20 mg if ACT was 300-400 seconds, 30 mg if ACT was > 400 seconds). Sheaths were pulled when ACT decreased to < 250 seconds.

Outcomes

Safety outcomes were stroke, transient ischemic attack (TIA), and "clinically important" and "clinically not important" bleeding events. Bleeding was considered "clinically important" if it required: hospitalization, transfusion, or cessation of anticoagulation for > 7 days. All other bleeding was considered minor. Stroke was defined as a sudden, focal neurologic deficit lasting > 24 hours, and presumed to be