Oral anticoagulants in cardiac electronic device implantation – case report and review of recent publications

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A - Research concept and design, B - Collection and/or assembly of data, C - Data analysis and interpretation,
D - Writing the article, E - Critical revision of the article, F - Final approval of article

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Received: 2018-12-19
Revised: 2019-01-07
Accepted: 2019-01-15
Final review: 2018-12-30
DOI: 10.24255/hbj/102948

Key words:

oral anticoagulants, hematoma, electrical device implantation.

Abstract

Every year, numerous cardiac electronic device implantations are performed in patients on oral anticoagulant therapy. This procedure has medium risk of bleeding; therefore the guidelines suggest discontinuation of vitamin K antagonists (VKA) with heparin introduction and interruption of novel oral anticoagulant (NOAC) therapy without heparin bridging before the implantation. In addition to the guidelines, we had trial results which showed greater benefits from continuing VKA therapy during cardiac implantable electronic device (CIED) implantation without including heparin. This option of therapy reduces the risk of hemorrhagic complications in patients after CIED implantation. The first large publication appeared this year and considers peri-implantation continuation of NOAC therapy. Ricciardi et al. have shown that there is no significant difference between interrupted and uninterrupted NOAC therapy before the procedure. This study includes information on the possibilities of using oral anticoagulants in the CIED implantation procedure and a case report of a patient who was treated according to the guidelines.

Introduction

There are numerous procedures which are performed to implant electrical cardiac devices every year[1,2]. Fourteen to 35% of patients who were qualified to be implanted with a cardiac implantable electronic device (CIED) require long-term oral anticoagulation therapy[3,4,5]. Hematoma is a major complication that occurs in 2.9-9.5% of patients[6] and 0.3-2% of them need evacuation[5,7]. The device-pocket hematomas can contribute to the discontinuation of anticoagulation therapy with high risk of thromboembolism[8,9], prolongation of hospitalization[10] and increased risk of developing hospital infection[11]. To reduce the risk of device-pocket hematomas, current guidelines recommend interruption of oral anticoagulation therapy before the procedures and use of bridging therapy with administration of heparin (low molecular weight or unfractionated) around the time of the operation[12]. In the case of novel oral anticoagulants (NOAC), the guidelines recommended stopping treatment before intervention without heparin bridging[13].

However, many randomized trials show that uninterrupted vitamin K antagonist (VKA) therapy compared to interrupted bridging with heparin is safer and reduces hemorrhagic risk complications, including pocket hematomas, during procedures with low/medium risk of bleeding[14,15,16].

Case report

The 78-year-old man was qualified for VVI device implantation due to atrial fibrillation with a slow heart rate. The patient had a mechanical mitral valve in situ and had persistent atrial fibrillation (AF). He suffered from diabetes and hypertension. Five days before the implantation, VKA was interrupted and the patient was bridged with low molecular weight heparin. On the day of the procedure, the international normalized ratio (INR) was 2.5. Two days after VVI device implantation, acenocoumarol was administered again. On the third day extensive hematoma occurred but did not require surgical intervention. Finally, the hematoma was absorbed spontaneously after a month.

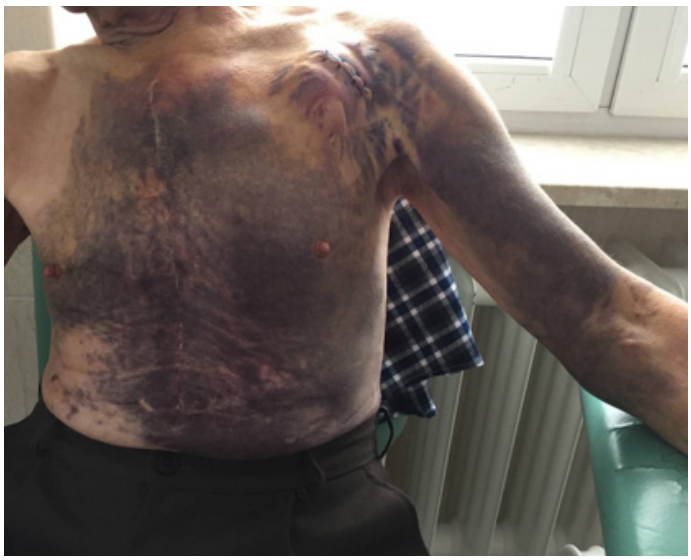

Figure1. Because the patient had a mechanical valve, acenocoumarol was given. In accordance with guidelines, VKA was interrupted and heparin bridging was introduced. The hematoma occurred three days after CIED implantation and one day after acenocoumarol administration. It was very extensive and covered the area of the chest, abdomen and left arm. The hematoma was absorbed one month later without any intervention.

Discussion

CIED implantation is classified as a low/medium-risk bleeding procedure. Patients with AF have heterogeneous risk of bleeding and it depends on many factors. The HAS-BLED score system is used to estimate bleeding risk in patients taking anticoagulants with atrial fibrillation[17]. The HAS-BLED score system contains the following parameters: hypertension (uncontrolled, > 160 mmHg systolic), abnormal renal (dialysis, transplant, Cr >2.26 mg/dL or >200 μmol/L) and liver functions (cirrhosis or bilirubin >2x normal with AST/ALT/AP >3x normal), stroke history, bleeding (prior major bleeding or predisposition to bleeding), labile INR (unstable/high INRs, time in therapeutic range <60%), age>65, medication usage predisposing to bleeding, alcohol use (≥8 drinks/week)[17]. Each parameter has a value of 1 point; a score of 3 or more indicates high risk of bleeding[17]. The patient had two points in the HAS-BLED score system (hypertension and age>65).

The CHAD-VASc score estimates the risk of thromboembolic complications (mainly stroke) in patients with AF [18]. The man from the case report had four points (age>75, hypertension and diabetes), which indicated high thromboembolic risk.

In the case thus described, the patient had periprocedural therapy recommended by guidelines[12]. Many trials show that continuation of VKA therapy without heparin bridging is better than therapy with interrupted VKA and administration of heparin around the time of CIED implantation, because there is less risk of bleeding and associated complications[7,14,15].

BRUISE CONTROL (Bridge or Continue Coumadin for Device Surgery Randomized Controlled Trial) enrolled 668 patients at medium-high risk of thromboembolism. In the VKA continuation arm, the goal was to reach an INR ≤ 3.0 (3.5 in patients with a mechanical valve). In the bridging therapy arm, the heparin was administered after 5 days of discontinuation of the oral anticoagulant, with discontinuation 24 h before the procedure (4 h in the case of unfractionated heparin i.v.) and resumption 24 h later. The mean INR at the time of the procedure in the VKA continuation arm was 2.3. About 16% of the enrolled patients had mechanical mitral valves. Aspirin administration was continued and clopidogrel therapy was interrupted. The primary endpoint was pocket hematoma requiring revision, prolongation of hospitalization, or discontinuation of anticoagulant therapy. 3.5% of patients in the VKA continuation group and 16% of patients in the heparin arm had clinically significant pocket hematoma. The results of this trial demonstrated the greater safety of a VKA continuation strategy compared with the bridging therapy in high–medium risk patients undergoing CIED implantation procedures.[14]

It is possible that the use of uninterrupted VKA therapy would protect the patient against extensive pocket hematoma, which can increase infection risk.

The perioperative treatment is different in procedures with high hemorrhagic risk such as transvenous lead extraction (TLE)[19]. It is recommended to discontinue oral anticoagulants. Guidelines suggest stopping NOAC for a minimum of 2 half-lives of the drug before low-risk bleeding procedures and for a minimum of 4 half-lives when the hemorrhagic risk is moderate/high[20]. Heparin bridging is dependent on thromboembolic risk[19]. Low molecular weight heparin (LMWH) is administered at medium/high risk and not administered at low risk[19].

However, more and more patients use NOAC in anticoagulation therapy, for example in persistent AF or deep vein thrombosis[13]. In the case of NOAC therapy, data about procedure-related bleeding complications around the time of cardiac device implantation were not enough, so it is recommended to interrupt NOAC therapy before the surgery, without heparin bridging[13]. In March 2018, Ricciardi et al. published the first large randomized trial that compares the effects of continuing with interruption NOAC therapy, without heparin bridging before the CIED implantation[21].

Description of publication

It was a prospective, open-label, randomized, controlled single blind pilot trial (1:1 randomization). 101 patients took part in it, and they were divided into two groups: 51 had interrupted NOAC therapy (group 1) and 50 had uninterrupted NOAC therapy (group 2). Patients were on treatment with dabigatran, apixaban, rivaroxaban (high or low dose) and they were qualified to CIED implantation/reimplantation. Rivaroxaban and apixaban were interrupted 24 hours before the procedures while administration of dabigatran was stopped 24-48 hours before the implantation (depending on the creatinine clearance). Antiplatelet therapy was not suspended. Cephalic and subclavian veins were used in implantation. The primary end-point was defined as clinically significant pocket hematoma. The secondary end-point included major bleeding events, infection connected with CIED implantation, thrombotic events, and extended time of hospitalization[21].

Finally, only 4 patients had a pocket hematoma (two in the first group and two in the second group) [p=0.984]. From among 3 patients who had a pocket hematoma, two were in dual antiplatelet therapy (one in the first group and one in the second group) and one, from the second group, was on clopidogrel. Only one patient presented clinically significant hematoma (from the uninterrupted NOAC group) and the same patient had CIED implantation-related infection, which ended with successful treatment. Major bleeding or thrombotic events did not occur. There was no significant difference between interrupted and uninterrupted therapy in view of the primary and secondary end-points (the same conclusion from the comparison of individual drugs and their doses)[21].

Conclusions

The conclusion from this trial is that no significant differences were observed between uninterrupted and interrupted NOAC therapy for the outcome of pocket hematoma. There are no significant changes between these two protocols for periprocedural bleeding outcomes. The benefit of continuing NOAC therapy is a shorter hospitalization time, which is associated with

a reduction in the health care costs. Summing up all the collected studies about using oral anticoagulants around the time of procedures with low/medium risk of bleeding, such as CIED implantation, it seems reasonable to continue treatment with both VKA (lower risk of bleeding and related complications, shorter hospitalization time, savings) and NOAC (shorter hospitalization, savings).

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