Comparison of Safety and Efficacy of Warfarin Versus Rivaroxaban in Northern Chinese Patients With Different CHA2DS2-VASc Score

Shiwei Xu  
Second Affiliated Hospital of Harbin Medical University

Yuanyuan Guo  
First Affiliated Hospital of Harbin Medical University

Xianghui Li  
Second Affiliated Hospital of Harbin Medical University

zengxiang dong (dongzx1982@163.com)  
The First Affiliated Hospital of Harbin Medical University  https://orcid.org/0000-0001-5255-3270

Xin Hai  
First Affiliated Hospital of Harbin Medical University

Research

Keywords: atrial fibrillation, warfarin, rivaroxaban, bleeding, ischemic stroke, CHA2DS2-VASc score

DOI: https://doi.org/10.21203/rs.3.rs-486483/v1

License: © This work is licensed under a Creative Commons Attribution 4.0 International License. Read Full License
Abstract

Purpose: Although many researches have indicated the anticoagulant effect of warfarin and rivaroxaban in atrial fibrillation (AF) patients, the comparison of these drugs on safety and efficacy in northern Chinese patients with different CHA2DS2-VASc Score is unclear. We aim to compare the safety and efficacy of warfarin versus rivaroxaban in northern Chinese AF patients with different CHA2DS2-VASc Score subgroups.

Methods: 387 AF patients were recruited in the study. Of these, one group patients (n=194) were receiving warfarin, and the other group patients (n=193) were receiving rivaroxaban. Follow-up data were collected for one year, which included adherence, bleeding and ischemic stroke (IS) events.

Results: There was better adherence in rivaroxaban-treated group than warfarin-treated group. The events of bleeding decreased with increased score in warfarin-treated group. Patients with score 2-3, had better adherence and less stroke events in warfarin-treated group. The events of bleeding and stroke was not significantly different in rivaroxaban-treated group at different score.

Conclusions: We found that there was better adherence and less bleeding and stroke events in rivaroxaban-treated group than warfarin-treated group with different CHA2DS2-VASc score. There is better choice for northern Chinese patients to select rivaroxaban in the anticoagulative treatment of AF, regardless of economic factors.

Introduction

Atrial fibrillation (AF), reported common cardiac arrhythmias, has high incidence in aging society [1, 2]. AF patients have high risk of death and various diseases, such as IS [3]. Due to the cold weather in northern China, the incidence of cardiovascular disease, such as AF and IS, is very high. Warfarin has been proven to effectively inhibit stroke events in patients with AF [4–6]. However, warfarin has a lot of restricted application in patients because of bleeding events [7]. At present, new oral anticoagulation agents (NOACs) have been indicated to be better than warfarin for preventing of stroke in non-valvular AF patients [8, 9]. Rivaroxaban plays the anticoagulant role by inhibiting coagulation factor Xa. Although rivaroxaban and warfarin have similar risks of bleeding and stroke events, rivaroxaban is easy to use and does not require therapeutic monitoring.

Although warfarin and NOACs are effective anticoagulation therapy for preventing stroke in patients with AF [10], improved medication adherence of AF patients is important for treatment benefits. Previous study reported that NOACs may have higher adherence, because of less require routine monitoring with laboratory testing than warfarin [11–13]. However, the higher proportion of medical insurance payment for warfarin than rivaroxaban in northern China and using of warfarin can reduce medical costs. The current situation of adherence to medication in northern Chinese patients is unclear. In this way, studying adherence of northern Chinese patients may be beneficial to the safety and efficacy of oral anticoagulants in cold region.
The CHA2DS2-VASc score has been generally known to evaluate the risk of IS in AF patients, however, there has been limited real-world evidence about the risk of IS according to the scores in northern Chinese patients. In this study, we aim to use real-world data to evaluate the incidence of bleeding and IS events according to relative adherence and different CHA2DS2-VASc scores in northern Chinese AF patients who were treated by warfarin or rivaroxaban.

Methods

Study Subjects

We selected patients with non-valvular AF from September 2018 to August 2019 at the Second Affiliated Hospital, Harbin Medical University in our hospital’s database. Patients received oral anticoagulant therapy (216 patients using warfarin and 211 patients using rivaroxaban) for prevention of IS. Patients who were taking anticoagulants for vein thrombosis treating were excluded. All patients were treated with warfarin (1.25–2.5 mg/d, INR: 2.0–3.0) or rivaroxaban (15–20 mg/d) according to physician's decision. The study protocols were approved by the Second Affiliated Hospital of the Harbin Medical University (KY2020-195).

Safety and Efficacy Assessments

The safety outcome included bleeding events such as hemorrhinia, fundus hemorrhage, gingival bleeding, and gastrointestinal bleeding. The efficacy outcome was identified with thrombosis events. The definition of IS was focal neurological deficit for 24 h but no hemorrhage. The definition of systemic embolism was acute vascular occlusion. Bleeding and IS was diagnosed by physician using radiological examination or vascular imaging. All medical records of the patients were evaluated by physician.

Follow-up and Outcomes

Follow-up data were obtained at 1, 3, 6 and 12 months. The patients’ clinical status, medication adherence, bleeding events (hemorrhinia, fundus hemorrhage, gingival bleeding, and gastrointestinal bleeding), stroke occurrence, and other side effects were assessed during the follow-up visits. The follow-up outcomes of warfarin and rivaroxaban -treated group was compared.

Statistical Analysis

We used CHA2DS2-VASc score to evaluate stroke risk. Warfarin and rivaroxaban -treated patients were further divided into three groups with CHA2DS2-VASc score 0–1, score 2–3 and score ≥ 4 according to the previous study [14]. Data were shown mean and ± standard deviation and were compared with independent-samples t test for continuous variables. Data were shown percentage and were compared using the chi-square test for categorical variables. All statistical assessments were conducted with SPSS 20 (SPSS, USA). \( P < 0.05 \) was accepted for statistical significance.
Study Population

427 AF patients who received anticoagulant therapy with warfarin or rivaroxaban were enrolled in the study. One group (216 participants) were treated with warfarin, the other group (211 participants) were treated with rivaroxaban. However, 40 participants were lost during the follow-up period: 22 in warfarin-treated group and 18 in rivaroxaban-treated group. The two group were comparable in age, gender, hypertension, diabetes mellitus, previous stroke, cardiac function, CHA2DS2-VASc score, and blood biochemical indexes et al. The results showed in Table 1.
### Table 1
Baseline characteristics of study population

| Characteristic                  | Warfarin (n = 194) | Rivaroxaban (n = 193) | P value |
|--------------------------------|--------------------|-----------------------|---------|
| Age (years)                    | 61.75 ± 9.83       | 64.90 ± 11.81         | 0.005   |
| Men (%)                        | 107 (55.2%)        | 112 (58.0%)           | 0.568   |
| Hypertension (%)               | 68 (35.1%)         | 95 (49.2%)            | 0.005   |
| Diabetes mellitus (%)          | 30 (15.5%)         | 40 (20.7%)            | 0.179   |
| Previous stroke/TIA (%)        | 31 (16.0%)         | 35 (18.1%)            | 0.573   |
| Heart failure (%)              | 126 (64.9%)        | 45 (23.3%)            | < 0.001 |
| Vascular disease (%)           | 126 (64.9%)        | 118 (61.1%)           | 0.001   |
| CHA2DS2-VASc score (mean)      | 2.75 ± 1.44        | 2.90 ± 1.77           | 0.348   |
| Smoker (%)                     | 52 (26.8%)         | 35 (18.1%)            | 0.041   |
| Alcohol user (%)               | 37 (19.1%)         | 24 (12.4%)            | 0.073   |
| LDL-C (mmol/l)                 | 2.59 ± 0.85        | 2.33 ± 0.73           | 0.001   |
| HDL-C (mmol/l)                 | 1.11 ± 0.32        | 1.09 ± 0.25           | 0.590   |
| Total cholesterol (mmol/l)     | 4.20 ± 1.03        | 3.98 ± 0.87           | 0.033   |
| Triglyceride (mmol/l)          | 1.55 ± 0.71        | 1.72 ± 1.16           | 0.089   |
| Lipoprotein (a) (g/l)          | 1.12 ± 0.24        | 1.17 ± 0.26           | 0.062   |
| Lipoprotein (b) (g/l)          | 0.90 ± 0.26        | 0.81 ± 0.23           | 0.001   |
| Uric acid (µmol/l)             | 393.31 ± 137.17    | 342.82 ± 122.61       | < 0.001 |
| Crcl (ml/min)                  | 96.83 ± 46.51      | 90.49 ± 31.51         | 0.118   |
| LAD (mm)                       | 45.98 ± 9.98       | 40.16 ± 6.38          | < 0.001 |
| LVEF (%)                       | 55.34 ± 10.75      | 58.83 ± 8.20          | 0.001   |

Data are presented as mean ± standard deviation or proportions. TIA, transient ischemic attack; LDL-C, low-density lipoprotein cholesterol; HDL-C, high density lipoprotein cholesterol; Crcl, creatinine clearance; LAD, Left atrial diameter; LVEF, left ventricular ejection fraction.

**Adherence**

Adherence rate was 59.3% in warfarin-treated group, which was lower than rivaroxaban-treated group (78.2%, P < 0.001). The adherence rate of moderate-risk stroke patients (score 2–3, 67.3%) was higher than patients with low or high-risk stroke in warfarin-treated group (score 0–1, 51.4% and score ≥ 4,
49.1%). The adherence rates were similar in rivaroxaban-treated patients with different CHA2DS2-VASc scores (score 0–1, 79.6%; score 2–3, 75.7%; score ≥ 4, 79.7%). There was lower adherence of warfarin-treated group than rivaroxaban-treated group with score 0–1 and score ≥ 4 ($P< 0.01$ for all comparisons). The results showed in Table 2.

| Characteristic                        | Warfarin (n = 194) | Rivaroxaban (n = 193) | $P$ value |
|---------------------------------------|--------------------|-----------------------|-----------|
| All                                   | 115 (59.3%)        | 151 (78.2%)           | < 0.001   |
| CHA2DS2-VASc score 0 or 1             | 19 (51.4%)         | 39 (79.6%)            | 0.006     |
| CHA2DS2-VASc score 2 or 3             | 70 (67.3%)         | 53 (75.7%)            | 0.232     |
| CHA2DS2-VASc score ≥ 4                | 26 (49.1%)         | 59 (79.7%)            | < 0.001   |

CHA2DS2-VASc, risk based on the presence of congestive heart failure, hypertension, age ≥ 75 year, diabetes mellitus, prior stroke or transient ischemic attack, vascular disease, sex category.

### Safety and Efficacy Outcomes

The safety and efficacy outcomes of two groups during the follow-up period were showed in Fig. 1. Bleeding events were more in warfarin-treated group (36, 18.6%) than rivaroxaban-treated group (29, 15.0%), but there was no statistical difference (Fig. 1A). There was 36 patients occurred bleeding in the warfarin group, which included hemorrhinia (12, 33.3%), fundus hemorrhage (4, 11.1%), gingival bleeding (16, 44.4%), and gastrointestinal bleeding (4, 11.1%) (Fig. 1C). There was 29 patients occurred bleeding in the rivaroxaban group, which included hemorrhinia (3, 10.3%), fundus hemorrhage (5, 17.2%), gingival bleeding (17, 58.6%), and gastrointestinal bleeding (4, 13.8%) (Fig. 1D). The cumulative incidence of IS events in the warfarin and rivaroxaban groups was 8.8% (17/194) and 6.7% (13/193), respectively (Fig. 1B). There was no statistical difference in the two treatment groups.

### Risks of Bleeding and IS based on CHA2DS2-VASc Scores

To evaluate the safety and efficacy of warfarin versus rivaroxaban in AF patients at different CHA2DS2-VASc scores, we classified the AF patients to three groups: CHA2DS2-VASc score 0–1, score 2–3, and score ≥ 4, which have treated with warfarin or rivaroxaban. Bleeding events tended to be more in warfarin-treated group than rivaroxaban-treated group at score 0–1 and score 2–3, but the difference was no significance (Fig. 2A). Furthermore, in warfarin-treated group, patients with score 0–1 have more bleeding events than patients with score 2–3 and score ≥ 4 (Fig. 2B) ($P< 0.05$). In rivaroxaban-treated group, bleeding was not significantly different between patients with different scores (Fig. 2C).

IS events were more in warfarin-treated group than rivaroxaban-treated group at score 0–1 and score ≥ 4, but the difference was no statistical significance (Fig. 2D). Furthermore, in warfarin-treated group, patients with score ≥ 4 have more IS events than patients with score 2–3 (Fig. 2E) ($P< 0.01$). In
rivaroxaban-treated group, IS events was not significantly different between patients with different scores (Fig. 2F).

To further study type of bleeding with CHA2DS2-VASc score, we divided the bleeding into four subgroups: hemorrhinia, fundus hemorrhage, gingival bleeding, and gastrointestinal bleeding, which have induced by warfarin or rivaroxaban (Fig. 3). Only hemorrhinia was more in the warfarin-treated group than the rivaroxaban-treated group with score 0–1 (Fig. 3A) ($P < 0.05$). The incidence rate of fundus hemorrhage, gingival bleeding, and gastrointestinal bleeding was not significantly different in warfarin or rivaroxaban-treated group with different scores (Fig. 3B-D).

**Hospitalization**

99 patients were hospitalized in the follow-up period. The incidence rates of hospitalization were 23.2% (45/194) in warfarin-treated group and 28.0% (54/193) in rivaroxaban-treated group (Fig. 4A). The incidence rates of hospitalization were not significantly different in warfarin or rivaroxaban-treated group with different scores (Fig. 4B).

**Discussion**

Our study is a retrospective research to compare safety and efficacy of warfarin versus rivaroxaban in northern Chinese AF patients with different CHA2DS2-VASc Scores. The findings of our study were including: (1) There was better adherence in the rivaroxaban-treated group than the warfarin-treated group; (2) Bleeding events decreased with the increased score in warfarin-treated group. Patients with score 2–3, had better adherence and less stroke events in warfarin-treated group; (3) The events of bleeding and stroke was not significantly different in rivaroxaban-treated group at different score.

The risks of bleeding events were relatively high in our present study. Previous study indicated that warfarin and rivaroxaban have similar risks of major bleeding [15–17]. The previous study also found that 10.1% and 16.4% patients occurred major bleeding in the NOACs and warfarin group, respectively [18]. Our study found that bleeding events was less in rivaroxaban-treated group (15.0%) than warfarin-treated group (18.6%), but there was no significant difference. Bleeding events in warfarin-treated group were more than in rivaroxaban-treated group with score 0–1 and score 2–3, but the difference was no significance (Fig. 2A). Furthermore, warfarin-treated group with score 0–1 have higher bleeding risk than group with score 2–3 and score $\geq 4$ (Fig. 2B) ($P < 0.05$). These result indicated that AF patients with score 0–1 might be induced bleeding by warfarin. The result was not consistent with previous findings [19]. They found that the high rates for bleeding events happened in the patients at score $\geq 5$.

In the present study, incidence rate of IS was high. Previous studies found that there was similar stroke rates in NOACs and warfarin-treated group [20–22]. In our study, IS risk in warfarin-treated group was higher than that in rivaroxaban-treated group with score 0–1 and score $\geq 4$, but the difference was no significance (Fig. 2D). Furthermore, in warfarin-treated group, patients with score 2–3 have less IS events
than patients with score 0–1 and score ≥ 4 (Fig. 2E) \( (P < 0.01) \). These results may be induced because of the higher adherence to treatment with warfarin in patients with score 2–3 (Table 2).

Oral anticoagulants are usually used for preventing thrombosis in AF patients, before the onset of symptoms, so AF patient is not especially vulnerable to adherence. The application of warfarin requires regular monitoring, which may be another reason for nonadherence. Many studies indicated that patients who were treated by warfarin, many difficulties to maintain adherence for long term \[23, 24\]. Our findings indicated low adherence rate to warfarin, which was consistent with previous study \[25\]. The important advantage of rivaroxaban is freedom from monitoring. Previous study indicated NOACs improved adherence \[12\], which is consistent with our data indicated that adherence to rivaroxaban was higher than warfarin. There were several limitations in our study: (1) Our data and analysis were retrospective. (2) The follow-up time was relatively short. (3) The number of AF patients for analysis and statistics were relatively small. (4) There was no reasons for nonadherence were explored in our present study.

**Conclusions**

According to the results of the safety and efficacy clinical profile for warfarin and rivaroxaban in northern Chinese AF patients at different CHA2DS2-VASc Scores, we found that better adherence and lower bleeding and thrombosis events in rivaroxaban-treated group than warfarin-treated group with different CHA2DS2-VASc score. There was better choice for northern Chinese patients to select rivaroxaban in the anticoagulative treatment of AF, regardless of economic factors.

**Declarations**

**Ethics approval consent to participate**

This study was reviewed by the Second Affiliated Hospital of the Harbin Medical University (KY2020-195). Informed consent was not applicable.

**Consent for publication**

All authors have given their consent for the manuscript to be published.

**Availability of data and materials**

The datasets generated and/or analysed during this study are available from the corresponding author on reasonable request.

**Competing interests**

There was no conflicts of interest to declare.

**Funding**
The study was funded by the National Natural Science Foundation of China (No. 81900366), Postdoctoral Initiation Foundation of Heilongjiang Province (LBH-Q19032).

**Authors’ contributions**

Conception and design: Shiwei Xu, Zengxiang Dong. Data analysis and interpretation: Yuanyuan Guo, Xianghui Li. Manuscript writing: Zengxiang Dong, Xin Hai. Final approval of manuscript: Zengxiang Dong, Xin Hai.

**Acknowledgements**

Not applicable.

**References**

1. Ding M, Qiu C (2018) Atrial Fibrillation, Cognitive Decline, and Dementia: an Epidemiologic Review. Curr Epidemiol Rep 5: 252-261. https://doi.org/10.1007/s40471-018-0159-7

2. Villani ER, Tummolo AM, Palmer K et al (2018) Frailty and atrial fibrillation: A systematic review. Eur J Intern Med 56: 33-38. https://doi.org/10.1016/j.ejim.2018.04.018

3. Lip GYH, Skjoth F, Rasmussen LH, Larsen TB (2015) Oral anticoagulation, aspirin, or no therapy in patients with nonvalvular af with 0 or 1 stroke risk factor based on the CHA2DS2-VASc score. J Am Coll Cardiol 65: 1385-1394. https://doi.org/10.1016/j.jacc.2015.01.044

4. Hart RG, Pearce LA, Aguilar MI (2007) Meta-analysis: antithrombotic therapy to prevent stroke in patients who have nonvalvular atrial fibrillation. Ann Intern Med 146: 857-867. https://doi.org/10.7326/0003-4819-146-12-200706190-00007

5. Mant J, Hobbs FD, Fletcher K et al (2007) Warfarin versus aspirin for stroke prevention in an elderly community population with atrial fibrillation (the Birmingham Atrial Fibrillation Treatment of the Aged Study, BAFTA): a randomised controlled trial. Lancet 370: 493-503. https://doi.org/10.1016/S0140-6736(07)61233-1

6. Singer DE, Chang Y, Fang MC et al (2009) The net clinical benefit of warfarin anticoagulation in atrial fibrillation. Ann Intern Med. 2009 151: 297-305. https://doi.org/10.7326/0003-4819-151-5-200909010-00003

7. Hylek EM, Evans-Molina C, Shea C, Henault LE, Regan S (2007) Major hemorrhage and tolerability of warfarin in the first year of therapy among elderly patients with atrial fibrillation. Circulation 115: 2689-2696. https://doi.org/10.1161/CIRCULATIONAHA.106.653048

8. Connolly SJ, Ezekowitz MD, Yusuf S et al (2009) Dabigatran versus warfarin in patients with atrial fibrillation. N Engl J Med 361: 1139-1151. https://doi.org/10.1056/NEJMoa0905561

9. Patel MR, Mahaffey KW, Garg J et al (2011) Rivaroxaban versus warfarin in nonvalvular atrial fibrillation. N Engl J Med 365: 883-891. https://doi.org/10.1056/NEJMoa1009638
10. Go AS, Hylek EM, Chang Y et al (2003) Anticoagulation therapy for stroke prevention in atrial fibrillation: how well do randomized trials translate into clinical practice? JAMA 290: 2685-2692. https://doi.org/10.1001/jama.290.20. 2685

11. Zalesak M, Siu K, Francis K et al (2013) Higher persistence in newly diagnosed nonvalvular atrial fibrillation patients treated with dabigatran versus warfarin. Circ Cardiovasc Qual Outcomes 6: 567-574. https://doi.org/10.1161/ CIRCOUTCOMES.113.000192

12. Shore S, Carey EP, Turakhia MP et al (2014) Adherence to dabigatran therapy and longitudinal patient outcomes: insights from the veterans health administration. Am Heart J 167: 810-817. https://doi.org/10.1016/j.ahj. 2014.03.023

13. Gorst-Rasmussen A, Skjøth F, Larsen TB, Rasmussen LH, Lip GY, Lane DA (2015) Dabigatran adherence in atrial fibrillation patients during the first year after diagnosis: a nationwide cohort study. J Thromb Haemost 13: 495-504. https://doi.org/10.1111/jth.12845

14. Yao X, Abraham NS, Alexander GC et al (2016) Effect of Adherence to Oral Anticoagulants on Risk of Stroke and Major Bleeding Among Patients With Atrial Fibrillation. J Am Heart Assoc 5: e003074. https://doi.org/10.1161/ JAHA.115.003074

15. EINSTEIN-PE Investigators, Büller HR, Prins MH et al (2012) Oral rivaroxaban for the treatment of symptomatic pulmonary embolism. N Engl J Med 366: 1287-1297. https://doi.org/10.1056/NEJMoa1113572

16. EINSTEIN Investigators, Bauersachs R, Berkowitz SD et al (2010) Oral rivaroxaban for symptomatic venous thromboembolism. N Engl J Med 363: 2499-2510. https://doi.org/10.1056/NEJMoa1007903

17. Goodman SG, Wojdyla DM, Piccini JP et al (2014) Factors associated with major bleeding events: insights from the ROCKET AF trial (rivaroxaban once-daily oral direct factor Xa inhibition compared with vitamin K antagonism for prevention of stroke and embolism trial in atrial fibrillation). J Am Coll Cardiol 63: 891-900. https://doi.org/10.1016/j.jacc.2013.11.013

18. Kwon CH, Kim M, Kim J, Nam GB, Choi KJ, Kim YH (2016) Real-world comparison of non-vitamin K antagonist oral anticoagulants and warfarin in Asian octogenarian patients with atrial fibrillation. J Geriatr Cardiol 13: 566-572. https://doi.org/10.11909/j.issn.1671-5411.2016.07.011

19. Lee KT, Chang SH, Yeh YH et al (2018) The CHA2DS2-VASc Score Predicts Major Bleeding in Non-Valvular Atrial Fibrillation Patients Who Take Oral Anticoagulants. J Clin Med 7: 338. https://doi.org/10.3390/jcm7100338

20. Wong KS, Hu DY, Oommen A et al (2014) Rivaroxaban for stroke prevention in East Asian patients from the ROCKET AF trial. Stroke 45: 1739-1747. https://doi.org/10.1161/STROKEAHA.113.002968

21. Hori M, Connolly SJ, Zhu J et al (2013) Dabigatran versus warfarin: effects on ischemic and hemorrhagic strokes and bleeding in Asians and non-Asians with atrial fibrillation. Stroke 44: 1891-1896. https://doi.org/10.1161/STROKEAHA. 113.000990

22. Hori M, Matsumoto M, Tanahashi N et al (2012) Rivaroxaban vs. warfarin in Japanese patients with atrial fibrillation-the J-ROCKET AF study. Circ J 76: 2104-2111. https://doi.org/10.1253/circj.cj-12-0454
23. Davis NJ, Billett HH, Cohen HW, Arnsten JH (2005) Impact of adherence, knowledge, and quality of life on anticoagulation control. Ann Pharmacother 39: 632-636. https://doi.org/10.1345/aph.1E464
24. Fang MC, Go AS, Chang Y et al (2010) Warfarin discontinuation after starting warfarin for atrial fibrillation. Circ Cardiovasc Qual Outcomes 3: 624-631. https://doi.org/10.1161/CIRCOUTCOMES.110.937680
25. Skeppholm M, Friberg L (2014) Adherence to warfarin treatment among patients with atrial fibrillation. Clin Res Cardiol 103: 998-1005. https://doi.org/10.1007/ s00392-014-0742-y

Figures

Figure 1

The efficacy and safety outcomes according to warfarin or rivaroxaban treatment. (A) The bleeding events incurred with warfarin or rivaroxaban treatment. (B) Ischemic stroke with warfarin or rivaroxaban treatment. Sites of bleeding with warfarin (C) or rivaroxaban (D).
**Figure 2**

The incidence rate of bleeding and ischemic stroke according to CHA2DS2-VASc Scores. (A) The bleeding with warfarin and rivaroxaban treatment according to score. The bleeding with warfarin (B) or rivaroxaban (C) treatment according to score. (D) IS with warfarin or rivaroxaban treatment according to score. IS with warfarin (E) or rivaroxaban (F) treatment according to CHA2DS2-VASc Scores.
Figure 3

The subgroups of bleeding with warfarin and rivaroxaban treatment according to CHA2DS2-VASc Scores. (A) Hemorrhinia, (B) fundus hemorrhage, (C) gingival bleeding, and (D) gastrointestinal bleeding.
Figure 4

The incidence rate of hospitalization. (A) The incidence rate of hospitalization with warfarin and rivaroxaban treatment. (B) The incidence rate of hospitalization according to CHA2DS2-VASc Scores.