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ORIGINAL ARTICLE

CME

Antithrombotic treatment of atrial fibrillation in a regional hospital in Hong Kong

香港地區醫院對心房纖維性顫動的抗血栓治療

Objective. To measure the use, appropriateness, and safety of antithrombotic therapy in Hong Kong Chinese patients with atrial fibrillation.

Design. Retrospective review.

Setting. Regional hospital, Hong Kong.

Subjects and methods. Medical records of all patients with atrial fibrillation admitted to acute internal medicine wards in April 2000 and between July and October 2001 were reviewed for details of antithrombotics given, results of international normalised ratio monitoring for patients receiving warfarin, side-effects, and additional risk factors for complications of atrial fibrillation. Statistical analysis was undertaken to assess factors predictive of antithrombotic use.

Results. A total of 207 patients with chronic atrial fibrillation were included in the study. Of these, 44.0% of patients with non-valvular atrial fibrillation without contra-indications for warfarin use were receiving warfarin, 34.1% were receiving aspirin, and 22.0% were receiving no antithrombotic therapy. The majority of patients (69.1%) were treated appropriately according to the American College of Chest Physicians guidelines. The major side-effect rates for warfarin and aspirin were 2.14% and 1.72% per patient-year, respectively, which were comparable with western studies of usual clinical practice. The ischaemic stroke rate for patients taking warfarin or aspirin were 1.40% and 6.02% per patient-year, respectively. The median international normalised ratio was 1.96. The median frequency of international normalised ratio measurement was 45.58 days.

Conclusions. This study found that antithrombotic use in a Hong Kong regional hospital for patients with atrial fibrillation was similar to that reported from western institutions. Complication and stroke rates were also comparable to the western data relating to usual clinical practice.

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目的：為香港心房纖維性顫動的華人患者，評估其抗血栓治療的使用、適當性及安全性。

設計：回顧性總結。

安排：地區醫院，香港。

患者與方法：總結2000年4月及2001年7月至10月期間，入住內科急症病房的所有心房纖維性顫動患者的病歷，以收集抗血栓治療的詳細資料、對服用華法林的患者 international normalised ratio 監測的結果、副作用、以及心房纖維性顫動併發症的附加風險因素。並進行統計分析以評估使用抗血栓治療的預示因素。

結果：本研究包括207名慢性心房纖維性顫動患者。對華法林無禁忌的非瓣門心房纖維性顫動患者中，44.0% 接受華法林治療，34.1% 接受阿斯匹林治療，22.0% 沒有接受抗血栓治療。根據 American College of Chest Physicians 的指引，大多數(69.1%)患者得到適當的治療。服用華法林和阿斯匹林的主要副作用率分別為每患者年2.14% 和1.72%，與西方一般的臨床實踐類似。而服用華法林或阿斯匹林的患者，其局部缺血中風率分別是每患者年 1.40% 和 6.02% ，中值 international normalised ratio 為 1.96，而 international normalised ratio 測量的中值頻率則為45.58 天。

結論：本研究發現，香港地區醫院對心房纖維性顫動患者使用抗血栓治療，與西方的報告相似。併發症和中風率也和西方臨床實踐的有關數據類似。

Introduction

Atrial fibrillation (AF) is the most common type of sustained arrhythmia and a major risk factor for stroke.[1] The prevalence increases with each advancing decade, from 0.5% for people aged 50 to 59 years, to almost 9% for those aged 80 to 89 years.[1] The attributable risk rises from 1.5% for patients aged 50 to 59 years, to 23.5% for patients aged 80 to 89 years.[1] Ischaemic stroke associated with AF not only occurs more commonly, but is also more severe than stroke not associated with AF. The mortality rate following ischaemic stroke almost doubles when ischaemic stroke is associated with AF.

Antithrombotic therapy is highly effective for reducing stroke in patients with AF, with warfarin substantially more efficacious than aspirin.[2] Meta-analysis of six trials found that adjusted-dose warfarin significantly reduced stroke by 62%, with an absolute risk reduction of 2.7% for primary prevention and 8.4% for secondary prevention. In comparison, meta-analysis of six trials showed that aspirin could reduce the risk of stroke by 22%, with an absolute risk reduction of 1.5% per year for primary prevention and 2.5% per year for secondary prevention. Adjusted-dose warfarin was noted in a meta-analysis of five trials to be more efficacious than aspirin, with a relative risk reduction of 36%.[2]

Antithrombotic therapy is one of the most important quality indicators of medical care in many western countries.[3] Despite the strong evidence of benefit, many western studies have found that only 21% to 67% of patients who appeared to be appropriate candidates for warfarin received this therapy.[3]

Stroke and AF are common in Asia. The World Health Organization estimated that there were a total of 2.7 million deaths from stroke in Asia in 2000, including 1.6 million deaths in China alone. In Hong Kong, stroke mortality in 1995 was approximately 41 per 100 000 for men, and 56 per 100 000 for women.[4] After malignant neoplasms and heart disease, cerebrovascular diseases were the third most common cause of death in Hong Kong in 1999.[5] The most important risk factors for stroke in elderly Chinese people are a history of transient ischaemic attacks (TIA) and AF.[6] Patients with a history of TIA and non-rheumatic AF have been shown to have a greater than 10-fold increase in the risk of stroke in the subsequent 30 months.[6]

The pattern of cerebral infarction in Chinese patients is similar to that noted in western stroke registries, with cardio-embolism constituting 20% of cases.[7] There is, however, a general perception that warfarin is less commonly used for Chinese patients. Many local physicians question whether the benefits and risks shown in major antithrombotic therapy trials in western populations equally apply to Chinese populations. Studies have shown that a lower daily dose of heparin and warfarin is required for Chinese people.[8-10] The mean daily warfarin requirement for Chinese people was noted to be 3.3 mg (standard deviation [SD], 1.4 mg) compared with 4 to 6 mg for Caucasian patients. Although AF is an important risk factor for ischaemic stroke, there are few studies investigating antithrombotic therapy for Chinese people with AF. This study aimed to determine the pattern and appropriateness of antithrombotic use for Chinese people with AF in Hong Kong. The study forms part of a clinical auditing programme to determine the appropriateness of antithrombotic use according to well-established western guidelines.[11-15]

Subjects and methods

This study was undertaken in a 799-bed acute regional hospital in Hong Kong. Patients are referred to the hospital either by primary care physicians or from the emergency room. The hospital does not have an anticoagulation clinic, and anticoagulation is controlled by regular international normalised ratio (INR) monitoring by individual physicians.

A retrospective review of medical records to identify patients for the study was undertaken by searching the Clinical Management System, a computerised hospital record system, for a principal or secondary diagnosis of AF. Electrocardiography (ECG) results were also reviewed to confirm the diagnosis of AF. All relevant in-patient and out-patient medical records were reviewed. Two hundred and seven patients with AF were identified. The appropriateness of the antithrombotic treatment was judged against the treatment recommendations prepared by the American College of Chest Physicians.

Inclusion and exclusion criteria

All patients admitted to Yan Chai Hospital in April 2000 and between July and October 2001 with the diagnosis of AF entered as the principal or a secondary diagnosis were included, regardless of whether the diagnosis was entered before, during, or after the index admission. This was to avoid the possibility of overlooking patients, especially where the admitting diagnosis was not directly related to AF. Patients with rheumatic heart disease, and prosthetic heart devices were also included as the study was part of a clinical audit programme to survey antithrombotic treatment practice. Patients with transient AF secondary to a temporary condition or medical procedure were excluded. Patients were also excluded if AF was not present on repeated ECG during the index admission. The contra-indications for anticoagulation were based on known contra-indications and exclusion criteria used in clinical trials and the package insert information for warfarin (Box).[16,17] Dementia alone was not a contra-indication unless the patient refused the treatment or had poor compliance, frequent falls, or psychiatric disturbances.

Study period

Patients were included if they were admitted to acute internal medical wards during April 2000 or between mid-July and October 2001. The first period was chosen arbitrarily as a pilot study.

Exclusion criteria for warfarin use
Gastrointestinal or genitourinary bleeding in preceding 6 months
Previous side-effects with warfarin/aspirin use
High risk of falls
Active bleeding disorder
Haematologic disorder
History of intracranial bleeding
Thrombocytopenia (white cell count, <100 x 10^9 /L)
Metastatic cancer
Allergy to warfarin
Anaemia (haemoglobin, <100 g/L)
Open wound or active ulcer in gastrointestinal/respiratory/
  genitourinary tract
Recurrent syncope or uncontrolled seizure disorder
Positive faecal occult blood
Inability to obtain adequate follow-up for prothrombin time
  monitoring
Psychosis/psychiatric illness
Poor compliance
Severe liver disease (aspartate aminotransferase, >120 IU/L; or
  total bilirubin, >51.3 µmol/L)
Severe renal impairment (creatinine, >300 µmol/L)
Alcohol consumption of more than 28 units in the past week
Refusal by patient
Life expectancy of less than 24 months
Recent surgery (<1 month)

Variables

Baseline characteristics, risk factors, and the reasons for omitting antithrombotics were recorded. Patients were stratified according to high, moderate, or low risk of stroke (high risk: annual stroke incidence, 8%-12%; moderate risk: annual stroke incidence, approximately 4%; low risk: annual stroke incidence, <1%) according to published guidelines.[12,13] Patients with AF were categorised as at high risk for stroke if any of the following risk factors were present: previous ischaemic stroke or TIA; arterial thrombo-embolism; rheumatic heart disease or mitral stenosis; clinical heart failure; age 75 years or older; history of hypertension; prosthetic heart valve; or two or more moderate risk factors. Patients were categorised as at moderate risk if only one moderate risk factor was present. Moderate risk factors for stroke were those that have been identified in patients with AF in various studies but are not as strongly or consistently found as the high risk factors previously stated. These include diabetes mellitus, age between 65 and 75 years, and coronary heart disease with preserved left ventricular systolic function. Patients designated as at low risk had none of the above-mentioned risk factors. Unless there were contra-indications for treatment (including documented patient refusal), the recommended treatment for high-risk patients was warfarin, warfarin or aspirin for moderate-risk patients, and aspirin for low-risk patients. Antithrombotic treatment received by patients was then compared with published guidelines and classified as follows:

(1) good—identical to the recommended treatment;
(2) inappropriate—treatment was not optimal. For example, the recommended treatment was warfarin, but the patient was given aspirin; or
(3) bad—no antithrombotics were given despite there being no contra-indications for antithrombotic therapy.

Side-effects were recorded. Major bleeding was recorded on evidence of life-threatening bleeding (for example, intracranial, spinal, or retroperitoneal bleeding), bleeding that required transfusion of 2 pints or more of packed cells, patient shock, or a haemoglobin level of less than 60 g/L. Minor bleeding was recorded for all other episodes of bleeding.

Results of blood tests for INR were recorded. The mean INR was calculated by multiplying the INR value by the duration from the date of INR to the next INR test date, and then dividing the sum by the total duration of therapy, according to the method described by Chenhsu et al.[18] For example, if the INR on day 1 was 2 and on day 15 was 3, with a total duration of therapy of 6 weeks, the average INR was [(2x14) + (3x28)]/(14+28)=2.67]. The duration of the INR for a particular range was calculated by counting the days the INR was within that range up to the day when the INR fell just outside that range. When the frequency of INR measurement was calculated, INR data within the first month were not recorded to exclude the frequent monitoring that occurs at the commencement of therapy. Data of INR were also not considered if the INR measurement was less than 7 days from the last measurement. These measurements usually reflected more frequent assessment due to the previous INR result being outside the desired range. These two exclusions were aimed at deriving more representative data on the frequency of INR measurement and mean INR values.

Statistics

Statistical analysis was performed using the Statistical Package for the Social Sciences (Windows version 10.0; SPSS Inc., Chicago, US). Chi squared analysis was used to compare categorical variables. Potential predictors of antithrombotic use were determined by Chi squared analysis. Multivariate logistic regression was then used to determine the influence of the predictor variables, while controlling for potentially confounding variables.

Results

There were 275 patients admitted to acute medical wards during the study period with a diagnosis of AF. Of these, 68 patients were excluded—33 patients who were judged not to have AF during the index admission after review of all available ECG results, and 27 patients with transient AF, mainly stress-induced, which spontaneously returned to sinus rhythm. A further eight patients had persistent sinus rhythm while taking antiarrhythmic drugs. As their thrombo-embolic risk was difficult to measure, they were also excluded. A total of 207 patients were thus included in the study—80 recruited in April 2000 and the remaining 127 recruited from mid-July to October 2001.

Characteristics of the study population

The clinical, social, and demographic characteristics of study patients are shown in the Table. The mean age was 76.02 years (SD, 11.89 years; range, 35-100 years). Slightly more than half of the group was female. Excluding age, 176 (85%) patients had at least one risk factor for stroke. Of the

Table. Clinical, social, and demographic characteristics of patients with atrial fibrillation (n=207)

Characteristics	Patients No. (%)
Sex	
Female	117 (56.5)
Male	90 (43.5)
Age (years)	
<65	31 (15.0)
65-75	47 (22.7)
>75	129 (62.3)
Associated medical conditions	
Thyrotoxicosis	4 (1.9)
Prosthetic heart device	4 (1.9)
Sick sinus syndrome	16 (7.7)
Rheumatic heart disease/mitral stenosis	19 (9.2)
Coronary artery disease	62 (30.0)
Prior myocardial infarction	17 (8.2)
Prior stroke and transient ischaemic attack	48 (23.2)
Prior transient ischaemic attack only	14 (6.8)
Hypertension	80 (38.6)
Congestive heart failure	97 (46.9)
Activities of daily living assessment	
Independent	148 (71.5)
Partially independent	18 (8.7)
Dependent	41 (19.8)
Living situation	
At home with relatives	137 (66.2)
Living alone	14 (6.8)
Resident in an old-age home	56 (27.1)
Patient follow-up	
No follow-up	49 (23.7)
Government general out-patient clinics	58 (28.0)
Private general practitioners	16 (7.7)
Other Hospital Authority, internal medicine specialist clinics	79 (38.2)
Non-internal medicine specialist clinics	5 (2.4)

Fig 1. Antithrombotic use

Fig 2. Distribution of antithrombotics received for patients without contra-indications for warfarin use

Fig 3. Type of antithrombotic used after excluding patients with contra-indications for warfarin use and patients with valvular atrial fibrillation
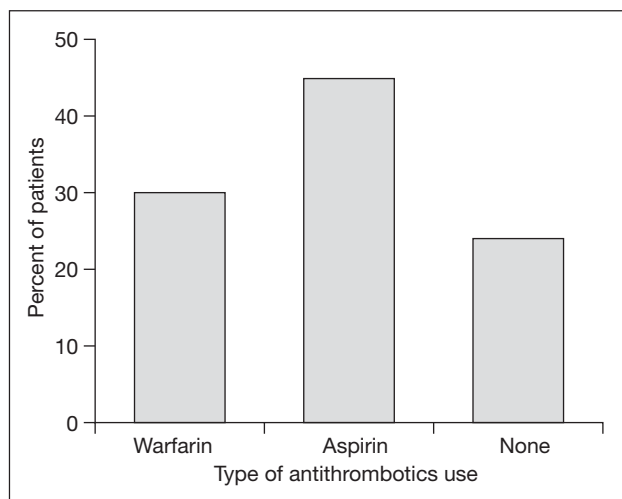
remaining 31 patients, 20 were older than 75 years, and only five were younger than 65 years. Therefore, most of the patients required some form of antithrombotic therapy.
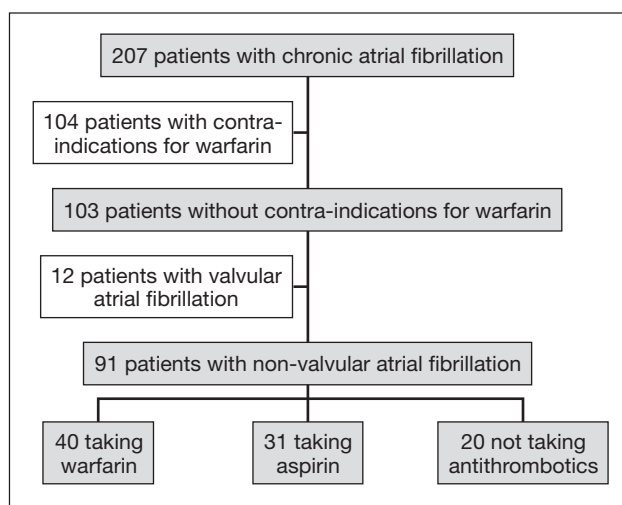
Warfarin and aspirin use for atrial fibrillation

The study included a minority of patients (13.5%) usually excluded in surveys of non-valvular AF—that is, patients with prosthetic heart valves (four patients, 1.9%), cardio-version (two patients, 1.0%), mitral stenosis (13 patients, 6.3%), and rheumatic heart disease (nine patients, 4.3%). Of the 207 patients, 64 were taking warfarin, 93 were taking aspirin, and 50 were not taking antithrombotics (Fig 1). The total duration of follow-up was 426.2 patient-years. Total antithrombotic use was 140.2 patient-years for warfarin and 232.6 patient-years for aspirin. Overall, patients were treated with any type of antithrombotics for 87.5% of the follow-up period (372.8 patient-years). If patients with contra-indications for warfarin use were excluded, the rate of antithrombotic use was as follows: warfarin, 50 (48.5%) of 103 patients; aspirin, 32 (31.1%) patients; and 21 (20.4%) patients were not taking antithrombotics. For the 91 patients with non-valvular AF and no contra-indications for warfarin use, 40 were taking warfarin, 31 were taking aspirin, and 20 were not taking any antithrombotics (Figs 2 and 3).
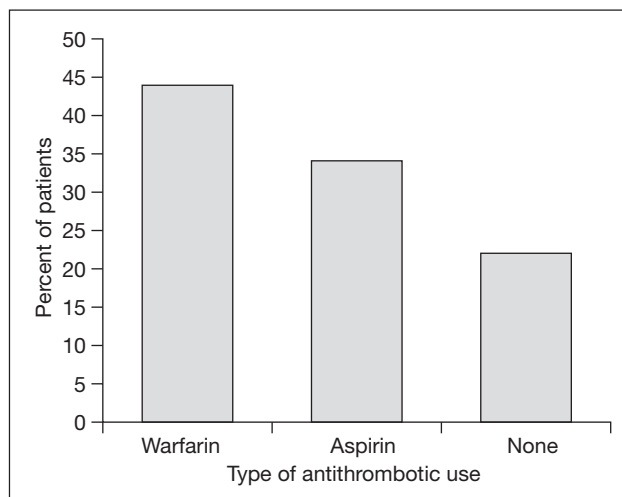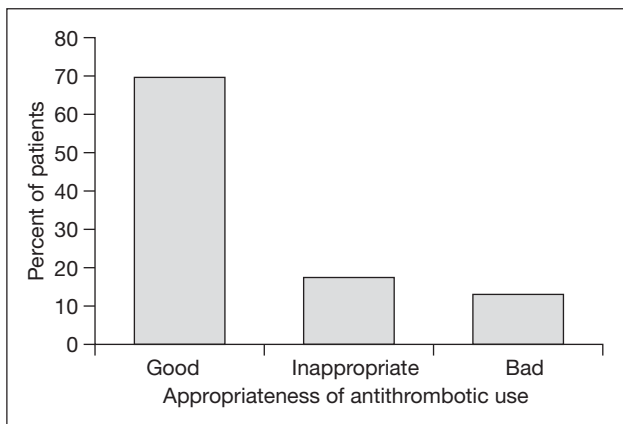
Predictors of warfarin use

On univariate analysis, use of warfarin was found to be significantly associated with: age greater than 75 years ($P<0.0005$; odds ratio [OR]=0.53; 95% confidence interval [CI], 0.37-0.75); old-age home residency ($P=0.004$; OR= 0.38; 95% CI, 0.18-0.79); dependence on activities of

Fig 4. Proportion of treatment meeting American College of Chest Physicians guidelines

daily living assessment (P=0.001; OR=0.20; 95% CI, 0.06-0.62), and rheumatic heart disease and/or mitral stenosis (P<0.0005; OR=9.47; 95% CI, 3.36-26.71). However, on multiple regression analysis, only rheumatic heart disease and/or mitral stenosis were significantly associated with the use of warfarin (P<0.0005; 95% CI, 3.02-36.21).

Predictors of appropriate antithrombotic use

Appropriate antithrombotic use was associated with dependence on activities of daily living assessment (P=0.004; OR=0.28; 95% CI, 0.10-0.75).

Appropriateness of antithrombotic treatment

Of the 207 patients in the study, 143 were receiving appropriate treatment, while 36 were receiving aspirin when warfarin was indicated. Twenty-eight patients were not receiving antithrombotics, although there were no contra-indications and antithrombotic treatment was indicated (Fig 4).

Contra-indications for warfarin

One hundred and three patients did not have any known contra-indications for warfarin use. Among the remaining 104 patients, the most common contra-indications were patient refusal (20.2%), recent (within 6 months) haemorrhage (17.3%), advanced cancer (6.3%), and frequent falls (4.8%).

Safety and event rates

The major and minor bleeding rates for patients receiving warfarin were 2.14% and 8.56% per patient-year, respectively. The corresponding rates for aspirin were 1.72% and 4.30% per patient-year, respectively. The major and minor bleeding rates for patients without antithrombotics were 0% and 1.87% per patient-year, respectively. The annual rate of intracranial bleeding (by definition, major bleeding) for warfarin, aspirin, and no antithrombotics were 1.43%, 1.29%, and 0%, respectively. The corresponding rates for extracranial (major and minor) bleeding were 9.27%, 4.73%, and 1.87%, respectively. The ischaemic stroke rate for patients receiving warfarin, aspirin, or no antithrombotics were 1.40%, 6.02%, and 9.33% per patient-year, respectively. There were three cases of peripheral arterial embolism

in patients receiving aspirin (1.29% per patient-year). The mean INR values measured at the time of major and minor bleeding were 2.33 (range, 1.50-3.30) and 2.69 (range, 1.00-12.00), respectively. The mean INR value measured at the time of ischaemic stroke was 2.35 (range, 1.4-3.3).

Quality of anticoagulation control during warfarin treatment

Some patients were not seen for follow-up at the clinic and thus data concerning their INR control were incomplete or unavailable. Only patients with complete INR records were included. There were 53 patients available for analysis. The mean and median INR values were 1.92 and 1.96, respectively. The time in therapeutic range (TTR) is one common surrogate marker of the quality of anticoagulation control. The mean and median TTR for an INR of 1.5 to 3.0 were 50.80% and 52.74%, respectively. Since most western studies have used a target INR between 2.0 and 3.0, the TTR for this range was also evaluated. The mean and median TTR for this range were 24.23% and 22.76%, respectively. This low rate suggests local physicians use a lower target range than that recommended in western guidelines. Another surrogate marker for anticoagulation control is the frequency of INR measurement. Since INR within the first month of starting warfarin and INR measurement earlier than 7 days from the last measurement were excluded, the frequency of INR testing measured was not inflated by the more frequent checking that occurs during the early period of starting warfarin or following an unsatisfactory INR result. The mean and median frequencies of INR measurement were both 45.58 days.

Discussion

Atrial fibrillation is an important risk factor for stroke. One in six strokes occurs in patients with AF, and approximately 10% of all ischaemic strokes are likely to be due to embolism of left atrial thrombi.[19] Studies have also specifically shown that AF is an important risk factor for stroke in Chinese people. One study reported that embolism was found at autopsy of 93 consecutive elderly Chinese patients with AF.[20] A cohort study of 427 Chinese patients aged 60 years or older to determine risk factors for stroke showed the most important risk factors were a history of TIA and AF.[7] A further Hong Kong case-control study found that AF and ischaemic heart disease were significant risk factors for ischaemic stroke in patients older than 70 years.[21]

Despite the strong evidence of benefit, many North American and European studies have found that only 21% to 67% of patients who appear to be appropriate candidates for warfarin receive warfarin treatment.[22,23] This study had similar findings, with 48.5% of patients with AF without contra-indication for warfarin use receiving warfarin treatment and 34.1% taking aspirin. If only patients with non-valvular AF with no contra-indication for warfarin were considered (in keeping with most other studies), 44.0% were

taking warfarin, while 34.1% were taking aspirin. Overall, 78.1% of patients were taking either warfarin or aspirin in this study. The mean age (76 years) of patients in this study was also comparable. The mean age of patients in the pooled clinical trials was 69 years and between 62 and 87 years in the retrospective studies conducted in clinical practice settings.[22,24]

Surveillance of antithrombotic use is rarely reported outside Europe and America. In the West Birmingham Atrial Fibrillation Project, 50% of Asian patients with chronic AF were treated with warfarin, and 37.5% with aspirin, although none had contra-indications for warfarin use.[25] In Japan, the Hokkaido Atrial Fibrillation Study Group found that only 8% of patients with non-valvular AF were treated with warfarin, while a further 19% were treated with aspirin, and 26% with ticlopidine.[26] Lok and Lau[27] surveyed 291 Chinese patients in a regional hospital in Hong Kong in 1993. Only 5.8% of patients were treated with warfarin, while 13.1% of patients were treated with aspirin. There is a large difference between Lok and Lau's[27] findings and those of the current study, although both were undertaken in regional hospitals in Hong Kong. This trend for improved care has also been observed elsewhere, with one American study noting that the use of warfarin increased four-fold from 13% in 1990 to 50% in 1996 among patients with chronic AF.[28]

Many studies have focused on the type of antithrombotic used, especially warfarin. However, the most important aspect of antithrombotic management of AF should be the appropriateness of antithrombotic use. Many studies have also excluded patients with contra-indications for warfarin use but this group of patients comprises a substantial proportion of patients with AF. In this study, 69.1% were receiving appropriate treatment, 17.4% were receiving inappropriate treatment, and only 13.5% were receiving no antithrombotics in the absence of contra-indications. Dependence on activities of daily living assessment was the only predictor significantly associated with appropriate antithrombotic use. The most common contra-indications for warfarin use in this study were patient refusal, recent haemorrhage, advanced cancer, and frequent falls. The proportions were similar to those reported in western studies but there were more instances of patient refusal and fewer due to heavy alcohol use in this study. The frequency of contra-indications for warfarin use varies widely across studies, from approximately 5.0% to 75.0%.[29-31] Approximately 50.2% of patients had contra-indications for warfarin use in this study—40.1% if patient refusal was not included.

The major bleeding rate for patients taking warfarin reported from five primary prevention trials was 0.4% to 2.1% compared with 0% to 1.6% for placebo (not statistically significant).[11] The bleeding risk in a clinical setting using retrospective observational studies, rather than randomised controlled trials with strict inclusion and exclusion criteria was also reviewed.[32] The frequency of major bleeding was approximately 7.7% per patient-year (0%-17.8%),[24,33] while the rate of fatal bleeding varied from 0% to 1.1% per patient-year, and the rate of minor bleeding noted ranged from 6.0% to 18.0%.[34,35]

The risk of major bleeding with aspirin use, as shown in six clinical trials, indicated the annual risk of major bleeding was not significantly different from placebo (0.3%-1.4%).[11,36] In retrospective studies using data from routine daily practice, the annual risk of major and minor bleeding was found to be between 2.5% and 4%.[37]

There are few data on bleeding rates in Asian and Chinese patients specifically. Chenhsu et al[18] evaluated warfarin use in a retrospective study in Taiwan, and found that the cumulative probability for haemorrhage at 12, 24, and 34 months were 24.5%, 32.3%, and 38.4%, respectively. A small study in Hong Kong found that the bleeding rates while taking warfarin therapy were 3.2% for intracranial haemorrhage, 0.6% for major non-cerebral bleeding, and 2.6% for minor bleeding.[38] The rates of bleeding with aspirin were 0%, 1.4%, and 4.1%, respectively. Findings of the current study indicate that the risk for ischaemic stroke and bleeding are similar to that seen with usual clinical practice in western institutions, however.

Limitations of the study

The current study reflected available resources, with a relatively small sample size and short follow-up period. A particular limitation of this retrospective study with its use of a historical cohort is the fact that many new guidelines have since been published, influencing current prescribing trends.

The TTR measurement proved difficult and may not be appropriate for comparison with western studies, where a higher target range is usually used. The mean INR of 1.92 in this study showed that most local physicians adopt a target range of around 1.5 to 3. In addition, the study population may not be representative of other Chinese populations as it included patients admitted into medical wards, whereas people are more commonly treated in out-patient clinics. These latter patients are usually younger and healthier and may tolerate warfarin better.

Conclusions

This study found that antithrombotic use in a small, regional hospital in Hong Kong was comparable with that found in western institutions and population studies. A total of 69.1% of patients were receiving appropriate antithrombotic therapy according to American College of Chest Physicians guidelines. One concern voiced by local physicians is the perceived high complication rate with warfarin treatment for Chinese patients. This study found that the rate of complications was comparable to that of western populations, however. As data for Chinese and Asian

patients are lacking, a larger multicentre audit study is indicated to more accurately gauge the risks and benefits for local patients. This will assist further improvements in the prescription of antithrombotic therapy, potentially leading to a reduction in the prevalence of thromboembolic stroke in Hong Kong in the future.

Acknowledgements

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