Risk Factors in the Development of Stroke in an Outpatient Cardiology Practice

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Abstract

Purpose: The aim of this study was to determine the risk factors in the development of stroke in an outpatient cardiology practice.

Methods: Chart reviews were performed in 1,599 patients (1138 men and 461 women), mean age 72 ± 12 years. Medication use and comorbidities were tabulated for each patient. Stepwise Cox regression analyses were used to analyze 45 different variables for statistical significance. The mean follow-up duration was 63 ± 55 months during 1977 to 2009.

Results: Of the 1, 599 patients, stroke occurred in 48 patients (3%) during follow-up. Stepwise Cox regression analysis showed significant independent risk factors for new stroke were statins (hazard ratio = 0.2656, 95% CI, 0.1480 to 0.4766, p <0.0001), carotid artery stenosis (hazard ratio = 3.7292, 95% CI, 1.7960 to 7.7433, p<0.001), and congestive heart failure (hazard ratio = 2.1369, 95% CI, 1.1046 to 4.1340, p <0.05).

Conclusions: In an outpatient cardiology practice, use of statins reduced the incidence of stroke by 73%. Carotid artery stenosis and congestive heart failure increased the risk of developing stroke by 3.7 times and 2.1 times, respectively.

Keywords: Stroke; Statins; Carotid artery stenosis; Congestive heart failure

Introduction

Numerous studies have demonstrated that statins reduce the incidence of stroke in patients at high risk for cardiovascular events [1-11]. The efficacy of statins in reducing stroke in an outpatient cardiology practice needed to be investigated. This article reports data on the efficacy of statins in reducing stroke in 1, 599 patients, mean age 72 years (94% with coronary artery disease), treated in an academic community cardiology practice

Methods

Paper and electronics chart reviews were performed in 1, 599 randomly selected patients who were actively treated at an academic community cardiology practice. The years of follow-up ranged from 1977 to 2009. For every patient, progress notes of all interim visits, letters of correspondence, medication usage, blood pressure, laboratory studies including lipid levels, and occurrence of stroke from the time of initial presentation to the last follow-up were recorded. Patient comorbidities including coronary artery disease, hyperlipidemia, hypertension, diabetes mellitus, cigarette smoking history, congestive heart failure, angina, atrial fibrillation, chronic kidney disease, peripheral arterial disease, abdominal aortic aneurysm, carotid artery stenosis, and prior cardiovascular events, transient ischemic attack, and stroke were recorded. Dates of strokes as well as dates of all medication initiation and discontinuation were recorded.

Data were extracted by the physician authors and tabulated with Microsoft Access 2003 (Microsoft Corporation, Redmond, WA, USA). Customized computer programming was written for macros within Microsoft Excel 2003. Stepwise Cox proportional hazards regression was used to analyze 45 different variables with MEDCAL statistical software. http://www.medcalc.be/. A p-value of <0.05 was considered statistically significant.

Results

Table 1 shows the baseline characteristics of the 1, 599 patients followed in the academic outpatient cardiology practice. Table 1 shows that the duration of follow-up was 63 ± 55 months. Table 2 shows the prevalence of use of medications in the 1,599 patients. Table 3 shows the stepwise Cox proportional hazards regression analysis for stroke using the 45 variables listed in Tables 1 and 2. Significant independent variables for stroke were 1) use of statins (odds ratio = 0.27), 2) carotid artery stenosis (odds ratio = 3.7), and congestive heart failure (odds ratio = 2.1).

The mean duration of treatment with statins at the time of development of stroke was 43.4 months. There was no significant difference in duration of therapy between patients with and without development of stroke.

Discussion

Numerous studies have demonstrated that statins reduce the incidence of stroke in patients at high risk for cardiovascular events [1-11]. The efficacy of statins in reducing stroke in an outpatient cardiology practice needed to be investigated.

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The present study was performed in 1,599 patients (71% men), mean age 72 years (94% with coronary artery disease), followed for a mean of 63 months in an outpatient cardiology practice. Stepwise Cox proportional hazards regression analysis using the 45 variables listed in Tables 1 and 2 showed that the use of statins caused a 73% significant independent reduction in the incidence of new stroke (p<0.0001). These data show the efficacy of use of statins in reducing stroke in high-risk patients followed in an outpatient cardiology practice as well as in controlled clinical trials.

The present study also showed that carotid arterial disease and congestive heart failure were significant independent risk factors for new stroke (odds ratios 3.7 and 2.1, respectively). Perioperative use of statins in patients undergoing carotid endarterectomy reduces perioperative mortality, myocardial infarction, and stroke [12-14] and 2-year mortality [14].

Ravipati et al. [11] also showed in 449 patients with severe carotid arterial disease who did not undergo carotid endarterectomy that the incidence of new stroke or new myocardial infarction or death at 2-year follow-up was 15% in patients treated with statins versus 68% in patients not treated with statins. Stepwise Cox regression analysis showed that use of statins significantly reduced new stroke or new myocardial infarction or death by 87%, p <0.0001 [11].

A limitation of this study is that it was not a double-blind, randomized, placebo-controlled study. Strength of this study is that it shows the reduction of stroke by use of statins in a high-risk population at long-term follow-up in a real world outpatient cardiology practice.

In conclusion, our study shows that use of statins in a high-risk population followed in an outpatient cardiology practice reduces the incidence of stroke at long-term follow-up.

Medications	Number of Patients	Duration of Therapy (months in mean numbers)
Statins	1425 (89%)	49
Ezetimibe	431 (27%)	23
Niacin	80 (5%)	25
Bile acid sequestrants	18 (1%)	12
Fibrates	127 (8%)	29
Fish oils	110 (7%)	22
Beta blockers	1,323 (83%)	53
Diuretics	849 (53%)	41
Angiotensin-converting enzyme inhibitors	1,062 (66%)	42
Angiotensin receptor blockers	422 (26%)	34
Calcium channel blockers	653 (41%)	48
Aspirin	1,362 (85%)	55
Ticlopidine	31 (2%)	25
Clopidogrel	490 (31%)	22
Aspirin/extended-release dipyridamole	20 (1%)	20
Warfarin	373 (23%)	40
Nitrates	386 (24%)	44
Digoxin	260 (16%)	45
Cilostazol	13 (1%)	27
Insulin	105 (7%)	46
Thiazolidinediones	159 (10%)	28
Sulfonylureas	236 (15%)	44
Metformin	205 (13%)	37
Sitagliptin	11 (1%)	8

Table 2: Prevalence of use of medications in 1,599 patients.

Parameter	Coefficient	Standard Error	P Value	Odds Ratio	95% Confidence Interval
Statins	-1.3256	0.2998	<0.0001	0.2656	0.1480 to 0.4766
Carotid stenosis	1.3162	0.3747	0.0004436	3.7292	1.7960 to 7.7433
Congestive heart failure	0.7594	0.3384	0.02483	2.1369	1.1046 to 4.1340

Table 3: Stepwise Cox proportional hazards regression analysis for stroke.

Age (years)	72 ± 12
Men	1, 138 (71%)
Women	461 (29%)
Duration of follow-up (months)	63 ± 55
Range in years	1977-2009
Coronary artery disease	1, 497 (94%)
Hyperlipidemia	1,411 (88%)
Hypertension	1227 (77%)
Diabetes mellitus	391 (24%)
Smoker	674 (42%)
Congestive heart failure	197 (12%)
Angina pectoris	207 (13%)
Atrial fibrillation	239 (15%)
Chronic kidney disease	64 (4%)
Peripheral arterial disease	157 (10%)
Abdominal aortic aneurysm	58 (4%)
Carotid artery stenosis	106 (7%)
Prior transient ischemic attack	41 (3%)
Prior stroke	45 (3%)
Prior myocardial infarction	614 (38%)
Prior percutaneous coronary intervention	459 (29%)
Prior coronary bypass surgery	383 (24%)

Table 1: Baseline characteristics of 1,599 patients.

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