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Lipid management in ischemic stroke patients

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Abstract

Objectives: In-hospital initiation and maintaining of lipid-lowering therapy (LLT) after discharge is recommended for dyslipidemic stroke patients. However, little is known about actual adherence to treatment in Taiwan. This study aims to describe the current practice of lipid testing and LLT and to identify predictors for patient to receive LLT.
Methods: Between February 2001 and December 2002, a total of 1105 consecutive ischemic stroke patients were prospectively registered. Dyslipidemic ischemic stroke patients were recruited and followed over a 6 months period.
Results: In-hospital lipid testing was performed in 91% of all patients and LLT was initiated in 74% (350/476) of dyslipidemic patients. During the 6 months follow-up period, lipid testing was performed in 77% (266/345) and LLT was maintained in 45% (154/345) of patients. However, the target LDL cholesterol level (<100 mg/dL) was achieved in only 30% (78/255) of patients. Older patients had a lower chance to receive LLT.
Conclusions: The in-hospital initiation of LLT and lipid testing was considered adequate as compared to other studies. However, after discharge from the hospital, many patients, especially older patients remained untreated. Efforts to close treatment gaps in lipid management require sustained quality improvement efforts. More awareness in this area is needed.

Keywords: Dyslipidemia; Ischemic stroke; Lipid management; Lipid-lowering therapy

1. Introduction

Despite the widespread use of a variety of antiplatelet drugs in secondary stroke prevention, patients with prior stroke or transient ischemic attack (TIA) are still at an increased risk for future strokes, coronary events and other cardiovascular diseases. [1] Additional treatment with statins (3-hydroxy-3-methylglutaryl-coenzyme A reductase inhibitors) result in a further reduction in stroke risk not only in hypercholesterolemic patients with atherosclerosis but also in normocholesterolemic individuals [2–4]. In a recent meta-analyses involving a total of 20,000 patients, the relative risk reduction related to statin therapy ranged between 2% and 30% [5–7]. Another meta-analysis including 90,000 patients showed that the reduction in stroke risk was primarily related to the extent of lowering low-density lipoprotein cholesterol (LDL-C)levels [8].

In Taiwan, about half of the patients with ischemic stroke also have dyslipidemia [9]. According to current guidelines, all of them should receive long-term lipid-lowering therapy (LLT) with statins to prevent further vascular events [10–14]. However, in clinical practice, prescription behaviour of treating physicians largely depends on several factors, such as the interpretation of available guidelines, the presence of contraindication or the overall acceptance of LLT. Studies in western countries have shown that both, testing

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for hypercholesterolemia during clinical work-up and subsequent treatment with LLT were inadequate with the result that many patients remain untreated [15–19]. Data on lipid management in patients with ischemic stroke and TIA in Taiwan are lacking. The objective of this hospital-based study was to evaluate the current practice of testing for hypercholesterolemia and the prescription behaviour of LLT in patients with ischemic stroke in Taiwan.

2. Patients and methods

Patients were recruited at the Chang Gung Memorial Hospital in Kaohsiung, which is the main referral hospital of an area with three million inhabitants in southern Taiwan. The majority of the stroke patients from this area are referred to this hospital. Moreover, 2 secondary and 24 tertiary hospitals are located in the same area. In total, 1105 consecutive patients with ischemic stroke according the WHO criteria, who were admitted to the neurology department of Chang Gung Memorial Hospital between February 2001 and December 2002, were enrolled prospectively in this study. After informed consent was obtained, patients were followed over 6-month after discharge from hospital. LLT is recommended in all patients with dyslipidemia and LLT is reimbursed by health insurances in Taiwan. Those patients without dyslipidemia were not recommended to receive LLT. Dyslipidemia was defined according to criteria provided by the Bureau of National Health Insurance as having either total cholesterol serum levels >200 mg/dL or high-density lipoprotein cholesterol (LDL-C) levels >130 mg/dL or high-density lipoprotein cholesterol (HDL-C) levels <40 mg/dL combined with triglycerides (TG) levels >200 mg/dL. After 6 months, medical records were reviewed by the study physicians and lipid testings and medication prescribed within the follow-up period were recorded. Treating physicians were unaware of the study goals.

3. Data collection and analysis

Medical records were reviewed by the study physicians using either the patient's electronically stored medical records or their medical charts. Data were entered into a standardized collection form on a Microsoft Excel spreadsheet. Demographic variables, the lipid values on admission and within 6-month after discharged were recorded. Age was classified into two categories (older than or younger than 55 years).

4. Lipid management

The Bureau of National Health Insurance recommends LLT for all dyslipidemic stroke patients. According to guidelines of the American Heart Association, the goal of LLT was to lower LDL-C <100 mg/dL [1]. Patients receiving LLT were further recommended to have their liver function parameter and their lipid profile checked at least once within the 6 months follow-up period. LLT was defined as the prescription of any combination of statins (simvastatin 20 mg/day; fluvastatin 40 mg/day; atorvastatin 10 mg/day) or fibrates (gemfibrozil 1200 mg/day; fenofibrate 200 mg/day). Lipid testing was defined as a documented measurement of any combination of TC, LDL-C, HDL-C and TG. During the study period, only the above-mentioned statins or fibrates (simvastatin 20 mg/tab; fluvastatin 40 mg/tab; atorvastatin 10 mg/tab; gemfibrozil 300 mg/cap; fenofibrate 200 mg/tab) were available for prescription from the pharmacy center of the hospital.

5. Statistical methods

Data were given as frequencies and percentages with 95% exact binomial confidence intervals (CIs). Additional descriptive statistics were provided for demographic, clinical, and follow-up variables. Median and 25% and 75% interquartile ranges (IQRs) were reported, as appropriate, for continuous variables. Frequencies and percentages were reported for categorical variables. To test for group differences, the chi-squared test was used for discrete variables to compare associations between categorical variables, and the independent-sample Student's *t*-test for variables measured on a continuous scale. Multivariate logistic regression analysis was performed including all risk factors considered. A *p*-value of less than 0.05 was considered statistically significant. SPSS 13.0 software was used for statistical analysis.

6. Results

Among the 1105 patients with ischemic stroke, only 9% (95/1105) were not screened for dyslipidemia. On admission, TC was tested in 91%, LDL-C in 84%, TG in 90%, and HDL-C in 84.5% of patients. The demographic data are shown in Table 1. From those 1010 patients with sufficient data on their lipid profile, 47% (476/1010) fulfilled the definition of dyslipidemia. In dyslipidemic patients, 74% (350/476) received LLT at discharge from hospital. Simvastatin was prescribed in 51% (177/350), fluvastatin in 29% (103/350), atorvastatin in 9% (33/350), gemfibrozil in 7% (25/350), and fenofibrate in 3% (12/350). After 6 months, 131 of 476 (27.5%) patients were lost to follow-up. From the remaining 345 patients, only 45% (154/345) still received LLT. Simvastatin was prescribed in 58% (90/154), fluvastatin in 23% (36/154), atorvastatin in 7% (11/154), gemfibrozil in 3% (5/154), fenofibrate in 8% (12/154). After discharge from hospital, lipid testing of at least one parameter was performed in 266 of 345 patients (77%). LDL-C levels were tested at the 6 months follow-up visit in 225 patients. Among these 225 patients, the number of those with an LDL-C < 100 mg/dL increased from 32 (12.5%)