TREATING CARDIOVASCULAR ATHEROSCLEROTIC PLAQUES WITH TONGMAIJIANGZHI (TMJZ) CAPSULE

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Abstract

Atherosclerotic plaques can cause serious syndromes and mortality. Cholesterol accumulation in the plaques can disrupt the arterial flow, with lumen narrowing and stenosis, which contributes to heart attack and sudden cardiac death. The pharmacological treatment to atherosclerotic plaques can be anti-hypertensives, anti-cholesterol, and cleaning of the existed plaques. This work examined the effects of pharmacological Tongmaijiangzhi (TMJZ) capsule on atherosclerotic plaques. The radiological findings of the atherosclerotic plaques of 107 patients receiving TMJZ treatment were analyzed. We found that the TMJZ administration decreases plaque volume and alters the composition in a relatively short period, showing highly promising effects. TMJZ treatment is able to remove the existed atherosclerotic plaques with no side effects observed.

Keywords: Tongmaijiangzhi; Atherosclerotic plaques; stenosis; hypertension

Introduction

Atherosclerotic plaques can cause serious syndromes and mortality (Psarros et al., 2012; Sanz et al., 2012; Shanmugam et al., 2010). The cholesterol accumulation in the plaques can disrupt the arterial flow, with lumen narrowing and stenosis, which contributes to heart attack and sudden cardiac death (Scott, 2002). In the United States, more than half of the patients with atherosclerotic cardiovascular disease show heart attack and sudden cardiac death in the first symptom. Such condition is severe and the treatment of atherosclerotic plaques mainly includes statins, combined dietary supplements, antibody treatment, as well as surgical interventions. The pharmacological treatment to atherosclerotic plaques can be anti-hypertension, anti-cholesterol, and cleaning of the existed plaques (Chu et al., 2011; Montecucco et al., 2012; Racherla and Arora, 2012; Redondo et al., 2011; Saito, 2011). We recently developed a combined pharmacological agent, Tongmaijiangzhi (TMJZ) capsule, with all these effects verified in previous animal models. We combined the TMJZ treatment with radiological measurement of atherosclerotic plaques in a non-invasive approach. We found that TMJZ treatment provided a novel approach for patients with mild atherosclerotic plaques and patients that are unsuitable for surgical intervention.

Materials and methods
Clinical data

107 patients were recruited for this study (67 male, 40 female, aged 57-89 years old, averaged 69.3±7.2 years) from December 2011 to June 2012. All patients were diagnosed by radiological findings and therefore were given TMJZ treatment. 62 patients were with mild level of stenosis, while 45 patients were unsuitable for surgical treatments (we divided stenosis levels as 0, 1-30%, 31-60%, and >60%). The study was approved by local ethics committee of medical research involved with human subjects, and we obtained written consent from all patients. The treatment was free to all patients (provided by L.K.P. donation to aged people in Shihezi city), and the drug production/administration procedures were explained to all patients. We phoned/visited patients at least once a month to track the drug administration progresses. The TMJZ capsules were provided by Xuelian Med. Co. (Shanghai, China). The drug was orally administered 3 times every day. The drugs were produced within 2 months before delivery to our hospital. The drug administration lasted for 4 months for all patients at least, with 16 patients for 1 year. The principle components of this capsule were: *Equisetum ramosissimum*, *Rhizoma Ligustici Chuanxiong*, *Folium Nelumbinis*, *Panax notoginseng*, and *Zanthoxylum simulans*.

CT detection of plaques

The 16-slice MDCT system (Siemens, Sensation 16, Erlangen, Germany) were used for carotid arteries imaging, and an optimized contrast-enhanced protocol (120 kVp, 180 mAs, collimation 16×0.75 mm, table feed 12 mm/rotation, pitch 1) was used as described previously (de Monye et al., 2005; Yoon et al., 2007). A 120-mm field of view with matrix size of 512×512 and slice thickness of 1.0 mm were used for image reconstruction. The increment was 0.6 mm, and intermediate reconstruction algorithm was used. The Volume of plaque and its components were measured as described previously (Rozie et al., 2009).

Statistics

Data were represented as mean ± SD and analysed with SPSS 16.0 software (Chicago, US). Paired sample t-test was used to compare the plaque changes before and after the drug treatments.

Results

Patients with mild stenosis (<30%) showed reduced plaque volume after treatment. We found that patients with mild stenosis showed reduced plaque volume, both in 0 and 1-30% groups. At 2 and 4 month time point, the changes were significant (P<0.05). Additionally, there is a trend of decrease in percentage of lipid in the plaque, though not significant (P>0.05).

Table 1:   Patients with mild stenosis (<30%) showed reduced plaque volume after treatment

Stenosis (%)	Number of patients	Number With plaques	Plaque volume (mm^3)	1 moth treatment	2 months treatment	4 months treatment	Percentage of lipids (%) before	Percentage ofLipids (%) After 4 m
0	18	10	307±119	296±104	272±77	180±98	12±9	11±9
1-30	44	40	594±268	451±207	314±124	201±116	17±11	15±8

Patients with severe stenosis (>30%) showed reduced plaque volume after treatment

45 patients were not suitable for surgical interventions and therefore were given TMJZ treatment. We found that TMJZ treatment is also effective in these patients, with reduction of plaque volume at 2 and 4 months' time points significantly (P<0.05). Additionally, the percentage of lipids in the plaque decreased significantly (P<0.05). This suggests that TMJZ can be used as complimentary treatment in severe patients for pre-surgical cares.

Table 2:   Patients with severe stenosis (>30%) showed reduced plaque volume after treatment as well

Stenosis (%)	Number of patients	Number With plaques	Plaque volume (mm^3)	1month treatment	2months treatment	4months treatment	Percentage of lipids (%) before	Percentage of lipids (%) After 4 m
31-60	41	41	1024±387	876±421	652±393	480±198	25±14	18±11
>60%	4	4	1545±355	1211±399	967±278	882±263	30±10	22±7

Adverse effects

None reported in all patients. Previous animal studies also found no side effects of this drug (data not shown).

Discussion

The pharmacological treatment to atherosclerotic plaques can be anti-hypertension, anti-cholesterol, and cleaning of the existed plaques (Chu et al., 2011; Montecucco et al., 2012; Racherla and Arora, 2012; Redondo et al., 2011; Saito, 2011). The elevated plasma cholesterol level was one major cause of the pathological changes observed and might act as the clinical index following pharmacological therapy. In this study, we utilised the non-invasive imaging approach to trace the treatment effects directly on the circulation system reflected by the changes in vessel stenosis and the existence of atherosclerotic plaques. We found that the recently developed Tongmaijiangzhi (TMJZ) capsule is with all the three

effects described above, and had been verified in previous animal models. In the present study, we found that with no other combined therapies, TMJZ administration itself could cause reduced plaque volume and remove some lipids in the existed plaques. The principle components of this TMJZ capsule were: *Equisetum ramosissimum*, *Rhizoma Ligustici Chuanxiong*, *Folium Nelumbinis*, *Panax notoginseng*, and *Zanthoxylum simulans*. There are multiple biologically active components inside these herbal medicines, with beneficial effects in treatments to the atherosclerotic plaques. For instance, the use of *Rhizoma Ligustici Chuanxiong* (with its effective component, Ligustrazine) can attenuate the oxidative stress, destabilise the plaque, and reduce the inflammatory reactions in both rabbit and transgenic mice model of atherosclerosis (Huang et al., 2011; Jiang et al., 2011; Zhang et al., 2009). Additionally, the *Panax notoginseng* saponins were found to be able to inhibit the Zymosan A induced atherosclerosis through regulations on integrin expression, FAK activation as well as NF-κB translocation in both rats and mice models (Li et al., 2011; Yuan et al., 2011). In future studies, we will try to combine the most effective components from purified extracts to investigate the possibility of improved efficiency. The present study did not measure the circulating blood lipids and other indices from the serum. It is mainly because the patients were not hospitalised during the drug administration period. We are carrying on other studies with only hospitalised patients, to monitor the serum lipid and blood pressure changes in routine examinations. Still, the promising result with TMJZ administration suggests that this treatment can be considered in patients with mild plaque/stenosis formation, as well as patients who are not suitable for surgical intervention immediately. This would be very useful for pre-surgical care of patients as well.

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