Effect of statins and the clinical nursing characteristics in patients with acute myocardial infarction

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Abstract: Statins are widely used in clinical practice because of their effectiveness and evidence-based medical evidence. In this paper, the effect of different kinds of statins on the treatment of patients with acute myocardial infarction has analyzed. By analyzing the clinical data of patients with acute myocardial infarction in our hospital, the authors summarized the characteristics of clinical nursing of statins. At the same time, this study retrospectively investigates the female patients with acute myocardial infarction treated in our hospital. Compared with the standard regimen, the enhanced statin lipid-lowering regimen is protective in reducing mortality and cardiovascular events for patients with diagnosed acute coronary syndrome (ACS). The morbidity of female patients with acute myocardial infarction is lower than the male, it also has larger concealment. The nursing staff should have a rapid identification and triage to female patients with acute myocardial infarction and have a health education of knowledge of acute myocardial infarction.

Keywords: Statins medicine, clinical characteristics, female patients, myocardial infarction.

INTRODUCTION

Hyperlipidemia is a major risk factor for coronary heart disease, because of statins effectiveness and evidence-based support and widely used in clinical test, 4S established the importance of hyperlipidemia in patients with coronary heart disease combined intervention (Dagher *et al.,* 2015; Isorni *et al.,* 2015). We should take full account of the serum lipid profile of patients after ACS and start the fasting blood lipid test as soon as possible after admission. Among them, the patients with acute myocardial infarction after admission to start lipid-lowering therapy, especially the use of statins, has become the basis of drug treatment and one of the most important measures (Perl *et al.,* 2015). There are other independent of the effects of lipid-lowering effect of statins, known as statins, including anti-inflammatory, antioxidant, improve endothelial function, plaque stabilization, reduction of neuroendocrine activation (Savonitto *et al.,* 2012). Compared with the standard regimen, the enhanced statin lipid-lowering regimen may be more protective in reducing mortality and cardiovascular events in patients with newly diagnosed acute coronary syndrome (ACS). At present, only REVERSAL studies have shown that atorvastatin 80mg daily oral intensive lipid-lowering treatment can completely prevent the progression of atherosclerosis.

Acute myocardial infarction is one of the diseases to causes death (González-Pacheco *et al.,* 2015; Heer *et al.,* 2015). The female morbidity is lower than the males in the middle age. But with the increase of age, the difference is narrowed gradually (Bruera *et al.,* 2015; Bulut *et al.,* 2015; Buyukhatipoglu *et al.,* 2015). The death toll of acute myocardial infarction between female and male are the same. Because the female patients have atypical symptoms and they will be ignored by the seldom signs of disease, the treatment is delayed (Cirak *et al.,* 2015; De Carlo *et al.,* 2015; Vagnarelli *et al.,* 2015). It increases the fatality rate and disability rate. The paper analyzes the clinical character and prognosis as well as the gender such relationship of 541 cases patients to explore the key point and the content of the nursing intervention in early stage of acute myocardial infarction.

MATERIALS AND METHODS

There were total 540 cases of patients with acute myocardial infarction from Jan., 2010 to Jan., 2013. All projects were approved by the ethics committee of the hospital, signed with informed consent. Ethical Approval number as 2010SD57PQ. They were diagnosed according to clinical performance, electrocardiogram performance, myocardial enzyme spectrum or coronary angiogram. The last follow-up was closed in Sep. 2016. We have done the comparison analysis of the differences between female and male patients in treatment and prognosis.

Drug intervention

The venous blood (5ml) was collected from the hospital admitted patients. The four groups on the day of admission were given atorvastatin 20mg, atorvastatin 40mg, fluvastatin 80mg and rosuvastatin 10mg orally at the same time, according to the condition of antiplatelet, anticoagulation, heart rate control and other drug treatment.

Collection and storage of blood samples

Patients in CCU ward immediately after venous blood (5ml), using random number table method. The subjects

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were randomly divided into four groups. The patients were randomly assigned into the group and were given the corresponding statin drugs. After taking the drug for one week and four weeks, 10 hours of fasting blood 5ml. All blood samples were collected at 4 DEG C for about 60min, and then centrifuged with 3000r/min for 10min, the supernatant was collected and stored in a -70°C ultra low temperature refrigerator to be tested.

RESULTS

Comparison of the four groups before treatment

The result shows that, there was no statistically significant difference for LDL-C (mmol/L), HDL-C (mmol/L), TC (mmol/L), hs-CRP (mg/L) and IL-6 (pg/ml). The medication for a week before and after treatment compared to the baseline LDL-C levels of the four groups was decreased (P<0.05). The result shows that HDL-C level increased in Atorvastatin group (P<0.05), and HDL-C has no significant change in fluvastatin group (P>0.05). TC levels in the four groups were all decreased (P<0.05); hs-CRP in 40mgatorvastatin group was decreased (P<0.05). For IL-6 atorvastatin group and fluvastatin group, there was no significant difference before and after treatment (P>0.05), 40mg atorvastatin group and rosuvastatin group after treatment before the reduction (P<0.05). Before and after treatment, compared with baseline, the LDL-C, TC, hs-CRP and IL-6 of the four groups were decreased (P<0.05); the levels of HDL-C in the four groups increased (P<0.05). The results are shown in figs. 1-4.

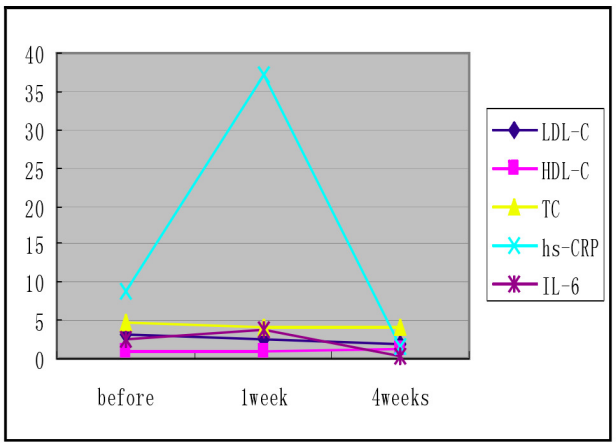

Fig. 1: Atorvastatin 20mg group

Comparison between four groups after four weeks of treatment

After one week of medication, the comparison between the four groups 20mg atorvastatin group and fluvastatin LDL-C statin group had no significant difference between the reduced value (P>0.05), fluvastatin group and rosuvastatin was no statistical difference between the Atorvastatin group (P>0.05), but rosuvastatin reduced the effect of LDL-C is better than atorvastatin group 20mg (P<0.05), atorvastatin group 40mg is stronger than the other three groups (P<0.05); 20mg atorvastatin group, rosuvastatin group decreased HDL-C values showed no significant difference (P>0.05); the four group TC decreased no statistical difference (P>0.05); 20mg atorvastatin group and fluvastatin group, Rui rosuvastatin group increased hs-CRP value had no significant difference (P>0.05); for IL-6, the four groups had no statistical difference of IL-6 change (P>0.05). Results see table 1. After four weeks of treatment, the LDL-C, TC, hs-CRP, IL-6 levels were not statistically different between the four groups (P>0.05), HDL-C value was not statistically significant (P>0.05). Results see table 2.

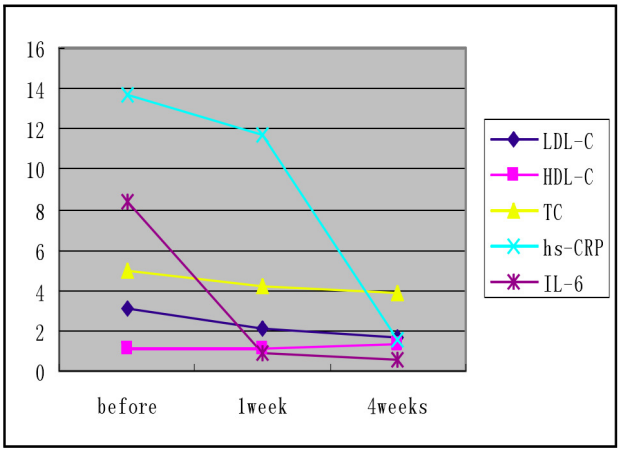

Fig. 2: atorvastatin 40mg group

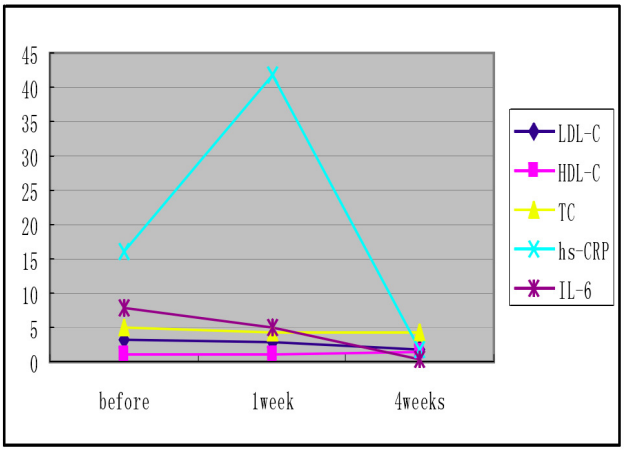

Fig. 3: Fluvastatin group

Clinical characteristics of acute myocardial infarction

The table 3 shows t there are some similar risk factors for acute myocardial infarction in female and male, such as family history, type 2 diabetes mellitus, hyperlipidemia, western style of life, etc. But in the aspect of hypertension and obesity, the female is higher than the male. The result of table 1 shows that there are more than half of female patients will have atypical angina pectoris when the acute myocardial infarction attacks. The typical ECG changes is obviously lower than the male patients, which leads to the

fact that obviously prolonged admission and the time of diagnosis and the misdiagnosis rate was higher than the male patients. Seen from the table 4, the incidence of mortality and rate of serious complication (cardiac shock, severe heart failure, ventricular septal perforation and papillary muscle rupture) of the female patients are higher than the male patient. Seen from the fig. 5, the long-term survival outcomes of female patients is lower than the male patients (P =0.000).

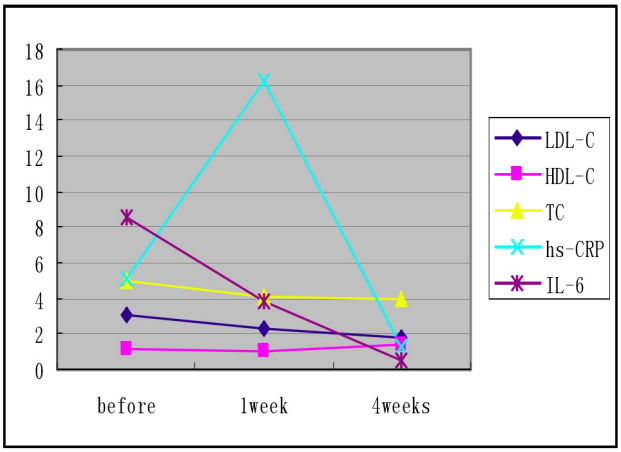

Fig. 4: Resuvastatin group

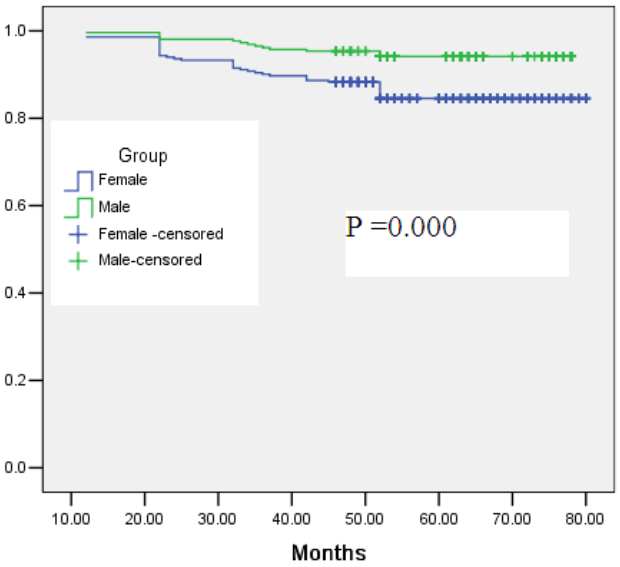

Fig. 5: Long term survival outcomes of the two groups

DISCUSSION

Clinical trials have demonstrated that inhibition of endogenous cholesterol synthesis by using HMG-Co a reductase inhibitors (statins) may reduce the incidence of primary and secondary cardiovascular events in people with cardiovascular risk (Clemmensen *et al.,* 201). Currently, there are six types of marketed statins: lovastatin, simvastatin, pravastatin, fluvastatin, atorvastatin and rosuvastatin (Dagher *et al.,* 2015; Isorni *et al.,* 2015). Each drug is very effective, reducing the risk of cardiovascular disease in 30-50% according to the dose and clinical background. Coronary atherosclerosis is an inflammatory response, and vascular inflammation plays a key role in the pathogenesis of atherosclerosis and thrombosis (Perl *et al.*, 2015). Hs-CRP and IL-6 are important indicators reflecting the inflammatory response of coronary atherosclerotic lesions, and can well reflect the degree of coronary artery inflammation in patients with acute myocardial infarction (Khera *et al.,* 2015). In the acute phase of ACS, a series of changes in serum lipid metabolism, plasma triglyceride and low-density lipoprotein levels increased, HDL-C, LDL-C and total cholesterol levels decreased. The changes of serum lipid levels in patients with acute myocardial infarction may be consistent with the trend. In this process, the relationship between inflammation and lipid metabolism is very close (Savonitto *et al.*, 2012). Statins because of its effectiveness and evidence-based support and widely used in clinical, in addition to lipid-lowering effect, its pleiotropic effects including anti-inflammatory, antioxidant, improve endothelial function and plaque stabilization, reduction of neuroendocrine activation. The anti-inflammatory effect of statins is one of the important mechanisms to improve the prognosis of cardiovascular events.

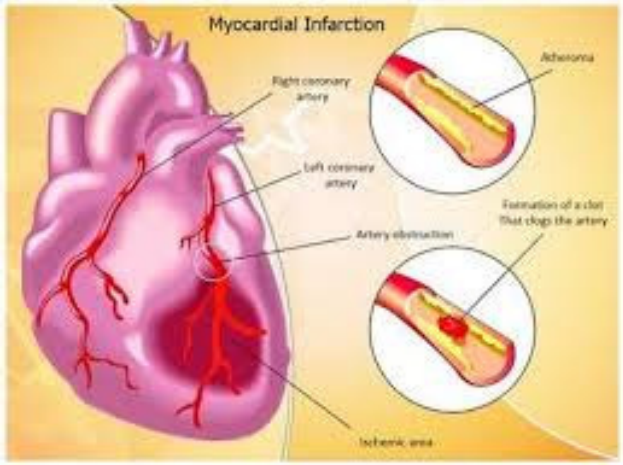

Fig. 6: Acute myocardial infarction (Abu, 2017)

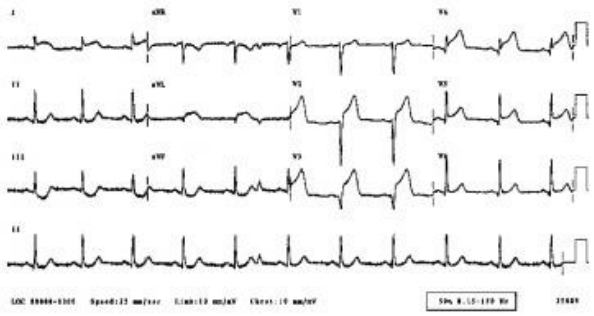

Fig. 7: Typical ECG of acute myocardial infarction (Isorni, 2015)

The pathogeny of acute myocardial infarction is unclear

and it is often caused by many elements working on different parts (fig. 6 to fig. 9). The elements are called as dangerous element and susceptible factor. Acute myocardial infarction is one of the most serious clinical event happened in the pathological basis of coronary atherosclerotic heart disease (Clemmensen *et al*., 2015; Galasso *et al*., 2015; Dagher *et al*., 2015; Isorni *et al*., 2015; Khera *et al*., 2015; Solinas *et al*., 2015; Savonitto *et al*., 2012; Perl *et al*., 2015). The acute myocardial infarction and unstable angina pectoris are called as acute coronary syndrome. The study shows that there are many similar or common danger elements between the male patients and the female patients. Some danger element will increase the incident of female patients with acute myocardial infarction, such as high blood pressure, smoking, diabetes, obesity. However, because of the atypical symptoms and signs of the female attacked by acute myocardial infarction, the treatment is delayed and the prognosis is worse. Some studies show that the female mortality is two times of the male's within one year after the attack of acute myocardial infarction (Han *et al*., 2015; Hou *et al*., 2015; Jia *et al*., 2015; Singh *et al*., 2016). The male patients are superior to the female patients in acquiring the acute myocardial infarction related knowledge. So many male patients start to do the prevention and treatment and get some effect earlier (Aldeas *et al*., 2015; Bal *et al*., 2015).

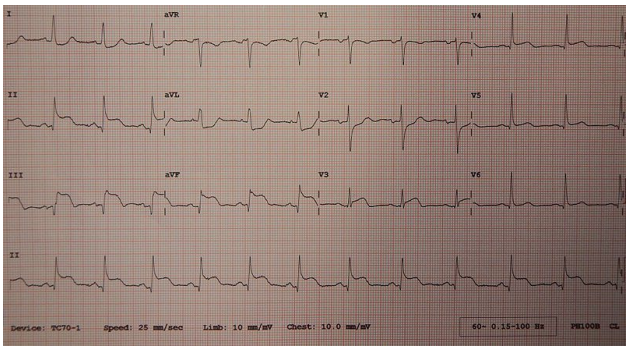

Fig. 8: An inferior and right ventricular STEMI as seen on 12 lead ECG (Isorni, 2015)

The danger elements of acute myocardial infarction include smoking, diabetes mellitus, hypertension, hyperlipidemia and obesity. Some documents show that although the international smoking rate has been decreased in recent years, there is increase tendency in developing countries, especially the quantity of female smoker (Lee *et al.,* 2015; Li *et al.,* 2015). The young women form a new smoking group. Smoking will make the women estrogen levels decrease before menopause and the low-density lipoprotein levels increased as well as the decrease of high density lipoprotein. It also does harm to vascular endothelial cell. Some documents show that the smoked women are 20 year earlier attacking by acute myocardial infarction than the non-smoked women (Apostolakis *et al.,* 2015). Women who smoked 5 cigarettes a day, the risk of acute myocardial infarction will be increased by about 3 times (Gao *et al.,* 2015). The medical staff should promote the danger of smoking and suggest the female to quit from smoking and to reduce the chance to be smoked (Bozkurt *et al.,* 2015; Breitenbuecher *et al.,* 2015).

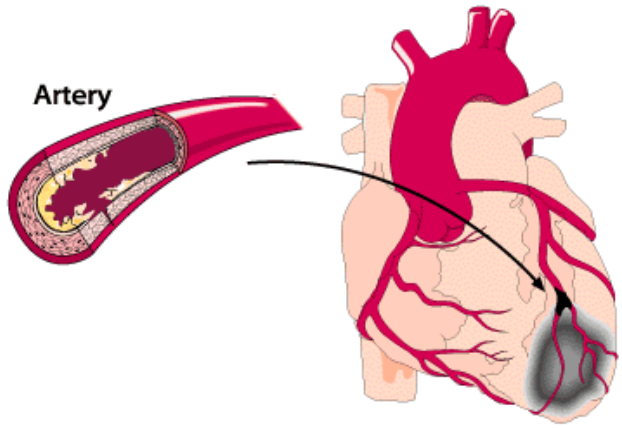

Fig. 9: Acute myocardial infarction (Hess, 2016)

Diabetes is one of the common danger elements that make female being attacked by acute myocardial infarction (Guo *et al.,* 2015; Gu *et al.,* 2015). Diabetes can increase the risk of acute myocardial infarction in women by 7 times. Female patients of diabetes will lose the protective effect of estrogen in the pre-menopausal period completely, but it can be controlled if it is found timely. The paper also finds that the diabetes is one of the major risk factors of acute myocardial infarction after high mortality. So the postmenopausal women should check the blood sugar in each year. If it is diagnosed as diabetes, there should be diabetes diets immediately and choose the suitable hypoglycemic agents with the guidance of doctor (Abu, 2017; Fang and Ruan, 2017; Liu *et al.* 2017; Takahashi, 2017). Hypertensive is also dangerous in female and male. It is a common dangerous element in old women. In the old female patients with acute myocardial infarction who are older than 70 years old, 50% of them have hypertensive. If the women have hypertensive disease before menopause, the chance of being attacking by acute myocardial infarction is added (Hess *et al.,* 2016; Kong *et al.,* 20155). The healthy people with family history should have prevention of all kinds of danger elements actively and monitor the blood pressure regularly.

Hyperlipidemia hyperlipidemia is one of the danger elements that cause the acute myocardial infarction (Akhter *et al.,* 2009; Caziuc *et al.,* 2015; Cetean *et al.,* 2015; Chen *et al.,* 2015; Kawamoto *et al.,* 2016). It is reported that the higher triglyceride levels play an important role in the development of acute myocardial infarction (Chandrasekhar *et al.,* 2016; Claassen *et al.,* 2012; Hochman *et al.,* 1999; Presbitero *et al.,* 2003; Trzeciak *et al.,* 2016; Tillmanns *et al.,* 2005; Vogel *et al.,* 2016). When female has higher blood fat, the risk of acute

Table 1: The difference of effect between four groups (one week)

	ΔLDL-C	ΔHDL-C	ΔTC	Δhs-CRP	ΔIL-6
Atorvastatin 20mg	0.39±0.3	-0.11±0.24	0.68±0.4	28.41±27.34	1.2±5.13
Atorvastatin 40mg	1.08±0.66	0.05±0.12	0.75±0.54	-2.0±0.41	-7.52±10.1
Fluvastatin	0.5±0.39	-0.1±0.26	0.65±0.43	25.94±37.52	-2.95±13
Rosuvastatin	0.73±0.61	-0.11±0.16	0.83±0.83	11.05±16.49	-4.66±9.87

Table 2: The difference of effect between four groups (four weeks)

	ΔLDL-C	ΔHDL-C	ΔTC	Δhs-CRP	ΔIL-6
Atorvastatin 20mg	1.22±0.45	0.33±0.23	0.87±0.5	-7.07±7.2	-2.33±5.55
Atorvastatin 40mg	1.43±0.4	0.22±0.23	1.01±0.62	-12.17±24.22	-7.92±10.32
Fluvastatin	1.36±0.36	0.22±0.17	0.9±0.46	-14.10±25.65	-7.48±11.49
Rosuvastatin	1.29±0.4	0.3±0.35	1.02±0.71	-3.9±4.88	-8.02±10.41

Table 3: Characteristics of acute myocardial infarction in female and male

	Female (n = 264)	Male (n = 277)	P
Risk factors			
family history	23	21	>0.05
type 2 diabetes mellitus	9	11	>0.05
hyperlipidemia	229	245	>0.05
western style of life	198	184	>0.05
hypertension	74	36	<0.05
obesity	62	41	<0.05
Presentation			
Atypical angina pectoris	156	69	<0.05
Typical ECG changes	109	212	<0.05
Mortality	12	4	<0.05
Cardiac shock	22	8	<0.05
Severe heart failure	32	11	<0.05
Ventricular septal perforation	10	1	<0.05
Muscle rupture	5	1	<0.05

Table 4: Outcomes of acute myocardial infarction in female and male

	Female (n = 264)	Male(n = 277)	P
Mortality	12	4	<0.05
Cardiac shock	22	8	<0.05
Severe heart failure	32	11	<0.05
Ventricular septal perforation	10	1	<0.05
Muscle rupture	5	1	<0.05

myocardial infarction will increase 3 times. So, the susceptible population of acute myocardial infarction should be actively guided in the diet to control the high fat food intake. The main nutritional components of serum total cholesterol are saturated fatty acids and dietary cholesterol. Hence, the main thing of diet guidance is to reduce the intake of saturated fatty acids and cholesterol.

CONCLUSION

In patients with acute myocardial infarction (AMI), lipid regulating therapy, especially the use of statins, has become one of the most important measures for the treatment of acute myocardial infarction. There are other independent of the effects of lipid-lowering effect of statins, known as statins, including anti-inflammatory, antioxidant, improve endothelial function, plaque stabilization, reduction of neuroendocrine activation. Compared with the standard regimen, the enhanced statin lipid-lowering regimen may be more protective in reducing mortality and cardiovascular events in patients with newly diagnosed ACS. The nursing staff should have a rapid identification and triage to female patients with acute myocardial infarction and have a health education of knowledge of acute myocardial infarction.

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