ROTATIONAL ATHERECTOMY AND DRUG ELUTING STENT IN TREATMENT OF UNPROTECTED LEFT MAIN CORONARY ARTERY CALCIFIED STENOTIC LESION

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ABSTRACT

Objective: To fully explore clinical effect of rotational atherectomy and drug treatment for left main coronary artery calcification.

Method: 1000 patients with left main coronary artery calcified stenotic lesions treated in ten hospitals in 2014 were included in the study. First, coronary rotational atherectomy and drug eluting stent (DES) implantation were adopted for treatment, and all patients were observed on return visits for a period of 12 months postoperative.

Results: Of 1000 patients, 984 had a successful operation, which is a 98.4% success rate. In addition, 16 patients had various degrees of postoperative adverse reactions and gradually improved after follow-up treatment. During the follow-up period, 1 patient was lost due to sudden cardiac death, and 21 patients suffered from angina and were hospitalized again.

Conclusion: The results demonstrate that coronary artery rotational atherectomy and drug stent implantation surgery offer high safety for serious calcified stenotic lesion of left main coronary artery, with good clinical effects and high clinical application value.

Key words: Calcification stenosis of left main coronary artery, rotational atherectomy, drug eluting stent

Introduction

Left main coronary artery disease (LM) is a serious form of coronary heart disease. Its clinical manifestations are mainly severe angina pectoris, with a high rate of sudden death. It may also cause myocardial infarction, triggering cardiogenic shock with a very poor prognosis\(^1\). Clinical studies show that with drug treatment for left main coronary artery lesion, survival rate of 50% does not exceed 5 years\(^2\).

Therefore, an efficient and safe treatment is urgently needed. Results confirm that: In percutaneous coronary intervention (PCI) process (Figure 1), patients’ coronary artery disease with severe stenosis accompanied by fibrosis or calcification usually means that a balloon or stent cannot pass through the lesion or that the lesion cannot be completely expanded by the balloon, or that the stent cannot be released.

Therefore, simple percutaneous coronary artery surgery has a very low success rate and a high incidence of complications\(^3\)\(^4\).

With continuous progress and development of clinical medical technology, rotational atherectomy and drug eluting stent (DES) implantation has been confirmed with good effect for treatment of left main coronary artery calcified stenotic lesion, which renders timely judgment of coronary artery lesion calcification degree possible and reduces risk of percutaneous coronary artery surgery. Incomplete expansion of calcified stenotic lesion is prone to stent malapposition, which increases risk of stent thrombosis, while repeated high pressure balloon dilatation increases risks of restenosis, vascular dissection and perforation, as restenosis and target lesion revascularization rate is high. Rotational atherectomy therapy combined with drug eluting stent (Figure 2) can significantly reduce restenosis and target lesion revascularization rate. In order to provide patients with better medical services, this paper conducted a wider range of research of the surgical approach, with specific circumstances as follows:

Method

General information

In this study, 1000 patients with left main coronary artery calcification stenosis treated in some 10 hospitals in 2014 were selected, with 632 male patients, 368 female patients; the oldest was 76 years, the youngest 37 years old, with average age 67.4 ± 11.3 years old.

Regarding the conditions of illness, there were 750 cases with hypertension, 375 cases with diabetes, 625 cases with hyperlipidemia, 125 cases with a history of smoking, 154 cases with stable angina pectoris, 632 cases with unstable angina pectoris, 243 cases with non-ST segment elevation myocardial infarction; with average ejection fraction at 48.8-57.3% and coronary artery SYNTAX score at 23.9 ± 3.4.

Regarding the pathological features of rotational atherectomy, 1000 patients were diagnosed with left main coronary artery double-vessel or triple vessel disease by coronary arteriography (see Figure 3 for rough lesions).

Left main coronary artery lesion: 625 cases of proximal and somatic part, 375 cases of bifurcation. A total of 4000 target lesions, 2500 lesions of rotational target. 3000 blood vessels were treated, including 1000 left main coronary artery, 1000 anterior descending branches, 500 circumflex branches, 500 right coronary artery. All patients were confirmed with severe superficial calcification by coronary angiography or intravascular ultrasound. In order to ensure accuracy of therapeutic calcification by coronary angiography or intravascular ultrasound. In order to ensure accuracy of therapeutic outcome, this study excluded acute or subacute thrombosis, self-dissection or obvious coronary artery dilatation and obvious left ventricular function decrease (ejection fraction less than 35%). All patients understood the purpose and significance of this study before surgery and signed informed consent.

Treatment methods

Among the 1000 patients, 875 had diameter of grinding head at 1.25mm, 125 had 1.75mm; 375 patients had rotational atherectomy due to unsuccessful trial balloon dilation for left main lesion, 231 cases received rotational atherectomy after being diagnosed with severe left main coronary artery calcification by intravascular ultrasound; 650 patients directly received left main coronary artery - anterior descending branch implantation after rotational atherectomy and balloon dilatation. 127 patients had intra aortic balloon pump (IABP) support in operation. With conventional preoperative oral administration of 100~300mg aspirin and
300mg clopidogrel, intraoperative application of 1mg/kg heparin infect, all patients had 6F guiding catheter through radial artery approach, of which 127 patients were changed to right femoral artery approach because of radial artery spasm. Rotational head is selected according to vessel diameter, with diameter at 1.25~1.75mm and rotational speed at 1.5 x 10^5~1.8 x 10^5r / min. Rotational atherectomy 2 ~ 5 times for each lesion, each lasting 10~20s until no sense of resistance in grinding head and no speed attenuation. In rotational process, 5% glucose and sodium chloride injection 500ml+2.5mg nitroglycerin + 2.5 mg verapamil + heparin 5000U flushing liquid were used for continuous washing of grinding head. Percutaneous transluminal coronary angioplasty (PTCA) with balloon diameter 0.5mm smaller than the reference diameter and pressure at 8~18atm (1atm=101.325kPa) for lesion expansion. Stent was implanted after sufficient predilation of lesion, then balloon dilatation was carried out with the same diameter as stent. The specific circumstances of troponin I, creatine kinase, isozyme were reviewed 10 to 20 hours after operation of patients who then had coronary heart disease drugs such as aspirin, clopidogrel, statins lipid altering drug, according to the condition of individual patients.

**Observation method**

The clinical effect of the treatment through observation of incidence of cardiovascular adverse events after operation were compared. Major cardiovascular adverse events (MACE): refer to vascular perforation, no reflow, rotary grinding head incarceration in interventional procedure and perioperative myocardial infarction (with postoperative creatine kinase MB isoenzyme three times greater than the normal upper limit) and death, acute myocardial infarction, and target lesion revascularization caused by a variety of reasons in follow-up visits, including repeated interventional therapy or CABG.

After the operation, all patients were monitored on return visits, in order to further clarify the safety and effectiveness of this treatment. Patients in the urban area were followed up on the spot, while the rest of the patients limited by distance received telephone follow-up. Follow-up visits were conducted at third month, sixth month and twelfth months after the operation.

**Statistical methods**

This treatment research utilized SPSS19.0 statistics software for relevant data analysis and processing. The measurement data is expressed by x±s, and count data is expressed by n,%. When the value of P is less than 0.05, the difference is statistically significant.

**Results**

In the course of treatment, all the selected 1000 patients received successful rotational atherectomy, after which balloon dilation and stent were applied, with 8 cases implanted with drug eluting stent; target lesion stent per case numbered 2.68 ± 0.67 on average; postoperative coronary arteriography confirms no residual stenosis in vascular lumen. However, after operation, during recovery of 1000 patients, 16 patients had serious complications such as acute vascular occlusion, coronary artery perforation and dissection rupture, etc., but no operative death or emergency CABG, etc. After completion of the operation, 22 patients had cardiac troponin I and creatine kinase MB isoenzyme three times greater than the normal upper limit, and were diagnosed with myocardial infarction related to percutaneous coronary intervention, but the patients reported no complaint.

Follow up: 8 patients were followed up for 6-12 months, with average follow-up at 7.9(6-12) months. During the follow-up period, there was 1 patient with sudden cardiac death, and 21 patients suffered from angina and were re-hospitalized.

**Discussion**

After surgery of severe left main calcified stenosis, 984 patients had very significant postoperative treatment effect, so the success rate of this treatment is as high as 98.4 (984/1000). Therefore, the effect of the operation fully proves that: In treatment of patients with left main stenosis complicated with severe calcification, coronary rotational atherectomy is feasible, with not only significant effect but also high safety. In the clinical course it is necessary to conduct perfect pretreatment for patients with severe left main calcified lesion.

Only by seizing this treatment opportunity can smooth completion of late stent therapy be ensured, which can effectively prevent various complications due to malapposition after stent implantation. In the course of the treatment, all 1000 patients with left main coronary artery disease had post balloon dilatation with high pressure to fully expand the stent after implantation, which effectively
reduced incidence of stent malapposition. Although some patients had adverse reactions after treatment, the symptoms improved significantly.

In summary, left main coronary artery rotational atherectomy combined with drug eluting stent implantation enjoys good efficacy in treatment of severe left main coronary artery calcified stenosis. Seen from the overall situation of follow-up visits, the operation offers significant effect and high safety, and thus is recommended to be widely popularized and applied in clinics.

References


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