Hansen Science Publishing

Open Access Library of Science A, 2019, 1(3), 26-32
http://www.hansenpub.com/journals/oalsa/

Study on Coronary Artery Bypass Grafting Combined with Carotid Endarterectomy in the Treatment of Elderly Coronary Heart Disease with Carotid Artery Stenosis

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How to cite this paper: McCormick, R. A. (2019). Study on Coronary Artery Bypass Grafting Combined with Carotid Endarterectomy in the Treatment of Elderly Coronary Heart Disease with Carotid Artery Stenosis. *Open Access Library of Science A, 1(3),* 26-32.
http://dx.doi.org/10.34038/oalsa.2019.03.001

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Abstract

Objective To investigate the tolerance and follow-up results of coronary artery bypass grafting (CABG) combined with carotid endarterectomy (CEA) in the treatment of elderly coronary heart disease with carotid artery stenosis. Methods 180 cases of elderly patients with coronary heart disease admitted to our hospital from March 2012 to March 2013 were retrospectively analyzed, among which 90 cases were treated with CEA and CABG (observation group) at the same time and 90 cases were treated with CABG and CEA (control group) at the same time. Operative time, time of single carotid artery occlusion, bridge blood flow, ICU stay time, length of stay in the ICU, changes in internal diameter and flow velocity of carotid artery stenosis and LVEF were compared in the two groups, and the incidence of perioperative complications were recorded.Results the duration of operation in the observation group was significantly longer than that in the control group, while the length of stay and hospitalization in ICU were significantly shorter than that in the control group ($P<0.05$). Compared with preoperative comparison, the inner diameter and LVEF of carotid artery stenosis were significantly increased and the change of flow velocity was significantly decreased in the two groups ($P<0.05$), while there was no significant difference between the two groups ($P>0.05$). The incidence of perioperative complications in the observation group was significantly lower than that in the control group ($P<0.05$). Conclusion concurrent CEA and CABG in the treatment of elderly coronary heart disease with carotid artery stenosis has the same effect as staging surgery, but the former requires only one operation, which is conducive to promoting the recovery of patients and reducing the incidence of perioperative complications.

Keywords

Coronary artery bypass grafting and carotid endarterectomy; Old age; Coronary heart disease (CHD)

1. Introduction

According to statistics, the incidence of coronary heart disease among the elderly in China reaches 30%[1]. Coronary artery bypass grafting (CABG) is an effective treatment for coronary artery disease and an important means of myocardial reperfusion therapy.With the progression of coronary heart disease, most patients need CABG treatment, but this surgery is prone to complications of stroke.According to the investigation, the incidence of stroke reached 5.2% in patients with coronary

heart disease complicated with carotid artery stenosis (stenosis degree > 50%) [2].At present, there is still a lot of controversy about what kind of operation should be done for such patients.Studies have shown that post-cabg stroke is mainly caused by carotid artery stenosis, and concurrent carotid endarterectomy (CEA) can reduce the risk of stroke after CABG. However, there are few clinical studies on the safety of concurrent or staged CABG and CEA in the treatment of coronary heart disease with carotid artery stenosis.This study retrospectively analyzed the clinical data of 180 elderly patients with coronary heart disease in our hospital, and discussed the tolerance and prognosis of patients with coronary heart disease complicated with carotid artery stenosis treated with CABG and CEA, providing certain basis for clinical treatment.

2. Material and method

2.1 patients

180 cases of elderly patients with coronary heart disease admitted to our hospital from March 2012 to March 2013 were retrospectively analyzed, including 90 cases of CABG and CEA (observation group) and 90 cases of CABG and CEA (control group) treated by stages. In the observation group, there were 70 males and 20 females, aged 65~78 years, with an average age of (69.52±3.41) years. In the control group, 66 males and 24 females were aged from 65 to 80 years, with an average age of (70.10±3.25) years. This study was approved by the hospital ethics committee.Inclusion criteria: (1) meet the diagnostic criteria for coronary heart disease [4]. (2) all patients were confirmed with unilateral and bilateral carotid artery stenosis (≥ 80%) by cervical vascular ultrasound and carotid artery CT angiography. (3) CABG surgical indications were met, and no contraindications were observed [4]. (4) complete clinical data.Exclusion criteria: severe liver, lung, kidney and other important organ dysfunction, combined with malignant tumor and severe mental dysfunction.The general data of the two groups, including gender, age, smoking, combined diseases, carotid artery stenosis, and coronary artery multi-vessel lesions, were not statistically significant (table 1), showing comparability.

Table 1 comparison of two groups of general data （n， $\bar{x}$ ±s）

variable	observition（n=90）	control（n=90）	P
age（yr， $\bar{x}$ ±s）	69.52±3.41	70.10±3.25	0.244
gender（male/female）	70/20	66/24	0.488
smoking[n（%）]	24（26.67）	22（24.44）	0.733
complications[n（%）]			0.405
diabetes mellitus	14（15.56）	16（17.78）	
hypertension	22（24.44）	15（16.67）	
hyperlipidemia	10（11.11）	13（14.44）	
Carotid stenosis [n（%）]			0.290
Stenosis of the carotid intersections	66（73.33）	72（80.00）	
Common carotid artery stenosis	24（26.67）	18（20.00）	
Coronary artery disease [n（%）]			0.411
Left main	16（17.78）	12（13.33）	
triple vessel	74（82.22）	78（86.67）	

2.2 methods

CEA and CABG were performed simultaneously in the observation group, and CEA and CABG were performed first and CABG was performed later.CEA was performed first in the control group and CABG was performed later.All patients were stopped using antiplatelet drugs before surgery, and were routinely treated with nitric acid, calcium antagonists and other anti-myocardial ischemia drugs.Patients with diabetes mellitus, hypertension and hyperlipidemia can be treated by controlling blood sugar, blood pressure or blood lipids respectively.

CEA surgery: all patients were placed in supine position with static inhalation in accordance with anesthesia. The shoulder was padded 30 °on the surgical side, and the head was turned to the non-surgical side for fixation.The skin was cut open (along the front edge of the sternocleidomastoid muscle) for 10cm, the carotid sheath was separated and cut open, and then the internal carotid artery, external carotid artery and common carotid artery were separated, and 3 blocking bands were set to block.Before systemic heparinization, the internal carotid artery reflux pressure was measured. If the internal carotid artery reflux pressure was > 40mmHg (1mmHg= 0.133kpa), the internal carotid artery bypass was not used.Open the outer membrane of the artery and peel off the intima to ensure the integrity of the intima.The remaining inner membrane and debris on the tube wall were removed and washed with heparin saline.The wound was trimmed and the arterial incision was sutured. The incision was closed after exhaust, and the external, general and internal carotid arteries were opened successively.The wound was routinely drained with a thin plastic tube.

The sternum midline incision CABG, not under the extracorporeal circulation, collection and radial artery, milk inside arteries or great saphenous vein, the use of heparin to maintain whole blood activated clotting time of 300 s, local fixed target blood vessels, the holder will target blood vessels when cut into shunt switch, and according to its location and length of blood vessels using single, sequential, T, Y vascular bypass.After distal anastomosis, the mitral valve was exposed and treated.

2.3 observation indexes

Observation indexes mainly include operation time, average time of single carotid artery occlusion, bridge blood flow, length of stay in ICU, length of stay in hospital, as well as changes in internal diameter and flow velocity of carotid artery stenosis, LVEF and incidence of complications.Changes in internal diameter, flow velocity and LVEF of carotid artery stenosis before and after operation were detected by echocardiography.All patients were followed up successfully for 3 years, and their prognosis was observed.Telephone follow-up was conducted once a week, and outpatient reexamination was conducted once every 3 months.

2.4. Statitsic analysis

statistical software SPSS19.0 was used, percentage of enumeration data was expressed, and chi-square test was used.Measurement data were expressed by ±s, and t-value test was adopted. P<0.05 was considered statistically significant.

3. Results

Compared with the control group, the operative time of the observation group was significantly prolonged, while the stay time and length of stay in ICU were significantly shortened (P<0.05).There were no statistically significant differences in the time of single carotid artery occlusion and bridge blood flow between the two groups (P>0.05, table 2).

Table 2 comparison of surgical indicators between the 2 groups ($\bar{x}$ ±s)

items	observation（n=90）	control（n=90）	t	P
Surgery time（min）	213.51±36.75	196.34±30.42	3.414	0.001

Time of single carotid artery occlusion（min）	22.34±5.12	23.40±4.15	1.526	0.129
flow of blood to the bridge（ml/min）	24.31±10.26	25.19±11.37	0.545	0.586
icu care duration(d)	2.10±0.75	2.53±0.94	3.392	0.001
hospital stays（d）	24.16±6.57	36.24±12.53	8.100	0.000

The results of echocardiography in the two groups were compared with those before operation, and the inner diameter and LVEF of carotid artery stenosis were significantly increased and the change of flow velocity was significantly slowed in the two groups after operation (P<0.05). However, there was no statistically significant difference between the two groups after operation (P>0.05)(table 3).

Table 3 2 comparison of echocardiography ($\bar{x}$ ±s)

items	observation（n=90）	control（n=90）	t	P
Internal diameter of carotid artery stenosis（mm）				
before	1.68±0.27	1.64±0.31	0.923	0.357
after	6.05±0.43[a]	6.12±0.47[a]	1.042	0.299
velocity change（cm/s）				
before	243.56±37.29	239.65±40.27	0.676	0.500
after	70.35±10.24[a]	69.10±7.58[a]	0.931	0.353
LVEF（%）				
before	52.62±13.10	53.10±12.76	0.249	0.804
after	69.25±12.16[a]	67.82±11.46[a]	0.812	0.418

[a] showed significant differences between after and before surgery at *P*<0.05.

Comparison of complications and postoperative follow-up between the two groups: no death during perioperative period, smooth operation, and recovery and discharge.The incidence of perioperative complications in the observation group was significantly lower than that in the control group, and the difference was statistically significant (P<0.05, table 4).

No postoperative death occurred in 3 years in 2 groups.One case of renal insufficiency occurred in the observation group 1 year after operation and recovered after hemofiltration.In the control group, l patients had multiple manifestations of cerebral hyperperfusion syndrome within six months after surgery, and recovered after diuretic and hormone therapy.One patient developed angina pectoris 3 years after surgery, and received CABG again after coronary angiography.There was no significant difference in the incidence of renal insufficiency, cerebral hyperperfusion syndrome and angina pectoris between the two groups (P > 0.05).

Table 4 comparison of complications in group 2 [cases (%)]

items	observation（n=90）	control（n=90）
Neck incision edema	2（2.22）	8（8.89）
nerve injury	6（6.67）	6（6.67）
hoarseness	4（4.44）	8（8.89）
MI	2（2.22）	2（2.22）
stroke	0（0.00）	8（8.89）
total	14（15.56）[a]	32（35.56）

[a] showed significant differences between observation and control group at $P<0.05$.

4. Disucssion and conclusion

In the guidelines of CABG, the American college of cardiology/American heart association recommended that simultaneous or staged CABG and CEA treatment for coronary heart disease with carotid artery stenosis significantly reduced the incidence of stroke after CABG [5]. Generally, it can be divided into concurrent operation and staging operation (CEA first, CABG later).According to traditional studies, the incidence of postoperative complications in the same period of surgery is higher than that in stage surgery [6]. In recent years, a large number of studies have confirmed that concurrent surgery can significantly reduce the incidence of postoperative complications of CABG [7-9].

The reduction of aortic operation of CABG under off-pump circulation can avoid the air thrombus and microthrombus generated by extracorporeal circulation. Compared with conventional CABG, it can also reduce the incidence of postoperative stroke [10-11]. The results of this study showed that, compared with the control group, the operation time of the observation group was prolonged, and the ICU stay time and hospitalization time were shortened, indicating that the operation operation was relatively complex and the operation time was prolonged during the same period. Surgeons should fully consider whether the patients' pulmonary and cardiac functions were tolerated, and accurately grasp the operation indications [12]. Two operations and anesthesia are required for the staging operation, with relatively large surgical injuries and prolonged ICU stay and hospitalization time.The results of this study showed that changes in internal diameter, flow velocity and LVEF of carotid artery stenosis were significantly improved in the observation group and the control group, but there was no significant difference between the two groups, suggesting that the two surgical treatments had similar effects.The retrospective study of qu qingxi et al. [13] on 22 patients who underwent concurrent CABG and CEA surgery showed that concurrent CABG and CEA surgery could effectively treat coronary heart disease complicated with carotid artery stenosis with high safety.The patients were followed up for 3 years, and all the 2 operations were fatal, and 4 complications were cured after symptomatic treatment.In addition, the complication rate of perioperative stroke was reduced. Liu jinsong et al. [14] also showed that simultaneous CEA and CABG surgery for coronary heart disease complicated with carotid artery stenosis had a better effect, and the results of short-term and mid-term follow-up were good.

In clinical practice, due to the fact that some patients with carotid artery stenosis have no neurological symptoms, and the degree of stenosis is not always in direct proportion to carotid artery murmurs, clinical attention is paid to coronary artery disease in patients with coronary heart disease, while carotid artery disease is ignored.But for such patients, the examination of carotid artery disease is of great significance.Therefore, the following problems should be paid attention to when CABG and

CEA were performed simultaneously: cases should be strictly screened before surgery; doppler vascular ultrasound combined with auscultation was used before surgery for CABG, and the location and degree of carotid artery stenosis were determined by CT angiography, and surgical indications should be strictly mastered.Systolic blood pressure ≥120mmHg was maintained when carotid artery was blocked intraoperatively, and the average arterial pressure was more than 20%~30% before operation, which was conducive to improving cerebral perfusion, preventing cerebral ischemia, and reducing the incidence of postoperative neurological complications [15].

In summary, concurrent CEA and CABG treatment of elderly coronary heart disease combined with carotid artery stenosis has a good effect, promoting the recovery of patients and reducing the incidence of perioperative complications, but the operation time is prolonged, which requires attention to surgical indications.

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