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JNMU
Journal of Nanjing Medical University, 2008, 22(6):395-397
www.elsevier.com/locate/jnmu
Research paper

The feasibility of left radial artery approach for coronary angiography

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Received 13 August, 2008

Abstract

Objective: To study the feasibility of the left radial approach for coronary angiography. **Methods:**195 patients diagnosed with coronary atherosclerotic heart disease were randomly divided for coronary angiography(CAG) into a left radial artery approach group(98 cases) and a right radial artery approach group(97 cases) from Jan 2006 to Dec 2006. Selective coronary angiographies were performed with 5F TIG catheters. The time of puncturing, duration under X-ray fluoroscopy and of the operation, successful rates of puncturing and coronary angiography were recorded. **Results:**There was no difference in the time of puncturing(2.25 ± 1.58 min vs 2.19 ± 1.62 min), duration under X-ray fluoroscopy(3.12 ± 1.53 min vs 3.21 ± 1.49 min) and the duration of the operation(12.87 ± 2.52 min vs 12.98 ± 2.85 min), nor in the success rates of puncturing(95.91% vs 95.87%) and coronary angiography(94.90% vs 94.85%). **Conclusion:** Coronary angiography can be accomplished via the left radial artery approach, indicating that this is a worthwhile clinical approach.

Key words: Coronary Angiography; Transradial Approach

INTRODUCTION

In recent years, with improvements in manipulating techniques and new equipment, a transradial approach for coronary angiography(CAG) has become the alternative approach because of lessened pain, minimal complications of local haemorrhage or blood vessel embolism, decreased time in hospital and specific advantages in using heparin[1-7]. But domestic researches have mainly concentrated on the right transradial approach, with few reports on the use of the left transradial approach. One issue with the transradial approach is that arteriospasm induces puncturing difficultly and operational failure, causing a fraction of patients to come back for the femoral artery approach. Thus it is necessary to explore a new approach for intervention therapy. In this study we investigated choices of equipment and features of the left transradial approach for CAG, and evaluated its feasibility.

MATERIALS AND METHODS

Objects

One hundred and ninety five patients who were diagnosed with coronary atherosclerotic heart disease were randomly divided into a left radial artery approach group for CAG(98 cases) and a right radial artery approach group(97 cases) from Jan 2006 to Dec 2006. There were no significant differences in gender, age and cardiovascular disease status between the two groups. All patients took aspirin 100 mg/d and clopidogrel 75 mg/d orally at least 6 days prior to the procedure. Patients requiring emergency CAG took clopidogrel as a 300 mg draught. The diastolic internal diameter of the radial artery to be used was measured with 2D hypersound.

Methods

With one side arm abducting horizontally, we punctured the radial artery 2~4 cm above the transverse striation of palm, using arteriopuncture wrap which included a 25 cm transfixion pin of 20,0.0019 inches(straight head) supersliding guide wire and 16 cm 6F artery sheathing canal, according to Seldinger's method. If successful, 200 ug Glycerol trinitrate were injected through the sheathing canal to prevent arteriospasm[8,9]. If failure occurred, we next used the radial artery on the opposite side, then lastly the femoral artery.

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Extubating and hemostasis: The artery sheathing canal was pulled out as soon as the operation terminated and an adhesive bandage pressure dressing was applied for 4 hours. The actions of the operated arms were limited, but other body movements were not. Selective coronary angiographies were performed with 5F TIG catheters, and Judkins or Amplatz catheters were used if necessary[10-12].

Observed indices

The time of puncturing, the duration under X-ray fluoroscopy, the duration of the operation, and success rates of puncturing and CAG were recorded.

Follow up

Patients were followed up for one moth after the procedure, and the radial artery pulse and diastolic internal diameter of the operated radial artery were checked again.

Statistical analysis

All the data were analyzed using Student t tests(SPSS 10.0). Differences between means were considered significant if $P < 0.05$.

RESULTS

In the left radial artery approach group 4 cases failed during puncturing, and one case failed due to CAG arteriospasm. Four cases in the right radial artery approach group failed in puncturing, one case failed in CAG due to an abnormity of the radial artery. In 8 cases that failed in puncturing we turned to the radial artery on the opposite side, 6 of which succeeded, and only 2 cases were performed via the femoral artery approach. The total success rate of puncturing was 98.97%. There was no difference in time of puncturing (2.25 ± 1.58min vs 2.19 ± 1.62 min), duration under X ray fluoroscopy(3.12 ± 1.53 min vs 3.21 ± 1.49 min) and duration of the operation(12.87 ± 2.52 min vs 12.98 ± 2.85 min), nor in success rates of puncturing (95.91% vs 95.87%) and coronary angiography(94.89% vs 94.85%)(***Table 1***).

Table 1 **Results of CAG using left and right radial artery approaches**

	Time of puncturing(min)	Successful rates of puncturing(%)	Duration under X-ray fluoroscopy(min)	Duration of the operation(min)	Successful rates of CAG(%)
left radial artery approach group	2.25 ± 1.58	94(95.92)	3.12 ± 1.53	12.87 ± 2.52	94.90
right radial artery approach group	2.19 ± 1.62	93(95.88)	3.21 ± 1.49	12.98 ± 2.85	94.85

Means $\pm$ SEM. Left radial artery group, N=93, and in the right radial artery group, N=92.

Mean radial artery diastolic internal diameter in the right radial artery group was bigger than in the left radial artery group before the operation, but this difference was not statistically significant. One month later, no arterial occlusion case was found, but the mean diastolic diameter of the radial artery decreased significantly in both groups, $P < 0.01$[12,13](***Table 2***).

Table 2 **Diastolic internal diameters**

	Diastolic internal diameter before operation, mm	Diastolic internal diameter after operation, mm
left radial artery approach group	2.53 ± 0.40	$2.35 \pm 0.37^{**}$
right radial artery approach group	2.60 ± 0.41	$2.40 \pm 0.36^{**}$

$^{**}P < 0.01$

DISCUSSION

Arteriospasm is the primary cause of failure in puncturing and CAG[14-16]. Repeatedly puncturing in one position can induce arteriospasm of a small radial artery, causing a fraction of them to fail during puncturing. Our aim was to puncture as few times as possible, preferably succeeding the first time. If it failed one or two times at one point, we moved to another point 1-2 cm away.In our study groups 8 cases failed with the first puncturing. We turned to the opposite side radial artery, where 6 of them succeeded, while 2 cases were performed via the femoral artery approach. The total success rate of puncturing attained was 98.97%. This indicates that difficulties with radial puncturing can be solved with more experiences. In addition, arteriospasm was decreased and the success rate of CAG was improved by performing the procedure with a small diameter catheter.In our research, 5F TIG catheters were used for CAG, decreasing ateriospasm sharply[17]. This resulted in a decrease in the operative time and in the time operators spent under the X-ray fluoroscope.

The arch of the aorta sends out the inominate, left common carotid and left subclavian arteries from right to left. Consequently, the catheter is able to access the descending aorta via the left common carotid, so guide wire and catheter should be adjusted accordingly to attain the ascending aorta[18-20]. When the left radial artery approach group and the right radial artery approach group were compared there was no difference in time of puncturing(2.25 ± 1.58 min vs 2.19 ± 1.62 min), Duration under the X ray fluoroscopy (3.12 ± 1.53 min vs 3.21 ± 1.49 min) and duration of operation(12.87 ± 2.52 min vs 12.98 ± 2.85 min), nor in success rates of puncturing(95.91% vs 95.87%) and coronary angiography(94.90% vs 94.85%). This confirms that the left radial artery was an appropriate approach for CAG. Furthermore, most patients pre-

ferred to perform CAG using the left radial artery approach for an easier daily life during recovery.

In summary, coronary angiography can be accomplished via the left radial artery approach, and this approach is worthy of clinical consideration.

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