

Long-term follow-up of PTCA of the right coronary artery with shepherd's crook morphology

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■ The authors evaluated the long-term outcome of percutaneous transluminal coronary angioplasty (PTCA) of the right coronary artery in patients with shepherd's crook morphology (51 patients) compared to a control group (53 patients) matched for lesion location, date of procedure, age, and gender. The primary success rate was lower (86% v 98%; $P=.03$) in the shepherd's crook group than in the control group. At a mean follow-up of 29 months, there was one death in each group. The restenosis rate was 18% in the shepherd's crook group and 21% in the control group; repeat PTCA (14% v 15%) and bypass surgery (2% v 6%) rates were also similar in both groups. The data suggest that PTCA of right coronary arteries with shepherd's crook morphology has a significantly lower primary success rate but similar long-term outcome when compared to PTCA of right coronary arteries without this anatomic variation.

□ INDEX TERMS: ANGIOPLASTY, TRANSLUMINAL; CORONARY ARTERIES □ CLEVE CLIN J MED 1989; 56:577-579

TECHNICAL difficulties and low primary success rates have been reported in percutaneous transluminal coronary angioplasty (PTCA) of coronary arteries with unusual morphology.¹⁻⁵ The shepherd's crook morphology may cause difficulty during angioplasty of the right coronary artery. Gossman et al⁶ recently reported on the technical difficulties and a low primary success rate found in association with PTCA of shepherd's crook right coronary artery. We undertook the present study to determine the long-term outcome of PTCA in these same patients. Gossman et al reported the methods used for patient

selection and detection of shepherd's crook morphology, described the clinical and angiographic characteristics and early results, and discussed the initial outcome of the study and the control groups; this data is not repeated in full below.

MATERIALS AND METHODS

In general terms, we defined shepherd's crook morphology as a right coronary artery with a proximal segment having a superior orientation when viewed in the left anterior oblique projection (*Figure 1*). To quantify the shepherd's crook, the angle between the ascending aorta and the initial portion of the right coronary artery (primary angle) and the angle between the ascending and descending portions of the right coronary artery (secondary angle) were measured. A shepherd's crook of the right coronary artery was considered to exist when both angles were $<90^\circ$.

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FIGURE 1. Anterior oblique projection. Right coronary artery with shepherd's crook morphology.

The coronary angiograms of the 1,043 patients who underwent right coronary artery angioplasty at The Cleveland Clinic Foundation between January 1984 and December 1986 were reviewed. Of these patients, 51 had shepherd's crook morphology according to the aforementioned definition. These 51 formed the study group. A control group of 53 patients was selected and matched to the shepherd's crook group according to lesion location (proximal, middle, distal), date of procedure, age, and gender.

Follow-up was by telephone interviews with all surviving patients or with the personal physicians. We determined whether the patient was still alive, had undergone hospitalization because of cardiac reasons, or had undergone repeat PTCA and/or coronary artery bypass grafting. Presence and severity of angina pectoris was assessed according to the Canadian Cardiovascular Society classification. Restenosis was defined as >50% stenosis at the site of index PTCA. The medical records and coronary angiograms of all patients were reviewed. Medical records and angiograms of the patients who were hospitalized or underwent catheterization in another institution were obtained and reviewed.

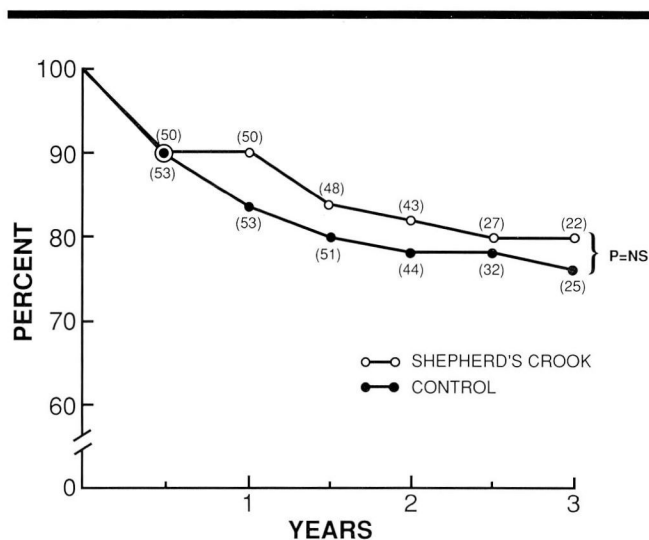


FIGURE 2. Event-free survival during the three years following PTCA. The numbers in parentheses represent patients at risk.

RESULTS

Angioplasty was unsuccessful in seven patients in the study group and in one in the control group. Among the seven, the cause of failure was acute occlusion in two, dissection in three, and inability to cross the lesion in two. Two patients with coronary dissection and one with acute occlusion underwent emergency coronary bypass surgery. The one failure in the control group was due to dissection; this patient required coronary bypass surgery.⁶

Follow-up was complete in 99% of patients; one patient in the study group was lost to follow-up. The mean duration of follow-up was 29 months. At the time of follow-up, angina pectoris was either mild or not present in 42 patients in the study group (81%) and 50 patients in the control group (94%) ($P=NS$). Fourteen patients (27%) in the study group and 10 patients (19%) in the control group were hospitalized for cardiac reasons during the follow-up period ($P=NS$). Repeat coronary arteriography was performed for 21 patients (41%) in the study group and 27 patients (51%) in the control group. Catheterization revealed a restenosis rate of 18% in the study group and 21% in the control group ($P=NS$). Repeat PTCA was performed for seven patients in the study group and eight patients in the control group. Only one patient in the study group un-

derwent coronary artery bypass graft surgery during the follow-up period, compared to three in the control group ($P=NS$). There was only one death in each group during the follow-up period.

Cardiac survival and event-free survival showed no significant difference between the two groups (Figure 2).

DISCUSSION

Primary success of coronary angioplasty is significantly lowered in patients with shepherd's crook morphology compared to patients who do not have this anatomic variation. The higher complication rate and the lower primary success rate are probably related to difficulties in steering the guide wire and the balloon across

the lesion. It is possible that the use of newer guiding catheters^{4,5} and low-profile balloons will improve results.

Although there was a significant difference between immediate outcome of angioplasty involving shepherd's crook morphology when compared to the control group, the long-term outcome was similar in both groups. There was no difference in mortality, need for repeat PTCA, coronary artery bypass graft surgery, or event-free survival.

Our study demonstrates that the right coronary artery with shepherd's crook morphology has a less favorable early outcome compared to the control group; however, there was no statistically significant difference in the long-term results once the stenosis was dilated.

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