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Case Reports

Sequential Dilatation of Septal and Left Anterior Descending Artery: Single Guiding Catheter and Double Guide Wire Technique

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A new technique was used to dilate sequentially a bifurcation lesion involving the left anterior descending artery and the origin of a large septal branch. Two steerable long guide wires (300 cm) were advanced through a single guiding catheter and placed across each lesion. The balloon catheters were introduced into the target arteries for angioplasty one at a time over the pre-positioned guide wires. After the septal branch had been successfully dilated, the balloon catheter was completely withdrawn from the manifold and a second balloon catheter positioned in the left anterior descending artery over the guide wire already placed across the stenosis. Such a technique is feasible and safe, and overcomes the potential risks of the conventional kissing balloon technique.

Key words: angioplasty, septal branch, long guide wire, kissing technique

INTRODUCTION

The continuous technical improvement of balloon dilatation symptoms and the growing experience of operators have led, in recent years, to a widening of the indications for coronary angioplasty [1]. One of the more recent advances has been the introduction of the kissing balloon technique to dilate stenosis involving the origin of two major branches [2]. This technique, as originally described, required two complete sets of guiding and angioplasty catheters. Furthermore a double femoral approach and a complex sequential cannulation of the left main stem by both guiding catheters were necessary. The technique is complex and has inherent risks.

This paper describes a new technique first proposed by Simon et al [3] and modified more recently by Oesterle et al [4]. We detail what we feel is the optimal procedure using this technique which involves a single guiding catheter used to position two steerable long guide wires.

CASE REPORT

A 60-year-old man, who was previously admitted to the coronary care unit for an acute antero-septal infarction, subsequently developed angina pectoris, at rest, 1 week later. The ECG showed Q waves of the recent infarction in precordial leads V_1- V_2 with S-T elevation and T wave inversion in the other anterior leads.

Repetitive episodes of chest pain unresponsive to pharmacological treatment with B-blocker, calcium antagonist, and intravenous nitrate led to emergency coronary and left ventricular angiography. A severe narrowing of the left anterior descending coronary artery, involving a large septal branch (Fig. 1), was detected with no other significant lesions in the other major coronary vessels. With a computer-based coronary angiographic analysis system currently used in our laboratory, a percentage area stenosis of 70% and 76% for the septal branch and left anterior descending, respectively, were calculated [5]. Left ventricular angiography showed hypokinesia of the antero-lateral and apical walls. The left ventricular end-diastolic pressure was 23 mmHg, the end-systolic and end-diastolic volumes were 81 ml/m^2 and 146 ml/m^2, respectively, with an ejection fraction of 42%. At 6 months follow-up, the respective volumes were 50 ml/m^2 and 116 ml/m^2, and the ejection fraction 57%, with considerable improvement in anterior wall motion, suggesting that depression of the myocardium was related to a "stunned" state.

In accordance with our practice regarding the treatment of patients with refractory unstable angina [6], an emergency percutaneous transluminal coronary angioplasty (PTCA) of both left anterior descending and septal branch was advised.

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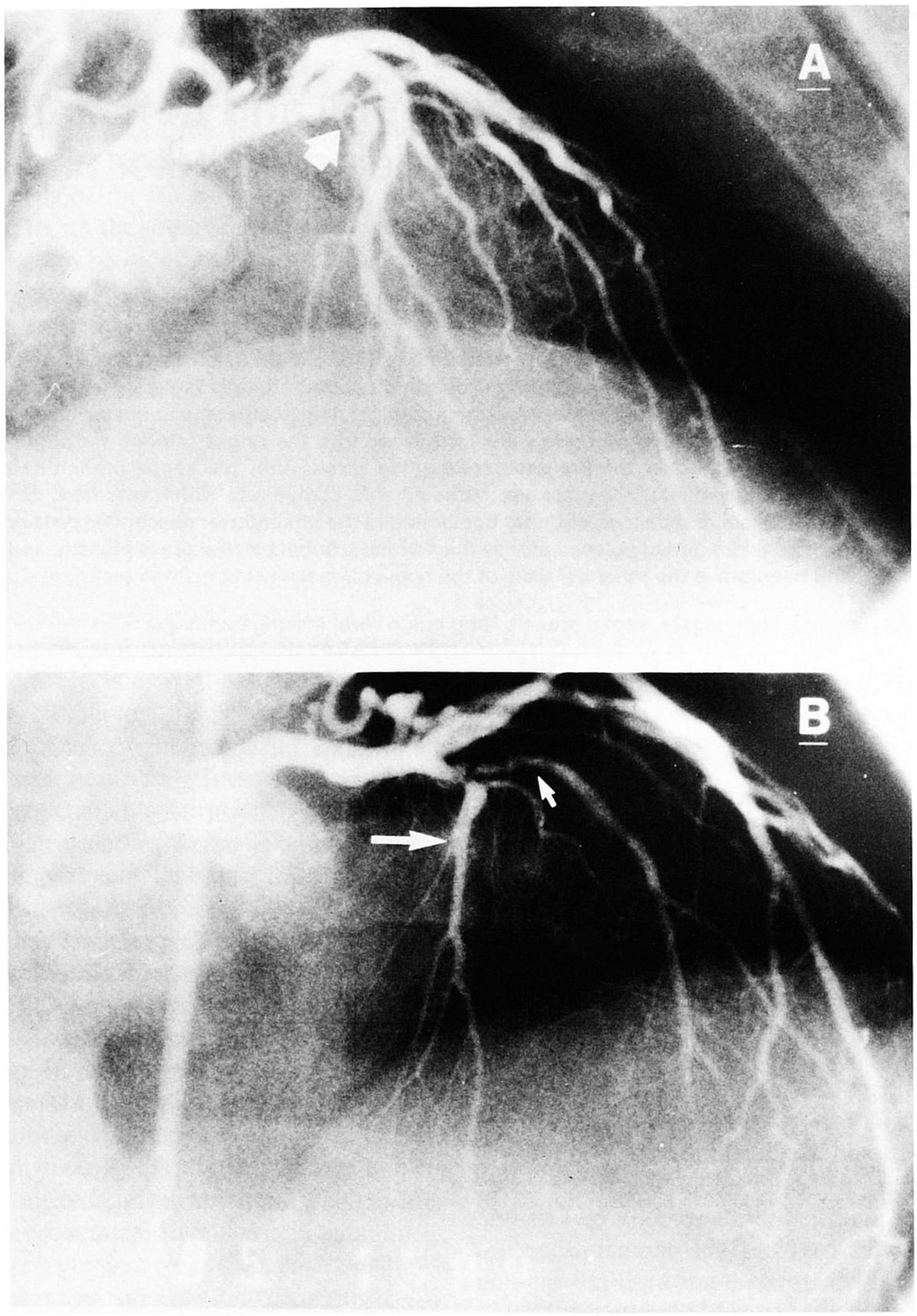

Fig. 1. Left coronary angiogram in right anterior oblique with cranial angulation (A) and cranial (B) projections before angioplasty. A severe narrowing is present (arrows) which involves both the left anterior descending (short arrow) and a large septal branch (long arrow).

MATERIALS AND METHODS

Figure 2 shows the balloon catheters in position over their respective guide wires, which in turn are inserted into the single guiding catheter. The wires were inserted through the screw seals of two separate Y manifolds, one positioned on the side arm of the other, and placed across the bifurcation lesion so that one wire lay in the distal left anterior descending artery and the other in the septal branch (Fig. 3). The catheter was placed in the left coronary ostium and the first steerable long (300 cm) guide wire (Kaltenbach J type; Schneider Medintag) 0.012" was advanced into the septal branch and positioned across the stenosis. The second identical guide wire was then similarly positioned across the left anterior descending stenosis. During the negotiation of the steno-

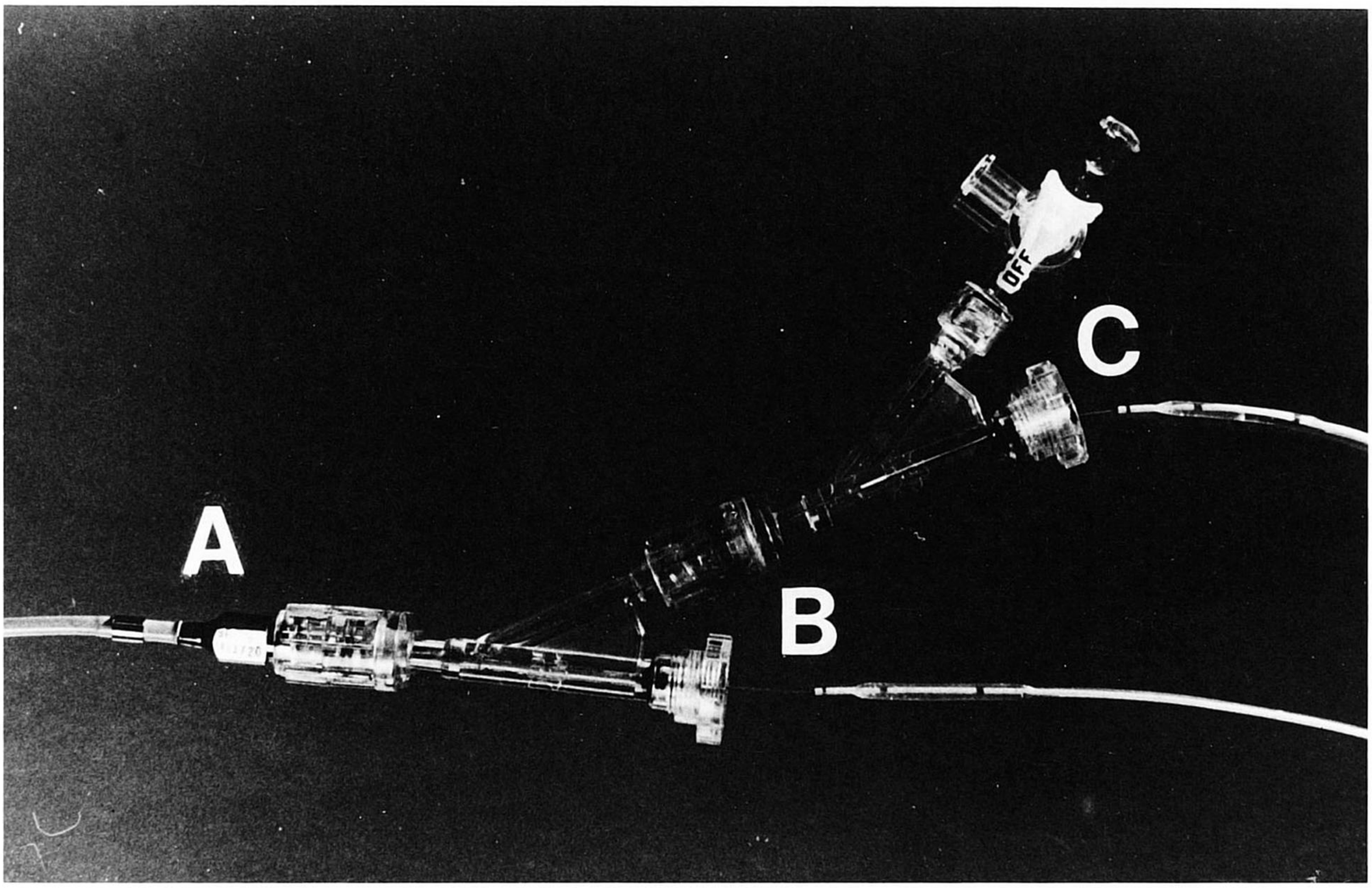

Fig. 2. The single guiding catheter (A) was connected with two Y manifolds in series (B and C), allowing the independent introduction and manipulation of both sets of balloon catheters and long guide wires during the procedure.

oses by both guide wires, manual contrast injections clearly defined the position of the wires in the relevant vessels. A 2.5 mm ACS balloon catheter was then passed over the first guide wire and the septal lesion crossed. The balloon was then twice inflated to 7 and 10 atmospheres, each inflation lasting approximately 45 sec. Multiple contrast injections in different projections after removal of the balloon catheter with the guide wire still in place showed a good angiographic result. Next, a 3.0 mm ACS balloon catheter was passed over the second guide wire. When positioned across the left anterior descending stenosis, three inflations were carried out at 7, 10, and 12 atmospheres, respectively (Fig. 3), each lasting approximately 50 sec. The second balloon was then removed from the guiding catheter, leaving both the long guide wires in place. Subsequent contrast injections clearly defined the dilated segments allowing accurate assessment of the result (Fig. 4).

The procedure was considered successful since the percentage area stenosis of each vessel at the end of the procedure did not exceed 25%.

DISCUSSION

It has been demonstrated that one of the problems during PTCA is the risk of iatrogenic occlusion of side branches in the proximity of the attempted stenosis [7]. Occlusion of side branches directly involved in the narrowing occurs in 14% of attempted procedures [7]. To overcome these potential limitations, the kissing balloon technique has been introduced [2]. However, this technique has several potential risks. These include the risk of coronary artery dissection or occlusion that may occur with manipulation of the additional dilatation catheter system within the coronary artery. Furthermore, when simultaneous dilatations of the two branches involved in the stenosis are performed, a risk of overdistension and mechanical damage to the vessels at the bifurcation exists [8].

Kaltenbach [9] has introduced the long guide wire technique which has the following advantages: 1) ability to position the wire across the lesion under high quality angiographic control; 2) ability to sequentially introduce

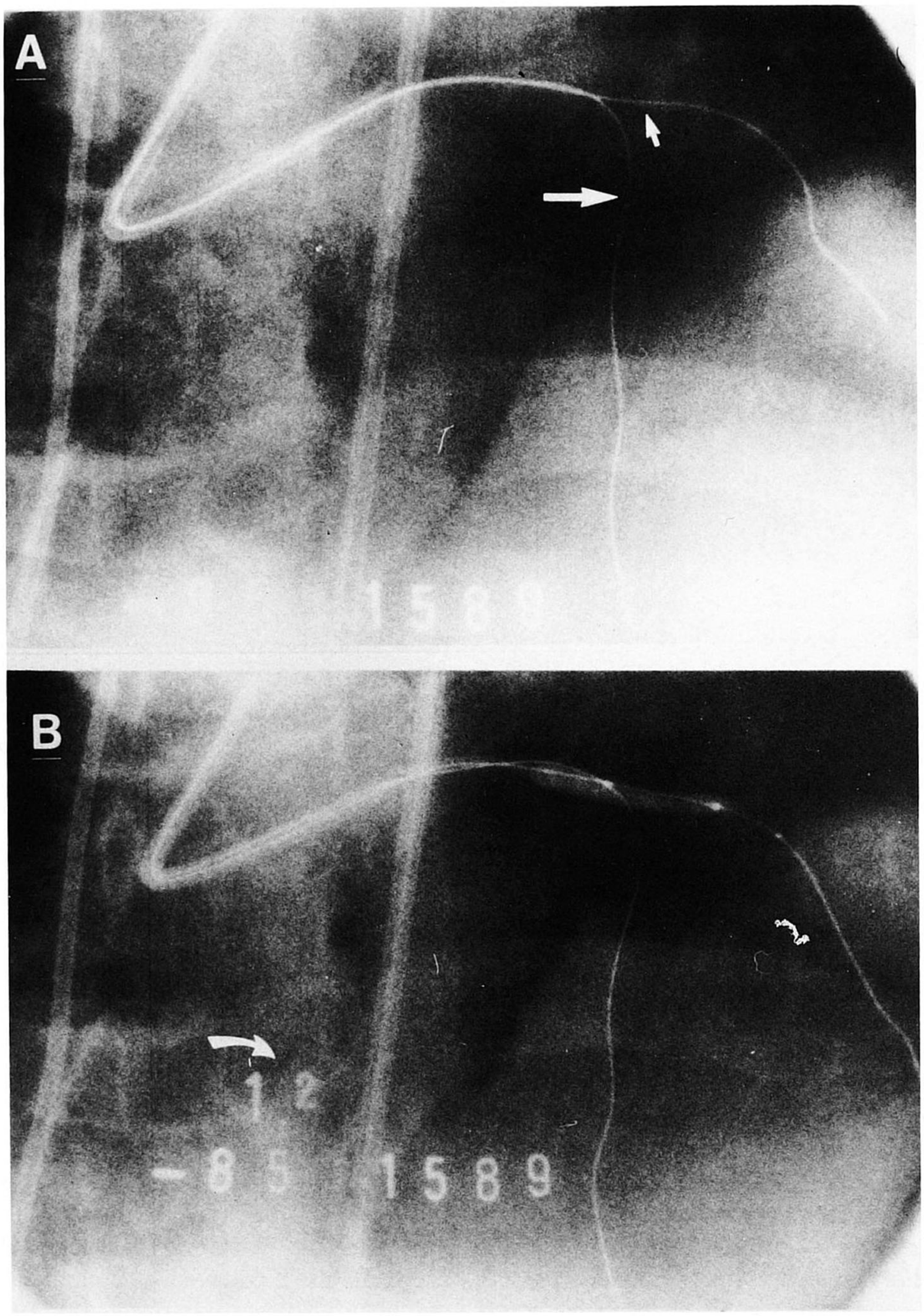

Fig. 3. Right anterior oblique projection of the heart showing A) the two long guide wires placed in the left anterior descending (short arrow) and in the septal branch (long arrow). In B) is shown the balloon inflation in the left anterior descending artery. The arrow shows the pressure of inflation in atmospheres.

balloon catheters of increasing size over the same long guide wire; 3) ability to allow postdilatation, high quality, angiographic control while maintaining access to the distal coronary artery.

Recently Simon et al [3] proposed that the "kissing technique" be adapted by using long guide wires. Using this technique, we were able to dilate successfully both vessels involved in the same narrowing. We believe that such a technique has several advantages: 1) Single arterial puncture; 2) introduction of two wires in only one guiding catheter; 3) unhindered contrast medium injection to check the positioning of the guide wires as well as to assess the final result of the procedure; 4) sequential introduction of separate balloon catheters already positioned outside the guiding catheter prior to dilatation (Fig. 2); 5) easy and continuous access to the lesions for

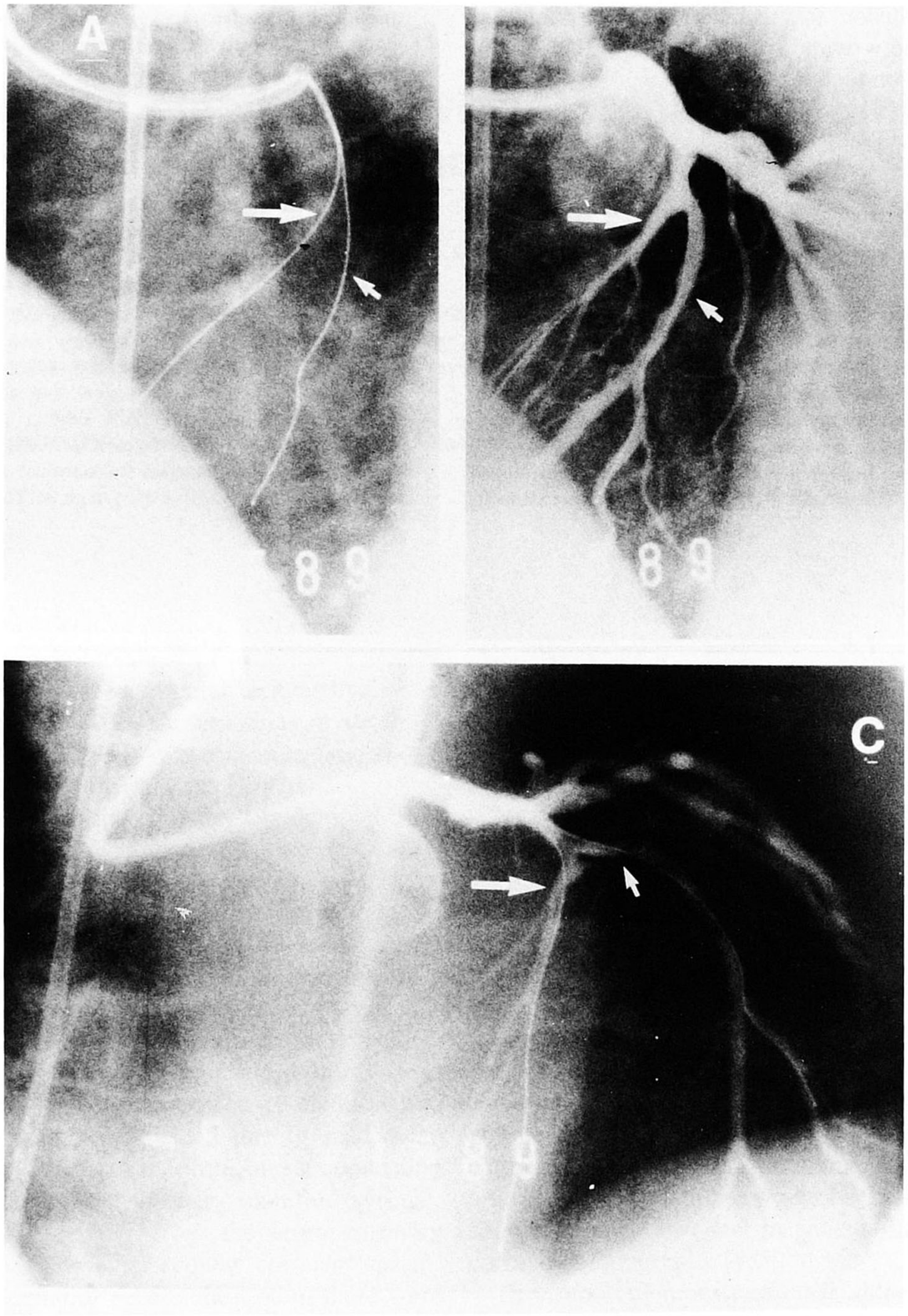

Fig. 4. After angioplasty with the guide wires still in place (A), repeated angiograms were performed (B and C) showing a successful dilatation of the branching lesion (arrows as in Fig. 1).

exchanging balloon catheters, recrossing an occluded vessel, or for distal reperfusion during the procedure.

Dilatation of a lesion in a large septal branch has recently been reported in a patient with occlusion of the left anterior descending, immediately after the origin of the septal branch [10]. We have shown that even when the septal artery narrowing is coupled to a stenosis of the left anterior descending, a successful negotiation and dilatation of both the vessels is possible by using the technique described. This new technique is essentially a combination of the kissing technique and the long guide wire technique. It makes use of the two guide wires used in the kissing technique, but by using long guide wires it has the advantage of needing only a single introducing catheter, and in addition has the established advantages of the long guide wire technique, as used in single lesion

dilatation. In conclusion, this technique enables dilatation of bifurcation lesions without the additional risk of the usual kissing balloon technique.

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