

CASE REPORTS

Excimer Laser-Facilitated Balloon Angioplasty of a Nondilatable Lesion

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Preliminary clinical experience with excimer laser coronary angioplasty shows that it is a safe and effective means of achieving nonsurgical coronary revascularization in selected patients but specific indications for its use are as yet undefined. In the present

report a specific indication is proposed for the use of the excimer laser: to facilitate balloon inflation in a rigid stenosis that fails to dilate despite high balloon inflation pressures.

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Initial experience with excimer laser coronary angioplasty demonstrates the feasibility of this technique (1-3), as well as its potential role in treating long lesions (>20 mm) with a greater success rate and lower complication rate than those of conventional balloon angioplasty (4). In this report a novel indication for the excimer laser is described: to pretreat a coronary stenosis that resisted balloon dilation despite high inflation pressures.

inflation could now be accomplished at 8 atm (Fig. 1, panel 4) and the lesion was dilated successfully to a 30% residual stenosis (Fig. 1, panel 5). The patient had an uneventful hospital course and was discharged 2 days after angioplasty.

Case Report

A 58-year old man with a 10-year history of angina and a positive thallium stress test in the anterior coronary distribution experienced a worsening of his anginal status that progressed to Canadian Cardiovascular Society class III angina over a period of several weeks. Coronary angiography showed a single discrete 90% eccentric calcified stenosis in the midportion of the left anterior descending artery (Fig. 1, panel 1). He was referred for balloon angioplasty and the lesion was easily crossed with a 0.014 in. (0.036 cm) floppy guide wire and a 3 mm balloon catheter (Advanced Cardiovascular Systems). Unfortunately, inflations up to 9 atm with this catheter and up to 24 atm with a 3 mm Orion balloon catheter (Cordis) failed to dilate the stenosis because a tight waist remained on the balloon (Fig. 1, panel 2). A 1.5 mm excimer laser catheter was then advanced through the lesion at a rate of <1 mm/s with use of 60-mJ/mm² fluence at 25 Hz and 3- to 5-s trains of laser pulses for a total of 40 s. After excimer laser angioplasty, an enlarged lumen with smooth borders and a 70% residual stenosis remained (Fig. 1, panel 3). With subsequent balloon angioplasty, complete balloon

Discussion

Preliminary experience with coronary excimer laser angioplasty. Experience has shown this technique to be a safe and effective means of achieving coronary revascularization (1-3); however, the specific indications for its use are not clearly defined. Immediate results with the excimer laser appear promising in improving the success rate and decreasing the complication rate in lesions >20 mm in length (4). Whether the excimer laser will also be useful in treating heavily calcified stenoses, ostial lesions, chronic total occlusions or friable saphenous vein bypass graft lesions remains to be ascertained. The excimer laser has previously been used (1) in a patient with unstable angina to pretreat a severe stenosis that could not be crossed with a low profile balloon.

Mechanism of laser angioplasty in the present case. In the patient described here, although the stenosis was easily traversed with a 3 mm balloon, the lesion could not be dilated despite inflation pressures of up to 24 atm. After pretreatment with the excimer laser, the balloon could be fully inflated without difficulty at 8 atm and the lesion was ultimately successfully dilated. Although there was only mild calcification of the lesion on fluoroscopy, the 10-year clinical history of angina suggests that the lesion was an old fibrocalcific stenosis, which probably accounted for its marked noncompliance to balloon dilation. The mechanism of the excimer laser's effectiveness in this case is speculative but may involve ablation of a portion of the fibrocalcific lesion. Alternatively, acoustic shock waves created by the laser may have initiated a fracture plane in the fibrous cap that was enlarged by the balloon.

Future role. The role of the excimer laser in the interventional catheterization laboratory will continue to evolve with technical improvements in catheter design and flexibility and

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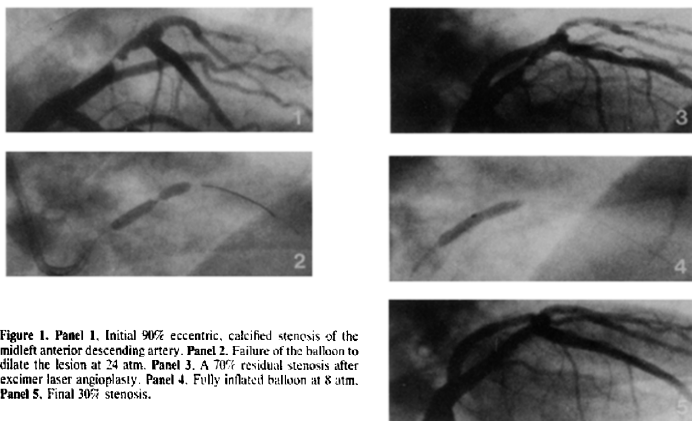


Figure 1. Panel 1. Initial 90% eccentric, calcified stenosis of the midleft anterior descending artery. **Panel 2.** Failure of the balloon to dilate the lesion at 24 atm. **Panel 3.** A 70% residual stenosis after excimer laser angioplasty. **Panel 4.** Fully inflated balloon at 8 atm. **Panel 5.** Final 30% stenosis.

increased operator experience. Specific indications for the laser will be defined with follow-up data and randomized trials. In this case report the facilitation of balloon inflation in a rigid balloon-resistant stenosis is presented as one clear indication for the use of the excimer laser.

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