ACUTE ANGIOGRAPHIC RESULTS OF EXCIMER LASER ASSISTED BALLOON ANGIOPLASTY VERSUS CONVENTIONAL BALLOON ANGIOPLASTY IN STABLE ANGINA.

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In contrast to conventional balloon angioplasty (CBA), the excimer laser ablates atheroma and creates an intraluminal channel with smooth borders. In most cases, however, the arterial lumen following excimer laser angioplasty is small and requires further enlargement by CBA. In order to ascertain whether debulking of the plaque by excimer irradiation prior to CBA yields a more favorable angiographic result, we compared the acute angiographic results in consecutive patients with stable angina treated with excimer laser assisted balloon angioplasty (ELABA) (n=45) versus CBA (n=46). The 2 groups had similar pre-angioplasty %stenosis, lesion length, degree of eccentricity, and lesions in a bend. ELABA treated pts had more LAD involvement, lesions with irregular borders and calcium, and a greater incidence of prior angioplasty. Post-angioplasty results:

	ELABA	CBA	p
Dissection	11(24%)	26(57%)	<0.02
Residual stenosis	22.8%	28.6%	<0.05
Side branch occlusion	5(11%)	1(2.2%)	NS

Three of the 5 side branch occlusions following ELABA occurred after balloon inflation. Vasospasm was slightly more frequent with ELABA.
Conclusions: 1. ELABA results in fewer dissections than CBA, thus plaque ablation prior to CBA may limit the vascular injury induced by balloon dilatation. 2. Initial debulking of the plaque by the laser appears to decrease residual stenosis following balloon dilatation.

EXCIMER LASER CORONARY ANGIOPLASTY: ANGIOGRAPHIC RESTENOSIS RATE AT SIX MONTH FOLLOW-UP.

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From May 1989 through February 1990, Excimer laser coronary angioplasty (ELCA) was performed on 72 pts using a 1.3mm, 1.6mm or 2mm diameter multiple fiber 308 nm xenon chloride laser with catheter tip energy density of 35-50 mjoules/mm^2. ELCA success (<50% residual stenosis) either stand-alone (SA) or with combined PTCA (ELCA+PTCA) was achieved in 63 pts (88%).

Six month repeat angiography was performed in 57/63 pts (90%); 29/30 (97%) of SA pts and 28/33 (85%) of ELCA+PTCA patients. Percent stenosis results are summarized below (mean ± SD).

	N	PRE-ELCA	POST-ELCA	POST-PTCA	6 MONTH RESTUDY
SA					
No restenosis	14	68±15	26±17	--	31±16
Restenonsis	15	73±15	28±11	--	83±17
ELCA+PTCA					
No restenosis	16	71±14	39±21	14±12	27±16
Restenosis	12	85±10	44±20	19±12	82±10
No restudy	6	76±18	44±15	7±12	-

Angiographic restenosis occurred in 27/57 (47%) of pts; 15/29 (52%) of SA pts and 12/28 (43%) of ELCA+PTCA pts. The 6 pts not restudied were all asymptomatic at 6 months with neg Thallium test.

Restenosis was not correlated with pre- or post-ELCA stenosis, post-PTCA stenosis, lesion length or previous PTCA.

CONCLUSION: ELCA effectively reduced coronary stenosis, however restenosis rates are high and not affected by adjunctive PTCA.

THERMAL COAGULATION OF VASCULAR COLLAGEN REDUCES PLATELET ADHESION FOLLOWING BALLOON ANGIOPLASTY

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Preliminary data has shown less platelet adhesion in arteries treated by thermal devices compared to balloon angioplasty (BA). To evaluate if thermal treatment of arteries before BA would reduce thrombogenicity, Indium^{111} labeled platelet (I'P) deposition and morphologic assessment were compared following BA, laser-thermal angioplasty (LTA), and laser-thermal prior to balloon angioplasty (LTBA). In each of 8 normal dogs, four 10 cm arterial segments were excised from femoral and carotid arteries and mounted in an arterio-venous shunt between the left carotid artery and right jugular vein. One segment served as control (C) and the remaining were treated over 2 cm with either 1) BA 6mm balloon, 6 atm, 1 min, 3X; 2) LTA 2.5mm probe, 7 watts x 5 sec, 6X or 3) LTBA as LTA followed by BA. One hour after I'P perfusion, I'P deposition was measured in each segment and normalized to 1cm^2 intimal surface. Temperature (T) was monitored at the probe tip and arterial surface using a circular array of six thermocouples. Histology was done using light (LM), scanning (SEM) and transmission electron microscopy (TEM) and immunoperoxidase staining (IPS) for collagen types I, III and IV.

Results: Platelet density (counts/cm^2) for BA was significantly greater than C, LTA and LTBA (p<0.05, ANOVA) while counts/cm^2 after LTA or LTBA were not significantly greater than C (P>0.05, ANOVA). Probe and arterial surface Ts were 188 ± 75°C and 81 ± 11°C, respectively.

	C	LTA	LTBA	BA
I'P counts/cm^2	2,049	5,386	6,176	9,259
mean (± SE)	(±442)	(±1,426)	(±1,571)	(±3,739)

Histology of LTBA versus BA showed fewer intimal flaps (LM, SEM), fusion of collagen fibers in the arterial media (TEM), and less collagen exposure at the intimal surface (TEM, IPS).

Conclusion: I'P deposition was greatest with BA and reduced with LTBA. This seems to be due to thermal coagulation of collagen causing less collagen exposure to platelets. Thus, T resulting in collagen fusion without severe thermal necrosis may reduce thrombogenicity with BA.

RECANALIZATION OF ACUTE THROMBUS: COMPARISON OF ACUTE SUCCESS AND SHORT-TERM PATENCY AFTER EXCIMER LASER CORONARY ANGIOPLASTY, BALLOON ANGIOPLASTY AND INTRA-CORONARY THOMBOLYSIS IN PIGS

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Goal: To compare acute results and short term patency of coronary thrombus recanalization with three modes of intervention: Excimer Laser Coronary Angioplasty (ELCA), PTCA and intra-coronary thrombolysis (ICT) with urokinase in a swine model.
Methods: Coronary thrombus was induced in 32 anesthetized pigs by low current transluminal anodal stimulation of the intima with a coronary guidewire insulated within a coronary infusion catheter. Within 15 min. after the occlusion, and after heparinization, recanalization was attempted by one of the 3 methods: ELCA with energy fluence of 40 mJ/mm2, pulse rate of 20Hz, PTCA with standard balloon catheters, inflated 3 times to 8atm or ICT with urokinase 500,000u, infused through the coronary infusion catheter. The vascular patency was monitored by repeated contrast injections until reocclusion or 6 hrs following recanalization. Patency was defined as flow raterTIMI 2.
Results: Twelve pigs died during the thrombus induction (attrition rate of 32%). The 20 remaining pigs underwent recanalization with ELCA (6), PTCA (9) and with ICT (5) with acute success of 5/6, 7/9 and 3/5 respectively (NS). The time to acute patency was 13.8±.75min for ELCA, 10.3±2.6min for PTCA and 45.0±14.4min for ICT (mean±sd, P=0.046). The 6 hrs patency rate was 4/5 for ELCA, 2/7 for PTCA and 3/3 for ICT (P=0.057). Late patency rate after ELCA tends to be higher than after PTCA (P=0.07).
Conclusions: ELCA may provide superior short term patency than PTCA in recanalization of acute coronary thrombus. The time needed for achieving patency is longer in ICT than ELCA or PTCA.