coronary artery in patients with acute myocardial infarction (AMI). 25 patients who underwent intracoronary thrombolytic therapy were included in this study. 3 patients were spontaneously reperfused and 1 was not successfully reperfused. 21 patients were divided into 3 groups based on ST segment changes at reperfusion, 1) ST segment elevation (9), 2) ST segment depression (3), 3) no change (4) group. The mean interval from the onset of infarct symptoms to reperfusion was 204 minutes. Some of the ST segment elevation group had early reperfusion within 4 hours but had not improvement of the regional wall motion in the chronic stage. Reperfusion arrhythmia was more frequent than the other groups. 7 patients of the ST segment depression group had early reperfusion within 4 hours and 4 had reperfusion with intracoronary injection of ISDN. In this group, all patients had improvement of the regional wall motion in the chronic stage. Some of the no change group had early reperfusion within 3 hours but had not improvement of the regional wall motion in the chronic stage. We conclude that ST segment elevation at reperfusion may be related to myocardial injury and some of the patients with AMI may rapidly advance to myocardial necrosis.

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FACTORS TO LARGE INFARCT IN PATIENTS TREATED WITH INTRACORONARY THROMBOLYSIS

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To determine contributing factors to large infarct in patients treated with intracoronary thrombolysis (ICT), 47 patients with first acute anterior infarct were studied. The obstructed coronary artery had been spontaneously recanalized in 12 of 47 patients (25.5%) (subset I), recanalized with ICT in 23 patients (49.0%) (subset II) and could not be recanalized in 12 patients (25.5%) (subset III). Large infarct ($\Sigma CK > 10000$ IU/l and/or $LVEF < 40\%$) developed in 20 of 47 patients (42.6%). Onset-arrival time, onset-ECG time and onset-ICT time were 2.0 ± 1.3 (SD), 2.3 ± 1.0 and 4.0 ± 1.2 hrs respectively and were not statistically different among 3 subsets. ΣCK correlated well with $LVEF$ in total cases ($r = -0.79$), subsets I+II ($r = -0.79$) and subset III ($r = -0.62$), and the regression equations were similar in the latter groups. This result supports ΣCK could be used as an index of infarct size even in ICT cases. Factors analysed were no history of angina, initial QRS score (Wagner) (score) ≥ 5 , onset-ICT time ≥ 4 hrs, onset-recanalization time ≥ 4 hrs, no collateral circulation, coronary obstruction at segment 6, residual stenosis (RS) $\leq 50\%$, no spontaneous recanalization (no spont recan) and no recanalization with ICT. Contributing factors to large infarct were score ≥ 5 (subset II and total cases, $p < 0.001$), no collateral (subset II, $p < 0.05$, subsets II+III, $p < 0.005$), no spont recan (subsets I+II, $p < 0.001$) and RS $\leq 50\%$ (subsets I+II, $p < 0.05$). The sensitivity, specificity and predictive value of score ≥ 5 as a predictive index of large infarct were 60%, 100% and 83% respectively in total cases. In conclusion large infarct after ICT was significantly correlated with score ≥ 5 , no collateral circulation (subsets II+III), no spontaneous recanalization (subsets I+II) and also wide recanalization (subsets I+II). Score ≥ 5 is the most sensitive and specific index of large infarct.

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EFFECTS OF VERAPAMIL, APRINDINE, BEPRIDIL AND LIDCAINE ON THE ELECTRO-

PHYSIOLOGICAL CHANGES DURING ACUTE MYOCARDIAL ISCHEMIA AND AFTER REPERFUSION

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The electrophysiological changes during acute myocardial ischemia and after reperfusion were studied, and the effects of verapamil (VP), aprindine (AP), bepridil (Bep) and lidocaine (Lid) on the effective refractory period (ERP) of the regional myocardium and intramyocardial conduction time (CT) were studied in 55 anesthetized dogs. (control: 15 dogs, VP group: 9 dogs, AP group: 11 dogs, Bep group: 10 dogs, Lid group: 10 dogs)

After coronary ligation, ERP in the ischemic zone (IZ) shortened significantly in control group and VP group, ERP in the IZ did not change in AP group, Bep group and Lid group. ERP shortened significantly between immediately after reperfusion and two minutes later in control group, VP group and Lid group than after coronary occlusion. But these changes of ERP in AP group and Bep group were suppressed. The CT in the IZ prolonged in all groups, but the conduction delay in VP group were suppressed significantly than another 4 groups.

These findings suggested that a reentry as one of the mechanisms of arrhythmia during acute ischemia and early reperfusion period was considered, and VP which suppressed conduction delay in the IZ, AP and Bep which suppressed the shortness of ERP during coronary ligation and early reperfusion period were effective to the protection of arrhythmia.

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QUANTITATIVE ANALYSIS OF CONTRACTION BAND NECROSIS (CBN) OF ACUTE MYOCARDIAL INFARCTION (AMI) TREATED WITH SELECTIVE INTRACORONARY THROMBOLYSIS (SICT)

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The histological features of human AMI are coagulation necrosis and CBN. To evaluate the relationship between CBN and recanalization of infarct-related coronary artery in human AMI, areas of CBN and coagulation necrosis were quantitatively analyzed using the autopsied hearts of 6 patients with successful SICT (100-99% stenosis; group A) and 5 patients with unsuccessful SICT (100-100%; group B). Between the two groups there was no significant difference in the time from the onset of AMI to SICT (group A/B = $4.3 \pm 1.9 / 5.3 \pm 2.7$ hours), the dose of urokinase (group A/B = $76 \pm 45.3 / 103 \pm 20 \times 10^4$ units) and the time from the onset of AMI to death (group A/B = $47 \pm 38 / 39 \pm 36$ hours). A whole transverse section of left ventricular wall including AMI areas was stained with Hematoxylin-Eosin, Masson-Trichrome, Heidenhain's iron hematoxylin in each heart. The areas of CBN and coagulation necrosis were traced at a magnification of $\times 100$ by light microscope, and were quantitatively calculated using an image analyser. All infarcts were transmural and large. The percentage of CBN areas to whole AMI areas was $20.1 \pm 8.7\%$ in group A and $4.6 \pm 3.3\%$ in group B ($p < 0.01$). In group A, the % CBN was greater in the cases with early recanalization (≤ 3 hours after the onset of AMI) or with good collaterals than those with late recanalization or no collaterals. The % CBN was $28.1 \pm 14.4\%$ in the peripheral zone of the infarct area and $2.4 \pm 3.5\%$ in the core zone ($p < 0.01$); most of CBN was seen in the peripheral zone. A similar tendency was also noted in group B. CBN was noted frequently around small arteries. These findings indicate that CBN in human AMI is related to reperfusion after ischemia. Therefore, it is

concluded that the patients with successful SICT have diffuse CBN as reperfusion injury and the prevention of CBN is clinically important for reduction of infarct size in SICT.

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SUPERIORITY OF THE EARLY MYOCARDIAL PYP UPTAKE TO THE EARLY CK, MB-CK PEAKING AS AN INDICATOR OF EARLY REPERFUSION IN AMI

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The efficacy of the early Tc-99m-PYP(PYP) scan as an indicator of early reperfusion in acutely occluded coronary artery was evaluated. We compared the findings of the early PYP scan to early CK, MB-CK peaking(within 16 hours) in patients(pts) with acute myocardial infarction (AMI). 37 pts were performed emergency coronary arteriography and urokinase infusion at 1.9 - 7.5 hours(hrs) after the onset of symptoms. PYP(20 m Ci) was injected intravenously at 2.8 - 9.3 hrs (mean 5.7 hrs) after the onset. 26 of 31 reperfused pts(84%) showed positive scans. In contrast, all 6 non-reperfused pts showed negative scans.

The time interval between onset of symptoms and peak CK was significantly shorter for the reperfused pts(14.4 ± 5.4 hrs vs 21.2 ± 3.2 hrs, $p < 0.01$), and the similar finding was shown in MB-CK release(12.7 ± 5.2 hrs vs 19.2 ± 3.3 hrs, $p < 0.01$).

The comparison of early PYP scan and early CK, MB-CK peaking(<16 hrs) as a non-invasive indicator of early reperfusion was done.

	Sensitivity	Specificity	Predictive Accuracy
PYP scan	84%(26/31)	100%(6/6)	86%(32/37)
CK peaking	61%(19/31)*	83%(5/6)	65%(24/37)*
MB-CK peaking	71%(22/31)	83%(5/6)	73%(27/37)

* $P < 0.05$

The present study showed that early PYP scan immediately after the thrombolysis could be utilized as an indicator of early reperfusion faster than the early CK, MB-CK peaking, and had the higher sensitivity and predictive accuracy than the early CK peaking.

In conclusion, we suggest that the early PYP scan may be an adequate non-invasive indicator of the early reperfusion in pts received the intravenous coronary thrombolysis.

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CORRELATION OF CORONARY ARTERIOGRAPHY DURING SELECTIVE INTRACORONARY THROMBOLYSIS WITH POSTMORTEM FINDINGS

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To assess the accuracy of coronary angiography (CAG) performed during selective intracoronary thrombolysis (SICT), the degree of stenosis determined by CAG was compared to that at autopsy in 21 patients who died within 7 days of SICT. The angiograms were evaluated according to the American Heart Association reporting system. At autopsy, the coronary arteries were cut

transversely and serially from the ostium to the periphery at 2-3mm intervals and the degree of coronary stenosis was macroscopically evaluated. A discrepancy was defined as a difference of over two grades between the degree of stenosis found in CAG and at autopsy. The degree of stenosis of infarct related coronary artery at autopsy was 99-100% in 14 cases and 90% in 4 cases. In the cases, CAG reflected accurately the pathological findings. In 2 of the other 3 cases with 75% stenosis and the one without stenosis, CAG lead to overestimation. Of 158 infarct unrelated segments, 34 were underestimated and 7 were overestimated angiographically. The underestimation was seen in 24% of the right coronary artery and 31% of the left main trunk. Six of the 7 overestimations involved the left circumflex artery. Complete occlusion or 99% stenosis at autopsy was found in 22 segments, of which 21 were accurately estimated and only one was underestimated. In 23 segments with 90% stenosis at autopsy, 12 were underestimated and other 11 were accurately estimated. In 20 segments with 75% stenosis at autopsy, 9 were underestimated, 9 were accurately estimated, and 2 were overestimated. In 114 segments with less than 50% stenosis at autopsy, 12 were underestimated and 8 overestimated.

It is concluded that CAG during SICT depicts accurately subtotal or total occlusion. However, the lesion with 75% or 90% stenosis are frequently underestimated. Further attention should be paid to the interpretation of CAG during SICT.

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PERCUTANEOUS TRANSLUMINAL CORONARY ANGIOPLASTY (PTCA) FOR AMI

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PTCA was attempted in 55 patients with acute myocardial infarction (AMI) within 7.5 hours from the symptom onset (mean 2.9 ± 1.4 hours) immediately after coronary thrombolysis (PTCR). In 18 of 35 total occlusions and 8 of 20 subtotal occlusions, PTCA was attempted after successful PTCR and in the remaining 17 total and 12 subtotal occlusions, after no improvement by PTCR. There were 4 reocclusions immediately after PTCA and one coronary perforation with guide wire that was cured by emergency CABG. PTCA was successful (20% or more reduction in percent diameter stenosis) in 46 patients (84%) and the degree of stenosis was reduced from $84.9 \pm 12.6\%$ to $28.3 \pm 33.5\%$ ($P < 0.01$). Five patients died during hospitalization, one from free wall rupture and 4 from cardiogenic shock (3 patients with shock could not improve even by successful PTCA and one might deteriorate during PTCA). In-hospital mortality was 9.1% (7 of 55) in PTCA attempted patients and 8.8% (7 of 102) in PTCR attempted ones. The coronary angiography before hospital discharge (about 4 weeks after) revealed reocclusion of the infarct-related vessel in one of 36 successful PTCA (2.7%) and 10 of 69 successful PTCR (14.5%). The left ventriculography at that time was analyzed by the method of mean axial shortening to evaluate the effect of PTCA on regional wall motion. In LAD occlusions, the PTCA group showed better regional wall motion than the PTCR group and in RCA occlusions, there were no significant differences between the two groups. In only 3 of 55 (5.5%) PTCA attempted patients, elective CABG or PTCA was performed, whereas it was performed in 15 of 102 (14.7%) PTCR attempted patients.

PTCA for AMI can be performed with a high success rate and can reduce the reocclusion rate. However, there is no evidence that PTCA can reduce in-hospital mortality. With respect to the regional wall motion, PTCA has a more beneficial effect than PTCR alone in LAD occlusions.