IN-VITRO THROMBUS FORMATION OF STENT WIRES: ROLE OF METALLIC COMPOSITION AND HEPARIN COATING.

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Acute thrombus formation continues to occur in stented human coronary arteries despite systemic anti-coagulation and anti-platelet therapy.
Hemostasis physiology varies widely between species such that extrapolation of animal studies to human clinical trials is error-prone. The purpose of this study was to determine the thrombogenic potential of various metals and to test the ability heparin to diminish this potential. We tested in-vitro thrombus formation on 0.006" stent wires (Cook, Inc.) composed of stainless steel (SS), copper (CU), heparin-coated copper (CUH), titanium (TI), tantalum (TA), and heparin-coated tantalum (TAH). Two cm length wires were incubated in 5 ml of fresh, rapidly heparinized (1 unit/ml) human venous blood from two young, healthy donors for 1 hour (polypropylene tubes on a flat rotator at 100 rpm). Wires were removed, rinsed in phosphate buffered saline, fixed in 2.5% glutaraldehyde in 0.1M cacodylate buffer, and examined with scanning electron microscopy. SEM photographs were ranked by observers blinded to metal content and heparin coating: 0-4 for thrombus content (area covered: $0 = 0-25\%$, $1 = 26-50\%$, $2 = 51-75\%$, $3 = 76-99\%$, $4 = 100\%$). Results: Amount of thrombus formation was TAH < TA < SS < CU < TI < CUH (Kruskal-Wallis ANOVA, $p < 0.0001$); TA < SS (median test, $p = 0.12$); TAH < SS (median test, $p = 0.005$).
Conclusion: Heparin-coated tantalum shows superior inhibition of thrombus formation in-vitro when compared with several other metal species. Uncoated tantalum also tends to be less thrombogenic although less so than heparin-coated tantalum.

PROTHROMBINFRAGMENT F1+2 PREDICTS ACUTE OCCLUSION AFTER INTRACORONARY STENTING

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In spite of an anticoagulation regimen with high dose heparin, phenprocoumon, salicylic acid, dipyridamole, and infusions of low molecular weight dextran a high rate of thrombotic occlusions occurred during the first days after stent implantation. In 30 patients treated by coronary stent implantation coagulation was monitored by conventional global tests and in addition with an enzyme immunoassay for the prothrombin-fragment F1+2 (PF) which is a highly sensitive marker for an activation of the coagulation system. Normal range of un-treated adults is 0.5-1.0 nmol/l, whereas in patients treated with phenprocoumon it should be below 0.5 nmol/l. At the first day after implantation uncomplicated cases exhibited PF levels not higher than 0.5 nmol/l and did not increase after change of treatment from heparin to phenprocoumon. However, in patients with acute stent occlusion in the early phase PF exceeded 0.5 nmol/l all the time. In these patients an addi-tional rise occurred after reduction of heparin which could be observed 2 to 3 days before the acute thrombotic occlusion resulted.

Conclusions: PF is an useful marker indicating an evolving acute occlusion of the stented segment if the measured con-centrations at the first days are beyond 0.5 nmol/l. Therefore, dose reduction of heparin – even at therapeutic prothrombin time ratios – should be avoided if PF is not below 0.5 nmol/l.

PALMAZ-SCHATZ STENTS IN THE TREATMENT OF PERIPHERAL VASCULAR DISEASES.

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Despite progress of modern interventional techniques (balloon, laser, mechanical atherectomy device...), the treatment of peripheral vascu-lar deseases still faces the risk of restenosis and acute thrombosis. The Palmaz-Schatz stent maintaining a good arterial lumen is an attractive solution.

From June 1989 to July 1990, 147 Palmaz-Schatz stents were implan-ted on 116 patients (pts) (males: 95; females: 21; mean age: 66 years; range 36-85 years): 71 superficial femoral or popliteal artery in 47 pts, 63 iliac artery in 56 pts, 11 renal artery in 11 pts, 1 subclavicular artery, 1 dialysis fistula. 132 stents were placed by percutaneous access, 15 stents by surgical access.
Indications are represented by residual stenoses after: balloon angio-plasty only (83), laser angioplasty (25), Kensey (3), angioplasty resteno-sis (12), delaminations (9), by-pass or prosthesis stenosis (4). In renal position, ostial stenosis seems to be a good indication (4).

Immediate results are satisfactory: 1 failure only out of 147 stents placed required a by-pass.
Mid-term results: 3 femoro-popliteal thromboses of which (2) were trea-ted by thrombolysis or Fogarty, 1 popliteal stenosis was treated by con-ventional angioplasty, 1 iliac stenosis after stent placement needed surgery.

CONCLUSION
Palmaz-Schatz Stent shows a high rate of success in mid-term results. 3 pts out of 116 pts underwent surgery, 1 popliteal restenosis only was observed.

EMERGENCY TEMPORARY STENTING FOR ACUTE OCCLUSION DURING PTCA : IMMEDIATE AND MID TERM RESULTS

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Temporary stenting is a new concept aiming to treat abrupt closure during PTCA. We studied the immediate and mid term results of this new technique in ten patients.
The temporary stent catheter (TSC) is a 3.0 F single lumen catheter with an expandable stainless steel mesh. The function of the wire cage is to support the vessel wall and maintain flow within the lumen thus avoiding the consequences of abrupt closure.
Between september 1988 and july 1990, the TSC was used in 9 men and one woman (mean age 59 ± 12 years) with acute occlusion of the left anterior descending coronary artery (5 cases), the right coronary (4 cases) or left circonflex artery (1 case) during PTCA, after failure of multiple and repeated inflations.
Results : In all cases, the TSC restored immediate antegrade blood flow while chest pain relieved. For the first patient, the TSC was used as a "bail out" device before proceeding to CABG. For the 9 remaining patients, the TSC was removed after 30 minutes. Late (before discharge) angiographic control (2 days) was excellent in 7 patients. CABG was performed in the 2 other patients with one myocardial infarction. No death occured.
Follow-up is available for the first 6 patients with angiographic control between 2 to 9 months. In 5 patients, the control was excellent without angina. For the last patient, angina was present with a significative stenosis on the left anterior descending artery.
Conclusion : Temporary stenting is safe and effective in case of acute closure during PTCA. CABG may be avoided in most cases but an excellent immediate and secundary (before discharge) angiographic control is necessary. If angiographic control is not perfect, CABG should be performed as soon as possible to prevent myocardial infarction.