

Poster Reception

Friday, June 21, 2002, 6:00 p.m. – 7:30 p.m.

P1 RIGHT VENTRICULAR ASSISTANCE FOR CORONARY ARTERY GRAFTING IN BEATING-HEART SURGERY

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OBJECTIVE: Use of right ventricular assistance device (RVAD) for postero-lateral arteries' grafting is proposed to maintain cardiac output and stabilise blood pressure during beating heart surgery. We evaluated this system in patients who poorly tolerated heart mobilisation for marginal artery grafting.

METHODS: 20 patients programmed for OPCAB were put on RVAD when significant fall of systemic blood pressure resulted from heart mobilisation, despite classical measures for exposure. All patients were operated on through midline sternotomy with full dose heparinisation (3 mg/kg). Anastomotic site stabilisation was achieved by Medtronic Octopus stabiliser. RVADs used were the Enabler system in 19 patients & A-MED in 1 patient. Mean number of grafts = 3.25 ± 0.75. Both mammary arteries were used in 72% of cases. Initially, the left anterior descending, right coronary arteries and their divisions were grafted on a beating heart without assistance. The device was used when grafting of lateral arteries resulted in significant hemodynamic changes.

RESULTS: Mean assistance time = 23.3 ± 10.3 minutes. Arteries grafted under assistance were the left marginal (19 pts), ramus intermedius (3 pts) and distal circumflex (1 pt) arteries. Mean anastomotic time = 9.6 min ± 4.4. Hemodynamic instability required small doses of positive inotropic drugs in 2 pts. Conversion to cardio-pulmonary bypass due to malpositioning of the cannula was necessary in 1 patient with significant cardiomegaly. One patient died 7 days postoperatively from septic shock. Three patients required postoperative inotropic support for transient vasoplegia. Mean lactates and troponine levels for the first 24 hours were 2.6 mmol/l and 2.3 g/l respectively. There were no complications directly related to the RVAD.

CONCLUSIONS: RVAD can provide adequate circulatory support in postero-lateral arteries' grafting when mobilization of the beating heart is poorly tolerated

P3 MINIMALLY INVASIVE PARTIAL UPPER HEMISTERNOTOMY FOR REOPERATIVE AORTIC SURGERY

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OBJECTIVE: Minimally invasive partial upper hemisternotomy (PUH) for reoperative ascending aortic surgery is reported.

METHODS: Seven patients underwent less invasive reoperative ascending aortic surgery. Six patients had graft replacement (GR) of true aneurysm of ascending aorta and 1 had repair of pseudaneurysm on ascending aorta late after ascending aortic GR. One patient underwent concomitant re-AVR. Previous cardiac operation included valvular surgery in 6 and ascending aortic GR with VSD closure in 1. Preoperative CT study revealed that mean size of the aneurysm was 51 mm and mean distance between aorta and posterior sternal table was 11 mm (range: 3 to 26 mm). After 10 to 12 cm midline skin incision and removal of sternal wires, the sternum was divided from notch to fourth intercostal space with horizontal transection to right side using an micro oscillating saw. In all patients, right femoral artery and vein were used for cardiopulmonary bypass, body temperature was cooled to between 28 to 30 degree centigrade, and selective antegrade cardioplegia and left ventricular venting through the right superior pulmonary vein or aortic annulus were performed. Carbon dioxide gas of 3 L/min was applied in the operative field and left ventricle to reduce the risk of air embolism.

RESULTS: Neither early nor late deaths occurred. Mean aortic crossclamp time was 89 min and cardiopulmonary bypass time was 139 min. Only one postoperative complication was re-operation for bleeding. All patients are now doing well.

CONCLUSIONS: PUH for reoperative ascending aortic surgery could be accomplished safely without any major problems. The advantage is avoidance of lower sternotomy and dissection of the lower mediastinal adhesions which have high risk of major bleeding and myocardial injury.

P2 IMPROVED HOSPITAL OUTCOMES IN 1030 CONSECUTIVE, UNSELECTED OPCAB PATIENTS

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OBJECTIVE: To assess the potential benefits of multivessel CABG without the use of cardiopulmonary bypass, a consecutive series of unselected, intention-to-treat OPCAB patients were evaluated.

METHODS: In a retrospective analysis 1030 consecutive, unselected OPCAB patients (July, 1999 – Oct., 2001) were compared to 615 conventional CABG (CCAB) patients (July, 1997 – July, 1998).

RESULTS: Evaluating 25 preop variables, OPCAB had a higher risk profile: The mean number of grafts performed was less, but not significantly, in OPCAB (3.22 vs 3.42; p < 0.09). Conversion to CPB occurred in 32 patients (3.1%) with 3 deaths. Reasons for conversions were hemodynamic/ischemic deterioration (20 pts.), intramyocardial LAD (6 pts.), distal coronary disease (4 pts.), and right ventricular injury (2 pts.). Compared to conventional CABG, OPCAB patients had a significantly less overall complication rate (10% vs 18%; p < 0.0001), deep sternal infection (1.4% vs 3.1%; p < 0.02), reop for bleeding (2.2% vs 6.3%; p < 0.0001), and hospital mortality (1.6% vs 3.4%; p < 0.02). Furthermore, OPCAB had a lower perioperative stroke rate (1.1% compared to CCAB (3.1%; p < 0.004). Multi-regression analysis demonstrated age, ejection fraction, hypertension and conventional CABG as significant factors for operative mortality (p < 0.003). Length of stay days was also less in OPCAB (6.1 vs 7.2; p < 0.01). The conversion rate was only 1.4% in the last 6 months, compared to 3.8% in previous months.

	No. of Pts.	HTN	>1 MI	CHF	RF	PTCA	IABP	Stroke	PVD
CCAB	615	68%	7%	45%	3.1%	19%	6.5%	6.7%	27.8%
OPCAB	1030	78%	10%	65%	7.3%	25%	4.0%	7.5%	24.9%
p value		0.0001	0.04	0.0001	0.01	0.001	0.02	NS	NS

CONCLUSIONS: In a single institution retrospective study of consecutive, unselected patients, the OPCAB method demonstrated significantly improved outcomes; notably for hospital mortality and perioperative stroke. Defining patient subtypes and techniques to prevent CPB conversion need to be further developed.

P4 IS CLAMPING OF THE AORTA LESS TRAUMATIC THAN OCCLUDING IT WITH A BALLOON?

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OBJECTIVE: Owing to the recent increase in the use of aortic endoluminal balloons to occlude the aorta, we compared its traumatic effects with those of conventional surgical clamps.

METHODS: Segments of human aorta were harvested from cadavers within 24 hours of death. Donors' age ranged from 23 months to 77 years. The segments were divided in 3 groups according to the degree of atherosclerosis: none or mild (group A, n = 8), moderate (group B, n = 14) and severe (group C, n = 6). Videoscopic assessment of the aortic lumen was performed before occluding the segments, in order to exclude previous lesions. Each segment was clamped, at 3 cm intervals, with an Edwards clamp at a pressure of 150mm Hg and occluded with a balloon filled at 300mm Hg. After 5 minutes the clamp and balloon were removed and videoscopic, stereomicroscopic and histological evaluations performed.

RESULTS: There was no documented damage of aorta segments in group A irrespectively of the occlusion method. Six segments of group B presented 8 lesions: seven from clamp and 1 from balloon. Four clamp induced lesions were limited to the intima and 3 extended to the media inner third. Rupture of the fibrous cap of a large lipid rich plaque was the only balloon induced lesion. Evaluation of group C specimens was inconclusive, irrespectively of the occlusion method, due to gross destruction of the aorta segments.

CONCLUSIONS: In normal or mildly atherosclerotic aortas the two methods show no differences, whereas moderately atherosclerotic aortas were less damaged when occluded with endoluminal balloons.

P5 DOES GENDER INFLUENCE BLOOD TRANSFUSION IN PATIENTS UNDERGOING OFF-PUMP CORONARY ARTERY BYPASS SURGERY?

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OBJECTIVE: Female gender is shown to be an essential determinant of blood transfusion in patients undergoing traditional coronary artery bypass surgery with utilization of extra corporeal circulation (ECC). Female patients receive more frequent blood transfusions than males. Female gender is also known to be a predictor of prolonged post operative length of stay (PLOS) and total length of stay (LOS) in patients undergoing traditional coronary artery bypass graft (CABG) surgery. The aim of the present study was to determine if gender influences blood transfusion requirements in patients undergoing Off pump coronary artery bypass (OPCAB) surgery and to examine the PLOS and LOS in this group of patients.

METHODS: This is a retrospective analysis of consecutive patients undergoing OPCAB surgery at a University hospital. Institution review board approval was obtained for collecting data from patient's medical records. We collected data pertaining to gender, total blood transfusion from the day of surgery till the day of discharge, postoperative length of stay (PLOS) and total length of stay (LOS). All male and female patients undergoing off-pump coronary artery bypass surgery at our institution for the years 1999 and 2000 were included. All patients underwent OPCAB surgery using a median sternotomy incision. There were a total of 553 patients. There were 165 women and 388 men. Procedures converted to on pump CABG were excluded. The data collected were analyzed for statistical significance using T test.

RESULTS: Our study suggests that females receive more blood transfusion than males (.63.6% versus 38.4%) among patients undergoing OPCAB surgery. They also have longer PLOS and LOS as compared to their male counterparts. There was a statistically significant difference between females and males as regards blood transfusion PLOS and LOS.

	Females	Males	P Value
Number of Patients:	165	388	
Total Units of Blood Administered	2.03	1.33	0.018
PLOS	6.47	4.97	0.039
LOS	9.91	7.98	0.014

CONCLUSIONS: This is a retrospective analysis of patients undergoing OPCAB surgery at a tertiary care center. Previous studies have shown female gender to be predictor of blood transfusion in patients undergoing traditional coronary artery bypass surgery. We wanted to examine if this difference persisted in patients undergoing OPCAB surgery. We found a statistically significant difference between females and males as regards blood transfusion and PLOS and LOS.

P6 ATRIAL SEPTAL DEFECT REPAIR WITH MINITHORACOTOMY USING TWO STAGE SINGLE VENOUS CANNULA

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OBJECTIVE: Repair of Atrial Septal Defect (ASD) via minimally access has been preferred method to improve the cosmesis since most of the patients are so young, the fast rehabilitation is most desired. A two stage single venous cannula introduced via the femoral route allows better vision of the surgical field and improves surgical manipulations through the limited incision.

METHODS: From February 1999 to December 2001 minithoracotomy approach was used for closure of secundum type ASD by using two stage-single bicaval Carpentier venous cannula (Medtronic, DLP, MI-USA) in 15 adult patients. A 6 to 7 cm. anterior minithoracotomy (submammary) approach used, with femoral arterial and two stage single venous cannula were utilized to maintain the cardiopulmonary bypass. Tension-free direct closure were possible in 13 patients, whereas pericardial patch closure became necessary in remaining 2 patients.

RESULTS: Calculated flow levels were easily maintained with single venous cannula without assisted venous drainage in all patients. The postoperative course was uneventful in all patients except one who required revision for bleeding which was performed through the same incision. Neither extension of the thoracotomy or shifting to the classic sternotomy required.

CONCLUSIONS: Single venous cannula allows efficient drainage of both vena cavae and improves the surgical vision and manipulation through the right minithoracotomy. With this technique, repair of ASD can be safely done with good cosmesis.

P7 EXTRA-ANATOMIC CABGS IN PATIENTS WITH PORCELAIN AORTA

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OBJECTIVE: Severe atherosclerotic ascending aorta is associated with increased morbidity and mortality during coronary artery bypass grafting (CABG) due to the increased risk of perioperative atheroembolism. Three maneuvers during CABG can cause atheromatous embolism from the diseased ascending aorta: 1-Cannulation of the ascending aorta, 2-Cross-clamping, 3-Partial clamping for the construction of the proximal anastomosis.

METHODS: In our hospital, CABG were performed in 7 patients with heavily calcified ascending aorta. Five patients were men and 1 woman. Operations were performed on the beating heart in 5 patients. One patient operated on beating heart and another patient on fibrillating heart with supportive cardiopulmonary bypass (CPB). Arterial cannulation was done through right femoral artery on these patients. Apart from IMA grafts, proximal anastomosis sites were right axillary artery, right subclavian artery and innominate artery.

RESULTS: One patient who was preoperatively dialysis dependent chronic renal failure, died as a result of dialysis complication on 5th day. The postoperative course was uneventful on the other patients and no patient experienced either any cerebrovascular or visceral organ injury as a result of atheroemboli.

CONCLUSIONS: We think that extra-anatomic CABG procedures are safe and reliable in patients with severe atherosclerotic ascending aorta to prevent the prevalence of perioperative stroke and systemic embolization.

P8 THE EFFECTS OF CARDIAC DISPLACEMENT WITH AND WITHOUT APICAL SUCTION DEVICE ON LEFT VENTRICULAR FUNCTION DURING OFF-PUMP CORONARY ARTERY BYPASS (OPCAB) SURGERY.

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OBJECTIVE: During cardiac displacement for OPCAB surgery maintenance of stable hemodynamics remains a challenge. The current study investigated the effects of cardiac displacement on left ventricular (LV) hemodynamics during surgical exposition of the left anterior descending coronary artery (LAD).

METHODS: A high-fidelity pressure catheter was positioned in the LV and left atrium in 10 OPCAB patients with a preoperative ejection fraction greater than 40%. Hemodynamic data were compared in control conditions, after exposure with a retrocardial sponge and with the apical suction device in place. Apart from baseline data, the LV response to increased cardiac load obtained by leg elevation was assessed under the three conditions. Effects on contraction were evaluated by analysis of changes in maximal rate of pressure development (dP/dtmax). Effects on relaxation were assessed by analysis of changes in minimum rate of pressure development (dP/dtmin) and by analysis of the load dependence of myocardial relaxation (R = slope of the relation between time constant tau of isovolumetric relaxation and end-systolic pressure).

RESULTS: In the presence of a stable LV end-diastolic pressure (EDP), reduction of dP/dtmax indicates a slight reduction of LV function. Tau increased during exposition indicating slower relaxation. Load dependence of relaxation (R) was not affected by exposition. (table: *p<0.05 versus baseline)

	Baseline	Sponge	Xpose
peak LVP (mm Hg)	85 ± 13	76 ± 10	76 ± 9
LV EDP (mm Hg)	6.6 ± 4.2	7.7 ± 2.6	6.6 ± 3.3
dP/dtmax (mm Hg/s)	924 ± 340	828 ± 199	817 ± 278*
dP/dtmin (mm Hg/s)	-771 ± 150	-557 ± 50*	-590 ± 80*
tau (ms)	52 ± 5	57 ± 5	59 ± 6*
R (ms)	-0.01 ± 0.349	-0.01 ± 0.304	-0.02 ± 0.249

CONCLUSIONS: In the present study, the use of the apical suction device for exposure of the LAD had no hemodynamic advantage compared to sponge exposition. Further investigation is needed to evaluate the effect of exposure devices for surgery on other myocardial regions.

P10 OFF PUMP CORONARY ARTERY BYPASS SURGERY WITH AND WITHOUT "STAR FISH"- A PROSPECTIVE ANALYSIS OF HAEMODYNAMIC CHANGES

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OBJECTIVE: Off pump coronary artery bypass (OPCAB) surgery causes significant haemodynamic changes during displacement of the heart. The purpose of this study was to define the haemodynamic changes in patients undergoing OPCAB using two different techniques of heart stabilization.

METHODS: 26 patients operated by a single surgeon were randomly divided into 2 groups called; "star fish" (n = 14) and "control" (n = 12). The parameters recorded were, heart rate (HR), mean arterial pressure (MAP), central venous pressure (CVP), pulmonary wedge pressure (PCWP), cardiac index (CI) systemic vascular resistance index (SVRI) were collected. The time per graft and the grafts per patient were also noted.

RESULTS: The positions were empirically classified as anterior, oblique, lateral and inferior depending on the location of the grafted coronary artery. The heart rate, MAP, CI and SVRI did not change significantly in the anterior, oblique, and inferior positions but there was a statistically significant change (p = <.05) in the lateral in the "control" group. The time per graft is reduced (7 min in star fish as compared to 9.5 minutes in control group. p = <.05) and graft per patient (3.9 in starfish as compared to 3.2 in the control group. p = <.05) is increased.

CONCLUSIONS: These results demonstrate that starfish allows better visibility, provides the operating comfort, more grafts in less time per patient. "Starfish" allows haemodynamic stability especially in the lateral positions.

P9 OPCAB SURGERY MAY PRODUCE A HYPERCOAGULABLE PATIENT

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OBJECTIVE: The incidence of thromboembolic events following traditional open-heart surgery has not been clinically significant. However with beating heart surgery, where cardiopulmonary bypass (CPB) is not required, spontaneous intravascular thrombosis may be similar to that encountered after general surgeries. To compound this risk, many cases of Off-pump Coronary Artery Bypass Surgery (OPCAB) are reserved for the elderly patient with multiple co-morbidities. The few studies to date assessing hypercoagulation in the OPCAB patients, have been limited to the first twenty-four hours.

METHODS: We prospectively studied 17 OPCAB and 4 on-pump patients over 4 days (hospital course) with daily thrombelastography. A coagulation index (C.I.) (refelcting R and K times alpha angle and MA) was calculated for each patient who served as their own control.

RESULTS: The OPCAB patients, 3 days post-operatively, demonstrated 17% increase in coagulation over baseline. Specifically, the C.I. consistently revealed an elevation in the alpha angle and the MA, both of which reflect increased fibrinogen and platelet activity. On the other hand, 3 days following surgery, the CI of the CPB group was tightly clustered around their respective baseline coagulation values, having recovered from a significant decrease in CI immediately after surgery.

CONCLUSIONS: A state of hypercoagulability, beyond the first post-operative day, exists in the OPCAB patient, as measured by thrombelastography, and suggests that the use of prophylactic post-operative anticoagulation therapy may be indicated in these patients which would target fibrinogen and platelet activity.

P11 ENDOTHELIAL FUNCTION STUDY OF COALESCENT U-CLIP STAPLED ANASTOMOSIS

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OBJECTIVE: A new compliant stapled anastomotic device (Coalescent® Surgical, Sunnyvale, CA) has been developed for minimally invasive and robotic surgery. The purpose of this study was to determine the effect of stapled anastomosis in the development of endothelial dysfunction.

METHODS: On a porcine model, both internal mammary arteries (IMA) were harvested and the heart removed. In a Krebs solution, two anastomoses were realized between IMAs and the left anterior descending artery: one with 12 Coalescent® U-clips (CA) and one with conventional running suture 7-0 Prolene (PA). Coronary rings onto the anastomotic sites were then harvested and placed in organ chambers filled with oxygenated Krebs solution. After contraction to prostaglandin F2a, endothelium-dependent relaxation to bradykinin was studied. The other coronary arteries served as controls.

RESULTS: There was no significant decrease of endothelium-dependent relaxation occurred between CA and controls (P>0.05), PA and controls (P>0.05) and between CA and PA (P>0.05).

CONCLUSIONS: Coalescent® U-clips used as anastomotic devices do not induce an endothelial dysfunction, when compared to controls and to conventional running suture anastomosis.

P12 IS OFF-PUMP CORONARY SURGERY BETTER IN THE OCTOGENARIAN?

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OBJECTIVE: The goal of this work is to evaluate the results of the coronary surgery in the octogenarian carried out with cardiopulmonary bypass (CPB) and off pump (OPCAB) in order to be able to propose the least morbid surgical technique among these risky patients.

METHODS: Over a 5-year period, 125 eighty-year-old patients or more were operated for coronary artery bypass alone at the Montreal Heart Institute. Among these 125 patients, 63 were operated under CPB and 62 in OPCAB. All early clinical and paraclinical per- and postoperative parameters were evaluated by univariate and multivariate statistical analyses, in this retrospective study.

RESULTS: Among all studied factors, in group CPB compared to group OPCAB, vasopressor drugs were more often used ($p < 0.05$), the patients were more often transfused ($p < 0.05$), but had a better diuresis ($p < 0.05$). The patients operated under CPB were also less hypothermic at the end of surgery ($p < 0.05$). The CPK-MB were higher in day 0 as well as the postoperative neurological events in group CPB compared to OPCAB group ($p < 0.05$). There was no significant difference for postoperative mortality between group CPB and OPCAB ($p > 0.05$). Follow-up showed satisfactory results.

CONCLUSIONS: OPCAB appears to be a satisfactory therapeutic option in the octogenarian.

P14 PERIOPERATIVE CARDIAC INJURY IN PATIENTS UNDERGOING CORONARY ARTERY BYPASS GRAFTING (CABG) WITH OR WITHOUT CARDIOPULMONARY BYPASS (CPB) AS EVALUATED BY CARDIAC-SPECIFIC TROPONIN I (cTNI).

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OBJECTIVE: Postoperative augmentation of cTnI levels were reported in all patients undergoing CABG surgery. The extent of cTnI elevation was attributed to the type and extent of surgery, the method of myocardial protection, patients' preoperative cardiac status and the amount of reperfusion injury. The beneficial effect of mild-to-moderate hypothermia in cardiac surgery as a myocardial protective strategy is controversial. This study evaluated the myocardial damage sustained during CABG with CPB vs. off-pump CAB (OPCAB) under normothermia or mild-to-moderate hypothermia.

METHODS: This retrospective analysis compared 120 patients equally divided into two groups: (1) CABG+CPB, with perioperative warming by the ALLON® thermoregulatory (AT) system ($n = 40$) and perioperative warming by routine thermal care (RTC, $n = 20$); (2) OPCAB, subdivided as group (1). Core temperature (measured via the rectum/urinary bladder), hemodynamics and cTnI values were assessed throughout the perioperative period in all patients.

RESULTS: Core temperature was maintained at $>36.5^{\circ}\text{C}$, the cardiac index was greater and the systemic vascular resistance lower in the AT subgroups versus the RTC subgroups at comparable time points ($P < 0.05$) in both types of surgery. The cTnI levels were lower in both AT subgroups from the end of surgery until 24 hours postoperatively. The cTnI levels were lower in both OPCAB subgroups than in the equivalent CPB subgroups, indicating the possibility of less intraoperative ischemic damage having been sustained during OPCAB.

CONCLUSIONS: OPCAB surgery was associated with less myocardial injury, as expressed by lower cTnI levels, compared to open-heart procedures. Maintenance of perioperative normothermia (36.5°C - 37.5°C) afforded reduced myocardial damage.

P13 INTRACORONARY SHUNT SIZE AND CORONARY ENDOTHELIAL FUNCTION DURING OPCAB

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OBJECTIVE: The purpose of this study was to determine the role of shunt to target artery diameter ratio in the development of endothelial dysfunction.

METHODS: Swine were operated via a median sternotomy approach. Three shunts (Clearview®, Medtronic, Grand Rapids, MI) were inserted via three arteriotomies into the right coronary artery with proximally to distally a 3-mm, 2-mm and a 1.25-mm diameter shunt to obtain an oversizing with the 3 mm, an undersizing with the 1.25 mm and a satisfying congruence with the 2 mm. Shunts were left in place for 15 minutes and bleeding at the anastomotic site was quantified. Coronary rings upstream and downstream from the arteriotomies were then harvested and placed in organ chambers filled with oxygenated Krebs solution. After contraction to prostaglandin F_{2a}, endothelium-dependent relaxation to serotonin and bradykinin were studied. Non-instrumented coronary arteries served as controls.

RESULTS: A decrease of endothelium-dependent relaxation occurred with 3-mm shunts ($P < 0.005$) associated with an adequate hemostasis. A decrease of endothelium-dependent relaxation occurred with 2-mm shunts ($P < 0.05$) associated with intermittent bleeding and no significant decrease of endothelium-dependent relaxation occurred with 1.25-mm shunt associated with continuous bleeding ($P > 0.05$).

CONCLUSIONS: Intracoronary shunts are associated with different disadvantages depending their mismatch to the target coronary artery and whatever the size, shunts are not the ideal device to obtain safely a satisfying hemostasis.

P15 CORONARY ARTERY BYPASS GRAFTING WITH OR WITHOUT CARDIOPULMONARY BYPASS: WHICH PATIENT POPULATION BENEFITS THE MOST?

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OBJECTIVE: We present our early results after off-pump coronary artery bypass grafting (OPCAB) on the beating heart and after conventional coronary artery bypass grafting (CABG), comparing patient outcome between both procedures.

METHODS: Between November 1997 and April 2001, OPCAB was performed in 330 patients. The results were compared with an equally matched population of 330 patients who underwent CABG during the same period. Patient subgroups with multimorbidity, impaired ventricular function, old age and young age without comorbidities were created for evaluation of the specific outcome.

RESULTS: Conversion to cardiopulmonary bypass (CPB) was necessary in 13 OPCAB patient (3.9%). There was a significant reduction in time of surgery ($p = 0.008$), postoperative inotropic medication ($p = 0.041$), ventilation time ($p < 0.001$), ICU stay ($p < 0.001$), transfusion rate ($p < 0.001$) and hospitalization ($p = 0.006$) in the OPCAB group. Postoperative myocardial infarction was 1.5% in the OPCAB and 4.5% in the CABG group, hospital mortality 1.5% and 4.8%, respectively and thus were significantly lower for the beating heart procedure ($p < 0.05$). Complication rates for wound infection, reexploration for bleeding, early graft failure and cerebrovascular accidents did not show differences between the groups ($p = \text{n.s.}$). Patients with multimorbidity were the only subgroup to show a reduction of hospital mortality after OPCAB surgery ($p = 0.048$). Postoperative ventilation, ICU stay and hospitalization were significantly reduced across all patient subgroups ($p < 0.05$).

CONCLUSIONS: These data emphasize the excellent early results after beating heart surgery with improved postoperative recovery for the entire patient population. Compared to conventional CABG, high risk patients with multimorbidity seem to particularly profit from avoiding cardiopulmonary bypass.

P17 THE EARLY CLINICAL AND ANGIOGRAPHIC OUTCOME OF THE SEQUENTIAL CORONARY ARTERY BYPASS GRAFTING USING THE OFF-PUMP TECHNIQUE

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OBJECTIVE: The emergence of the Off Pump Coronary Artery Bypass (OPCAB) technique has made surgeons question the outcome of combining it with other techniques developed and learnt with conventional Coronary Artery Bypass Grafting (CABG) using Cardiopulmonary Bypass (CPB). One of these techniques is the construction of a sequential graft to bypass more than one coronary vessel. The purpose of this study is to review the outcome of combining sequential coronary artery bypass grafting and OPCAB techniques.

METHODS: We reviewed, retrospectively, the records of 45 consecutive patients who underwent isolated coronary bypass surgery using the OPCAB and sequential grafting techniques at Harefield Hospital between July 1999 and December 2000. Registry database, medical notes and charts were studied for preoperative and postoperative data of the patients. Ten patients consented and underwent early postoperative angiography to check the quality of the grafts and anastomoses.

RESULTS: There was no death among the study patients. Morbidity consisted of atrial fibrillation (AF) occurred in six patients (13.3%), leg wound infection in two patients (4.4%) and pleural effusion in one patient (2.2%). Angiography of the ten patients revealed ten patent sequential grafts (100%) with twenty satisfactory End-to-Side (ES) and Side-to Side (SS) anastomoses (100%).

CONCLUSIONS: The combination of sequential grafting and OPCAB techniques is feasible, safe and provides good early clinical and angiographic outcomes.

P19 THE CLINICAL OUTCOME AND QUALITY OF LIFE FOLLOWING MINIMALLY INVASIVE DIRECT CORONARY ARTERY BYPASS (MIDCAB) SURGERY

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OBJECTIVE: Minimally Invasive Direct Coronary Artery Bypass (MIDCAB) through a limited anterior small thoracotomy has been shown to be a promising technique of surgical treatment for single or double vessel disease. Little is known about the Health Related Quality Of Life (HRQOL) in this group of patients.

METHODS: The records of 55 consecutive patients who underwent MIDCAB procedure at Harefield Hospital between April 2000 and May 2001 were reviewed retrospectively. HRQOL assessment was planned in a cross-sectional design. Patients were contacted by telephone to conduct a semi-structured interview and were sent two questionnaires: the Short Form health survey (SF-36) and the Hospital Anxiety and Depression Scale (HADS).

RESULTS: There was no in-hospital death. Patients stayed in the Intensive Therapy Unit (ITU) for 12.87 ± 6.35 hours and stayed in hospital for 3 ± 2.47 days. None of the study patients had peri-operative Myocardial Infarction (MI) or neurological complications including permanent and transient strokes. We were able to contact 48 out of the 55 by telephone, and out of these, 44 completed the SF-36 and HADS. The SF-36 scores were compared to an age-matched group of normal British people. The MIDCAB group had an excellent general health perception compared to the normal group ($p < 0.001$), but similar scores otherwise. The HADS scores showed that only one patient (2.3%) had mild depression, 5 patients (11.4%) had mild anxiety and two patients (4.5%) had moderate anxiety.

CONCLUSIONS: MIDCAB is a safe surgical treatment and provides excellent clinical and HRQOL outcomes.

P18 MITRAL ANNULUS DISTORTION DURING BEATING-HEART SURGERY: A POTENTIAL CAUSE FOR HAEMODYNAMIC DISTURBANCE: A 3-D ECHOCARDIOGRAPHY RECONSTRUCTION STUDY.

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OBJECTIVE: Positioning for access to the coronary arteries leads to hemodynamic instability during off-pump cardiac surgery. External changes have been well described but description of the intracardiac structures in man has not been described.

METHODS: With multi-plane intra-operative echocardiography, the mitral annulus at end diastole was reconstructed in the different positions and correlated with hemodynamic changes in the right heart and left atrium.

RESULTS: Significant distortion of the mitral annulus with enlargement of the left atrium and pulmonary veins were demonstrated, which correlated with high left atrial pressures.

CONCLUSIONS: Mitral valve distortion can significantly contribute to hemodynamic instability during the positioning for off-pump cardiac surgery.

P20 DYSFUNCTION OF LEFT VENTRICLE AS AN INDICATION FOR OFF-PUMP CABG

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OBJECTIVE: CABG operation with cardiopulmonary by-pass carries significant risk for patients with severe LV dysfunction.

METHODS: 240 patients underwent OPCAB between 1997 and 2000. They were retrospectively divided into two groups with regard to LV function. Group one consisted of 90 patients with $EF < 35\%$ and group two of 150 patients without severe impairment of LV and $EF > 35\%$. Patients were compared for preoperative risk factors, perioperative mortality and postoperative complications.

RESULTS: Preoperative expected mortality according to EUROSCORE was higher in gr. two - 5.95 cp. gr. one - 2.66 - $p = 0.0005$. Among preoperative risk factors a few were more common in gr. one: urgent operation ($p = 0.00001$), unstable angina ($p = 0.0018$), CCS state ($p = 0.001$), MI ($p = 0.0001$), peripheral arteriopathy- ($p = 0.0006$). Perioperative drainage, anesthesia and intubation time, transfusions rate, inotropes were comparable. Actual, nonadjusted mortality was 2.5% in gr one and 1.4% in gr two ($p = ns$). Overall postoperative complications were comparable, only IABP was more frequent in group one ($p = 0.006$). Postoperative stay was shorter in group one ($p = 0.007$)

CONCLUSIONS: OPCAB for patients with LV impairment is associated with similar surgical outcome as those with normal LV function, in spite of unfavorable risk factors. "Off pump" surgery with selective anterior (including main right) arteria.

P21 CLINICAL OUTCOMES IN CORONARY ARTERY BYPASS GRAFT SURGERY: COMPARISON OF OFF-PUMP AND ON-PUMP TECHNIQUES

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OBJECTIVE: A consecutive series of patients undergoing coronary artery bypass graft surgery were analysed and the impact of off-pump surgery was evaluated.

METHODS: From 1 January to 31 December 2000, 367 patients underwent first time CABG. One hundred and twenty patients underwent off-pump CABG (Group A, 32.7%) and 247 underwent conventional on-pump CABG (Group B, 67.3%). The pre-operative characteristics, intra-operative details and post-operative course were analysed in the two groups. All patients were followed up between 11 and 23 months (median 18 months) post-op by telephone interviews or questionnaire survey.

RESULTS: Both groups were similar with respect to age, gender distribution, LV function and co-morbidities. Early mortality was 2.1% (group A, 0.83%; group B, 2.83%; p = NS). The incidence of post-op stroke (group A 1.66%; group B 3.66%), renal failure (group A 2.5%; group B 5.66%) and gastrointestinal complications (group A 1.66%; group B 1.21%) was not significantly different in the two groups. However, patients in Group A had a statistically significant lesser incidence of low cardiac-output (group A 13.3%; group B 29.5%; p = 0.002), atrial fibrillation (group A 11.66%; group B 30.36%; p<0.001), blood product transfusion (group A 39.66%; group B 89.87%; p<0.001), time on ventilator (group A, 5.96 hrs; group B, 10.31 hrs; p<0.001), and post-op hospital stay (group A, 7.79 days; group B, 9.81 days; p<0.001). Medium term results (recurrence of angina, cardiovascular events, reintervention) were similar in the two groups.

CONCLUSIONS: Off-pump CABG results in a decreased incidence of complications in the immediate post-op period with comparable results in the medium term.

P24 BEATING-HEART MYOCARDIAL REVASCLARIZATION WITH THE ASSISTANCE OF THE IMPELLA BI-VENTRICULAR MICRO-AXIAL PUMP: INITIAL SERIES

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OBJECTIVE: We sought to evaluate technical feasibility and clinical outcome following beating-heart myocardial revascularization with the assistance of the Impella bi-ventricular micro-axial pump

METHODS: The Impella-pump was applied in 22 patients (15 male, 7 female) admitted for beating-heart myocardial revascularization between 01/10/2000 and 01/02/2002 in our institution. Mean endpoints of the study were baseline characteristics, intraoperative data such as completeness of revascularization and duration of the procedure and postoperative data including myocardial infarction rate, low-output syndrome, length of hospital stay and 30 days mortality.

RESULTS: Mean age was 63 +/- 8,9 years and mean preoperative EF 68 +/- 12,2%. A LV-Dysfunction was present in 4 patients (18,1%). Procedure time was 140,5 +/- 26,2 min. Complete revascularization was achieved in 18 cases (81,8%) whereas in further 4 cases complete revascularization was not practiced due to a small vessel diameter. There were no events of myocardial infarction, low-output syndrome or cardiac related death. Patients were dismissed at 6 +/- 0,9 days.

CONCLUSIONS: Beating-heart myocardial revascularization with the assistance of the Impella bi-ventricular micro-axial pump is effective and should be a safe alternative to conventional revascularization using ECC.

P23 OPCAB VERSUS CABG IN RE-DO CORONARY SURGERY

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OBJECTIVE: Changing patient profiles forces surgeons to access operative indications, techniques, and their impact on the results of reoperative myocardial revascularization. The authors evaluated results in the past 4 years focusing on the type of the procedure performed, and its impact on patient's outcome.

METHODS: From January 1998 till December 2001 a total of 1322 patients were operated on in our institution for different cardiac surgical procedures. There were 65 (4,98%) re-do surgeries and 27 (41,54%) of them were re-do coronary artery surgeries (25 males/2 females). The median age was 61 years (range 46-73) and median interval from the first procedure was 8 years (range 4 months-17 years). Preoperatively LVEF was 52,96±11,54%, median NYHA class was II, median CCS class was 3, and median Euroscore was 5, respectively. The main cause for reoperation was occlusion of the venous grafts in 24 patients (96%), 2 of them (7,4%) had additional occlusion of LIMA, and progression of coronary artery disease was observed in 3 patients (11%). The patients were divided into 2 groups: the CABG group (reoperated using CPB; 15 patients-55,5%; Jan 1998-Jun 2000), and the OPCAB group (reoperated without CPB; 12 patients-44,5%; Jul 2000-Dec 2001).

RESULTS: Extensive arterial revascularization was used in both groups (OPCAB: 16 art.+3 ven., CABG:18 art+14 ven.). The two groups did not significantly differ regarding postoperative mediastinal bleeding, laboratory findings of CK, and CK-MB on the 1st and 2nd postoperative day, and need for inotropes although a marked clinical difference was observed (OPCAB 3 pts-25% VS CABG 8 pts-53%). There was significant difference between the groups regarding lab findings of CK immediately after the surgery (p = 0,002) as well as CK-MB (p = 0,002) in favour of the OPCAB group indicating myocardial damage due to effects of CPB and insufficient myocardial preservation. There was no perioperative mortality in both groups.

CONCLUSIONS: Reoperative coronary artery bypass surgery can and should be, whenever possible, performed using OPCAB technique with emphasis on arterial graft revascularization

P25 ENDOSCOPIC RADIAL ARTERY HARVESTING: INITIAL EXPERIENCE IN CROATIA

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OBJECTIVE: The benefits of radial artery (RA) as a conduit in coronary artery bypass surgery is clearly documented. Despite its advantages, there are still many patients, particularly women, who decline RA harvesting because of cosmetically less acceptable scar. Encouraged by recent reports utilizing endoscopic technique for RA harvesting, we present our initial experience in the first two patients.

METHODS: Through a 2 cm transverse incision at the distal forearm, RA was exposed without direct manipulation. Endoscopic vessel dissector was applied for longitudinal dissection of the overlying fascia, and endoscopic tissue retractor was applied. Side branches were identified and transected by means of harmonic scalpel with a hooked blade. A second incision was made in the cubital fossa, proximal part of RA identified and ligated. RA is then transected and pulled through a tunnel and a distal part was ligated and transected. Endoscope was used to check for bleeding spots. The incisions were closed using subcuticular 4-0 absorbable suture, and elastic bandage was applied for 48 hours. RA is then treated with a spasmoplegic solution.

RESULTS: No major clinical adverse effects were observed, and slight postoperative haemathoma of the forearm resolved within several days without any complications. The quality of the graft harvested was excellent and comparable to the grafts harvested with open technique.

CONCLUSIONS: ERA harvesting, although technically demanding, can be performed with a high level of confidence, excellent cosmetic results, and no evidential damage to the graft harvested. Once the learning curve is achieved, this "not any more academic" method should routinely be used in modern cardiac surgical centres.

P26 ENDOSCOPIC ROBOTIC INTERNAL MAMMARY PEDICLE HARVEST FOR USE IN POST-MASTECTOMY RECONSTRUCTION

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OBJECTIVE: The internal mammary vessels as a recipient for free tissue flap have been reported in postmastectomy reconstruction. This involved rib and cartilage resection with associated pain and chest wall instability. The alternative thoracodorsal vessels requires enlarging the incision and results in arm lymphedema and limited pedicle. We report a novel use of endoscopic robotic harvest techniques via existing incisions adapted from the atraumatic CABG procedure to deliver the mammary pedicle for reconstructive surgery.

METHODS: After completion of mastectomy surgery, abdominal muscle or gluteal donor flap was isolated but left attached to its vascular pedicle. The mastectomy wound was used to position ports for the Aesop robotic arm and endoinstruments with port placement away from flap tissue raised during mastectomy. Using standard endoscopic, robotic techniques the internal mammary artery and vein were dissected. The pedicle is delivered through a 1.5cm incision adjacent to the sternum in the 2nd intercostal space. The free tissue flap was then transferred to the chest wall and using microvascular anastomotic technique was attached to the internal mammary artery and vein.

RESULTS: 12 reconstructions (9 left, 3 right) have been done in this manner with excellent vessel function in each case. Radiation fibrosis, limitations to arm extension from previous axillary dissection and limitations on port placement make endoscopic harvest challenging. No thoracic complications of this procedure were noted.

CONCLUSIONS: Endoscopic harvest of the internal mammary pedicle robotically through the existing mastectomy incision delivers a long vascular pedicle that extends options for free flap reconstruction after mastectomy surgery and offers excellent cosmetic outcomes.

P28 NOVEL MINIMAL ACCESS REOPERATIVE APPROACH FOR LV ANEURYSM REPAIR

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OBJECTIVE: Aneurysms of the left ventricle (LV) require surgical repair when they result in symptoms of congestive heart failure or become large enough to be at risk for sudden rupture. Repair has typically involved a sternal incision with cardiopulmonary bypass support and cardioplegic arrest. This has considerable additional risk when there are patent coronary bypass grafts. An alternative approach is desirable for this subgroup of patients.

METHODS: This 71 year old female with prior triple coronary bypass grafting presented with patent saphenous vein grafts to all three coronary distributions on her heart. She was admitted in cardiogenic shock due to a new myocardial infarction and was found to have developed a new large antero-lateral LV aneurysm. Through a left antero-lateral thoracotomy incision the LV aneurysm was exposed under cardiopulmonary bypass support instituted through the groin. With warm fibrillatory arrest the aneurysm was opened and a repair was accomplished using a modified Dor endoaneurysmorrhaphy with a Hemashield patch. The bypass grafts remained undisturbed. Cardiopulmonary bypass support was weaned and the thoracotomy closed. The patient was discharged from hospital 8 days later.

RESULTS: This previously unreported minimal access approach for reoperative LV aneurysm repair allowed for treatment of the aneurysm without jeopardizing any patent bypass grafts. The included video briefly demonstrates this technique.

CONCLUSIONS: Minimal access reoperative LV aneurysm repair is a safe alternative strategy for the treatment of LV aneurysms in the presence of patent coronary bypass grafts.

P27 OFF PUMP MYOCARDIAL REVASCULARIZATION: EVALUATION OF MORBIDITY AND MORTALITY WITH 800 CONSECUTIVE PATIENTS IN A COMMUNITY HOSPITAL.

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OBJECTIVE: Off pump myocardial revascularization has been shown to decrease morbidity and mortality as compared to coronary bypass grafting done with cardiopulmonary bypass. The purpose of this study is to report the experience of 800 consecutive coronary bypass patients done off pump in a community hospital.

METHODS: A retrospective review of 800 consecutive patients done off pump was performed. Data is reported as average or percentage of the 800 patients.

RESULTS: Between June 1997 and June 2001, 800 consecutive off pump bypasses were performed at one community hospital. Over the past year 88%(450/511) of coronary bypass operations were performed off pump. The average age was 65 years, while 65%(520/800) were smokers, 31%(248/800) had diabetes, and 72%(572/800) were hypertensive. An average of 3.0 grafts per patient was constructed. The IMA was used 98%(789/800) of the cases. Post operative length of stay was 4.27 days. In terms of morbidity, 1.0%(8/800) of patients were taken back for bleeding. Myocardial infarction was recorded in 1.0%(8/800) and stroke occurred in 0.7%(6/800) of the patients. Renal failure occurred in 1.4%(11/800) and atrial fibrillation occurred in 19%(152/800) of cases. Overall mortality was 1.1%(9/800).

CONCLUSIONS: Off pump coronary bypass grafting can be done with minimal morbidity and mortality in a community hospital setting.

P29 INTRAOPERATIVE ANGIOGRAPHY - A VALUABLE METHOD FOR QUALITY CONTROL IN OFF-PUMP CORONARY ARTERY SURGERY?

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OBJECTIVE: The information obtained by intraoperative graft angiography in off pump coronary artery bypass grafting remains a matter of debate despite the fact that anastomotic revision rates in the range of 10% after intraoperative graft angiography are reported in the literature. We present our initial experience with intraoperative angiographic evaluation of grafts placed on the beating heart.

METHODS: 29 coronary artery bypass grafts were investigated in 20 patients (17 male, 3 female, age 60 (44-73)). Transfemoral angiography was performed before (n = 8) or after sternotomy closure (n = 12) using an OEC 9800 mobile C-arm. Examination times were 24 (8-80) min and fluoroscopy times were 464 (211-1337) sec. 150 (50-470) ml of contrast agent were needed to visualize the grafts.

RESULTS: No technical complications specific for angiography occurred. Except for 3 aortocoronary vein grafts all bypass vessels could be visualized. Spasm of the graft and/or target vessel was present in 10 grafts, which responded well to intraluminal nitroglycerine in 8 of these. 2 grafts were severely stenosed requiring surgical revision. In addition 2 proximal target vessel occlusions were noted, which were left because of lacking intraoperative ischemic signs. There was no hospital mortality and no perioperative myocardial ischemic event.

CONCLUSIONS: This experience suggests that despite being a time consuming examination technique intraoperative angiography can reveal valuable information that may demand surgical consequences.

P30 RESULTS IN MINIMALLY INVASIVE MITRAL VALVE SURGERY IN COMPARISON WITH CONVENTIONAL SURGERY OF MITRAL VALVE

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OBJECTIVE: In the last few years minimally invasive cardiac surgery has become very popular. This is especially evident in minimally invasive mitral valve repair (MVR) and mitral valve replacement (MVRp).

METHODS: Before widely accepting new methods, we have compared our 16-year experience in conventional mitral valve surgery with the results of minimally invasive methods regarding the available data from the literature.

RESULTS: Results are shown in the table.

Author	MVR/MVRp	No. pts	AoCCT- min	ECC- min	PM-30 days (%)	LOS (days)
Loulmet DF, 1998	19/2	21	-	157±8.2	0	-
Fann JJ, 1997	5/5	10	99±22	151±5.2	0	-
Chitwood WR, 1997	20/11	31	136±5.5	183±7.2	3.2	5.1
Mohr FW, 1998	28/23	51	72±27	133±52	9.8	13
Conv. surgery N.R.	60/352	412	36±9	44±9	1.5	12

CONCLUSIONS: Our standard conventional technique in mitral valve surgery shows 2-4 times shorter time ($p < 0.01$) of aortic cross-clamping time (AoCCT) and 3-4 times ($p < 0.01$) of extracorporeal circulation (ECC). The length of stay in hospital (LOS) was similar but postoperative mortality was more than 6 times lower than Mohr's experience ($p < 0.01$). We estimate that only when minimally invasive surgery reaches the level of results of conventional surgery, it could be accepted as a routine procedure in mitral valve surgery.

P32 INCIDENCE OF ATRIAL FIBRILLATION FOLLOWING OFF-PUMP AND ON-PUMP MYOCARDIAL REVASCULARIZATION

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OBJECTIVE: It has been suggested that myocardial revascularization without extracorporeal circulation could decrease the incidence of postoperative atrial fibrillation. However results in the recent literature are controversial. We report our experience in this issue following the OPCAB-, the MIDCAB- and the conventional on-pump- procedure.

METHODS: From 01/01/1999 to 31/12/2000 64 patients underwent off-pump revascularization (OPCAB n = 53, MIDCAB n = 11). The European System for Operative Cardiac Risk Evaluation (EUROscore) was used for cross-matching to an equal sample of conventionally on-pump operated patients (n = 64). Main endpoints of the study were baseline characteristics, postoperative hospital events including atrial fibrillation and 30-days mortality. The Student's t test was utilized.

RESULTS: There were no baseline demographic differences in all groups. 30 days mortality was significantly lower ($p < 0.05$) for the off-pump patients as for the on-pump patients (0% vs. 4.7%). Atrial fibrillation rate was 9% ($p < 0.05$) for the MIDCAB-, 20.7% ($p < 0.05$) for the OPCAB- and 27.9% for the conventionally on-pump operated patients.

CONCLUSIONS: Off-pump revascularization is in general associated with a lower atrial fibrillation rate. These results, especially following the MIDCAB-procedure, indicate that the incidence of atrial fibrillation correlates to the extent of intraoperative atrial manipulation, which should be further investigated.

P31 EARLY CLINICAL OUTCOME FOLLOWING INCOMPLETE MYOCARDIAL REVASCULARIZATION OFF-PUMP

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OBJECTIVE: We sought to evaluate early clinical outcome in different patient risk groups following incomplete and complete myocardial revascularization in a consecutive unselected series of off-pump (OPCAB, MIDCAB) operated patients in our institute.

METHODS: Between 01/01/1999 and 31/12/2000 64 patients underwent off-pump myocardial revascularization (complete revascularization n = 41, incomplete revascularization n = 23). The EUROscore risk evaluation model was used for stratification in a low- (n = 28) a medium- (n = 22) and a high-risk (n = 14) group. Main endpoints of the study were baseline characteristics and postoperative events including myocardial infarction and 30 days mortality. The Student's t-test was utilized.

RESULTS: Complete revascularization was achieved in 60.7% (n = 17) of all low-, 63% (n = 14) of all medium- and 71.4% (n = 10) of all high-risk patients. There were statistically no significant differences between complete and incomplete revascularized patients of all risk groups regarding myocardial infarction rate and 30 days mortality (0 % vs. 0 %).

CONCLUSIONS: Complete myocardial revascularization should be whenever possible performed, but in cases where that is not feasible incomplete off-pump revascularization seems to be safe and should be therefore further investigated.

P33 VIDEOSCOPY-CONTROLLED CORONARY ARTERY BYPASS GRAFTS

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OBJECTIVE: In minimally invasive coronary artery bypass (MICAB), graft conduits are controlled via limited incisions. We have been using videoscopies for harvesting and quality-control of the grafts, and the clinical results were reviewed.

METHODS: Fifty-four patients (44 male, 10 female, 64.5_±9.5 years old) underwent MICAB using the internal thoracic artery (ITA) graft in-situ, which was entirely harvested thoroscopically through three ports. Thirteen patients (10 male, 3 female, 69.5_±11.5 years old) underwent modified MICAB using a vein graft with axillary arterial inflow (n = 8) or gastro-epiploic artery (GEA) graft in-situ (n = 5). Intra-pleural pathway of each vein and GEA graft was videoscopically controlled through a limited anterior thoracotomy. In each patient, hemipulmonary collapse was allowed using double-lumen endo-tracheal tube and a 30-degree, 5-mm rigid scope was used. Intra-pleural 5-10 mmHg carbon-dioxide insufflation was used during thoroscopic ITA harvest.

RESULTS: There was no mortality or no videoscopies-associated morbidity. The ITA harvest was completed thoroscopically in all 54 cases with a mean period of 47_±12.5 min and negligible blood loss. One (1.9%) of the harvested ITA grafts was unused due to intimal dissection. Graft angiography was carried out in all cases 2-9 days after surgery, and 100% patency was confirmed and no kinking, twisting or redundant parts was found along each graft. Follow-up study is 100% complete and each graft has been checked using transcutaneous Doppler study. Angiography of eighteen (33%) ITAs and three (37%) vein grafts were obtained 1-3 years after surgery and their patency was re-confirmed.

CONCLUSIONS: In MICAB via a limited approach, harvesting and control of graft conduits are cumbersome and their intra-pleural pathways are disturbed by lung tissue motion. Therefore, videoscopies is a useful modality for harvesting and quality-control of MICAB grafts.

P35 INTRAVENTRICULAR SUPPORT DURING BEATING HEART PROCEDURES

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OBJECTIVE: Less invasive operation procedures without support of extracorporeal circulation are becoming increasingly important. Basic requirements for a good long-term result in such cases is unequivocally the complete revascularization of the affected coronary vessels. The unsatisfactorily high conversion rate from bypass operations originally planned as off-pump to conventional operations with heart-lung machines, because of the failure to reach the target vessels on the rear wall of the heart through haemodynamic instability led to investigation of the efficiency of a micro axial pump (Impella elect300) placed in the left ventricle.

METHODS: In a prospective study 15 from 38 consecutive patients selected for coronary revascularization with beating heart techniques had a micro pump trans-aortically implanted in the left ventricle to support the heart during the operation with a flow rate of 2.5 to 3.9 l/min.

RESULTS: With 8/23 patients operated on without pump support the operation had to be converted to conventional methods with heart-lung machine. Only one patient out of the left ventricle supported group had to be further operated on conventionally because of deep intramyocardial positioned LAD (p<0.05). The investigated laboratory parameters, especially CK, CK-MB and markers of the coagulation system showed no significant difference. There tended to be a higher blood loss recorded with the pump-supported patients.

CONCLUSIONS: Support of the left ventricle using the new Impella elect circulatory assist system is feasible in all patients scheduled for beating heart patients. Significant decrease of conversion to on-pump in addition to improved myocardial tolerance encourages further application of this new intracardiac micro pump.

P38 CLOSURE OF PATIENT DUCTUS ARTERIOSUS BY VIDEO-ASSISTED THORACOSCOPIC SURGERY; MINIMALLY INVASIVE, MAXIMALLY EFFETIVE: 420 CASES.

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OBJECTIVE: In the last decade, increasing interest has focused on diferent applications and various aspect s of minimally invasive surgery . To further determine the safty and efficacy of video-assisted thoracoscopic surgical (VATS) closure of Patent Ductus Arteriosus (PDA) , we prospectively studied 420 patients treated by this new method.

METHODS: From June 1997 to January 2002, 420 consecutive patients diagnosed as PDA (mean age: 6 years old), were referred to us, all of them met our inclusion criteria eligible for VATS procedure. Recently, we have made some minor alterations in our routine methodology, which will be discussed in more detail later. After complete closure of PDA by two titanium clips, the extubated patient leaves the Operating Room (O.R.) without a chest tube.

RESULTS: All the pertaing data were collected and analyzed. There were two cases of chylothorax, which were succesfully treated by thoracotomy and ligation of the small lymphatic ducts, after one week of close observation. The procedure was changed to thoracotomy in four adult patients due to inappropriately dilated canal (greater than 9 mm), meanwhile, three additional patients developed transient recurrent laryngeal nerve dysfunction. All cases were re-assessed immediately after the procedure, and followed for near 5 years by control echocardiography. No significant complication and residual shunt was recorded during the follow-up period. Mean procedure time was about 20+/-2 minutes. All patients were discharged shortly after the procedure (~20 hours).

CONCLUSIONS: This experience indicate that video-assisted thoracoscopic surgery is superior to other techniches of ductal closure, as well as, it is simple , rapide, cost-effective, and more comfortable for the patients, in addition to the cosmetic benefits

P37 BEATING-HEART CORONARY ARTERY BYPASS GRAFTING PATIENTS WITH POOR EJECTION FRACTION AND INCREASED MORTALITY AND MORBIDITY RISK.

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OBJECTIVE: The perioperative morbidity and mortality for coronary artery disease (CABG) surgery remains high in patients presenting with severely depressed ventricular ejection fraction (EF) and co-morbidity. The objective is to assess the benefits, morbidity and mortality risks of beating-heart surgery and off-pump CABG (OPCABG) in a selected group of high-risk patients.

METHODS: The over 18-months period prospectively and consecutively gathered data of selected coronary artery disease patients were analyzed. Co-morbidity and surgical risk of the patients were assessed using the modified Parsonnet morbidity/mortality score and stratification system for cardiac surgery. The age of the twenty-one patients ranged from 47-85 years of age (mean = 67.5 ±11.6, 24% females) and the (EF 10%-35%, mean = 27.1 ±8.7). The average Parsonnet surgical risk stratification score was 23.7 (±10.9). The most significant morbidity/mortality risk factors included age greater than 80 years (19%), left main disease with 90% occlusion (14%), EF less than 30% and end-stage ischemic cardiomyopathy (67%). Interventions: These patients underwent beating-heart coronary artery bypass grafting.

RESULTS: The perioperative mortality was 0%. The 30-day mortality rate was 10%. The conversion to on-pump CABG occurred in three patients. Complete target vessel revascularization was accomplished in 19 of the 21 patients with an average of 2.2 (range 1 to 3, ±0.7) including posterolateral coronary artery branches in 80%. Post-operative cardiac troponin I was 2.8 ng/mL (±2.3) for all the patients. Two patients underwent a hybrid procedure. A follow-up evaluation (18 months ± 4) revealed unchanged mortality and improved angina and heart failure classification .

CONCLUSIONS: Off-pump coronary artery bypass grafting might become an important asset to already existing surgical treatment options in coronary artery revascularization for patients with very low EF. This technology provides excellent myocardial protection. OPCABG seems to be an alternative approach with acceptable morbidity and mortality.

P40 PITFALLS AND INVENTIONS OF MINIMALLY INVASIVE CARDIAC SURGERY FOR VALVULAR DISEASES

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OBJECTIVE: To report our experience and inventions of MICS for valvular diseases in Sapporo.

METHODS: Since May 1997, 114 patients underwent MICS and 43 of them had valvular surgery; 21 MVPs, 7 MVRs, 2 OMCs and 13 AVRs. We use inverted J sternotomy for mitral, and reverse L sternotomy for aortic surgery. In mitral-MICS, we cannulate caval drainage tubes through another small skin incisions to avoid interfere the surgical view. We also use CO2 flooding for complete deairing.

RESULTS: No hospital death. Two late deaths, both from malignancy. No cardiac or valve-related deaths. Seven patients in mitral surgery were converted to full-sternotomy because of poor exposure in 2, bleeding in 3, and further mitral surgery in 2 patients. Five patient in early series had post-operative convulsions during recovery, whereas none after CO2 flooding were used. In 21 MVP cases, 7 patients (33.3%) showed residual MR more than 2/4 in the-ater and 2 required further surgery. Four in resting 5 patients showed increasing MR in follow-up, one had re-MVP and the others are waiting for re-surgery. Risk for residual MR related to mitral lesions and LA-size. Patients with prolapsing P1-scallop likely showed residual. Also. Patient with smaller left atrium, saying maximal diameter was smaller than 70mm, likely showed residual MR probably because poor exposure in surgery.

CONCLUSIONS: MICS-valvular surgery for AVR and MVR were satisfactory, whereas indication for MVP should be considered by valvular lesion-site and LA-size.

P41 CORONARY ARTERY BYPASS NUMERICAL COMPUTER MODEL FOR SHUNT FLOW MEASUREMENT INTERPRETATION

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OBJECTIVE: Intraoperative coronary bypass blood flow measurement gives quite often readings that are not easy to interpretate. But this information is critical for future decisions, is need for redo anastomosis or not.

METHODS: We created a numerical model for blood flow simulations. Model has simple user interface and can be used in operation room. Input parameters are flow graph, arterial blood pressure diastolic and systolic values, tcentral venous pressure and preoperatively known aortal valve maximal pressure gradient. In combined operation with aortal valve replacement need to be used new valve hypothetical gradient.

RESULTS: By using this model is possible to estimate quantity of collateral flow and give estimation when we have no-reflow phenomen or damage of microcirculation. Additionally model draw a new calculated flowmeter graph for visual accuracy control. Correlation coeficent is between 0.75 and 0.95.

CONCLUSIONS: This model together with flowmeter is tool for undstanding bypass flow measurements and give additional information.

P42 RESECTION OF LEFT ATRIAL MYXOMA BY T-SHAPED ATRIOTOMY WITH MICS APPROACH

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OBJECTIVE: To report our technique for resection of LA-myxoma by MICS approach.

METHODS: By lower partial sternotomy with inverted J incision, the heart was exposed and cardio-pulmonary bypass was established. Drainage cannulae were inserted into both caves through another small skin incisions. Right-sided left atrium was incised along the inter-atrial groove in 5 cm. Then, transverse incision was made for RA-wall and inter-atrial septum towards foramen ovale beginning at the center of LA-tomy line. Myxoma attached on the LA side of septum was easily exposed at this point, and was resected with septal wall. Septum was stitched without any patch and then LA-tomy was closed. Finally, RA-wall was stitched and operation was finished.

RESULTS: Four cases underwent resection of LA-myxoma with T-shaped incision with MICS approach. No morbidity and mortality were seen. Operative time, bypass time were shorter than ordinally both-atriotomy technique. Recovery from surgery is quicker than full-sternotomy case and hospital stay could be shorter.

CONCLUSIONS: T-shaped incision with MICS approach for LA-myxoma is easier and reliable technique and should be considered as the first choice.

P44 ESTABLISHING A ROBOTIC CORONARY ARTERY SURGERY PROGRAM - WHAT MAY BE EXPECTED FROM THE FIRST CASES?

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OBJECTIVE: In spring 2001 a robotic surgery program was implemented at our cardiac surgery unit in order to perform totally endoscopic coronary artery bypass grafting (TECAB). The aim of this report is to summarize the initial results of a single center using a computer enhanced telemanipulation system.

METHODS: Since April 2001 a da Vinci® telemanipulation system was used in 17 patients. Endoscopic harvesting of the left internal thoracic artery (LITA) was followed by conventional coronary artery bypass grafting (CABG, group 1, n = 7), by a minimally invasive direct coronary artery bypass operation (MIDCAB, group 2, n = 5) or by an off pump coronary artery bypass operation (OPCAB, group 3, n = 4). In one patient a totally endoscopic coronary artery bypass operation (TECAB) was performed using the HeartportTM system.

RESULTS: The LIMA take down time was 85 (35-300) minutes, the operating times including intraoperative graft angiography were 442 (330-690) minutes in group 1, 390 (290-435) minutes in group 2, 352 (345-380) minutes in group 3 and 500 minutes in the TECAB. Stay on the ICU and hospitalisation were 1 (1-19) days and 10 (8-28) days, respectively. There was no evidence for perioperative myocardial ischemia and no hospital mortality.

CONCLUSIONS: From this initial experience we conclude that robotically assisted coronary artery bypass grafting can be safely implemented within several months to a heart surgery department. Operation times, stay on the ICU and hospitalisation are prolonged, learning curves, however, are steep and a stepwise approach to performance of a totally endoscopic procedure seems worthwhile.

P45 REOPERATIVE MULTIVESSEL OFF-PUMP CORONARY ARTERY BYPASS GRAFTING (OPCAB), ARE WE PUSHING THE ENVELOPE?

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OBJECTIVE: Reoperative(REDO) coronary artery bypass grafting(CABG) is associated with a higher mortality and morbidity then primary CABG. As off-pump techniques are applied to a larger portion of patients needing CABG, the same benefits which have been described for the primary patients, may also be gained by the REDO patients. The aim of this study was to evaluate the clinical outcomes of 50 consecutive patients undergoing off-pump REDO CABG.

METHODS: From August 1, 1999 thru December 31, 2001, 50 consecutive patients underwent off-pump REDO CABG. This represented 15.6% (50/320) of the patients undergoing OPCAB during the study period. The mean age was 67 years. There were 66% men in this study. Average number of grafts were 2.1. All cases were done electively. Surgical approaches included: sternotomy 24 (48%), subxiphoid 15 (30%), lateral thoracotomy 7 (14%) and anterior thoracotomy 4 (8%). Seven patients had more than one approach used. There were 38/50 patients (76%) with a patent left internal mammary artery graft.

RESULTS: There were no operative or 30-day mortalities. Morbidity included: renal failure 1, pulmonary insufficiency 6, stroke 1, bleeding 2, for a total complication rate of 10/50 (20%). Three patients had an intra-aortic balloon pump placed preoperatively, but none were placed intraoperatively.

CONCLUSIONS: The application of off-pump techniques to multi-vessel REDO CABG can be done safely and with low mortality and morbidity. The benefit of avoidance of cardiopulmonary bypass would appear to extend to the REDO patient. As off-pump techniques are applied to a more diverse group of higher risk patients, we will need to carefully monitor outcomes before we can conclude that OPCAB is the best approach for multivessel reoperations.

P46 ROUTINE INTRA-CORONARY SHUNTING IN MULTIVESSEL OFF-PUMP CORONARY ARTERY BYPASS: A RETROSPECTIVE REVIEW OF IN-HOSPITAL OUTCOMES IN 514 CONSECUTIVE CASES.

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OBJECTIVE: Since 1999 we have adapted off-pump coronary artery bypass in the majority of our patients. In the year 2001, 96% of our isolated coronary bypass procedures were performed off-pump. Routine use of intra-coronary shunts in OPCAB has been a controversial topic. We use routine intra-coronary shunting in all cases to maintain distal perfusion and to help achieve hemostasis.

METHODS: We reviewed the first 514 OPCAB procedures at our institution (July 1998- December 2001) by 2 surgeons currently performing > 95% of all coronary bypasses off-pump. All cases were completed with routine intra-coronary shunting using Flo-Coil (Guidant, Santa Clara, CA), or Flo-Thru (Bio-Vascular, Inc., St Paul, MN) shunts. The mean number of grafts was 3.6.

RESULTS: In-hospital outcomes in this series of patients were compared to outcomes in 498 patients performed by the same 2 surgeons using traditional CPB and aortic cross-clamping, prior to adapting routine OPCAB. Statistical significance was conducted using Pearson Chi-Square and independent t-test analysis and reported for p values of <0.05. The occurrence of post-operative CVA, atrial fibrillation, prolonged ventilator time, renal failure, blood product use and post-op LOS were significantly less in the off pump group (p<0.05). Predicted risk of mortality, observed mortality and peri-op MI rates were not statistically different in the two groups (p >0.05). The conversion rate to CPB was 3.2%.

	Off Pump (514)	On Pump (498)	P Value
Observed Mortality	11 (2.1%)	20 (4.0%)	> 0.05
Predicted Mortality	2.9 %	3.4%	> 0.05
Peri Op MI	7 (1.4%)	7 (1.4%)	> 0.05
Post Op CVA	5 (1.0%)	19 (3.8%)	< 0.05
Post Op AF	92 (17.9%)	22 (24.5%)	< 0.05
Post Op Renal Failure	13 (2.5%)	35 (7.0%)	< 0.05
Post Op Blood Use	89 (36.8%)	63 (52.8%)	< 0.05
Post Op LOS (mean)	5.89 days	7.58 days	< 0.05
Prolonged Ventilator	18 (3.5%)	48 (9.6%)	< 0.05

CONCLUSIONS: We conclude that routine intra-coronary shunting in off-pump CABG is a safe technique associated with good myocardial preservation and allows for total revascularization with a low conversion rate to CPB.

P48 LEFT VENTRICULAR PERFORMANCE DURING OPCAB PROCEDURES

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OBJECTIVE: During OPCAB procedures, it is of crucial importance to preserve appropriate myocardial function and to enable meticulous distal anastomosis. The purpose of this study was to assess left ventricular (LV) function during OPCAB procedures.

METHODS: The study comprised 62 consecutive OPCAB patients (pts) (59 male and 3 female) at mean age 57,2±9,6. One hundred forty four distal anastomosis (mean 2,3±0,9, from 1 to 5) were performed. LV systolic (mean arterial pressure - MAP, cardiac index - CI, LV external work - LVEW, LV ejection time - LVET) and diastolic function (pulmonary artery pressure - PAP, pulmonary capillary wedge pressure - PCWP) were assessed after sternotomy (bs), before (b), during and after (2 minutes) each distal anastomosis.

RESULTS: Exposure to LAD, RCA and PDA caused no significant changes in standard hemodynamic parameters (MAP, CI, PAP or PCWP). Otherwise, when the heart was exposed before anastomosis to Cx transient decrease in MAP (from 76,9±12,7 mmHg to 67,8±17,2 mmHg; p = 0,034) was noted. Employing LVEW and LVET as more sensitive parameters of myocardial function, reversible deterioration of heart performance was seen during anastomosis to all vessels (LVEW drop and LVET abbreviation) (table). The values of all parameters returned to baseline within 2 minutes after anastomosis. * p<0,001 vs. bs

	bs	bLAD	bCx	bRCA	bPDA
LVEW[gm·m]	74,3±29,9	61,5±26,9*	48,1±23,2*	55,5±19,0*	61,2±26,1*
LVET[ms/beat]	303±21	281±20*	281±22*	287±18*	279±22*

CONCLUSIONS: LV function is affected by reposition of the heart but this deterioration is transient and well tolerated.

P47 IS PRIOR ON-PUMP CORONARY BYPASS EXPERIENCE ESSENTIAL TO BECOME AN ACCOMPLISHED OPCAB SURGEON? – RESULTS OF FIRST 100 OPCABS BY A NOVICE SURGEON.

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OBJECTIVE: Although beating heart surgery has replaced conventional coronary surgery in many centers, concerns have been raised about safety of this procedure with young surgeons. We report results of first consecutive 100 cases by a surgeon without prior on pump CABG experience.

METHODS: Retrospective analysis of first consecutive unselected 100 OPCAB (intend to treat all OPCABS) cases in a single center by a surgeon who had no prior coronary experience. All cases were done via midline sternotomy using mechanical stabilizer and heart dislocating device.

RESULTS: The cases consisted of 64 males and 36 females. Pre-operative risk factors included re-operation 1, COPD 8, chronic renal failure 4, prior CVA 12, CHF 42 EF<30% 12 and severe atherosclerosis of the ascending aorta in 7 patients. Three patients had single, 20 had double and 77 had three or more grafts with graft average of 2.9±0.8. There were total 4 conversions, 2 for hemodynamic instability, 1 for diffuse disease and 1 for proximal aortic connector failure.

	Complications
Bleeding Requiring Reop	3 (3%)
PostOp MI	2 (2%)
Stroke	0 (0%)
Prolonged Ventilation	2 (2%)
Renal Failure	0 (0%)
Death	1 (1%)
Risk Adj. Mortality	1.3

CONCLUSIONS: Off pump surgery can be performed safely with good results by young surgeons without expertise in conventional CABGS. We believe learning curve of OPCAB is independent of prior on pump coronary experience.

P49 ROBOTICALLY ASSISTED CORONARY ARTERY BYPASS GRAFTING IN A RANDOMIZED STUDY: THE CLEVELAND CLINIC EXPERIENCE

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OBJECTIVE: The ZEUS Robotic Surgical System (Computer Motion, Inc., Goleta, California, USA) is designed especially for precise microsurgical work under high magnification. We performed left internal thoracic artery (LITA) to left anterior descending artery (LAD) anastomosis with and without assistance of the ZEUS system as a part of an FDA approved multi-center prospective randomized clinical study at our center.

METHODS: Elective CABG candidates whose ejection fraction was more than 40 % were selected. After intraoperative randomization, the control group patient underwent CABG through median sternotomy in the standard fashion. The study group patients underwent LITA to LAD anastomosis using the ZEUS system. Intraoperative graft flow measurements and a pre discharge angiogram were performed and to be followed by a 10-week postoperative stress echo.

RESULTS: To date seven patients have been enrolled. Three patients were control and underwent standard manual anastomosis. Four patients underwent LITA to LAD anastomosis using the ZEUS system. Mean system setup time was 3.4 minutes. Mean port placement time was 19 minutes. Mean anastomosis time was 29 minutes. Mean graft flow was 33 ml/min in the control group and 96 ml/min in the study group. All patients showed patent grafts (Fitzgibbon Class A) on postoperative angiography. There was no complication related to the ZEUS system use.

CONCLUSIONS: In our limited experience, LITA to LAD anastomosis using the ZEUS system was performed successfully with equivalent results to traditional CABG.

P50 POSTOPERATORY PULMONARY FUNCTION IN OFF-PUMP (OPCAB) VERSUS ON-PUMP CORONARY ARTERY BYPASS SURGERY (CABG)

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OBJECTIVE: It has been postulated that with OPCAB some of the disadvantages of On-Pump CABG, specifically pulmonary dysfunction, can be avoided. The purpose of our study was to determine if there was any significant difference in the pulmonary function studies in the post-operative period in patients with OPCAB and patients with On-Pump CABG.

METHODS: We studied 20 consecutive elective coronary patients operated by the same surgeon. Ten patients underwent On-Pump CABG and ten patients OPCAB. Forced Vital Capacity (FVC), Forced Expiratory Volume (FEV1) Total Lung Capacity (TLC), Residual Volume (RV), Physiological Dead Space (VD), arterial blood gases, PaO₂/FIO₂ and P (A-a) O₂ were measured 24 hours before and 24 and 72 hours following surgery.

RESULTS: There was a significant decline in postoperative pulmonary function tests and gas exchange variables in both groups, but there were no differences between the two at 24 or 72 hours postop.

CONCLUSIONS: Our current data suggests that although there is a decrease in the early post-operative pulmonary function post CABG surgery there is no difference in the pulmonary function tests in the group operated with the OPCAB versus the On-Pump CABG. The changes in pulmonary function seen in OPCAB and On-Pump CABG suggest that they are produced by factors other than CPB.

P52 IS LEFT INTERNAL THORACIC ARTERY ENOUGH FOR BLOOD SOURCE IN OFF-PUMP CORONARY REVASCLARIZATION FOR LEFT MAIN TRUNK DISEASE?

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OBJECTIVE: Off-pump coronary artery bypass grafting (OPCAB) has been widely performed with aorta no touch technique using internal thoracic arteries (ITAs) and composite radial artery (RA). Although Y-composite RA with left ITA (LITA) has been used for total myocardial revascularization, potential underperfusion syndrome is suspected in left main trunk disease. In the present study, we examined the safety of LITA as a single blood source for left main trunk disease in OPCAB.

METHODS: Sixty-three patients with left main trunk disease who underwent OPCAB with LITA or bilateral ITAs and composite RA were enrolled. Group 1 was composed of 43 patients who underwent OPCAB using LITA and composite RA. Group 2 was composed of 20 patients who underwent OPCAB using bilateral ITAs and composite RA. Seven patients in Group 1 and one in Group 2 underwent urgent operation because of unstable state. Two patients in Group 1 and one in Group 2 received IABP insertion preoperatively. Average number of anastomosed sites was significantly larger in Group 2 (3.3 ± 0.7) than in Group 1 (2.9 ± 0.5).

RESULTS: Operative time was significantly longer in Group 2 (365 ± 69 minutes) than in Group 1 (309 ± 85 minutes). There was no operative death or no stroke. There was no clinical underperfusion syndrome or new IABP insertion in both groups. The RA graft patency rate was the same in both groups (98% in Group 1 and 100% in Group 2).

CONCLUSIONS: LITA was a safe single blood source for left main trunk disease in OPCAB.

P51 MINIMALLY INVASIVE VIDEO ASSISTED OPERATIVE GRAFT REPLACEMENT OF A DESCENDING THORACIC AORTIC ANEURYSM

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OBJECTIVE: The standard approach for descending thoracic aortic surgery entails a large posterolateral thoracotomy, multiple muscle division, rib notching, resection or costal margin division, and wide rib distraction. These painful aspects of requisite exposure for visualization, dissection, cannulation, clamping, and graft placement often yield respiratory dysfunction and prolonged ventilatory support. To attenuate these consequences in a patient, a minimally invasive alternative to traditional approaches was utilized.

METHODS: The method of study is a single human case report.

RESULTS: A 70-year-old female presented with significant back pain. Contrast CT demonstrated a large saccular aneurysm of the proximal descending thoracic aorta. Major comorbidities included CAD, LV dysfunction, AFib, diabetes, resected colon carcinoma, and significant COPD, FEV1 = 0.66liters. Given current restrictions on endovascular stent therapy, the patient underwent operative repair. A 7cm left posterior mini-thoracotomy via partial latissimus ventilation and minimal rib distraction was performed. A videothoracoscope, dissecting instruments, and ultimately, proximal and distal aortic cross-clamps were introduced via three additional 1cm sites. Adjunctive left femoral partial cardiopulmonary bypass was initiated at 1.0 l/m²/min. An interposition prosthetic graft was sutured with cross-clamp and bypass times of 61 and 83minutes. Neurologically intact, the patient was extubated to nasal cannula at post-operative hour 15.

CONCLUSIONS: To our knowledge, this is the first report of minimally invasive replacement of the descending thoracic aorta. This approach was performed safely, is feasible, and may result in decreased postoperative pain, less respiratory dysfunction and earlier extubation. These factors may also translate into decreased ICU time, hospital stay, and cost.

P53 EXPERIMENTAL ROBOTIC CLOSURE OF ATRIAL SEPTAL DEFECT: A SURGICAL TRAINING MODEL

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OBJECTIVE: Shorter operative time is essential for totally endoscopic atrial septal defect (ASD) closure using robotic techniques.

METHODS: We used an endoscopic robotic approach (Zeus® Surgical Robotic System, Computer Motion, Inc., Goleta, CA) to repair ASDs in cadaveric porcine hearts. Experimentally created ASDs were repaired directly (group 1) and with a patch (group 2). All repairs (n = 10 in each group) were assessed for time (minutes), quality (good = 3, fair = 2, poor = 1) and technical difficulty (easy-difficult: 1-3).

RESULTS: Learning curves for both group 1 and 2 were steep, and their calculated time performance rates (Crawford's method) were 92% and 95%, respectively. Mean operative time was 10.3±1 min in group 1 and 21.6±1.2 min in group 2. Difficulty of repairs with patch was higher than the direct repair group, 2.1±0.8 vs. 1.3±0.4, P = 0.009. There was no significant difference in quality of repair between the two groups.

CONCLUSIONS: Robotically operated surgical bench models are an important step in the evolution of minimally invasive cardiac surgery. The model described can serve as a training tool for on-bench robotic closure of atrial septal defect.

P54 THE ROLE OF LAD REVASCULARISATION IN THE TREATMENT OF INOPERABLE CAD ON BEATING HEART.

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OBJECTIVE: To evaluate the effect of LAD revascularisation as the only viable surgical procedure in the presence of inoperable either RCA or and Cx arteries in patients with class VI angina.

METHODS: Retrospective evaluation of the effect of off pump LAD revascularisation as the sole operative procedure on angina relief in patients who had inoperable RCA & or Cx systems. The operability was deemed by two independent cardiologists & cardiac surgeons. All patients were receiving maximal medical treatment and were in class IV angina. 11 females & 18 males, age 40 to 68 years, 20 tobacco users, 14 diabetics, 18 hyperlipidemics & hypertensives, 4 with COPD, 3 with chronic renal failure. All had routine preop & postop work up which included cardiac echo. 8 had left parasternal incision & 21 had mini-access partial upper mid sternotomy incision. Cardiac cath findings; 16 patients had totally occluded LAD with faint distal visualization, 13 had two subtotal stenosis. RCA & Cx system were either totally occluded without distal filling or were severely diseased systems. 17 patients had LVEF 30% or less. 14 patients had LAD endarterectomy with LITA used as distal patch anastomosis, 6 with LITA to proximal LAD sequential to distal LAD, 7 had RITA to proximal LAD & LITA to distal LAD and in 4 patients radial artery was used for distal LAD. In 5 patients partial CPB was used for intramuscular LAD.

RESULTS: Mortality & morbidity; 1 postop death, 3 MI, 1 wound infection, 1 sternal mal-union. 3 to 36 months follow up showed 1 death due to surgery for PVD, 1 death due renal failure. Angina relief; 3 patients had recurrence of angina within the first three months, 7 patients had class II angina controlled with medication and 19 patients had complete relief of angina.

CONCLUSIONS: Revascularisation of the LAD system in the presence of inoperable RCA or and CX systems is warranted and it can achieve a good clinical relief of angina that compares well with other treatment modalities.

P56 ENDOVASCULAR STENT-GRAFT COMPLETION OF "ELEPHANT TRUNK" TECHNIQUE IN THE MANAGEMENT OF A DESCENDING THORACIC AORTA GIANT ANEURYSM

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OBJECTIVE: We report two cases of endovascular completion of elephant trunk operation for aortic aneurysm of entire thoracic aorta.

METHODS: Case n°1: a 63-year-old man with aortic valve regurgitation and giant aneurysm of the entire thoracic aorta underwent aortic valve and Dacron graft replacement of ascending aorta and arch, using the elephant trunk technique. On the 24th postoperative day the patient underwent endovascular treatment by positioning a self-expanding 37x200mm (Excluder® - Gore, Sunnival, CA) stent-graft proximally sealed to the Dacron prosthesis. A right subclavian approach was chosen in order to avoid a dislodgement of the Dacron prosthesis during the stent-graft insertion and deployment. Case n°2: a 68-year-old woman with severe aortic valve regurgitation associated with aneurysm of the entire thoracic aorta underwent aortic valve conservative surgery and Dacron graft replacement of ascending aorta and arch. Second step was the implant of three self-expanding 34x130 stent-grafts (Talent® LPS - Medtronic Ave, Sunrise, FL) via right retro-peritoneal iliac artery exposition.

RESULTS: Case n°1: At the end of the procedure intra-operative TEE and angiography showed complete exclusion of the aneurysm from the blood flow. Postoperative clinical course was uneventful. Case n°2: There was no operative complication and the patient left the hospital on the 6th day. One month follow-up spiral angio-CT scan demonstrated a complete thrombosis of the thoracic aneurysm sac.

CONCLUSIONS: The satisfying outcome of these two cases suggests that endovascular stent-grafting following elephant trunk surgery is a safe and efficacious approach for the completion treatment of diffuse thoracic aortic aneurysms in high-risk patients.

P55 TOTALLY ENDOSCOPIC ON-PUMP CABG ON THE BEATING HEART – A REAL OPTION OR AN ACT OF DESPERATION ?

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OBJECTIVE: Totally endoscopic CABG using computer-enhanced telemanipulation is complex and is associated with a considerable perioperative morbidity. Therefore it is still controversial and has not reached acceptance among cardiac surgeons. Since 1999 53 totally endoscopic coronary artery bypass operations (TECAB) were performed at our institution using the daVinci system in combination with the Port Access technique to arrest the heart. In the following 8 patients underwent totally endoscopic LIMA to LAD grafting without CPB. Because stabilization using an endoscopic stabilizer is challenging we developed a modified technique to facilitate closed chest CABG on the beating heart.

METHODS: After endoscopic ITA dissection CPB is instituted via femoro-femoral cannulation to decompress the heart. After placement of transthoracic stay sutures next to the coronary target site, the ITA is anastomosed to the LAD on the beating heart using the daVinci surgical system.

RESULTS: 4 patients underwent TECAB with CPB on the beating heart. Operating time was 4.5 ± 0.7 hours, CPB time was 80 ± 19 min. All patients were discharged after uneventful recovery. Postoperative Angiography showed good graft function in all patients.

CONCLUSIONS: TECAB with CPB on the beating heart using transthoracic stabilization with sutures is a new option to lower the risk of port access endoclamping and avoids epicardial placement of an endoscopic stabilizer. Operating time is still long and further evaluation is necessary.

P57 INITIAL CLINICAL EXPERIENCE WITH A NEW MICROWAVE ABLATION CATHETER FOR THORACOSCOPIC USE IN ATRIAL FIBRILLATION TREATMENT

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OBJECTIVE: Recently, we demonstrated the efficacy of epicardial, offpump ablation for atrial fibrillation with a 4 cm microwave antenna. The Flex-10 (AFx-inc, Fremont, CA) is a novel device with a 20 cm flexible microwave catheter allowing thoracoscopic use.

METHODS: In various animal species (goat, sheep, dog, and pig, N = 6) the ability to produce with this catheter, a single contiguous, transmural lesion line completely encircling the pulmonary veins, was tested. To evaluate its clinical feasibility, after getting a CE mark in January 2002, 3 patients were treated with the new device (February 2002).

RESULTS: Using the full length of the catheter, with video-assistance and thoracoscopic instruments, complete, electrical isolation of the pulmonary veins was achieved with a single application. In all but one animals, transmural lesions were obtained. Whereas the animals were approached from the left thoracic side, the patients were approached from the right side to facilitate opening of the pericardial reflections between caval veins and pulmonary veins. The catheter length allowed complete encircling of the pulmonary veins. Isolation was effective as evidenced by electrophysiologic examination. The left atrial appendage was removed with an endoscopic stapling device. No complications occurred.

CONCLUSIONS: The Flex-10 microwave catheter simplifies epicardial ablation for atrial fibrillation on the offpump beating heart and allows a thoracoscopic approach.

P58 COMBINED CAROTID AND CORONARY ARTERY SURGERY ON BEATING HEART

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OBJECTIVE: Safety of carotid endarterectomy as a combined procedure with coronary artery bypass especially if done on beating heart needs justification as an established procedure keeping in mind the complications associated with it.

METHODS: This is a prospective on going study with an approximately 127 number of patients planned to be presented. These patients have diagnosed coronary artery disease based on angiography and significant carotid artery disease picked up on routine preoperative work up which is further confirmed by carotid doppler and magnetic resonance digital subtraction angiography (MRDSA). One stage combined carotid endarterectomy along with beating heart CABG is been performed in the study group. A complete inter-operation and post operative record of all events is been kept and a mean follow up period of 2.3 years is been done on patients reporting for routine cardiac evaluations.

RESULTS: The result will be presented which will include the total number of patients in various age groups, incidence of hospital deaths, myocardial infarction, incidence of neurological complication associated monitoring with this combined procedures. The possible predictors of hospital death and post operative stroke will be evaluation and the safety and efficacy of this combined procedure on beating heart will be presented.

CONCLUSIONS: Carotid endarterectomy and CABG can be performed with gratifying results at the same sitting.

P60 AVOIDING CROSS CLAMP IS MORE IMPORTANT THAN AVOIDING CY BYPASS DURING HIGH RISK CABG!

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OBJECTIVE: To assess the efficacy of using Beating Heart techniques in conjunction with cardiopulmonary bypass in high risk subsets of patients coming forward for surgical revascularisation.

METHODS: There were three methods of revascularisation in between 1st July 2001 to 31st Jan 2002: namely 1. Off Pump, 2. On Pump but Beating (NO CROSS CLAMP), 3. On Pump and Cardioplegia arrest, Only high risk patients were included who had one or more of the following risk factors. Very recent acute myocardial infarction (< 24hrs), "Large" hearts on chest X Ray (CTR > 0.7), Severely depressed LV function (LVEF < 0.25), Pre-renal Renal Failure. Pulmonary oedema ± Ventilatory support, Biventricular congestive cardiac failure. Between 1st July and 31st Jan 2002, there 44 patients fulfilling the aforesaid criteria out of a total of 327 patients who underwent surgical revascularisation at our unit. There were 18 in Group A, 14 in Group B, 12 in Group C, The following parameters were monitored perioperatively and analysed: Lowest mean arterial pressure during surgery, Urine output during surgery, Cardiac indices periop and postop, Troponin T levels, CPK, CPK MB, Requirement of inotropic support, Requirement of new IABP support, Rise in Blood Urea and S Creatinine, Duration of ICU stay, Pancreatitis, Mortality.

RESULTS: All the observations are being statistically analysed and at the time of submission of this abstract, it appears that based on morbidity and mortality criteria, the 14 (HIGH RISK) patients done by Beating Heart technique on pump (Group B) fared better than Group A or Group C. This however does not include low risk patients where there was a clear clinical benefit in Off Pump (which is currently the preferred technique in approximately 80% of our annual turnover of 600 patients).

GROUP	IABP	ICU STAY	ARF	MORTALITY
A n :18	2	4.5	3	1
B n :14	0	3.0	1	0
C n :12	4	5.2	2	2

CONCLUSIONS: In a severely compromised hemodynamic situation, subendocardial perfusion is critical and any aggravation of hypoperfusion is detrimental to the final outcome. Maintaining "acceptable" pressures with inotropic support does not guarantee adequate whole body perfusion and many problems after "successful" OPCAB were possibly due to "hypoperfusion of the splanchnic and renal circulation which appears to be obviated by CP Bypass".

P59 CLINICAL OUTCOME OF 100 CONSECUTIVE COROARY CASES INTENDED FOR OFF-PUMP TOTAL ARTERIAL CORONARY REVASCLARIZATION.

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OBJECTIVE: In our practice all coronary cases are considered potential candidates for off-pump revascularization. The operation is consisted of the following principles: a) multiple arterial revascularization, b) "Deviation" of Internal Thoracic Arteries (ITAs), an aorta non-touch procedure rerouting the ITAs, using "T", "Y", "-" and extension of proximal RITA techniques. In order to evaluate the applicability of the method and the early clinical results, we studied 100 consecutive cases.

METHODS: During a three-month period (Nov 2001-Jan 2002), 88 males and 12 females were operated. 31 were urgent cases. Age ranged from 40 to 92. Preoperative Euroscore was 0-3 in 40 cases, 4-7 in 32 cases, 8-9 in 15 cases and >9 in 13 patients (pts). Ninety three pts were operated for first time, 5 for second time, one for third time and one for fifth time. LITA was used in all cases and RITA in 95. Preconstructed conduits attached to the in situ ITAs were applied using the "T", "Y" and "-" types of connection in 39, 4 and 4 pts respectively. The RITA was extended using the left radial artery in 39 cases and a saphenous vein graft (SVG) in 14. Partial Aortic X-clamp was required only once for SVG central anastomosis. A mean of 2.71 anastomoses was performed.

RESULTS: Conversion to extracorporeal circulation was necessary in 3 cases. Two of them had complicated outcome, one of them expired. From the OPCAB group (97 cases) one male patient 65y.o., with severe right carotid disease, suffered a not sustained CVA. 15 patients developed postoperative atrial fibrillation.

CONCLUSIONS: Routine off-pump surgery combined with "Deviation" of ITAs is applicable on a great range of patients with excellent results, independently of the risk factors, provided the operating team is experienced and dedicated to the method.

P61 MICRO SURGICAL ANASTOMOSIS DURING OFF-PUMP CABG

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OBJECTIVE: Short and long term patency of small caliber arterial anastomosis are influenced by the surgical technic. High patency rate in LIMA to LAD anastomosis are obtained by microsurgical technics of sutures, using 9-0 Prolene material and distal angioplasty. Beating heart makes application of this technic more difficult: a strictly stable and dry operative field is a requirement difficult to achieve off pump.

METHODS: The present study is focused on the patency rate of LIMA to LAD consecutive grafts (n = 50), performed with this microsurgical technic. The stabilization platform is either the Octopus 3 system or the Donut. 15 to 25 bites of Prolene 9-0 continuous suture associated to a distal angioplasty is the routine procedure. Angiographic assessment of the anastomosis is performed systematically before hospital discharge (n = 50).

RESULTS: 98% patency rate of the anastomosis. One graft on a 1 mm ID vascular bed is occluded. The toe of the anastomose is free of any narrowing in 92%. The heel of anastomosis is free of any suture bulding in 65%. Time required for the completion of anastomosis (15-20 min) does not induce any myocardial damage, as assessed by CK and Troponine release.

CONCLUSIONS: The clinical data show the feasibility of fine micro surgical technics in off pump CABG.

P62 OFF-PUMP REDO CABG HAS FACILITATED THE SURGICAL OUTCOME AS COMPARED TO ON-PUMP SURGERY

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OBJECTIVE: With the increasing number of patients undergoing coronary artery bypass surgery, the incidence of reoperative coronary artery bypass grafting is also increasing. The clinical outcome of redo coronary artery bypass grafting without cardiopulmonary bypass and conventional coronary artery bypass grafting using cardiopulmonary bypass is variable.

METHODS: We compared clinical parameters in patients who underwent off pump (n = 156) versus on pump (n = 194) redo coronary artery bypass grafting performed between January 1995 to December 2001 in our institute to determine if off pump surgery has facilitated the surgical outcome of redo coronary artery bypass grafting in emerging as an ideal technique.

RESULTS: An increasing trend towards off pump redo coronary artery bypass grafting is evident (76.28% patients versus 39.16% patients since January 1999). On pump redo patients had a higher postoperative blood transfusion (86.53% on pump versus 12.82% off pump, P = 0.001), prolonged ventilatory support (> 24 hrs) (16.49% on pump versus 7.7% on pump, P = 0.021), higher postoperative inotropic support (23.71% on pump versus 10.89% off pump, P = 0.003). On pump redo coronary artery bypass grafting was also associated with prolonged intensive care unit stay (40 ± 6.2 hours on pump versus 20 ± 4.1 hours off pump, p = 0.001) and longer hospital stay (9 ± 4.2 days on pump versus 5 ± 3.4 days off pump, p = 0.001). In hospital mortality was higher in on pump patients than in off pump patients (7.7% versus 3.2%) however this was not statistically significant (p = 0.114).

CONCLUSIONS: Off pump redo coronary artery bypass grafting offers safe method of myocardial revascularization with lower operative morbidity and mortality, less requirement of blood products and early hospital discharge compared with conventional on pump redo coronary artery bypass grafting.

P64 ROBOTICALLY ENHANCED PLACEMENT OF LEFT VENTRICULAR EPICARDIAL ELECTRODES DURING IMPLANTATION OF BIVENTRICULAR PACEMAKER SYSTEMS

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OBJECTIVE: Biventricular pacing has gained increasing acceptance in advanced heart failure. One limitation is positioning of the left-ventricular electrode via the coronary sinus. We report the initial experience with a minimally-invasive approach of robotically enhanced direct placement of left-ventricular epicardial electrodes.

METHODS: Between June 2001 and February 2002 a total of three patients underwent totally endoscopic placement of a left-ventricular epicardial electrode using the DaVinci surgical system. In all patients transvenous positioning of the electrode had failed due to massive right atrial enlargement. Three ports were inserted, CO2 insufflation led to temporary hemodynamic depression in one patient, which was controlled by low dosage of inotropic support. Following mapping of the posterolateral and anterior wall, two screw-in and one tip electrode (Medtronic Inc.) were placed in the position, that offered best pacing and sensing results and led to a maximum shortening of the QRS complex width.

RESULTS: Operation time was 55±34 minutes, pacing thresholds of the epicardial lead were 1.3±0.4 V, R-wave amplitudes were 8.7±3.4 mV. QRS width was shortened from 310±44 ms to 220±37 ms. The postoperative course was uneventful in all patients, pacing parameters remained stable during follow-up with a significant increase in quality-of-life self assessment.

CONCLUSIONS: Totally endoscopic direct placement of left-ventricular epicardial electrodes for biventricular pacing is feasible using the DaVinci surgical system. Compared to the limited thoracotomy technique, our approach is even less invasive, allows better access for mapping of the anterior and posterolateral left ventricular wall and offers excellent cosmetic results.

P63 BEATING-HEART CORONARY SURGERY TWO YEARS EXPERIENCE EVALUATION OF RESULTS AND PREDICTED RISK STRATIFICATION SYSTEM EUROSCORE.

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Department of Cardiac Surgery and Transplantology, Silesian University Center for Heart Disease, Zabrze, Poland

OBJECTIVE: Coronary artery bypass grafting without cardiopulmonary bypass via median sternotomy have seen more popular in the last years. The low incidence of postoperative complications, good outcome after surgery and low cost makes this surgical approach as alternative procedure of complete myocardial revascularization.

METHODS: There were analyzed 425 patients who underwent direct myocardial revascularization without extracorporeal circulation in the period from January 2000 to December 2001. There were 166 female and 259 male, the age varied from 65 to 86 years. Number of coronary artery disease vessels compared to the number of performed grafts to achieved complete revascularization. The EUROSCORE predict risk stratification table were used in the different groups : low, medium and height risk patients to evaluate the outcome after surgery.

RESULTS: The global mortality rate was..... (/425) In the group of low and medium operative risk no death. Mortality 1.6 % (7/425) was in the height risk group of patients to predicted 11,2 % mortality rate. The incident of complications were low as myocardial infarction % (/), atrial fibrillation, wound infections, neurological complications.....

CONCLUSIONS: Beating heart coronary surgery is a safe alternative method for myocardial revascularization with low incident of complications rate and low mortality specially in the height risk group of patients.

P65 THE NEW JOMED REITAN CATHETER PUMP VS. IABP DURING ACUTE MITRAL REGURGITATION

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OBJECTIVE: The Jomed Reitan Catheter Pump (RCP) is a new, minimal invasive, propeller based intra aortic device, designed to reduce left ventricular afterload. In this study the RCP was tested, placed in the high descending aorta, and compared to IABP in an acute mitral regurgitation (MR) animal model.

METHODS: In nine calves, acute MR was created by placing a steel wire cage in the mitral valve. During acute MR, the RCP was tested at 2000 to 14000 rpm and compared to 1:1 IABP support. Cardiac output, coronary blood flow, carotid artery flow, ascending and abdominal aortic pressure, left atrial pressure and LV pressure-volume loops were recorded.

RESULTS: The RCP caused a large reduction in afterload (-28%, p<.001) at 14000 rpm. In the mean time, preload decreased (-20%, p<.001) and cardiac output remained the same. PV-loops shifted leftward and reduced in size, suggesting acute LV remodeling and a reduction in stroke work. The RCP redistributed blood from the upper to the lower body as seen by a reduction in carotid artery flow (-28%, p = .002) and an increase in mean abdominal aortic pressure (+32%, p<.001). The IABP increased cardiac output (+30%, p = .005), carotid flow and aortic pressure.

CONCLUSIONS: The RCP is a very powerful afterload reducing device. In this acute MR animal model, it favored blood flow distally from the device and remodeled the left ventricle, but left out positive effects on cardiac output. Further research activities are planned to test the RCP in other aortic positions and types of heart failure, such as ischemic failure.

P66 AVOIDING CROSS CLAMP IS MORE IMPORTANT THAN AVOIDING CP BYPASS DURING HIGH RISK CABG!

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OBJECTIVE: To assess the efficacy of using Beating Heart techniques in conjunction with cardiopulmonary bypass in high risk subsets of patients coming forward for surgical revascularisation.

METHODS: There were three methods of revascularisation in between 1st July 2001 to 31st Jan 2002: 1. Off Pump 2. On Pump but Beating 3. On Pump and Cardioplegia arrest Only high risk patients were included who had one or more of the following risk factors. Very recent acute myocardial infarction (< 24hrs) "Large" hearts on chest X Ray (CTR > 0.7) Severely depressed LV function (LVEF < 0.25) Pre-renal Renal Failure Pulmonary oedema ±Ventilatory support Biventricular congestive cardiac failure Between 1 st July and 31st Jan 2002, there 44 patients fulfilling the aforesaid criteria out of a total of 327 patients who underwent surgical revascularisation at our unit. There were 18 in Group A 14 in Group B 12 in Group C The following parameters were monitored perioperatively and analysed : Lowest mean arterial pressure during surgery, Urine output during surgery, Cardiac indices perio and postop, Troponin T levels, CPK, CPK MB, Requirement of inotropic support, Requirement of new IABP support, Rise in Blood Urea and S Creatinine, Duration of ICU stay, Morbidity, Mortality.

RESULTS: All the observations are being statistically analysed and at the time of submission of this abstract. It appears that based on morbidity and mortality , the 14 (HIGH RISK)patients done by Beating Heart technique on pump (Group B) fared better than Group A or Group C. This however does not include low risk patients where there was a clear clinical benefit in Off Pump (which is currently the preferred technique in approxiamtely 80% of our annual turnover of 600 patients.

GROUP	IABP	ICU STAY	ARF	MORTALITY
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CONCLUSIONS: In a severely compromised hemodynamic situation, subendocardial perfusion is critical and any aggravation of hypoperfusion is detrimental to the final outcome. Maintaining "acceptable" pressures with inotropic support does not guarantee adequate whole body perfusion and many problems after "successful" OPCAB were possibly due to "hypoperfusion of the splanchnic and renal circulation which appears to be obviated by CP Bypass".

P68 NITRIC OXIDE INHALATION AS A CONCEPT OF PRECONDITIONING - EFFECTS ON LUNG INJURY IN AN IN-VIVO PIG MODEL OF NORMOTHERMIC PULMONARY ISCHEMIA

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OBJECTIVE: Recently, we could demonstrate the improvement of lung function by systemic preconditioning. Using an in vivo pig model of warm lung ischemia, NO inhalation as preconditioning was used. Lung function, hemodynamics, and serum levels of ROS, IL 1 beta and IL 6 were analyzed.

METHODS: In group I (n = 7) 90 minutes of normothermic lung ischemia were followed by 5 hours of reperfusion. In group II (n = 6) NO inhalation (10min, 15ppm) preceded ischemia. Group III (n = 7) underwent sham surgery. Hemodynamics, gas exchange and lung function parameters were measured over a defined time course. ROS (H2O2, O2) were measured using chemiluminescence. IL 1 beta and IL 6 were analyzed by enzyme immunoassay.

RESULTS: Animals in group I developed multiple signs of significant pulmonary reperfusion injury including pulmonary hypertension and significantly increased levels of ROS, IL 1 beta and IL 6. Animals that received NO showed no significant differences compared to controls concerning mean pulmonary artery pressure, pO2 levels from left-side pulmonary venous blood, and levels of ROS and IL 1 beta.

CONCLUSIONS: Preconditioning with NO inhalation results in a better lung function of the ischemic organ combined with a decreased generation of ROS and reduced IL1 beta liberation. IL 6 release was not influenced suggesting an IL 1 beta-independent induction.

P67 GLUED DISTAL END-TO-SIDE SLEEVE ANASTOMOSIS IN OPCAB

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OBJECTIVE: In the exploration of facilitated distal anastomosis strategies, we assessed a four suture-sleeve end-to-side anastomosis technique with octylcyanoacrylate adhesive in porcine off-pump CABG.

METHODS: In 10 pigs (80 kg), 20 sleeve-adhesive anastomoses were studied intra-operatively, at 3 days (n = 4) and at 35 days (n = 16), in low flow bypass (< = 15 mL/min; pro-thrombotic condition) (n = 10) and control high flow bypass conditions (±60 mL/min) (n = 10). Anastomoses were examined by flow measurement, angiography and histology.

RESULTS: All anastomoses were fully patent (FitzGibbon Grade A) and showed streamlining repair intimal hyperplasia formation. Glue remnants were surrounded by a focal acute and limited chronic inflammatory response confined to the adventitial application site.

	Anastomosis construction time (min)	Patency	Aneurysm formation	Anastomotic diameter narrowing (%)	Intimal hyperplasia	Medial necrosis
Low flow (n=10)	8.0±1.4	10/10	0/10	20 (0.6/3.0 mm; n=2)/0 (n=8)	mild	0/10
High flow (n=10)	9.1±1.5	10/10	0/10	0	mild	0/10

CONCLUSIONS: In the pig, the use of glue in a distal sleeve-adhesive ITA-to-LAD anastomosis demonstrated a favorable healing response and deserves interest to facilitate distal anastomosis construction in off-pump CABG.

P69 AN ENDOSCOPIC LENS CLEANING INSTRUMENT.

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OBJECTIVE: Maintaining a clear visual field during endoscopic surgery can be a problem due to fogging or the accumulation of tissue and body fluids on the endoscopic lens. Previous attempts to solve this problem by channeling fluid to the end of the endoscope have encountered difficulties with sterilization of the channeling device and cohesion of cleaning fluid on the lens.

METHODS: A 6 inch length of 18 gauge hypodermic needle tubing was secured to a metal tube sized to fit between the endoscope and the instrument port. The distal 2 mm of the tubing was bent at approximately a 90 degree angle and the proximal end was attached by small flexible tubing to a 30 cc syringe. The device was routinely used during 50 minimally invasive cardiac surgical laboratory procedures. Excess cleaning fluid on the lens was eliminated by drawing back on the syringe plunger.

RESULTS: The device design served to accurately align the device on the end of the scope and traverse a stream of cleaning solution across the lens surface. Accumulation of the washing fluid on the lens was overcome by back-pressure on the syringe.

CONCLUSIONS: The ability of the device to draw back excess fluid from the lens and the lack of a rim or surface to promote washing fluid cohesion helped to solve problems associated with previous devices. The simplicity of this design may eliminate sterilization issues since it could be manufactured as a disposable device for single patient use.

P70 RADIOFREQUENCY ABLATION OF ATRIAL FIBRILLATION IN ADDITION TO OPEN HEART SURGERY

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OBJECTIVE: Since 1987 the Maze procedure has been applied for surgical treatment of atrial fibrillation. As this procedure is invasive and time consuming, a number of alternative surgical techniques have been developed recently in order to simplify the original Maze procedure. We report on our early experience with the Radiofrequency Ablation (RFA).

METHODS: Between July 2001 and January 2002 17 patients (10 male, 7 female), aged 32 to 82 years (mean 65.3 years) suffering from chronic atrial fibrillation were treated with Radiofrequency Ablation with the Cardioblate™ Ablation System (Medtronic Ltd, Minneapolis, Mn, USA) in addition to open heart surgery. 10 patients underwent a mitral valve procedure (2 of them combined with a tricuspid valve procedure, 1 combined with an aortic valve replacement and 1 with a CABG). 3 further patients received RFA in combination with aortic valve surgery, 1 of them combined with a CABG. 1 patient had an isolated tricuspid valve disease. 1 patient had a sinus venosus defect and 2 patients were exclusively treated with CABG. In all patients RFA was performed as standard left atrial RFA.

RESULTS: At the day of discharge 10 patients were in stable sinus rhythm (58.8%), while 7 patients (41.2%) suffered from persisting atrial fibrillation. One female patient after mitral and tricuspid valve reconstruction suffered from severe bradyarrhythmia with persisting atrial fibrillation so she had to be supplied with a sequential pacing system expecting her to achieve sinus rhythm in the future.

CONCLUSIONS: Left atrial radiofrequency ablation with the Cardioblate™ Ablation System offers a safe and easily to perform surgical method for the efficient treatment of chronic atrial fibrillation. A larger number of patients with a long-term follow-up is mandatory to evaluate the long-term success and which patients may benefit from this procedure.

P72 OFF-PUMP ARTERIAL REVASCLARIZATION USING A NEW DEVICE FOR CORONARY OCCLUSION AND LOCAL STABILIZATION

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OBJECTIVE: Local stabilization is of most importance during off-pump surgery in order to facilitate high quality anastomoses. At the same time an unobstructed view and free field for operation are mandatory. We report on a new reusable stabilizing platform for complete off-pump coronary revascularization.

METHODS: From June 2001 to January 2002 a total of 62 consecutive patients (male n = 46, female n = 16) with an age of 63 ± 10 years (41-88 yrs) suffering from coronary artery disease (1-vessel n = 35, 2-vessel n = 20, 3-vessel n = 7) were scheduled for complete off-pump arterial revascularization. Mean ejection fraction was 55 ± 12% (25-82%). Exposition of the coronary vessels was facilitated by deep pericardial slings. The target coronary vessel was snared twice with air-cushioned silicon loops (Genenzyme, Allen, Texas, USA) and fixed to the platform (Geister, Tütlingen, Germany), which was connected to a flexible steel arm (Estech, Danville, CA, USA). The platform is available in three versions with different connector angles to accommodate to variable anatomical conditions. Together, with its flat design, it provides an unobstructed view and a free field of operation.

RESULTS: All operations were carried out without any complications and all planned bypasses could be carried out. Mean number of bypass grafts was 1.7 ± 0.8 (1-4). Patients were hemodynamically stable during coronary occlusion. No significant CKMB increase was measured postoperatively in any patient. There was no early (30 days) mortalities. Postoperative course was uneventful in all patients excepting one re-exploration due to retrosternal bleeding. Patients were discharged from the hospital in good condition 8.4 ± 2.5 days (4-18 days) after surgery.

CONCLUSIONS: Our data indicate, that complete arterial off-pump revascularization can be performed safely and effectively using a new reusable platform, which provides excellent stabilization and unobstructed view to the target vessel.

P71 BILATERAL SKELETONIZED INTERNAL MAMMARY ARTERY GRAFTS FOR REVASCLARIZATION: EARLY CLINICAL RESULTS

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OBJECTIVE: This study was started in February 2001 to assess long-term data of cardiac morbidity and mortality comparing patients undergoing coronary bypass revascularization (CABG) with skeletonized single IMA (SIMA) or bilateral IMA (BIMA) in situ grafts. We present our early results, especially the incidence of bleeding and wound complications in diabetic patients.

METHODS: An analysis was performed comparing 173 consecutive patients from a single surgical practice receiving CABG with or without concomitant procedures between February 2001 and February 2002. IMA grafts were used in 167 patients (97%) and were skeletonized in all cases. 76 patients received SIMA (44%) and 91 patients BIMA (53%) in situ grafts. Additional bypasses were performed with veins or radial artery grafts. Complete arterial revascularization was achieved in 39% of the cases. 48 patients (29%) suffered from diabetes mellitus, 21 patients in the SIMA and 27 patients in the BIMA group.

RESULTS: The 30-day mortality was 1.3% and 1.1% in the SIMA and BIMA group, respectively. In the BIMA group a higher incidence of postoperative complications was observed, including blood loss (SIMA 872 ± 551 ml, BIMA 937 ± 826 ml), rethoracotomy rate due to bleeding (BIMA 2 patients), late pericardiotomy inferior (SIMA 1 patient, BIMA 2 patients), sternal instability (BIMA 2 patients) and sternal wound infection (BIMA 2 patients). Diabetes mellitus could not be identified as an independent risk factor for sternal complications. However, a longer ICU and hospital stay was observed for diabetic patients, but not for patients with BIMA grafts compared to those with SIMA grafts.

CONCLUSIONS: Revascularization with bilateral IMA in situ grafts has been feasible in nearly all patients with good clinical outcome and low mortality. The low rate of sternal complications may depend on the skeletonizing technique for IMA harvesting. Diabetes mellitus was not an additional risk factor in this series.

P73 OFF-PUMP CORONARY ARTERY BYPASS WITH EXCLUSIVE USE OF PEDICLED ARTERIAL GRAFTS

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OBJECTIVE: In selected patients, complete off-pump myocardial revascularization can be achieved using exclusively pedicled arterial conduits.

METHODS: From October 1998 to December 2001, 172 patients underwent off-pump coronary artery bypass (OPCAB) using exclusively pedicled arterial conduits. The mean age was 66 years (range 38 to 82). Preoperative NYHA class was III in 98 (57%) patients and IV in 40 (23%). One, two and three vessels disease was present in 44 (26%), 83 (48%) and 45 (26%) of patients, respectively. Average Parsonnet score was 8 (range 0 to 29).

RESULTS: The surgical approach was sternotomy in 160 (93%) patients, others in 12 (7%). A total of 319 anastomoses were constructed with a mean of 1.9 per patient (range 1 to 4). There were 197 anastomoses with the left internal thoracic artery (LITA), 81 with the right internal thoracic artery (RITA) and 38 with the right gastroepiploic artery (GEA). Hospital mortality occurred in 2 (1.2%) patients. In 2 (1.2%) patients conversion to conventional CABG was necessary. Perioperative myocardial infarction occurred in 5 (2.9%) patients. Postoperative atrial fibrillation occurred in 19 (11%) patients. No neurological complications were noted. Follow-up is 100% complete with an average of 15 months (range 1 to 38). Late mortality occurred in 3 (1.7%) patients. One patient underwent PTCA of one non-grafted vessel. Of the remaining patients, 163 (98%) are in NYHA class I, and 4 (2%) are in NYHA class II.

CONCLUSIONS: In selected patients, OPCAB using exclusively pedicled arterial grafts seems a safe procedure with acceptable hospital morbidity and with excellent clinical short-term follow-up.

P74 PULMONARY VALVE RECONSTRUCTION AFTER PULMONARY ARTERY BANDING AND DEBANDING IN CHILDHOOD

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Department of Cardiac Surgery, Department of Cardiac Anesthesia, Department of Cardiology, Albertinen Hospital, Hamburg, Germany

OBJECTIVE: Banding too close to the pulmonary valve may result in malformation of the pulmonary valve. In these special cases debanding and pulmonary artery patch plastic may cause damage to the pulmonary valve resulting in its dysfunction.

METHODS: We report on a 32 year old woman suffering from progressive congestive right ventricular failure due to severe pulmonary regurgitation. Pulmonary banding had been performed in the neonate period because of an atrial and ventricular septal defect. Five years later a debanding operation was performed and occlusion of the VSD carried out. Pre-operative echocardiography demonstrated ASD II (2.5 x 3 cm) with a left-to-right-shunt of 30 % and maximal pulmonary valve gradient of 35 mmHg. Intraoperatively, banding was found to alter the normal configuration of the right sinus resulting in malfunction of the right cusp due to imprisonment. Furthermore a perforation with a diameter of 1 cm² was detected in the left cusp. In addition, a congenital gap of about 5 mm existed between the insertion of the left and the right cusp.

RESULTS: Standard CPB operation was performed without complications. The ASD II was closed by a gore-tex (GORE, Evry Cédex, France) patch. The perforation in the left cusp was closed with a glutaraldehyd (2.5 %) treated pericardial patch and an additional patch was used for enlargement of the right sinus. The gap between the left and right cusps was closed with a 4-0 gore-tex suture. Finally the anterior wall of the pulmonary artery was enlarged with a gore-tex-patch. The postoperative course was uneventful. Echocardiography performed at the 5th postoperative day showed trivial pulmonary valve regurgitation, with a mean gradient of 4.5 mmHg, and good ventricular function. The patient was discharged in good condition on the 8th postoperative day.

CONCLUSIONS: Pulmonary valve reconstruction was performed successfully in a patient with severe pulmonary valve regurgitation after banding and debanding operation in infancy. In suitable patients pulmonary reconstruction can be performed safely and effectively with good early results.

P76 LEFT VENTRICULAR CORONARY REVASCULARIZATION: PHYSIOLOGY

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OBJECTIVE: Advanced atherosclerotic coronary disease presents a challenge to conventional surgical and percutaneous revascularization methods. To overcome these limitations we developed a novel method of direct myocardial revascularization through transmyocardial placement of a left ventricular (LV) coronary direct revascularization device (DRD). Arterial blood from the LV is directed into the coronary artery via a transmyocardial DRD

METHODS: An L-shaped titanium DRD was surgically placed through the anterior left ventricular wall and inserted into the ligated proximal left anterior descending coronary artery in six juvenile pigs. Hemodynamics, ST elevation, arrhythmias, coronary blood flow and regional wall motion were monitored under resting and stress (dobutamine 10µg/kg/min) conditions and compared to baseline pre-procedural values (control) and sham controls.

RESULTS: DRDs were successfully placed in 6/6 pigs without procedural deaths. Following DRD placement, under resting conditions, HR (91±14 vs 93±15 (baseline), p = 0.23), BP systolic (102±7 vs 103±16 (baseline), p = 0.44), ST elevation V4-V6 (0.2 vs 0 (baseline), p = 0.35), VT/VF frequency (0 vs 0 (baseline), p = 0.42), and ECHO score (1 vs 1 (baseline), p = 0.38) did not vary significantly from pre-procedural values. Under stress conditions, LV anterior wall motion and coronary blood flow (12.5±7 vs 8.8±4 ml/min (post-implant), p = 0.03) increased. Post-placement all DRDs were accessed via the LV, selectively cannulated, and visualized via angiography.

CONCLUSIONS: Direct myocardial revascularization utilizing a DRD is readily performed and not associated with untoward acute effects on survival, myocardial function or coronary flow at rest and stress and can be imaged and accessed. This approach offers potential as a viable means of myocardial revascularization.

P75 PROPHYLAXIS OF STERNAL INSTABILITY AFTER STERNOTOMY BY MEANS OF AN ADDITIONAL STEEL BAND

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OBJECTIVE: Wound healing disorders in the sternal area are serious complications of cardiac surgery. They often result in extended hospitalisation, plastic surgery, stress for the patient, and substantial costs to the health care system. Stable closure of the median sternotomy plays a crucial role in the avoidance of sternal instabilities and osteomyelitis.

METHODS: All patients undergoing full sternotomy from January 1999 till December 2001 were investigated with respect to the incidence of sternal instability. Since January 2000 patients determined to be at risk for sternum instability were more frequently treated with a steel band (ETHICON, Norderstedt, Germany) at the 3rd intercostal space in addition to standard osteosynthesis by means of eight steel cerclages. High-risk patients for sternal instability were considered: Patients with chronic obstructive lung disease, bilateral mammary grafts, osteoporosis, insulin-dependent diabetes, and severe obesity.

RESULTS: Since introduction of this method the incidence of sternal instability has decreased from 2.7 % in 1999, to 0.3 % in 2001. Insert Table Steel Band Table 01 This results in a reduced postoperative hospital stay, less strain on the patients, and a substantial reduction in post-surgical costs.

CONCLUSIONS: A steel band used additionally to the standard osteosynthesis with wire cerclages, is a safe and effective procedure, decreasing significantly the number of sternal instabilities.

P77 BEATING HEART CORONARY SURGERY TWO YEARS EXPERIENCE: EVALUATION OF RESULTS AND PREDICTED RISK STRATIFICATION SYSTEM EUROSORE

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OBJECTIVE: Coronary artery bypass grafting without cardiopulmonary bypass via median sternotomy have seen more popular in the last years. The low incidence of postoperative complications, good outcome after surgery and low cost make this surgical approach an alternative procedure of complete myocardial revascularization.

METHODS: There were analyzed 425 patients who underwent direct myocardial revascularization without extracorporeal circulation in the period from January 2000 to December 2001. There were 105 female and 320 male, the age varied from 28 to 86 years. Number of coronary artery disease vessels detected in coronary angiography were compared to the number of performed grafts to evaluate complete revascularization. The EUROSORE predict risk stratification table were used in the different groups: low, medium and high risk patients to evaluate the outcome after surgery.

RESULTS: The global mortality rate was 3,1% (13/425). In the group of low operative risk no death. Two patients die in medium risk group. Mortality 2,6% (11/425) was in the high risk group of patients to predicted 11,2 % mortality rate according Euroscore. The incident of complications were low as myocardial infarction 1,6% (7/425), atrial fibrillation 3,7% (16/425), wound infections 1,6% (7/425), neurological complications 0,9% (4/425).

CONCLUSIONS: Beating heart coronary surgery is a safe alternative method for myocardial revascularization with low rate of complication. The mortality was low specially in the high risk group of patients.

P78 DA VINCI ROBOTIC MITRAL VALVE REPAIR: REDUCED LENGTH OF STAY

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OBJECTIVE: Robotically assisted mitral valve repair using the DaVinci Surgical system is currently under investigation. We evaluated our initial robot experience to see if it impacts on overall hospitalization.

METHODS: Patients with non-ischemic, severe MR having elective mitral valve repair were evaluated. The last ten patients having standard sternotomy prior to the robot protocol were used for comparison. All data was prospectively collected and retrospectively reviewed.

RESULTS: All patients with robotic repair had posterior leaflet resection with an annuloplasty ring. There were no incisional conversions. Four controls had leaflet resection and annuloplasty ring and six had annuloplasty only. There were no deaths, strokes or re-ops for bleeding in either group. All patients had normal ventricular function. The control patients were older but had shorter cross clamp and CPB times. Six patients with robotic repair were extubated in the OR. Two patients with robotic repair were discharged home less than 24 hrs after their procedure. LOS (procedure to discharge) is two days shorter on average in the study group. * Only three patients were intubated postoperatively.

	Robot (n = 9)	Control (n = 10)
Age(yrs)	42-72 (56)	47-73 (65)
Ef(%)	50-66 (56)	50-63 (55)
CPB(min)	102-186 (139.6)	54-137 (91.6)
Clamp(min)	67-143 (99.6)	40-105 (63.5)
Vent(min)	*180-270 (230)	240-660 (359)
LOS(hrs)	21-378 (93.7)	72-264 (144)

CONCLUSIONS: Complex mitral valve repair can be performed with similar CPB and clamp times compared to standard techniques. Robotically assisted mitral valve repair results in earlier extubation and shorter hospitalization.

P80 SURGICAL TECHNIQUE OF ROBOT ASSISTED LIMA TAKEDOWN

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OBJECTIVE: Robotic Assisted LIMA Takedown (RALTD) is the initial step in totally endoscopic coronary artery bypass. Traditional LIMA takedown (TLTD) uses well-described techniques. The surgical technique of RALTD has several fundamental differences when compared to TLTD. This report describes the lessons we have learned from our initial experience with 21 RLTD, using the DaVinci surgical system.

METHODS: Proper patient positioning, left lung deflation and port placement are critically important. RALTD approaches the LIMA transpleurally from lateral to medial. RALTD affords markedly improved visualization of the LIMA and magnification but lacks tactile feedback. The phrenic nerve is well seen in RALTD but is seldom seen in TLTD. Great care must be exercised to avoid dissections because of sidebranch avulsions in RALTD. RALTD seems to be associated with less LIMA spasm than traditional takedowns.

RESULTS: Nineteen males and 2 females have undergone 13 OPCAB's and 8 traditional CABG procedures using RALTD. Of the 21 RALTD's, 20 LIMA's were used. There were 2 localized dissections one of which resulted in an unusable LIMA. The last 10 cases the average time from initial incision to the start of the takedown was 16 minutes. The average takedown time was 46 minutes. Total operative time was 45 minutes longer than similar procedures done with TLTD.

CONCLUSIONS: Once the technique of RALTD is mastered LIMA takedown can be done in an expeditious and safe fashion and prepares the LIMA very well for use as a conduit.

P79 CAN OPCAB REDUCE PERIOPERATIVE MORTALITY AND STROKE?

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OBJECTIVE: In comparison to conventional coronary artery bypass grafting off pump coronary artery bypass grafting (OPCAB) is claimed to reduce the operative risk. It was the aim of this study to compare the observed with the predicted mortality and the observed with the predicted stroke rate in OPCAB using commonly applied heart surgery risk scores.

METHODS: 145 patients (age 68 (37-83) years, 105 male/40 female) underwent OPCAB at our institution from 1998 to 2002. Cumulative risk adjusted mortality (CRAM) and cumulative risk adjusted stroke incidence (CRAS) were calculated according to EuroSCORE, Parsonnet-Score and McSPI stroke risk index predictions. Median EuroSCORE, Parsonnet-Score and McSPI stroke risk index were 5 (0-17), 6 (0-30), and 1.9% (0.2%-30.0%) respectively.

RESULTS: Overall mortality was 4.2%, and the overall stroke rate was 0.0%. Gains and losses in risk adjusted mortality were observed during the first 78 patients and lives saved versus the EuroSCORE predictions amounted to 1.7 thereafter. This gain was even higher when applying the Parsonnet-Score. The CRAS plot showed a steady gain leading to a total of 5.7 strokes prevented versus McSPI stroke risk index predictions.

CONCLUSIONS: We conclude that if standard risk scores are applied OPCAB can save lives and prevent strokes.

P81 OFF-PUMP VERSUS CONVENTIONAL CORONARY ARTERY BYPASS

GRAFTING: EVALUATION OF HEMODYNAMIC PARAMETERS
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OBJECTIVE: In this prospective study we aimed to evaluate the early effects of off-pump coronary revascularization versus on-pump coronary bypass grafting on myocardial function and hemodynamic parameters.

METHODS: Forty patients who scheduled for coronary artery bypass grafting (20 patients with and 20 without cardiopulmonary bypass) were studied. Hemodynamic measurements were performed at following intervals. T0-baseline, T1-after reperfusion, T2-1st hour postoperatively, T3-12th hour postoperatively. Measurements included mean arterial pressure, heart rate, mean pulmonary arterial pressure, central venous pressure, pulmonary capillary wedge pressure, cardiac index, systemic vascular resistance, pulmonary vascular resistance, stroke volume index, left ventricular stroke-work index and right ventricular stroke-work index.

RESULTS: Heart rate was significantly lower in off-pump group (65.02±13.5 beats/min versus 84.01±7.9 beats/min, p < 0.01) on T1 period. Cardiac index values were higher on T2 and T3 than the other periods in off-pump group (p < 0.05). Systemic vascular resistance values were lower on T2 and T3 periods compare with the baseline (p < 0.01). Inotropic support was required for 2 patients (10%) in on-pump group but not requirement in off-pump group. There were no significant differences between two groups for other hemodynamic parameters (p > 0.05).

CONCLUSIONS: The results of our study suggested that the values of hemodynamic parameters which reflect to a great degree the quality of anastomosis in early postoperative period were acceptable in off-pump group. We concluded that off-pump revascularization provides stable hemodynamic status for the patients in early period. However to consider this method safe, quality of anastomosis needs to be confirm by coronary angiography.

P82 COMPLETE VERSUS INCOMPLETE REVASCLARIZATION IN PATIENTS WITH SEVERE LEFT ANTERIOR DESCENDING CORONARY ARTERY (LAD) STENOSIS AND RIGHT CORONARY ARTERY (RCA)

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OBJECTIVE: Miniinvasive myocardial revascularization is less demanding procedure what is especially important in high risk patients. The aim of our study is to determine if it is necessary to perform complete revascularization in the case of stenosis of LAD and occlusion of RCA or if incomplete revascularization with only LIMA to LAD anastomosis is acceptable.

METHODS: Our study retrospectively analyzed series of 102 patients with LAD stenosis and RCA occlusion. This series was divided to group A (n = 44) with complete revascularization (bypass to LAD and RCA) mostly performed using CPB and Group B (n = 58) with incomplete revascularization (LIMA - LAD) mostly using LAST access. In both groups we analyzed preoperative symptomatology, perioperative mortality and complications and postoperative outcome.

RESULTS: In the average follow-up period of 2 years there was average symptomatology improvement of 1,35 CCS class in group A and 1,80 CCS class in group B. 8 patients died. Early (30 days) postoperative mortality was 1 patient in each group. The other 6 deaths occurred later than 30 days after operation and were all in group B.

CONCLUSIONS: In patients with high risk for CPB-CABG incomplete revascularization means satisfactory symptomatology improvement that is similar to complete revascularization. As to long time follow-up incomplete revascularization has higher mortality, but enables to indicate these risky patients for operation.

P84 EMOTIONAL STATUS AFTER OFF-PUMP CORONARY ARTERY BYPASS SURGERY

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OBJECTIVE: Neurocognitive dysfunction after conventional coronary artery bypass grafting with cardiopulmonary bypass have been documented by many studies. It is shown that due to the avoidance of cardiopulmonary bypass, off-pump coronary artery bypass procedure reduces the incidence of postoperative neurobehavioral deficits in patients undergoing coronary artery revascularization. The aim of this study was to evaluate the emotional state after off-pump versus on-pump coronary artery bypass grafting.

METHODS: Thirty patients who scheduled for elective coronary artery bypass grafting were studied. Fifteen patients undergoing on-pump coronary artery bypass grafting and 15 patients receiving off-pump coronary artery bypass grafting were evaluated preoperatively and on the 3rd days postoperatively. Emotional state assessment involved serial administration of some neuropsychologic tests including Symptom Check List-90 (SCL-90-R), Hospital Anxiety and Depression Scale (HAD), Hamilton Depression Rating Scale (HAM-D), Hamilton Anxiety Rating Scale (HAM-A) and State-Trait Anxiety Inventory (STAI).

RESULTS: In on-pump group depression and anxiety scores were higher than off-pump group in postoperatively respect to Hamilton Depression Rating Scale and Hamilton Anxiety Rating Scale (p < 0.05). Of patients in conventional group, 28% demonstrated moderate-severe depression and anxiety symptoms (HAD score >10) compare with 12% patients in off-pump group at 3 days postoperatively (p < 0.05).

CONCLUSIONS: We concluded that following coronary artery bypass surgery, impairment in emotional status which is one of the component of neurocognitive function associate with using cardiopulmonary bypass.

P83 "AORTA-NON-TOUCH" TECHNIQUE AND COMPOSITE GRAFTS IN PATIENTS WITH ATHEROMATOUS AORTA UNDERGOING OPCAB

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OBJECTIVE: Patients with atheromatous ascending aorta are at high risk of developing stroke after CABG. To avoid aortic manipulations in such patients we used off-pump coronary artery bypass (OPCAB) with an aorta-non-touch (ANT) technique by extended utilization of both internal mammary arteries (IMA).

METHODS: From 10/95 to 10/00, 231 patients (41 women) underwent elective OPCAB by our Department. Twelve of them (6.3%) had severely atherosclerotic ascending aorta and underwent coronary revascularization using one or both IMAs for construction of 13 composite bypass grafts in an ANT technique. Their age was 32-88 years (mean: 64 years). Composite grafts were constructed by anastomosing end-to-end the proximal right IMA to the radial artery (n = 8), the left IMA to the radial artery (n = 1), the left IMA to free right IMA (n = 1) and the left IMA to vein (n = 3). In 3 patients the left IMA bypassed sequentially 2 coronary targets. In 5 patients, end-to-side proximal anastomoses were constructed with 4 free right IMA grafts and 1 radial graft to the left IMA and right IMA respectively.

RESULTS: There was no surgical (30-day) mortality, nor neurological complications. The patients were all in NYHA class I at last follow-up (13-50 months).

CONCLUSIONS: OPCAB and extensive use of the IMAs with composite graft construction provide a satisfactory way for coronary revascularization with an ANT technique, and may be the procedure of choice for patients with atheromatous ascending aorta.

P85 NINETY DEGREES ANTERIOR CARDIAC DISPLACEMENT IN OFF-PUMP CABG: THE STARFISH™ CARDIAC POSITIONER PRESERVES STROKE VOLUME

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OBJECTIVE: In off-pump coronary surgery, exposure of posterior circumflex branches via sternotomy causes circulatory collaps. In the pig and in patients, ninety degrees vertical displacement (DIS) of the beating heart decreases stroke volume up to 40% which is primarily caused by right ventricular dysfunction. Fifteen degrees head-down tilt (Trendelenburg maneuver, TREN), in part, restores stroke volume. We assessed pump function when lifting the porcine heart with the Medtronic Starfish™ cardiac positioner which was attached to the apex by means of suction.

METHODS: Six pigs (80 kg) were instrumented for hemodynamics and paced at 80 beats/min. Ultrasound flow probes were placed around the aorta, LAD, RCA and Cx. Values relative to baseline (mean ± SD, comparison Paired-Samples T Test) at 3 min after DIS and DIS+TREN

RESULTS: Stroke volume and arterial pressure did not decrease with DIS. Coronary flow remained unchanged.

	Anatomic position (base)	DIS (% from base)	p value vs base	DIS +TREN (%from base)	p value vs base
Stroke volume (mL/min)	46±9	94±13	0.135	113±17	0.015
Mean arterial pressure (mmHg)	104±22	95±13	0.09	113±25	0.087
Right ventricular end-diastolic pressure (mmHg)	4±2	129±37	0.009	186±63	0.001
Left ventricular end-diastolic pressure (mmHg)	8±3	128±57	0.235	157±49	0.001
LAD flow (mL/min)	38±8	100±15	0.962	117±23	0.035
RCA flow (mL/min)	34±8	99±16	0.117	125±41	0.003
Cx flow (mL/min)	33±15	107±15	0.081	123±24	0.006

CONCLUSIONS: The Starfish™ cardiac positioner preserved stroke volume and arterial pressure at the expense of marginally elevated right ventricular pre-load pressure when lifting the porcine heart ninety degrees anteriorly. Coronary flow was unaffected. Additional fifteen degrees head-down tilt (Trendelenburg maneuver) overnormalized stroke volume and mean arterial pressure.

P86 ROBOTICALLY ASSISTED, TOTALLY ENDOSCOPIC ATRIAL SEPTAL DEFECT REPAIR

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OBJECTIVE: Computer (robotic) enhancement has emerged as a potential facilitator of minimally invasive cardiac surgery, and has been used to perform portions of intracardiac procedures via thoracotomy incisions. This report describes the next step in this progression — the first U.S. application of robotic technology for totally endoscopic open-heart surgery.

METHODS: Over 4 months, 10 patients underwent repair of a secundum-type atrial septal defect (n = 7) or patent foramen ovale (n = 3) by a totally endoscopic approach, utilizing the Da Vinci™ system. Cardiopulmonary bypass (CPB) was achieved peripherally (femoral ESTECH endoaortic balloon cannula; femoral and right internal jugular venous cannulae). Antegrade cold blood cardioplegia was administered via the distal port of the arterial cannula after balloon inflation. Via three port incisions (8-12 mm) in the right chest, the entire operation, including pericardiotomy, bicaval occlusion, atriotomy, atrial septopexy, and atrial closure, was performed by a surgeon seated at a computer console. A fourth 15 mm port was utilized for suction and suture passage by a patient-side assistant.

RESULTS: Mean age was 46 years (range 22–68). Aortic crossclamp time was 40 min (median), and CPB time was 137 min. In 9 cases, transesophageal echocardiography after 30 days confirmed successful repair. In one case, a recurrent shunt was identified and repaired on POD 5. There were no other complications. Median ICU length of stay (LOS) was 20 hours, and median hospital LOS was 3 days.

CONCLUSIONS: Robotic technology can be utilized to perform open heart procedures safely and effectively via totally endoscopic approaches. This technique represents an option for patients seeking a reliable ASD repair but wishing to avoid sternotomy or thoracotomy and the uncertainty of transcatheter techniques.

P88 AN ALTERNATE ENDOSCOPICALLY HARVESTED ARTERIAL CONDUIT

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OBJECTIVE: The ultimate goal of coronary artery bypass grafting (CABG) is performing totally endoscopic procedure using multiple arterial conduits. We have been performing endoscopic robotic harvesting of internal thoracic artery (ITA). The right gastroepiploic artery (RGEA) has been shown to be reliable and versatile arterial conduit for coronary vessels not easily accessible by ITA's. We report a new less-invasive port-access surgical technique for harvesting the RGEA using the harmonic scalpel.

METHODS: One patient with single vessel coronary artery disease was administered general anaesthesia and intubated. 10mm and 5mm trocars were inserted. The Endoscope was adapted to voice activated robotic arm (AESOP, Computer Motion, Goleta, CA). RGEA was harvested totally endoscopically using harmonic scalpel. The RGEA was delivered into pericardial sac endoscopically and anastomosed to the posterior descending artery (PDA) using off pump technique. The harvest time and flow rate were recorded.

RESULTS: The RGEA was successfully harvested without injury. Harvest time measured 92 min. The harvested RGEA was anastomosed to the PDA successfully. The RGEA flow rate was 22 cc/min. Harmonic scalpel controlled all RGEA branches with excellent hemostasis.

CONCLUSIONS: RGEA can be safely and efficaciously harvested endoscopically through port access with robotic assistance. This conduit is of sufficient length and can be used as alternate arterial conduit for totally endoscopic CABG.

P87 ADVANCED THORACOSCOPIC PROCEDURES ARE FACILITATED BY COMPUTER-AIDED ROBOTIC TECHNOLOGY

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OBJECTIVE: Computer (robotic) enhancement has been used to facilitate simple thoracoscopic procedures such as internal mammary artery (IMA) mobilization. This report describes the use of robotic technology in advanced thoracoscopic procedures.

METHODS: Five patients underwent advanced thoracoscopic procedures utilizing the Da Vinci™ robotic surgical system. Patient 1 presented for reoperative CABG with patent IMA and vein grafts. Via three right thoracic port incisions, DaVinci was used to mobilize the RIMA and lyse mediastinal adhesions, allowing safe sternotomy. Patient 2 presented for esophageal reconstruction 1 year after sternotomy for AVR. Via three left thoracic port incisions, mediastinal adhesions were lysed, allowing the retrosternal passage of the gastric tube into the neck for esophago-gastric anastomosis. Patient 3 presented with central hypoventilation syndrome ("Ondine's curse"), patient 4 suffered from chronic hiccups (previous CABG with patent IMA graft), and patient 5 had a high spinal cord injury with hypoventilation. In patients 3 through 5, via three port incisions in each hemithorax, DaVinci was used to mobilize the phrenic nerves and to insert bilateral phrenic pacing systems.

RESULTS: All robotically assisted procedures were performed completely endoscopically, and without complications.

CONCLUSIONS: Robotic technology can be used to perform reoperative dissections and advanced intrathoracic maneuvers thoracoscopically. The increased visualization and instrument dexterity afforded by this technology may facilitate the development of minimally invasive thoracic approaches that were previously not feasible.

P89 MINIMALLY INVASIVE STENTLESS AORTIC VALVE REPLACEMENT

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OBJECTIVE: Stentless aortic valve replacement (AVR) requires an additional suture line to maintain the proper orientation of the prosthesis commissural posts. We sought to study if the additional complexity of stentless AVR precludes a minimally invasive approach.

METHODS: All patient data from the defined time intervals was captured and prospectively entered into our computerized CV Database. Patients undergoing stentless AVR (AV Min) were computer matched with patients undergoing standard AVR (AV Std).

RESULTS: From January 2000 to January 2002, 31 patients underwent AV Min vs. 31 patients who underwent AV Std. There were no demographic differences between the groups including mean age (64.68 years in AV Min vs. 66.77 years in AV Std) and preop NYHA Functional Class (2.8 in AV Min vs. 2.9 in AV Std). Mean cross-clamp time was [hours:minutes] 1:49 vs. 2:03 and total bypass time was 2:21 vs. 2:37 (AV Min vs AV Std). There were no deaths in either group. There was more postop atrial fibrillation (AF) in AV Min 11/31 (35%) vs. 6/31 (19%) in AV Std. Mean postop length of stay was 8.61 days in AV Min and 6.97 in AV Std (median was 5 days in each, there was one outlier in AV Min).

CONCLUSIONS: Stentless aortic valve replacement can be accomplished via the minimally invasive approach with predictable outcomes and comparable results to the standard techniques.

P90 COMPARISON OF THE CLINICAL OUTCOME IN THE ELDERLY: OFF-PUMP VERSUS ON-PUMP CORONARY ARTERY BYPASS SURGERY

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OBJECTIVE: The population of elderly patients is rapid expanding and often significant comorbidity is present. It is believed that off-pump coronary artery bypass surgery (OPCAB) may decrease the risk of standard coronary artery bypass surgery.

METHODS: We reviewed our experience, retrospectively on elderly patients aged 75 years and older (79.4±4.5 years) who were operated on using OPCAB technique (group A, n = 68). Group B consisted of 120 computer-matched patients aged 75 and older (77.6±3.4 years) who underwent conventional CABG with cardiopulmonary bypass (CPB). The groups had not similar risk factor profiles; Parsonnet score was 28.2±3.5 (group A) versus 7.6 ± 2.4 (group B), p<0.05. There were no differences in age, gender, NYHA class, EF, but the group A had a higher incidence of extracardiac risk factors, cerebrovascular diseases, previous surgery and renal failure.

RESULTS: There were no significant differences in mortality and postoperative extracardiac morbidity. The positive inotropic support and the number of intra-aortic balloon pumps (IABP) was significantly higher in the group B (p = 0.003). Also time to extubation (group A = 7.2±2.4, group B = 14.4±4.6, p = 0.05), length of intensive (group A = 28.8±4.6h, and group B = 64.2±8.4h, p<0.001) and hospital stay was shorter in group A. The OPCAB patients had significant reduction of atrial fibrillation (p<0.05) and transfusions required (p<0.005). Ten CPB patients (8.3%) were re-operated on for bleeding compared to one OPCAB patient (1.4%), p = 0.02.

CONCLUSIONS: Although the incidence of extracardiac risk factors in the OPCAB group was significantly higher than in the CPB group, off-pump surgery showed several advantages; it is a viable alternative in the elderly with a benefit of reduced associated morbidity and it can be performed safely with cost-effectiveness regarding reduced length of intensive and hospital stay.

P92 A MINIMALLY INVASIVE CANNULA WITH A DYNAMIC DIAMETER.

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OBJECTIVE: Peripheral cannulation for surgical procedures can result in sub-optimal fluid dynamics when small cannulae are used and may be traumatic with larger cannulae. A new self-expanding cannula designed for percutaneous insertion was evaluated.

METHODS: The distal 14 cm length of a standard 16 F diameter femoral arterial cannula (RMI, Edwards Inc.) was replaced with a similar length of 16 mm diameter silicone-coated, braided, stainless steel wire stent (WallStent®, Boston Scientific Inc.) The distal end of the stent portion is uncoated and tapered to a closed position except for a central orifice allowing passage of a .038 inch guidewire. The cannula passes through a 7 F opening and then passively expands. The resistance (pressure gradient) was compared between the the new cannula and "standard" arterial cannula (RMI, Edwards Inc.) of various sizes by pumping saline at room temperature at flows from 1 to 6 L/min.

RESULTS: The new cannula design exhibited a low resistance, comparable to standard cannula with much larger insertion diameters (Figure).

CONCLUSIONS: A novel dynamic cannula designed for percutaneous insertion via a 7 F arteriotomy demonstrated excellent hemodynamic performance (superior to a 18 F standard cannula). This device may expand the role of percutaneous cannulation in traditional and minimally invasive cardiac surgery.

P91 ROBOTIC MITRAL VALVE REPAIR USING NITINOL CLIPS: A CHRONIC ANIMAL MODEL

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OBJECTIVE: A troubling aspect of robotic-assisted mitral valve repair is the increased time required. Our study compares sutures to nitinol U-clips® (Coalescent Surgical, Sunnyvale, CA) for mitral valve annuloplasties in a chronic ovine model.

METHODS: Eight anesthetized sheep were placed on cardiopulmonary bypass via the carotid artery and jugular vein. Through a left thoracotomy and left atrial appendage incision, the mitral valve was exposed with the heart arrested. The daVinci® robotic system (Intuitive Surgical, Mountain View, CA) was used to secure the annuloplasty bands using sutures (GP1) or U-clips® (GP2). The atria were closed, the animals weaned from bypass, and the thoracotomy was closed. Transthoracic echocardiography was performed at one-month post-operative and will be repeated at three and six months.

RESULTS: Aortic cross-clamp times were 81.0 ± 10.0 min (mean ± SEM) and 72.3 ± 5.8 min (p = 0.21) while cardiopulmonary bypass times were 151.0 ± 15.0 min and 127.6 ± 8.6 min (p = 0.05) in GP1 and GP2, respectively. Time to place suture in GP1 was 4.9 ± 0.4 min compared with 2.6 ± 0.2 min to deploy the U-clip® in GP2 (p<0.001). Band placement times were significantly shorter for GP2 (24.3 ± 2.5 min) than GP1 (40.2 ± 4.6 min) [p<0.001]. Echocardiograms at one-month showed good band adherence and normal valve function.

CONCLUSIONS: Time for annuloplasty band placement was reduced significantly using U-clips® without compromising valve function. This led to reduced cardiac arrest and cardiopulmonary bypass times. Using nitinol clips may prove beneficial in facilitating clinical robotic mitral valve repairs and replacements.

P93 STAGED LAPAROSCOPIC SPLENECTOMY AND VALVE REPLACEMENT IN PATIENTS WITH SPLENIC ABSCESS AND INFECTIVE ENDOCARDITIS

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OBJECTIVE: Splenic abscess is a rare clinical entity. It is most commonly associated with endocarditis. Valve replacement in the setting of an unaddressed splenic abscess is associated with an exceptionally high incidence of prosthetic valve infection and death. Laparoscopic splenectomy and a staged cardiac valve procedure may be the optimal management strategy for this clinical situation. We report two patients with IE and splenic abscess treated successfully by laparoscopic splenectomy followed by interval valve replacement.

METHODS: Retrospective chart review

RESULTS: Case 1. A 78 year-old male presented with fever and chills. Blood cultures grew staph. Aureus. Computerized tomography (CT) of the abdomen showed a splenic abscess. Transesophageal echocardiography (TEE) demonstrated a vegetation on the anterior leaflet of the mitral valve and severe mitral insufficiency. He underwent an uneventful laparoscopic splenectomy, followed five days later by mitral valve replacement. Case 2. A 42 year-old male presented with fever, chills and abdominal pain. Blood cultures grew strep. mitis. CT scan of the abdomen revealed a splenic abscess. TEE showed a vegetation on the aortic valve and severe aortic insufficiency. Laparoscopic splenectomy was followed five days later by an aortic valve replacement. Both patients enjoyed uneventful recoveries.

CONCLUSIONS: Valve replacement in the setting of an unaddressed splenic abscess is associated with an exceedingly high mortality rate. We believe that the optimal approach to this clinical scenario is laparoscopic splenectomy, which permits definitive resolution of the extracardiac focus of infection with least physiologic perturbation, followed by staged heart valve operation.

P94 EXPANDING THE INDICATIONS FOR OPCAB IN PRIVATE PRACTICE

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OBJECTIVE: The progressive growth in Off-pump coronary bypass (OPCAB) procedures has been stimulated by reports indicating improvement in outcomes and reduced morbidity and mortality, particularly in high risk patients. In our own private practice, and after a learning period for both the surgeons and the anesthesiologists on the team, we were able to abandon coronary bypass on-pump except for very few select patients.

METHODS: Since April 1999 we have performed 500 consecutive OPCAB procedures. 63% were males, the mean age was 71 years. An average of 3.2 grafts per patient were implanted. 42% of all conduits were arterial. Expanding indications for OPCAB included: severe LV dysfunction (EF less than 30%) in 31%, left main stenosis (12%), re-operations (76 patients-15% with 2 on their 4th redo), chronic renal failure on dialysis (18 patients-3.6%), spontaneous post-partum coronary dissection (1), dextrocardia with situs inversus (1), combined with vascular surgery (carotid endarterectomy 13, aortobifemoral bypass 1) or pulmonary resection (3), "unplanned" coronary bypass (2 RCA grafts for post-cardiotomy right heart failure in a Ross procedure and an AVR), and hybrid procedures (combined OPCAB-stenting in 2 patients with esophageal carcinoma and 1 with metastatic prostatic carcinoma). There were 59 MIDCAB procedures, 21 of which included sequential LIMA to LAD and diagonal branch. The IMAs were routinely skeletonized allowing creative total arterial revascularization.

RESULTS: The 30 day mortality was 1% (0.93% in primary OPCAB and 1.3% in redos). There were 4 reexplorations for bleeding (0.8%), 6 patients required prolonged intubation (1.2%), 1 patient developed mediastinitis (0.2%), 1 patient sustained a perioperative stroke resulting in death. No patient developed new renal insufficiency to the point of requiring dialysis.

CONCLUSIONS: While we initially performed OPCAB in only select low risk patients, we have now embraced this operation exclusively for all coronary revascularizations. The only exceptions remain: true cardiogenic shock, severe pulmonary hypertension with chronic atrial fibrillation (though we have started to successfully manage such cases with temporary right heart assist devices), and pronounced pectus excavatum. Our success is the result of learned patience and cooperation with the anesthesiologists as well as development of satisfactory instrumentation. Based on our experience, it is our opinion that OPCAB allows total-uncompromised-revascularization of the heart under most circumstances while avoiding the well known complications of traditional on-pump CABG.

P96 OPERATING TIME IN ENDOSCOPIC ATRAUMATIC CORONARY ARTERY BYPASS

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OBJECTIVE: Recently, endoscopic atraumatic coronary artery bypass (Endo-ACAB) has gained support as a bridge technique to totally endoscopic coronary bypass. The aim of this study is to analyze the Endo-ACAB operating time, whether a learning curve effect exists, and to compare Endo-ACAB to traditional minimally invasive direct coronary artery bypass (MIDCAB).

METHODS: Twenty-four consecutive Endo-ACAB procedures performed by a single surgeon and 25 consecutive MIDCAB procedures performed between 1998 and 2000 were analyzed. The procedures involving more than a single graft or re-operation were excluded. The MIDCAB cases before 1998 were excluded to eliminate the learning curve effect on MIDCAB. Operating times for both groups were analyzed.

RESULTS: Preoperative risk factors (age, weight, height, ASA, CCS, and NYHA classification, ejection fraction) were comparable between both groups. The percentage of female was higher in the MIDCAB group (36% {9 of 25} vs. 8.3% {2 of 24}, $p = 0.02$). One Endo-ACAB procedure converted to on-pump due to Protamine shock was excluded from the analysis. The operating time for Endo-ACAB had no learning curve effect (slope = 0.27). The mean operating times for Endo-ACAB and MIDCAB were 182.7 and 138.8 minutes, respectively ($p < 0.001$).

CONCLUSIONS: There was no improvement in operating time in the 24 Endo-ACAB cases; in fact there was a significant difference between the operating times in Endo-ACAB and MIDCAB. A larger sample of patients is needed to identify whether a learning curve effect appears after certain cases, and whether the Endo-ACAB operating time eventually becomes closer to the one in MIDCAB.

P95 RISK FACTORS FOR MORTALITY WITH OFF-PUMP CORONARY ARTERY BYPASS GRAFTING

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OBJECTIVE: The comparisons of operative mortality and complications between off-pump and on-pump have been the focus of numerous studies. However, all comparisons to date analyze risk factors defined as clinical correlates of mortality and complications with on-pump. There have been no studies that investigate the risk factors associated with the off-pump alternative. The aim of this study is to identify specific risk factors for mortality with off-pump coronary artery bypass grafting (CABG).

METHODS: Three-hundred-fifty-one consecutive patients who underwent off-pump CABG from January 1999 to December 2001 were enrolled. To eliminate the learning-curve effect for off-pump technique, pre-1999 cases were excluded. Potential risk factors included age, gender, previous myocardial infarction (MI), acute MI, congestive heart failure, shock, resuscitation, ejection fraction, re-operation, urgent or emergent operation, number of diseased vessels, >70% stenotic left main coronary artery, totally occluded left anterior descending artery, totally occluded right main coronary artery, totally occluded circumflex coronary artery, and the number of grafts implanted. Logistic regression analysis was performed.

RESULTS: Age of 75 years or older (OR 12.9, $p < 0.001$), reoperation (OR 52.5, $p = 0.001$) and totally occluded right main coronary artery (OR 6.7, $p = 0.015$) were statistically significant ($p < 0.05$). Other risk factors were not statistically significant.

CONCLUSIONS: Older age and re-operation are also well known risk factors for on-pump. On the other hand, a totally occluded right coronary artery is characteristic of off-pump. This corresponds with our impression that hemodynamic instability is often encountered in off-pump CABG if patients have a totally occluded right coronary artery.

P97 FEASIBILITY OF ENDOSCOPIC LEFT HEART PACING LEAD IMPLANTATION

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OBJECTIVE: Preliminary data are supportive of the value of locating permanent pacing leads in the left heart, atrium (LA) or ventricle (LV). We are developing technology which will permit epicardial placement of these leads via endoscopic access.

METHODS: Five healthy adult pigs (35-45 kg) were utilized. A left-sided double-lumen modified endotracheal tube for left lung isolation was used. Access to the epicardium was achieved through three 5-mm left thoracic ports with the chest closed. Visualization was achieved with standard 5 mm (0° angulation) endoscope.

RESULTS: Exposure and immobilization of anterior, lateral and inferior surfaces of the LV could be rapidly achieved using a suction-based device. Exposure of the roof of the LA (region of the Bachmann's bundle) was obtained after stapling and removal of the left atrial appendage. Active fixation leads could be implanted without complication at any exposed site with excellent pacing and sensing characteristics.

CONCLUSIONS: Endoscopic left heart pacing lead placement is feasible. Potential advantages of this approach over transvenous left heart access include: unrestricted access, lead multiplicity and the possibility for synergy with other procedures (e.g. appendectomy, ablation). Newer lead designs will be required to overcome issues heretofore plaguing epicardial positioning.

P98 LEFT ATRIAL APPENDAGE OBLITERATION: FEASIBILITY OF AN ENDOSCOPIC APPROACH

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OBJECTIVE: Preliminary data are supportive of the value of occluding the left atrial appendage (LAAO) as a means to prevent atrial fibrillation-attributable cardioembolism. We are developing technology which will permit LAAO via an endoscopic approach.

METHODS: 10 healthy adult pigs (35-45 kg) were utilized. In the first group of 5 animals, access to the LAA was achieved through 5 mm left thoracic ports with the chest closed. In the second group of 5 animals, access to the LAA was achieved through direct pericardial puncture using a subxyphoid approach. Visualization for both groups was achieved with standard 5 mm (0° angulation) endoscope. To achieve LAAO, we deployed a custom-made capture/compression device which is intended for permanent deployment. In each animal baseline and post-LAAO imaging was performed with intracardiac echocardiography (AcuNAV, Acuson Inc). Animals were sacrificed acutely, and tissue analysis was performed. Successful LAAO was defined as elimination of all LAA Doppler flow plus tissue confirmation of complete occlusion.

RESULTS: In each animal, successful LAAO was achieved without complications.

CONCLUSIONS: Endoscopic LAAO is feasible. Potential advantages of this approach over a percutaneous, intracardiac approach include procedure time, safety, as well as the possibility for simultaneously performing other procedures (e.g. lead implantation, ablation). These data warrant continued progress towards a clinical trial.

P99 COMPLETE MYOCARDIAL REVASCULARIZATION WITHOUT CARDIOPULMONARY BYPASS: SEQUENCE OF DISTAL ANASTOMOSES

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OBJECTIVE: Hemodynamic stability in off pump surgery (Off CPB) is generally achieved by initially implanting the LIMA to the LAD. Problems associated with length and insufficient blood flow may adversely affect the recovery of the ischemic LV mass. Moreover Off CPB surgery has been criticized because of incomplete revascularization. To assess completeness of myocardial revascularization in Off CPB procedures a prospective study was conducted. The LIMA pedicle was harvested using cautery. Post-operatively the sequence of distal coronary anastomosis was recorded. The projected/performed grafts were compared.

METHODS: Data was collected on 100 consecutive patients. There were 97 males and 3 females, mean age was 65.22 yrs. The mean LVEF 48.77%. Six patients (pts) had 1 vessel disease (VD), 16 2VD and 78 3VD. The LAD territory was compromised in 98 pts, RCA in 81 and the CFX in 93. The surgical technique consisted in the placement of three deep pericardial sutures, creation of a right pleuro-pericardial window and the use of intermittent hypotensive anesthesia with multimodality brain monitoring. The revascularization was usually initiated in the RCA territory.

RESULTS: One pt died and there were no conversions to CPB. The first and the last anastomosis for 78 patients with 3VD is shown in the table. A total of 378 grafts (mean = 3.8) were performed in 272 VD. The mean grafts for 3VD was 4.14, for 2VD was 2.75 and for 1VD was 1.66. Grafted Vessel LAD Diag RI OM1 OM2 PLV PDA/AM RCA Total First Graft 8 Vein 1 1 5 9 9 23 22 78 Last Graft 67 LIMA 3 0 5 1 0 2 0 78 Grafts Performed 78 43 24 54 33 11 46 35 324

Grafted Vessels	LAD	Diag	RI	OM1	OM2	PLV	PDA/AM	RCA	Total
First Graft	8 Vein	1	1	5	9	9	23	22	78
Last Graft	67 LIMA	3	0	5	1	0	2	0	78
Grafts Performed	78	43	24	54	33	11	46	35	324

CONCLUSIONS: Operative management, and grafting the LIMA to the LAD last, provides hemodynamic stability and allows the surgeon to achieve complete myocardial revascularization.

P100 IS FEMALE GENDER AN INDEPENDENT PREDICTOR OF ADVERSE OUTCOME AFTER OFF-PUMP CABG?

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