There were significant correlations of B/A ratio (p = 0.05) and DS after MRA (p = 0.01) with lower final DS.

Conclusions: For Rotablator, final burr/artery ratio >0.7 resulted in significantly better luminal enlargement compared to burr/artery ratio <0.7 and did not lead to increased major clinical and angiographic complications. These data should be evaluated in larger prospective randomized trials.

919-15   Rotational Atherectomy in Chronic Total Occlusions

Nowa Omoigui, Joan Booth, Mark Reisman, Irving Franco, Patrick Whitlow, Multicenter Rotablator Registry. *The Cleveland Clinic Foundation, Cleveland, OH*

The purpose of this study was to evaluate the success rate, complication profile and predictors of outcome of rotational atherectomy (RA) after guidewire crossing of chronic total occlusions (CTO). 145 total occlusions were treated in 139 procedures between 1988 and 1993. Of these, there were 112 single lesion procedures. Compared to pts with non-total occlusions (NTO), pts with CTO were more likely to be male, younger and have a prior MI, but less likely to present with unstable angina or to have diabetes. Lesions were more likely type C (68.7% vs 15.1%, p < 0.0001) and longer (14.8 ± 7.8 vs 8.0 ± 5.6 mm, p < 0.0001). Mean baseline stenosis was 100.0%. Post-Rotablator stenosis was 45.6 ± 17.5%. Post-adjunctive balloon stenosis was 24.6 ± 15.9% while final residual stenosis was 26.9 ± 16.8%. The maximum mean burr size was 1.8 ± 0.26 mm while average vessel diameter was 2.74 ± 0.65 mm. Success without major complications occurred in 91.0%. Dissection occurred in 18.0%, acute in-lab closure in 3.6%, post-Cath lab reocclusion in 3.6%, emergency bypass surgery on 0%, death in 1.4% and NQMI in 4.3% of pts. Based on 49.2% angiographic follow-up, restenosis occurred in 62.5% of pts. Univariate predictors of RA success were pt age (p = 0.02), lesion eccentricity (p = 0.04) and vessel diameter (p = 0.02). In a multivariable logistic regression model, only larger vessel diameter remained as an independent predictor of success (2.8 ± 0.6 vs 2.0 ± 0.5 mm). Older age (p = 0.04) and diabetes (p = 0.01) were univariate predictors of restenosis. However, in the final multivariable logistic model, only diabetes remained a significant predictor.

In conclusion, RA for the treatment of CTO has acceptable success and restenosis. Non-diabetics with relatively larger vessel diameter appear to benefit most.

920   Coronary Artery Bypass Grafting

Monday, March 20, 1995, 3:00 p.m.–5:00 p.m.
Ernest N. Morial Convention Center, Hall E
Presentation Hour: 3:00 p.m.–4:00 p.m.

920-46   A Prospective Clinical Risk Score for Predicting Morbidity After Coronary Artery Bypass Surgery

James Magovern, Tamara Sakert, George Magovern, Jr., Daniel Benckart, John Burkholder, George Liebler, George J. Magovern, Sr. *Allegheny General Hospital, Medical College of Pennsylvania, Pittsburgh, PA*

In an effort to identify areas of high cost for coronary artery bypass (CAB) surgery, we used logistic regression methods to predict patients at risk for postoperative morbidity. The predictive model was derived from 1567 consecutive isolated CAB cases performed between July 1, 1991 and December 31, 1992. The patients were categorized into 3 groups: Group 1 (N = 756, 48%) no complications, Group 2 (N = 560, 36%) minor complications, and Group 3 (N = 251, 16%) major complications with extended stay and/or death. Estimated hospital costs were 3.5 times higher for Group 3 than Group 1, and 2 times higher for Group 2 than Group 1. The following patient factors were found to be significant independent predictors of morbidity, listed in decreasing order of importance: preoperative cardiogenic shock, emergency surgery, severe left ventricular dysfunction, cardiac laboratory induced cardiac collapse, increasing age, diabetes mellitus, high serum creatinine levels, peripheral vascular disease, cardiomegaly, female gender, re-

operation, serum albumin levels of less than 4 mg/dl, low body mass index, history of congestive heart failure, atrial arrhythmia, cerebral vascular disease, chronic pulmonary disease, anemia, and blood urea nitrogen levels greater than 29 mg/dl. A cumulative clinical risk score (CRS) was developed by assigning each factor a score of 1 to 7 based on the predictive power. The mean CRS for Groups 1, 2 and 3 were 1.5 ± 4.9, 5.3 ± 3.2 and 9.0 ± 4.5, respectively (p = 0.0001). The model was prospectively validated on 1235 CAB surgery patients from January 1, 1993 to April 30, 1994. Postoperative morbidity was stratified by CRS points as low (0–2), moderate (3–5), high (6–8) and extremely high (≥9). The validation group morbidity rates fell within the 95% confidence interval of the predicted rates in each category of risk. Preoperative patient variables can predict postoperative morbidity for CAB patients. Significant cost reduction can only be accomplished by reducing postoperative morbidity. The ability to predict morbidity risk provides data for improved patient selection and for development of targeted protocols to reduce specific complications.

920-47   The Monetary Cost of Complications After Bypass Surgery: The Achilles' Heel of Contract Pricing

Timothy A. Denton, George A. Diamond, Jack M. Matloff. *Cedars-Sinai Medical Center, Los Angeles, California*

Contract pricing among providers is being used as a method to control the costs of health care. To estimate a contract price, providers must take into account not only the direct costs of uncomplicated procedures, but the incremental costs of complications. Accordingly, we determined the incremental costs of postoperative complications in a series of 722 consecutive patients (3/12/90 to 3/22/94) undergoing routine CABG (DRG 107 — CABG without catheterization).

We identified 31 prospectively collected candidate variables from the perioperative period and 15 routinely collected complications. Total direct costs were obtained from the hospital central financial system. Only patients who survived to discharge were included in the analysis. Forward, stepwise, multiple linear regression was used to determine the incremental costs of complications above the cost of an uncomplicated procedure.

Of the candidate variables, 6 perioperative variables (age, angina CHA class, non-use of internal thoracic artery, widow(er), peripheral vascular disease, hypercholesterolemia), and 6 complications contributed to the direct costs of CABG. The following table shows the incremental cost of each postoperative complication and its percent of the average direct cost of CABG ($27,400).

New dialysis	$36,436	133%	Any neuro compl	$13,333	49%
Intubated >48 hrs	$24,535	90%	Leg infection	$ 5,055	18%
Pneumonia	$20,847	76%	SVT	$ 2,670	10%

Conclusion: Postoperative complications add large, incremental costs to CABG surgery, and can be more expensive than the basic direct costs of the procedure itself. By knowing the incidence and costs of complications, contract prices can be adjusted to more accurately reflect true direct costs.

920-48   Influence of Preoperative Risk Factors on Intraoperative and Postoperative Cerebrovascular Accidents in Cardiac Surgery

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Influence of risk factors on cerebrovascular accidents (CVA) in cardiac surgery has been investigated in several studies, but no one has identified differences in risk factors on intraoperative CVA (I-CVA) and postoperative CVA (P-CVA). I-CVA is identified when evidence of CVA is seen as patient emerges from anesthesia and P-CVA is identified if after emerging from anesthesia normally, signs of CVA then appear. To explore proper preventive strategies for each CVA, data were reviewed in 4351 adult patients who underwent cardiac surgery between 1/1/90 and 6/30/94. Sixty (1.38%) patients suffered I-CVA and 53 (1.24%) patients experienced P-CVA. CVA patients are older (I-CVA: 69.6 vs. 64.2, p < 0.001; P-CVA: 70.1 vs. 64.1, p < 0.001) and I-CVA shows a higher proportion of females (45.0% vs. 30.0%, p = 0.01). The rates of I-CVA and P-CVA are 1.48% and 1.34% for isolated CABG patients (n = 3037), 0.28% and 0.70% for isolated valve patients (n = 713), 1.90% and 1.69% for patients who underwent combined procedures (n = 422), 2.79% and 0.57% for other surgeries (n = 179). Patient age (p < 0.001) and proportion of females (p < 0.001) differed by procedures (CABG: 64.6 ± 10.4, 25.0%; Valve: 60.4 ± 15.7, 46.1%; CABG + Valve: 70.4 ± 9.0, 34.8%; others: 58.4 ± 16.2, 44.7%). In order to adjust influence of preoperative risk factors on each CVA, stepwise logistic regression was applied to a subset of isolated CABGs.