



Off-Pump Coronary Artery Bypass in Octogenarians: Results of a Statewide, Matched Comparison



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Objectives

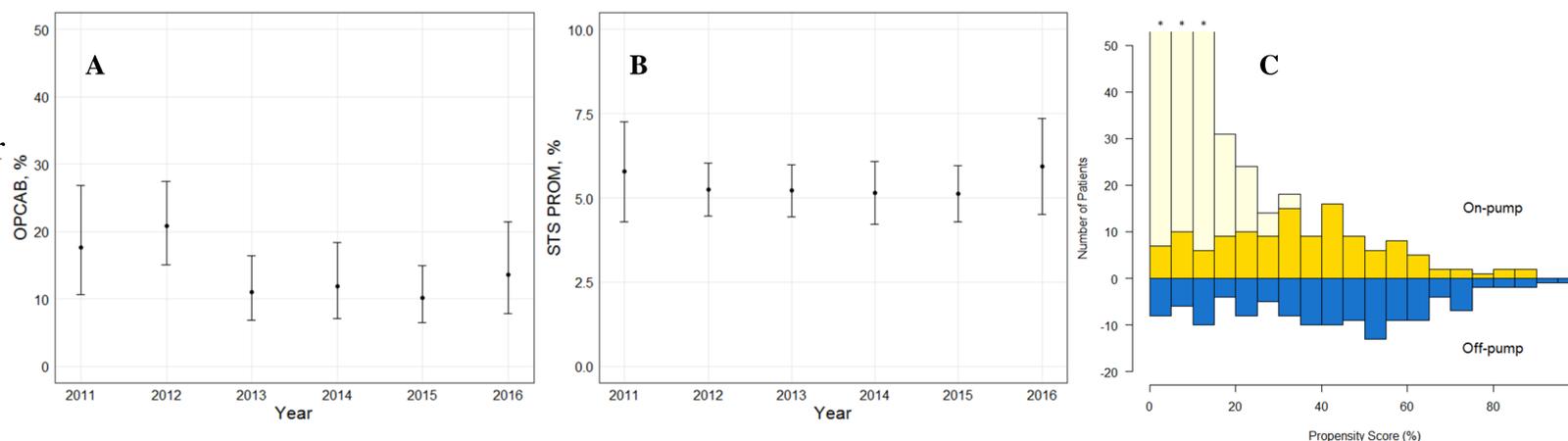
- Coronary artery bypass (CAB) may be safely performed in the elderly while providing satisfactory long-term survival benefits
- Reports suggest that certain groups benefit from OPCAB; especially women, those with renal failure, and high-risk profiles
- We sought to understand whether octogenarians could attain a similar benefit
- Hypothesis: octogenarians may benefit from avoiding CPB and cardioplegic arrest

Methods

- Patients ≥ 80 years (octogenarians) undergoing isolated CAB from July 2011 to July 2016 in the state of Maryland
- 926 octogenarians were dichotomized into on-pump CAB (ONCAB, n=798) versus off-pump (OPCAB, n=128)
- We calculated a score to predict propensity of being assigned to OPCAB among 36 preoperative factors (c-statistic=0.89)
- 128 pairs were matched (1:1) using nearest-neighbor principle
- Primary outcomes:
 - Operative mortality
 - Completeness of revascularization = total grafts / diseased vessels
- Secondary outcomes:
 - Length of stay
 - Discharge pathways
 - Occurrence of major complications

Results

- OPCAB was performed in 14% of octogenarians
- Overall, the majority of patients were male (64%), had hypertension (91%), and 3-vessel coronary disease (80%)
- Mean STS predicted risk of mortality was 5% and overall operative mortality was 4.5% (O/E ratio=0.9)
- Factors associated with OPCAB were female sex, African American race, diffuse aortic calcification, liver disease, renal replacement therapy, and fewer diseased coronary vessels (all *p-values* ≤ 0.01)
- Matching yielded 128 pairs with adequate balance (all SMD < 0.20) within a comprehensive spectrum among possible scores (**Figure C**)
- There was no difference in operative mortality after matching (p=0.36)
- Rates of complications and discharge pathways were similar between groups
- OPCAB patients has a lower revascularization ratio (0.92 vs 1.15, p<0.01), mostly from a lower number of vein grafts (median 1 vs 2 grafts, p<0.01)



Legend: [A] Percentage of OPCAB with 95% CI in relation to all CAB by year of operation. [B] STS PROM with 95% CI by year of operation. [C] Mirrored histogram illustrating the distribution of propensity scores for CAB (in yellow; above zero-line) and OPCAB (in blue; below zero-line). Dark area represents matched pairs, demonstrating a comprehensive spectrum obtained through the matching algorithm. *Censored bars; y-axis fitted to focus on matched pairs. CAB, coronary artery bypass; CI, confidence intervals; OPCAB, off-pump CAB; PROM, predicted risk of mortality.

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Comparisons Between Matched Pairs	ONCAB n = 128	OPCAB n = 128	p-value
Outcomes			
Operative mortality, n (%)	4 (3)	7 (6)	0.36
Stroke, n (%)	3 (2)	0	0.08
Prolonged length of stay (>14d), n (%)	11 (9)	5 (4)	0.12
ICU length of stay (hours), median (IQR)	41 (23-71)	29 (22-54)	0.09
30-day hospital readmission, n (%)	7 (6)	11 (9)	0.33
Discharge pathway, n (%)			0.49
Home	44 (34)	45 (35)	
Transition/extended care	74 (58)	66 (52)	
Inpatient facility	6 (5)	10 (8)	
Deceased	4 (3)	7 (6)	
Operative results			
Operative time (min), median (IQR)	194 (166-232)	158 (140-179)	< 0.01
In-room time (min), median (IQR)	264 (237-308)	232 (208-260)	< 0.01
Use of any blood products, n (%)	80 (63)	42 (33)	< 0.01
Use of pRBC, n (%)	73 (57)	34 (27)	< 0.01
Revascularization ratio, mean \pm SD	1.15 \pm 0.33	0.92 \pm 0.41	< 0.01
Distal graft types, median (IQR)			
Arterial	1	1	0.50
Venous	2 (1-3)	1 (0-2)	< 0.01
Total	3 (2-4)	2 (1-3)	< 0.01
Graft use, n (%)			
Left IMA	114 (89)	124 (97)	0.01
Right IMA	5 (4)	1 (1)	0.10

ICU, intensive care unit; IMA, internal mammary artery; IQR, interquartile range; pRBC, packed red blood cells; SD, standard deviation.

Limitations

- Inherent selection bias must be considered from retrospective study design
- Intention-to-treat and patient crossover are lacking
- Long-term survival and surgeon effect could not be addressed
- Potential for unrecognized miscoding of data

Conclusions

- OPCAB did not offer a survival benefit to octogenarians after matching
- Furthermore, OPCAB was associated to inferior completeness of revascularization
- ONCAB should continue to be considered the standard of care for this patient population