

Brief Report

EDWARD A. RANZENBACH, PA-C, MPAS, FAPACVS, DFAAPA; LI POA, MD, FACS;
MIGUEL PUIG-PALOMAR, MD; MADELINE HOLTZMAN, MD; SHARI MILLER, PA-C; MICHAEL MOHR, PA-C

The safety and efficacy of physician assistants as first assistant surgeons in cardiac surgery

ABSTRACT This study is a retrospective review of 956 patients comparing cases first-assisted by physician assistants (PAs) to those first-assisted by surgeons, examining whether PAs can function safely and efficiently in the role of first assistant surgeon for cardiac surgery. No differences were found between the two cohorts.

A retrospective analysis was performed on all patients undergoing cardiac surgery over a 4-year period (N=956) at Enloe Medical Center, a small community hospital in northern California. The Enloe Institutional Review Board approved this study. Patients were divided into two cohorts based on whether their surgical procedure was first assisted by a physician/surgeon (MD) or a physician assistant (PA). Euro scores¹ and predicted mortality were calculated for the patients to compare the overall risks of surgery. Surgeon assistants assisted at 78% of all cases (n=748), while PAs assisted at 22% of all cases (n=208). Risk scores for the two cohorts were virtually identical.

Cases were performed by a total of four primary surgeons, although nearly all the cases (n=947, 98.8%) were performed by two surgeons. Fourteen surgeons first-assisted cases, although the majority of assistance was provided by two surgeons (n=494, 66.0%; n=209, 27.9%, respectively). Six PAs functioned as first assistants. Experience in cardiothoracic surgery for these PAs ranged from several months to greater than 10 years. The majority of the assisting was accomplished by three PAs (n=178, 86%).

Edward Ranzenbach is senior physician assistant, UC Davis Medical Center, Division of Cardiothoracic Surgery, Sacramento, California. **Li Poa**, **Miguel Puig-Palomar**, **Madeline Holtzman**, **Shari Miller**, and **Michael Mohr** practice cardiothoracic surgery at Enloe Medical Center, Chico, California. The authors have indicated no relationships to disclose relating to the content of this article.

Approximately one-third of the cases in the MD cohort did not require extracorporeal bypass. By contrast, approximately two-thirds of the PA cohort cases were off-pump ($P < .001$) (Table 1). Off-pump bypass is generally considered more technically difficult than bypass utilizing extracorporeal bypass. The use of PAs as first assistants for off-pump cases is in keeping with California Title 22,² which requires a three-surgeon team for cases requiring extracorporeal bypass.

Analysis of the incidence of surgery demonstrates no significant difference in the types of cases assisted by PAs ($P = .057$) (Table 2). This would indicate that there was no attempt by the primary surgeon to delay a reoperative case until a physician/surgeon assistant was available and demonstrates confidence by the primary surgeon in the PA's ability to assist even these more difficult cases. Mean Euro scores and predicted mortality were virtually identical for the two cohorts in all case classifications, indicating that the cases assisted by PAs were just as difficult as those assisted by physicians (Table 3).

ANOVA analysis was performed on nine different performance factors to determine differences between the cohorts. OR time was significantly less for PAs (4.09 hours \pm 1.73; 95% CI 0.394) than for their surgeon counterparts (4.95 hours \pm 2.0; 95% CI .211) ($P = .002$). These results were thought to be most likely attributable to the use of PAs as assistants primarily for off-pump cases, which generally are

shorter than on-pump cases. Additional analysis of OR time for only on-pump cases showed no significant difference between the two cohorts ($P = .973$).

Skin-to-skin incision time was also significantly shorter for PA-assisted cases (167.5 \pm 82; 95% CI 11.23) than for surgeon assistants (205.9 \pm 6.9; 95% CI 4.80) ($P < .001$). Again, this is likely the result of a tendency to utilize PAs for shorter off-pump cases. Further analysis of incision times for only on-pump cases showed no statistical significance between the two cohorts ($P = .903$). All other performance factors examined showed no significant difference between PA and surgeon assistants. Analysis of performance factors is shown in Table 4.

Twenty-six complications including in-hospital and 30-day mortality were analyzed using chi-square testing. Only blood product use was found to be statistically significant. Blood products were utilized for 53.37% of PA-assisted cases and for 73.93% of surgeon-assisted cases ($P < .001$). Given the significant difference in off-pump cases performed by PAs, further analysis was performed for blood product use for on-pump cases only and was found not to be significant ($P = .115$). Analysis of these complications is depicted in Table 5.

This small sample size, single-site retrospective study strongly suggests that physician assistants provide safe and efficient care as first assistants for cardiac surgery cases but has limited generalizability. A randomized controlled trial should be conducted to further test this hypothesis. [JAAPA](#)

Richard Dehn, MPA, PA-C, DFAAPA,
department editor

To view the references and tables,
please see the online version of this
article at www.jaapa.com.

Brief Report

ACKNOWLEDGMENTS

The authors thank Tammy Freeland, STS Database Administrator, and Pablo Zubiato, MD, CCP, Administrator for Cardiac Surgery Program at Enloe Medical Center, for their kind assistance.

REFERENCES

1. Rouges F, Michael P, Goldstone AS, et al. The logistic EuroSCORE. *Eur Heart J*. 2003;24(9):882-883.
2. California Title 22 Division 5, Article 6, §70435, (b) (2).

TABLE 1. Cases by pump type and provider (P<.001)

Case type	MD(n)	MD%All	MD%MD	PA(n)	PA%All	PA%PA
Off-pump	306	31.9	40.9	134	14.0	64.4
On-pump	442	46.1	59.1	74	8.0	35.6
Total	748	78		208	22.0	

TABLE 2. Cases by incidence and provider (P = .057)

Case type	MD(n)	MD%All	MD%MD	PA(n)	PA%All	PA%PA
1st surgery	671	70.0	89.7	189	20.0	90.9
1st reop	71	7.4	9.5	17	1.8	8.1
2nd reop	6	0.6	0.8	0	0.0	0.0
3rd reop	0	0.0	0.0	1	0.1	0.5
≥4th reop	0	0.0	0.0	1	0.1	0.5
Total	748	78.0		208	22.0	

TABLE 3. Comparison of case types by EuroScore/EuroMortality

Case pump type	Mean EuroScore MD	Mean EuroScore PA	Mean EuroMortality MD%	Mean EuroMortality PA%
Off-pump	8.33	8.24	17.0	16.7
Full bypass	8.30	8.33	16.8	17.7
Combo bypass	9.68	10.26	23.3	25.2
Any bypass	8.28	8.01	16.9	15.2

Brief Report

TABLE 4. Comparison of performance markers

Item	Mean	95% CI	MD mean	95% CI	PA mean	95% CI	P value
OR Hours	4.78 ± 2.0	0.190	4.95 ± 2.0	0.211	4.09 ± 1.73	0.394	.002
OR hours(p)	5.26 ± 2.00	0.24	5.27 ± 2.05	0.26	5.17 ± 1.56	0.62	.973
Incision min	197.16 ± 72.4	4.60	205.867 ± 66.9	4.80	167.54 ± 82.0	11.23	<.001
Incision min(p)	228.44 ± 69.8	6.03	229.02 ± 69.6	6.50	225.05 ± 71.3	16.53	.903
Perfusion min	103.0 ± 41.8	3.61	99.6 ± 43.3	7.65	100.7 ± 42.4	16.78	.692
x-clamp time	67.3 ± 30.1	3.68	78.2 ± 33.2	6.74	72.3 ± 40.1	20.36	.014
Number grafts	3.45 ± 1.22	0.093	3.45 ± 1.22	0.104	3.45 ± 1.21	0.213	.122
Extubation min	1,242 ± 2156	214.9	1,132 ± 1138	316.8	1,237 ± 1401	523.2	.935
ICU initial hours	65.17 ± 87.4	5.64	64.00 ± 86.4	6.30	70.23 ± 92.0	14.05	.709
LOS days	5.69 ± 4.85	0.307	5.79 ± 4.70	0.338	5.38 ± 5.34	0.730	.544

Key: (p), pump cases only.

Brief Report

TABLE 5. Complication rates by provider

Complication	MD%	PA%	P value
Mortality in hospital	3.56	1.26	.465
Mortality 30 day	3.77	1.57	.173
Any complication	38.24	31.25	.064
Aortic dissection	0.00	0.48	.057
Re-op bleeding	3.61	2.40	.392
Re-op graft closure	0.00	0.00	N/A
Re-op valve dysfunction	0.00	0.00	N/A
Re-op other	0.94	1.44	.525
Blood products used all	73.93	53.37	<.001
Blood products pump case	68.38	75.81	.115
IABP preop	77.8	22.2	.008
IABP intraop	79.4	20.6	.059
Tamponade	0.67	0.00	.237
Perioperative MI	0.94	0.96	.972
Heart block	0.80	0.48	.630
Cardiac arrest	0.80	0.96	.823
Multisystems failure	1.74	2.88	.294
Renal failure	5.48	2.40	.066
Stroke permanent	1.60	1.44	.867
Continuous coma	0.80	0.48	.630
Paralysis	0.13	0.00	.597
Pulmonary embolism	0.27	0.48	.626
Prolonged ventilation	7.89	7.69	.926
Septicemia	0.80	0.96	.823
Deep sternal infection	0.27	0.48	.626
GI event	1.07	0.48	.436
30-day readmission	15.55	13.78	.540