

Elective mechanical cardiopulmonary support during transcatheter aortic valve implantation

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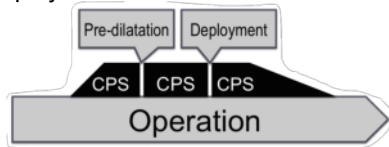
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Background

Although **transcatheter aortic valve implantation (TAVI)** is widely known as a low invasive treatment for aortic stenosis (AS), intraoperative hemodynamic changes due to surgical steps may be fatal to patients with severely impaired cardiac function.

For extremely high-risk cases, we have used mechanical **cardiopulmonary support (CPS)** electively^[1]. In order to avoid circulatory collapse due to rapid pacing or aortic insufficiency after pre-dilatation, CPS was usually started before pre-dilatation and gradually discontinued after valve deployment.



In this report, we aimed to assess the efficacy of elective CPS during TAVI.

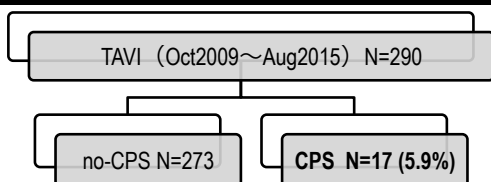
Methods

Consecutive patients who underwent TAVI for severe AS between October 2009 and August 2015 in our institute were enrolled into the study, and were divided into two groups; patients who required elective CPS and those who did not.

The preoperative (patient characteristics and echocardiographic findings), operative data were compared between the two groups.

Statistic analysis was conducted by the Students' t-test or the Wilcoxon rank-sum test or the chi-square test. A P value of <0.05 was considered statistically significant.

Results



Reasons for elective CPS	N
Impaired left ventricular function	14 cases
Preserved LVEF but probable intraoperative myocardial ischemia due to diffuse coronary stenosis	2 cases
Preserved LVEF but severe heart failure with pulmonary hypertension	1 case

Patients Characteristics	no-CPS (N=273)	CPS (N=17)	P
Age (yr) *	82.9 (5.89)	80.2 (8.69)	N.S.
Female sex	63.6%	64.7%	N.S.
BSA (m ²)*	1.45(0.17)	1.38 (0.16)	N.S.
Diabetes	30.1%	18.8%	N.S.
Coronary artery disease	40.9%	56.3%	N.S.
History of cardiovasc.surgery	17.7%	43.8%	<0.05
Peripheral vascular disease,	37.9%	31.3%	N.S.
BNP (pg/dL) *	442.8(703.3)	1395.6(1459.6)	<0.05
NYHA>III, (%)	51.3%	82.4%	<0.05
Logistic euroSCORE (%) *	22.1 (13.0)	59.1 (29.7)	<0.05

Preoperative Echocardiogram	no-CPS (N=273)	CPS (N=17)	P
LVDd* (mm)	46.3 (7.60)	52.0 (8.41)	<0.05
LVEF* (%)	63.2 (12.0)	39.7 (18.2)	<0.05
peak ΔP* (mmHg)	86.1 (29.9)	71.2 (23.0)	<0.05
AVA* (cm ²)	0.69 (0.18)	0.53 (0.17)	<0.05
TR > moderate	6.9%	23.5%	<0.05

Surgical data	no-CPS (N=273)	CPS (N=17)	P
Transapical approach	45.1%	29.4%	N.S.
Postope. peak CK-MB (ng/mL)†	13.3 (7.2 – 19.7)	12.3 (5 – 14.7)	N.S.
Postope. hospital stay (day) †	10 (8 – 14)	15 (10 – 21.5)	<0.05
Home discharge, n (%)	249 (91.2%)	12 (70.6%)	<0.05
30-days mortality, n (%)	3 (1.1%)	1 (5.9%)	N.S.

* Values are expressed as mean (SD). †Values are expressed as median (IQR).

Discussions

✓The patients with elective CPS had **significantly higher risk profiles** than those without CPS.

✓Although postoperative hospital stay was longer and home discharge rate was lower in the CPS group, 30-days mortality did not show significant difference between two groups, and the postoperative outcomes of the CPS group were considered to be **satisfactory**.

Limitations

Lack of information about anesthetic technique and use of hemodynamic drugs, which would have given good insights to anesthetic management.

Conclusion

Elective CPS during TAVI is considered to be effective to perform a safe operation for AS patients at extremely high risk.

References

1. Maeda K, et al. On-pump transcatheter aortic valve replacement in patients with poor left ventricular function. J Card Surg. 2012 Nov;27(6):686-8