

Mid-term results of Sleeve procedure for repairing aortic regurgitation with mild to moderate aortic root dilatation

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Key question

Are there differences in mid-term recurrence of AR between David and Sleeve procedures?



Key findings

Sleeve procedure was applied to cases with more complex valve repair, however, its mid-term results were comparable to David procedure.



Take-home message

Sleeve procedure can be an effective and durable option for AR with mild to moderate root dilatation.

Objective

- For severe aortic valve regurgitation (AR), valve sparing root replacement, represented by David procedure, is performed in cases of severe root dilatation. However, there is no established surgical method for cases of mild to moderate dilatation¹⁾. We performed Sleeve procedure²⁾ and compared its efficacy with David procedure.

1) S. Tamer, S. Mastrobuoni, D. Vancraeynest, G. Lemaire, E. Navarra, G. El Khoury, et al. Late results of aortic valve repair for isolated severe aortic regurgitation. *J Thorac Cardiovasc Surg*, 165 (2023), pp. 995-1006.e3

2) Hess P, Klodell C, Beaver T, Martin T. The Florida Sleeve: a new technique for aortic root remodeling with preservation of the aortic valve and sinuses. *Ann Thorac Surg* 2005;80:748–50.4b

Methods

- We analyzed 55 cases of Sleeve procedure (S group) and 59 cases of David procedure (D group) performed at our hospital between 2012 and 2021. We investigated patient background, reoperation free rate, and AR recurrence rate more than moderate to severe. In addition, we scored the preoperative complexity of the aortic valve lesion and the intraoperative difficulty of the cusp repair technique to determine factors related to recurrence.

Table1: Baseline characteristics

Variables	S group	D group	p value
Age	62(46-71)	59(42-69)	0.461
Female gender	9(16.4)	11(18.6)	0.749
BSA(m ²)	1.70(1.55-1.77)	1.71(1.58-1.79)	0.856
LVDd(mm)	60.0(56.8-65.3)	58.0(50.0-67.0)	0.071
LVDs(mm)	41.5(38.0-47.3)	42.0(30-48)	0.183
LVDs/BSA(mm)	25.0(22.8-29.0)	24.0(18-30)	0.120
LVEF(%)	57.5(51.0-63.0)	60.0(44.0-67.0)	0.326
AD(mm)	24.2(23.0-27.0)	24.0(22.0-27.0)	0.216
Valsalva(mm)	38.0(35.0-41.5)	48.5(43.0-54.0)	<0.001
STJ(mm)	31.0(27.0-34.0)	40.0(35-44)	<0.001
Bicuspid AV	15(27.3)	10(17.0)	0.182
AR grade \geq 3°	44(80.0)	38(65.5)	0.083
Valve complexity score \geq 1	50(90.9)	33(55.9)	<0.001

Date are presented as median(range) or as numbers(%).

BSA: body surface area; LVDd: left ventricular end-diastolic diameter; LVDs: left ventricular end-systolic diameter; EF: left ventricular ejection fraction; AD: aortic annular diameter; STJ: sinotubular junction; AV: aortic valve.

Methods

Table2: Valve complexity scoring system

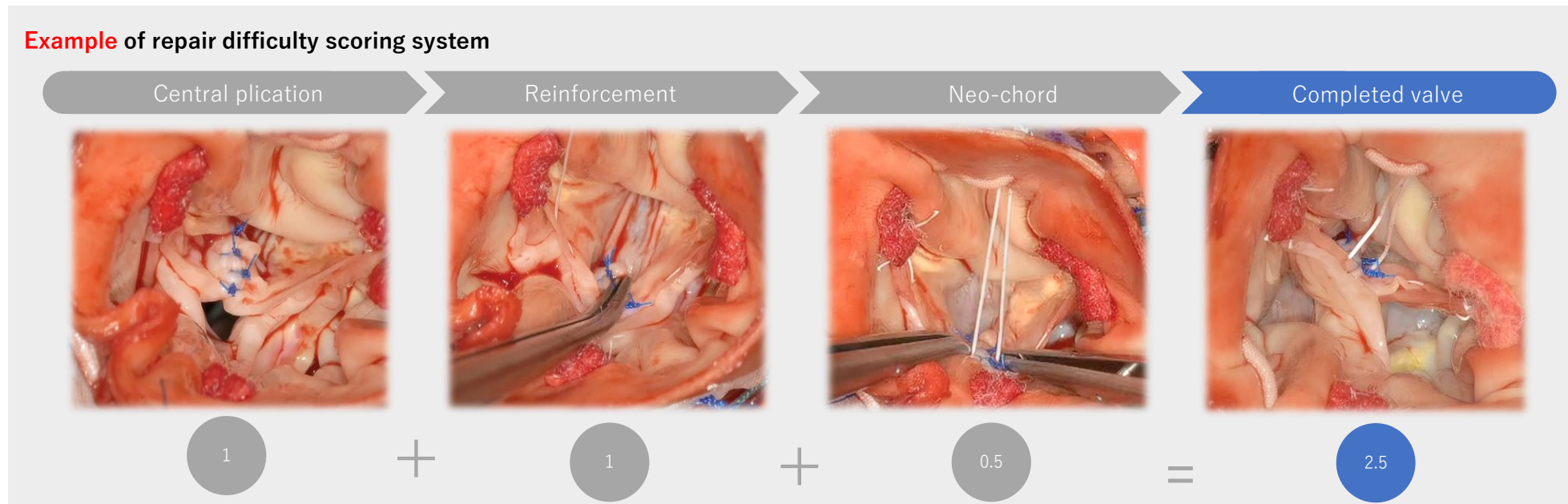
Characteristics	Points
Each cusp prolapse	1
Cusp shortening required extension	1.5
Bicuspid	2
Unicuspid	3

Table3: Cusp repair difficulty scoring system

Repair technique	Points
Non-prolapsed valve CP	0.5
Prolapsed cusp suspension with Neo-chord	0.5
Prolapsed valve CP	1
Fusion cusp CP	1
Prolapsed free margin reinforcement	1
Patch repair	2
Patch reconstruction around commissure	3

CP; Central Plication

Example of repair difficulty scoring system



Results

Table4: Operative date			
Variables	S group	D group	p value
Cusp repair difficulty score ≥ 2.5	30(54.6)	11(18.6)	<0.001
Ope time(min)	369(317-420)	471(391-594)	<0.001
CPB time(min)	218(187-251)	260(216-349)	<0.001
X-clamp time(min)	157(142-189)	260(216-349)	<0.001
CABG	2(3.6)	5(8.5)	0.274
MP or TAP	10(18.2)	2(3.4)	0.008
Aortic arch surgery	4(9.1)	14(23.7)	0.033

Date are presented as median(range) or as numbers(%).

CPB: cardiopulmonary bypass; CABG: coronary artery bypass graft; MP: mitral valve plasty; TAP:Tricuspid valve plasty.

Results

Table5:Postoperative date			
Variables	S group	D group	p value
Stroke	0	1(1.1)	0.250
Re-exploration for bleeding	1(1.8)	2(3.4)	0.596
Permanent Pacemaker	2(3.6)	2(3.4)	0.943
ICU length of stay(days)	1(1-2)	2(1-3)	0.032
30-Day mortality	0	0	
Recurrence of AR grade $\geq 3^\circ$ 2 years postoperatively	5(9.1)	1(1.7)	0.067

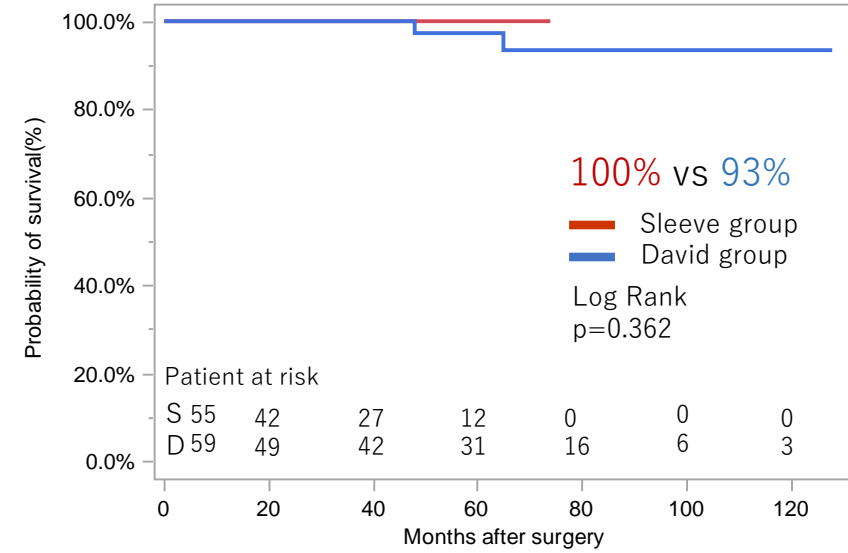
Date are presented as median(range) or as numbers(%).
ICU: intensive care unit.

Table6: Postoperative subanalysis of Sleeve procedure			
	No recurrence (n=50)	\geq moderate to severe (n=5)	p value
pre AD	24.0(22.6-26.0)	31.0(27.0-35.8)	0.010
pre Valsalva	38.0(35.0-41.0)	42.0(35.6-46.5)	0.244
pre STJ	31.0(27.0-34.0)	31.5(25.8-35.8)	0.902
Used Autologous pericardium	0(0)	1(20)	0.026
Valve complexity score ≥ 1	46(92)	4(80)	0.357
Cusp repair difficulty score ≥ 2.5	26(52)	4(80)	0.213
Bicuspid valve	13(26.0)	2(40.0)	0.517

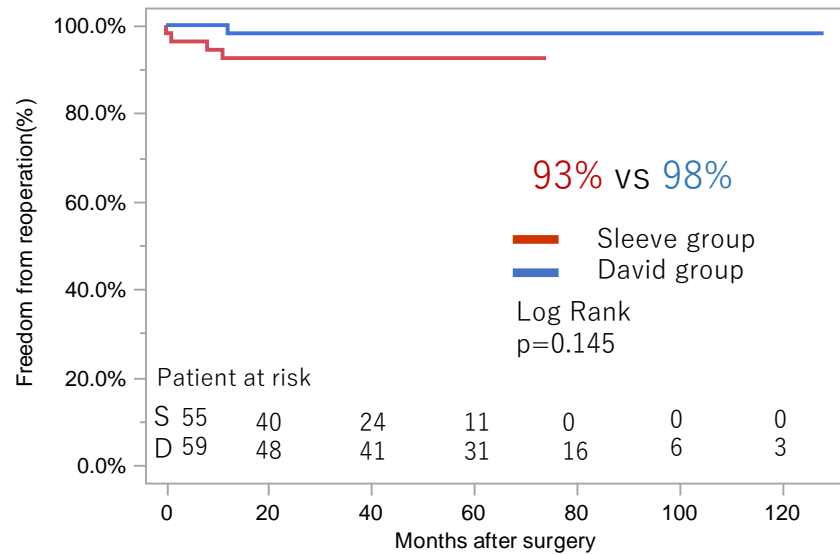
Date are presented as median(range) or as numbers(%).

Results

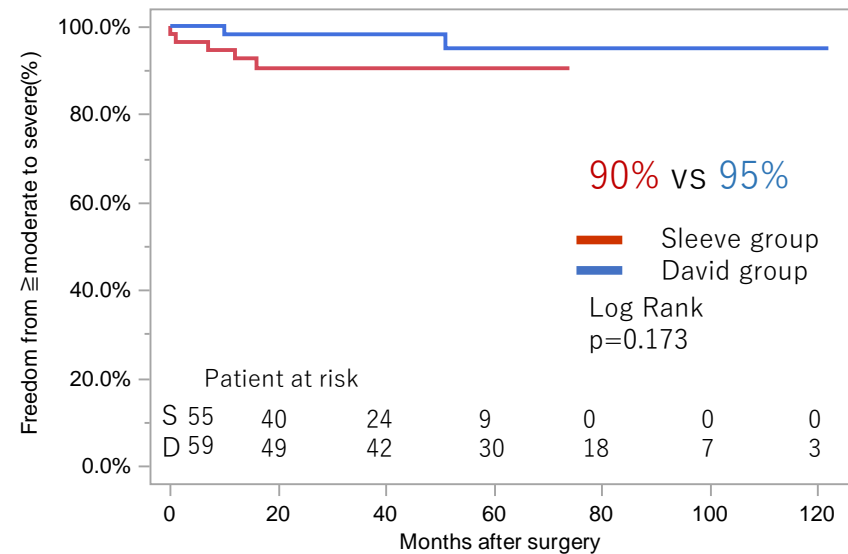
Probability of survival



Freedom from reoperation



Freedom from \geq moderate to severe



Conclusions

- Sleeve procedure has been applied to cases with more complex valve repair.
- However its mid-term results are equivalent to David procedure and it is expected to be an excellent total root remodeling for severe AR with mild to moderate root dilatation.