Left sided atrioventricular valve outcome after the two-patch repair of complete atrioventricular septal defect

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Background

- Left sided atrioventricular valve (LAVV) regurgitation (LAVVR) is a serious complication after the biventricular repair for complete atrioventricular septal defect (CAVSD).

- Several risk factors for adverse LAVV outcomes were reported, including small left mural leaflet, preoperative significant regurgitation, chromosome abnormality, and previous pulmonary artery banding (PAB) for staged repair.

- Once after LAVVR occurred, it is essential to avoid prosthetic valve replacement for better quality of life.

Purpose

To investigate LAVV outcome after 2 patch repair of CAVSD.

Patients

- Patients with CAVSD who underwent biventricular repair at our center: n = 55

(Dec./1998-Oct./2022)

Patient characteristics

Female	27	(49.1%)
BW < 2.5kg	23	(43.4%)
Prematurity	25	(47.2%)
Age at Op. (months)	5.5	(3.4-9.1)
Weight at Op.	4.6	(3.9-5.9)
Previous PAB	20	(36.4%)
Rastelli A	35	(64.8%)
B	0	
C	19	(35.2%)
Down syndrome	42	(76.4%)
Left atrial isomerism	2	(3.6%)

Associated lesions		
PLSVC	11	(20.8%)
TOF	5	(9.1%)
CoA	2	(3.6%)
LAVVR > mild	9	(16.7%)
Procedure		
Complete cleft closure	42	(76.4%)
CPB time	172	(142-230)
AXC time	124	(98-154)

Data were represented as number (%) or median (interquartile rage)

Study method

- Retrospective, single institutional cohort study
- IRB approved No. 2023-078 (04/10/2023)
- Endpoint
  - Primary: Mortality, Reoperation, LAVV reoperation, ≥ moderate LAVVR
  - Secondary: LAVV prognosis (avoidance of LAVV replacement)
- Statistical analysis: Kaplan-Meier, Cox proportional hazard model

➢ Follow-up period in survivors: 11.0 years (6.2-15.2, max 24.8)

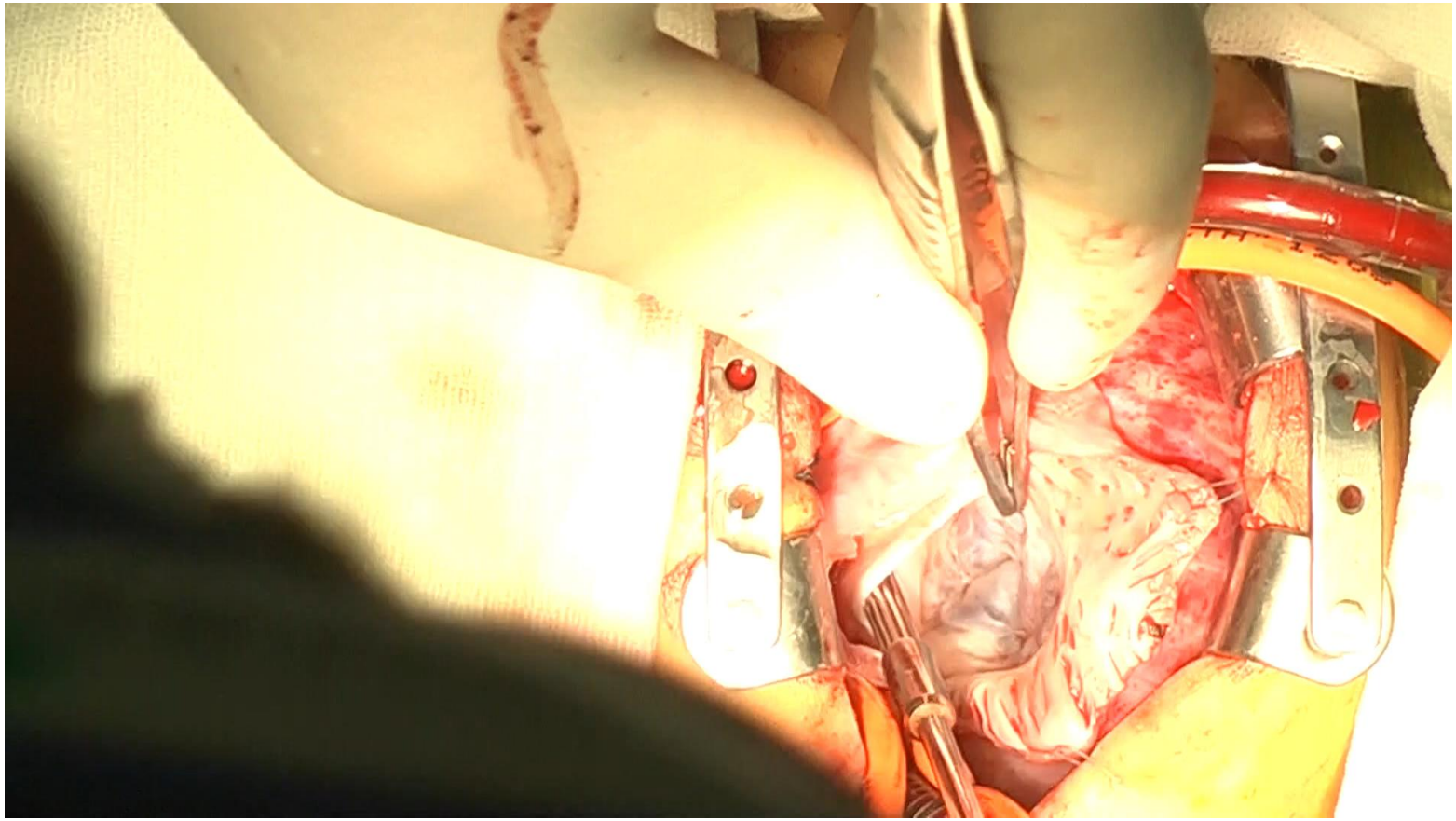
➢ Follow-up rate: 96.4%

Study method

- Possible risk factors for LAVV reoperation, post-operative moderate LAVVR
  1. Rastelli A (classification)
  2. Down syndrome
  3. Immaturity (GA 37wks)
  4. LBWI (<2500g)
  5. PLSVC
  6. TOF
  7. Pre-operative LAVVR > mild
  8. Early surgical era (-2010)
  9. PAB (staged repair)
  10. Complete cleft closure

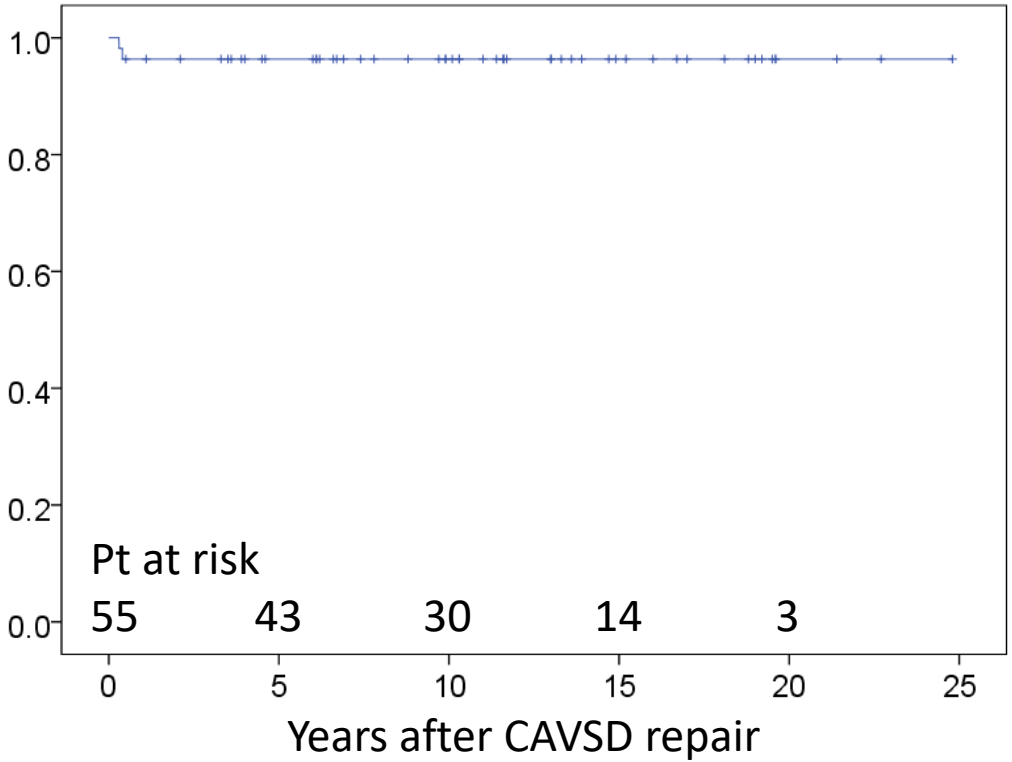
Two Patch closure of AVSD

3mo 4.2kg Rastelli type A



Results

Overall survival



96.4%@ 5yrs
96.4%@10yrs
96.4%@15yrs
96.4%@20yrs

Mortality after discharge

2 late non-cardiac deaths

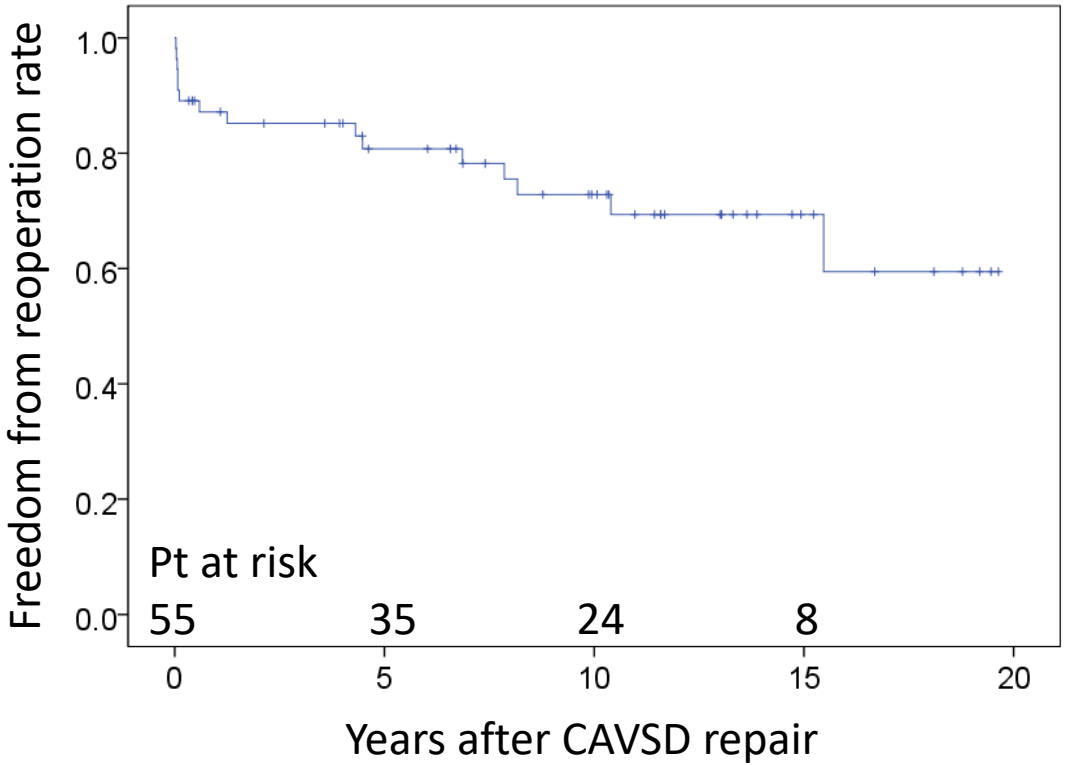
- Case 1 (3 months after CAVSD repair)

Hypovolemic shock, Adenovirus enterocolitis infection

- Case 2 (4 months after CAVSD repair)

Shock, strangulation ileus, after the repair of duodenal atresia

Freedom from reoperation rate

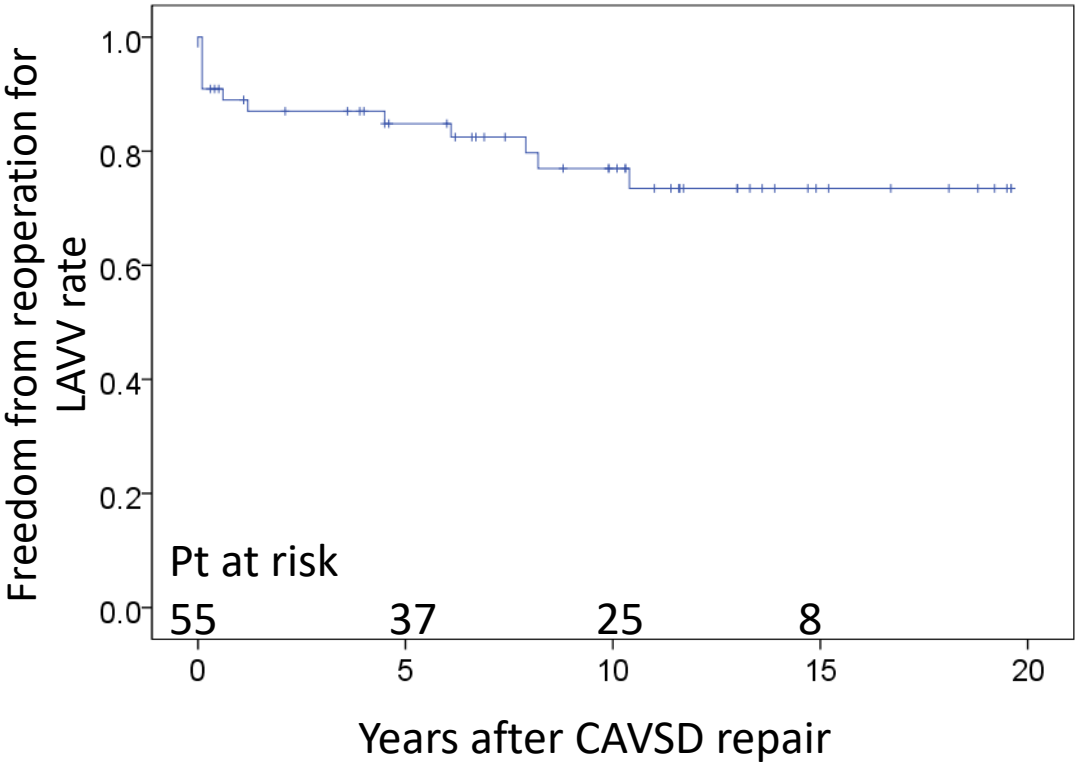


80.7%@ 5yrs
72.8%@10yrs
69.4%@15yrs

Reoperations: n = 15 pats

• For LAVV	15 cases
• For RAVV	5
• Residual VSD	5
• LVOTO	1
• AR	1
• Permanent PMI	0

Freedom from reoperation for LAVV rate



84.8%@ 5yrs
77.0%@10yrs
73.5%@15yrs

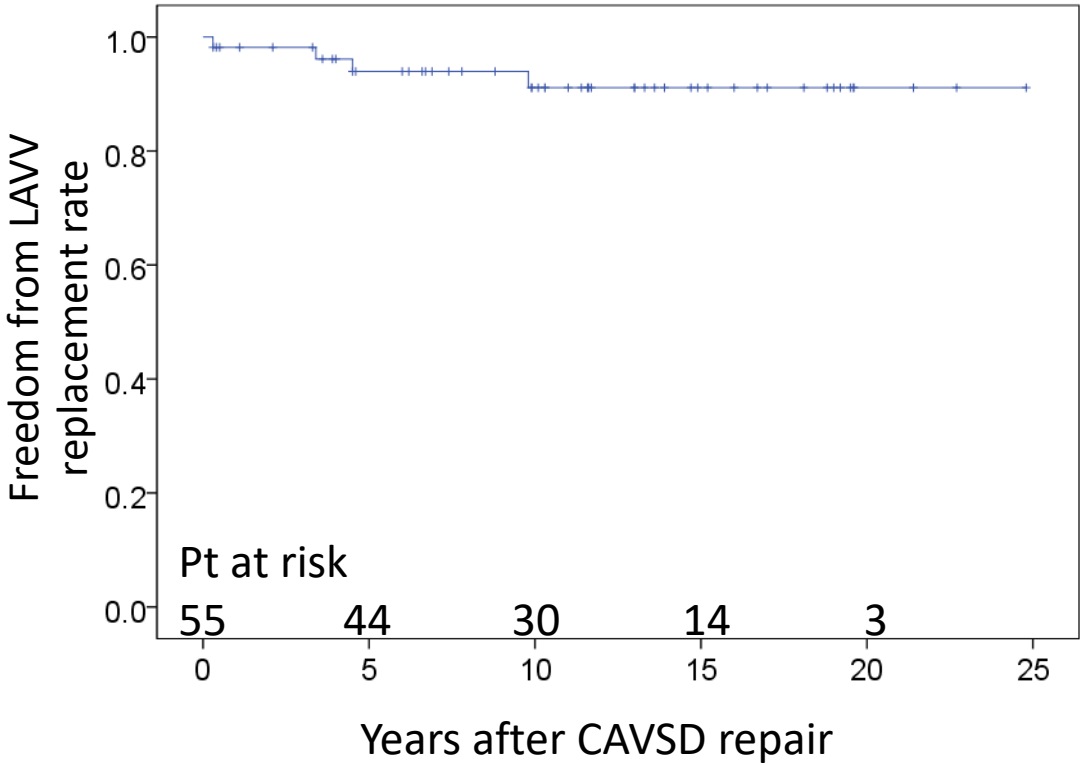
Risk factor analysis for LAVV reoperation

Variables	p	OR	95%CI
Pre LAVVR > mild	0.21	2.37	0.62-9.00
PLSVC	0.23	2.10	0.63-6.97
BW < 2.5kg	0.35	1.76	0.54-5.76
Complete cleft closure	0.49	0.65	0.20-2.17
Rastelli A	0.52	0.68	0.21-2.22
Early surgical era (-2010)	0.78	0.85	0.27-2.70
Previous PAB	0.81	0.86	0.26-2.86
Prematurity	0.83	0.87	0.23-3.27
TOF	0.88	0.86	0.11-6.65
Down syndrome	0.91	0.93	0.25-3.42

Reoperation for LAVV

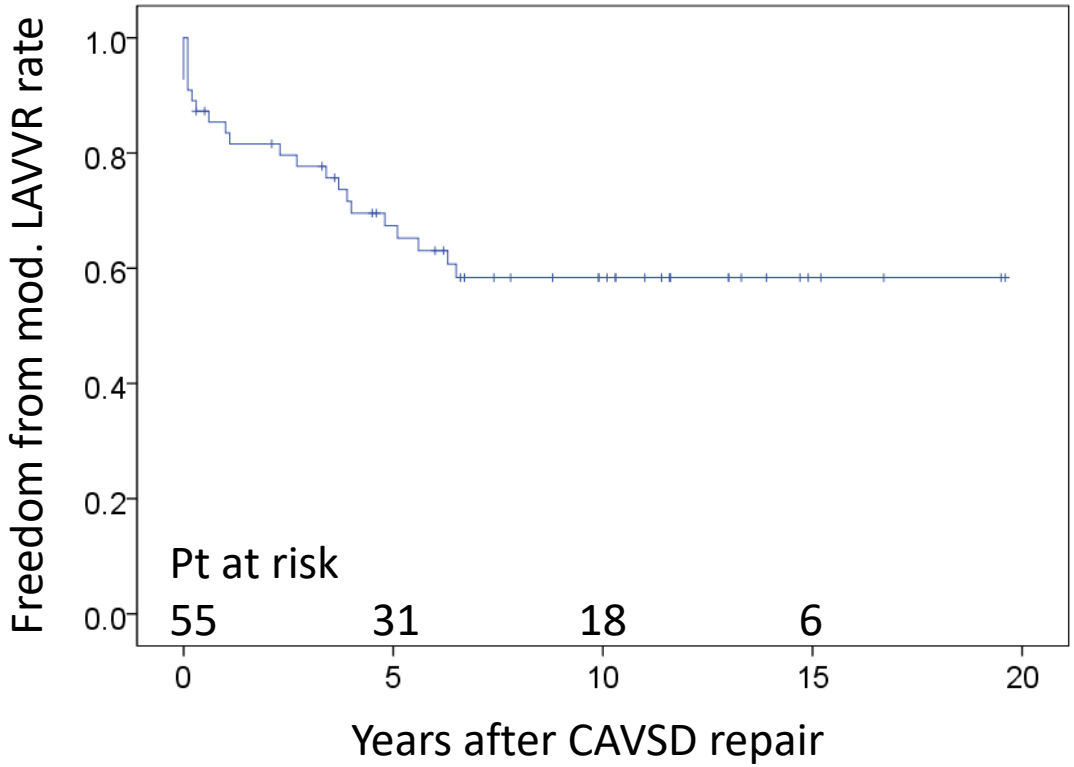
Patient	2nd operation procedure	3rd operation
1	Total cleft closure	
2	Total cleft closure, commissuroplasty	
3	Total cleft closure, commissuroplasty	
4	Tip of cleft closure, commissuroplasty	
5	Tip and bottom of cleft closure	
6	Closure of tone cleft and PBL	
7	Tone cleft patch augmentation, commissuroplasty	Replacement (for **LAVVS**, PH)
8	Total closure of tone cleft, commissuroplasty	
9	Replacement (for **LAVVS**, PH)	
10	ABL patch augmentation, bottom of cleft closure	Replacement (for **LAVVS**, PH)
11	LLL patch augmentation	Replacement (for **LAVVS**, PH)
12	Closure of tip and tone cleft, commissuroplasy	

Freedom from LAVV replacement



94.0%@ 5yrs
91.1%@10yrs
91.1%@15yrs
91.1%@20yrs

Freedom from mod. LAVVR rate

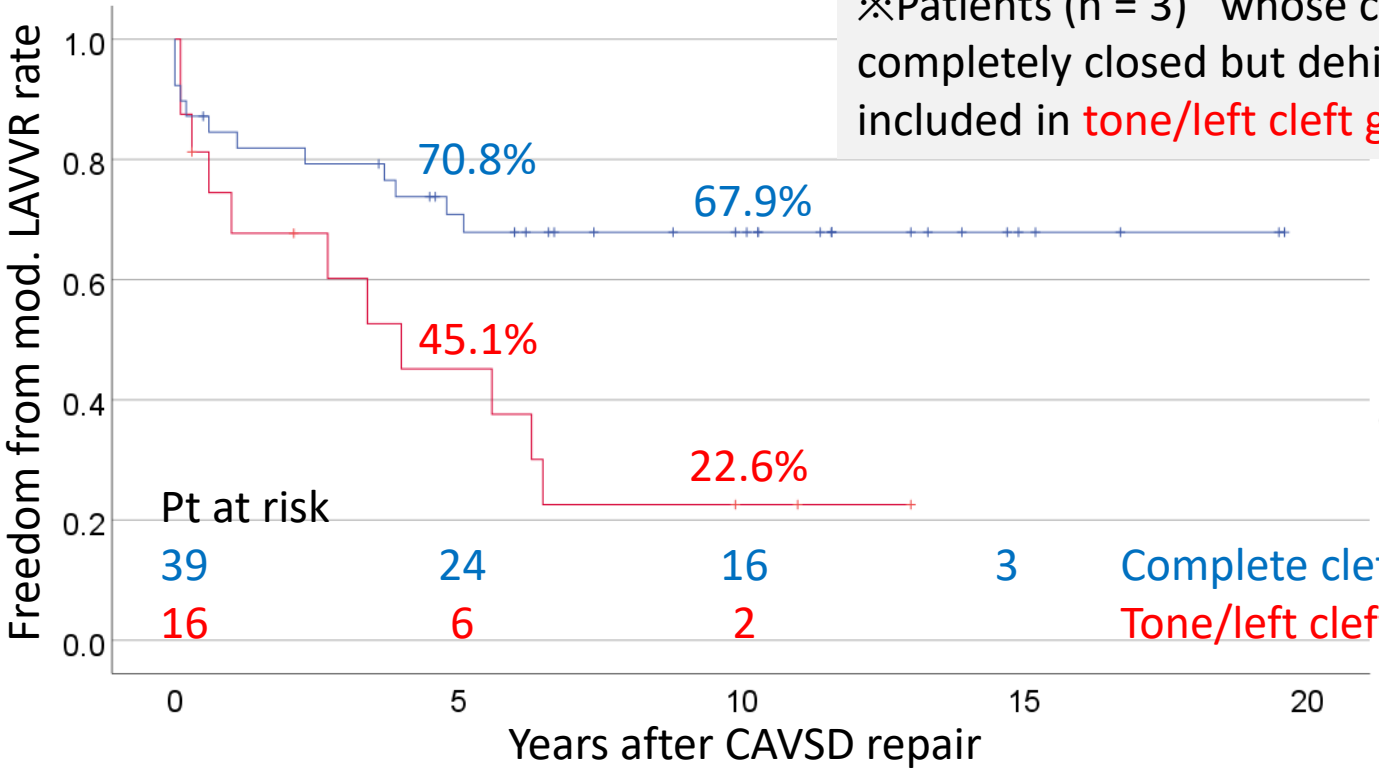


67.4%@ 5yrs
58.4%@10yrs
58.4%@15yrs

Risk factor analysis for moderate LAVVR

Variables	p	OR	95%CI
Complete cleft closure without dehiscence	0.012	0.35	0.15-0.79
PLSVC	0.13	2.07	0.80-5.35
Preoperative LAVVR > mild	0.29	1.81	0.60-5.46
Down syndrome	0.32	1.87	0.55-6.36
Rastelli A	0.50	1.39	0.53-3.62
TOF	0.57	1.43	0.42-4.85
BW < 2.5kg	0.80	1.12	0.46-2.70
Early surgical era (-2010)	0.86	1.21	0.52-2.86
Prematurity	0.89	0.93	0.36-2.43
Previous PAB	0.90	0.94	0.38-2.34

Freedom from mod. LAVVR rate



Summary

1. Good long-term prognosis after 2 patch repair of CAVSD was observed.
2. Surgical complete atrioventricular block had never been documented.
3. Incomplete LAVV cleft closure (open, partially closed or dehiscence of completely closed cleft) was a risk factor for post-operative moderate LAVVR.
4. Risk factor for LAVV reoperation was not identified.
5. LAVV stenosis must be prevented at LAVV repair, because prosthetic replacement is unavoidable once after LAVV stenosis occurred.
6. Although leaflet patch augmentation was usually applied for LAVVR from other than cleft closure, which resulted in later prosthetic replacement.

Conclusion

- By proper selection of strategy (primary vs staged), prognostic outcome after the biventricular repair for CAVSD was good.
- Significant LAVVR was observed in about a half of patients late after the biventricular repair for CAVSD.
- All known variables, such as significant preoperative LAVVR, previous PAB, Down syndrome, or small BW were not identified as risk factors for post-operative significant LAVVR, excepting for incomplete cleft closure.
- LAVV replacement could not be avoided once after LAVV stenosis caused pulmonary hypertension.