The Effect of Vertical Vein Division on Pulmonary Vein Stenosis after Total Anomalous Pulmonary Venous Return

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Introduction

- **Post-repair pulmonary vein stenosis (PVS)**
  - ✓ Difficult to manage
  - ✓ PVS after total anomalous pulmonary venous return (TAPVR) repair: 10 to 17%
  - ✓ Contributing factors: controversial

- The approach to **managing the vertical vein** in total anomalous pulmonary venous return (TAPVR) repair remains unclear.

Introduction

The aim of this study

- To identify the risk factors for pulmonary vein stenosis following TAPVR repair, with a particular focus on the impact of vertical vein division on pulmonary vein stenosis

Methods

- **A single center, retrospective study**

- **Inclusion criteria**
  - ✓ From Jan 2000 to Dec 2023
  - ✓ Patients who underwent TAPVR repair

- **Exclusion criteria**
  - ✓ Patients with complex congenital heart defects

Methods

- **Assessment of the post-repair PVS**
  - ✓ Postoperative echocardiography with a mean pressure gradient of 3 mmHg or higher observed at least once"

- **Statistical analysis**
  - ✓ Categorical variables: chi-square test
  - ✓ Numerical variables: T-test, Mann-Whitney U test
  - ✓ Multivariate RF analysis for post-repair PVS
    - ✓ logistic regression analysis
    - ✓ Factors with $p<0.05$ on univariate analyses were entered
    - ✓ Multicollinearity was controlled by backward stepwise method
  - ✓ Kaplan-Meier curve for survival

Results

Baseline Characteristics

Variable	N = 114
Sex, female, n (%)	46 (40.4)
Age at operation (days)	62.0±208.2
Weight at operation (kg)	3.9±1.7
Risk factors	
Prematurity, n (%)	7 (6.1)
Genetic syndrome, n (%)	6 (5.3)
Preoperative pulmonary hypertension (PHTN), n (%)	90 (85.0)
Obstructive	78 (69.0)
TAPVR types	
Supracardiac, n (%)	55 (48.2)
Cardiac, n (%)	20 (17.5)
Infracardiac, n (%)	26 (22.8)
Mixed, n (%)	13 (11.4)

Operative Data

Operative data	**N = 114**
CPB time (minutes)	142.4±44.3
ACC time (minutes)	68.4±23.8
Operative technique	**N = 94**
Sutureless at initial procedure, n (%)	4 (4.3)
Vertical vein procedure	**N = 94**
Ligation, n (%)	18 (19.8)
Division, n (%)	63 (69.2)
No procedure, n (%)	10 (11.0)

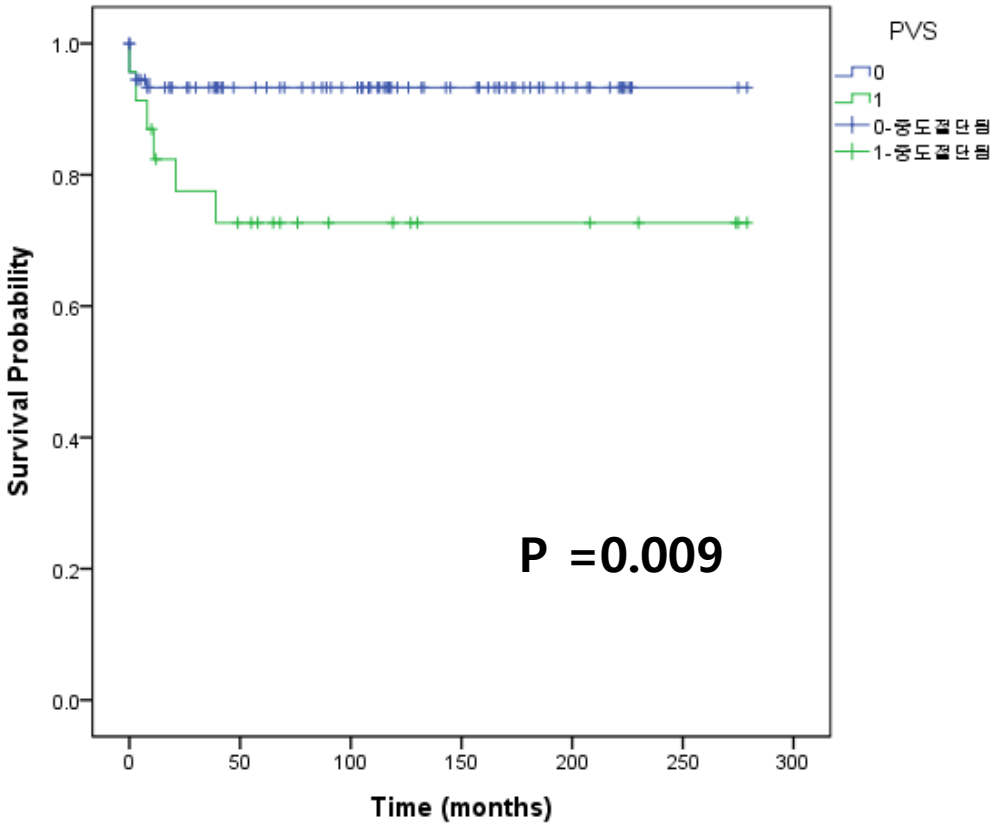
Postoperative Outcomes

Outcomes	N = 114
Follow-up duration (months)	105.7±81.0
Early mortality (< 30 days), n (%)	5 (4.4)
Late mortality (> 30 days), n (%)	7 (6.1)
Complications	
Mechanical circulatory support, n (%)	7 (6.1)
Delayed sternal closure, n (%)	13 (11.4)
Bleeding reoperation, n (%)	3 (2.6)
Prolonged intubation (> 7 days), n (%)	10 (8.8)
Tracheostomy, n (%)	2 (1.8)
Neurological problem, n (%)	4 (3.5)
Pulmonary vein stenosis	**N = 23**
Reoperation, n (%)	16 (69.6)
Transcatheter intervention, n (%)	5 (21.7)
No procedure, n (%)	7 (30.4)

Risk Factors of PVS

Factors	Univariate	Multivariate analysis		
Variable	***P***	**Odds ratio**	**95% CI**	***P***
Age (days)	0.706	-	-	-
Sex	0.738	-	-	-
Weight (kg)	**0.002**	**0.921**	**0.261 – 6.263**	**<0.001**
Prematurity	0.117	-	-	-
Genetic syndrome	1.000	-	-	-
Preoperative PHTN	0.047	1.436	0.124 – 16.650	0.772
Type of TAPVR	0.248	-	-	-
Obstructive TAPVR	0.501	-	-	-
Sutureless technique	1.000	-	-	-
Vertical vein procedure	**0.038**	**-**	**-**	**0.017**
Ligation		**7.769**	**0.515 – 117.205**	**0.011**
Division		**0.772**	**0.047 – 12.679**	**0.031**
CPB time (min)	0.130	-	-	-
ACC time (min)	0.253	-	-	-

Results


PVS
0
1
0-중도절단됨
1-중도절단됨
Survival Probability
1.0
0.8
0.6
0.4
0.2
0.0
0
50
100
150
200
250
300
Time (months)
P =0.009

Conclusions

- **The procedure performed on the vertical vein** can influence the development of pulmonary vein stenosis following TAPVR repair, with the **division of the vertical vein** potentially serving as a protective factor.

THANK YOU

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