

TOF Correction in Low Z-scores: Expanding the Use of the Valve- Sparing Approach

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Disclosures

- None



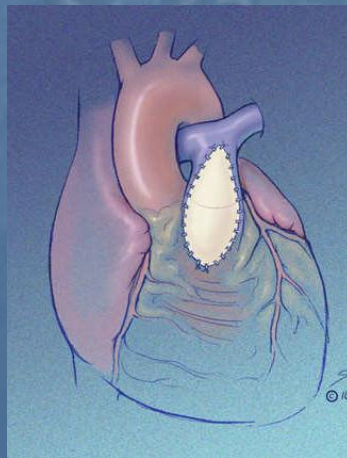
Repair of Tetralogy of Fallot

- Strategies for relieving right ventricular outflow tract (RVOT) obstruction

Repair of Tetralogy of Fallot

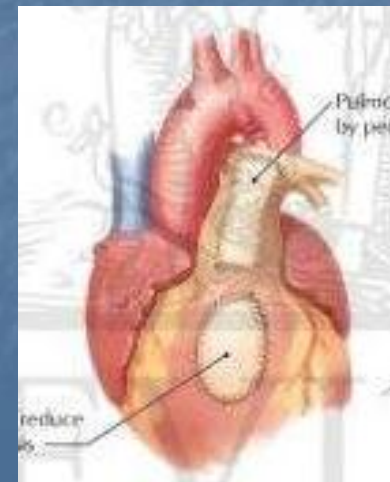
TRANSANNULAR PATCHING

- No residual stenosis
- Late pulmonary insufficiency
 - Ventricular dysfunction



PULMONARY VALVE-SPARING

- Minimizes pulmonary regurgitation (PR)
 - Valve replacement
- Risk of residual stenosis but improves through time



Pulmonary Valve Z-score

- Standard deviation from the mean size for age
- Preoperative measure for a valve-sparing TOF repair

Valve-Sparing Technique

- Preoperative criteria: z-score ≥ -2
 - Sasson 2012, Ismail 2010, Singh 2011
- Lesser PV z-scores correlate with higher postoperative RV:LV pressure ratios
 - Kirklin 2008
- Recent studies: z-scores of up to -3, and even -4
 - Boni 2009, Bacha 2012, Stewart 2005



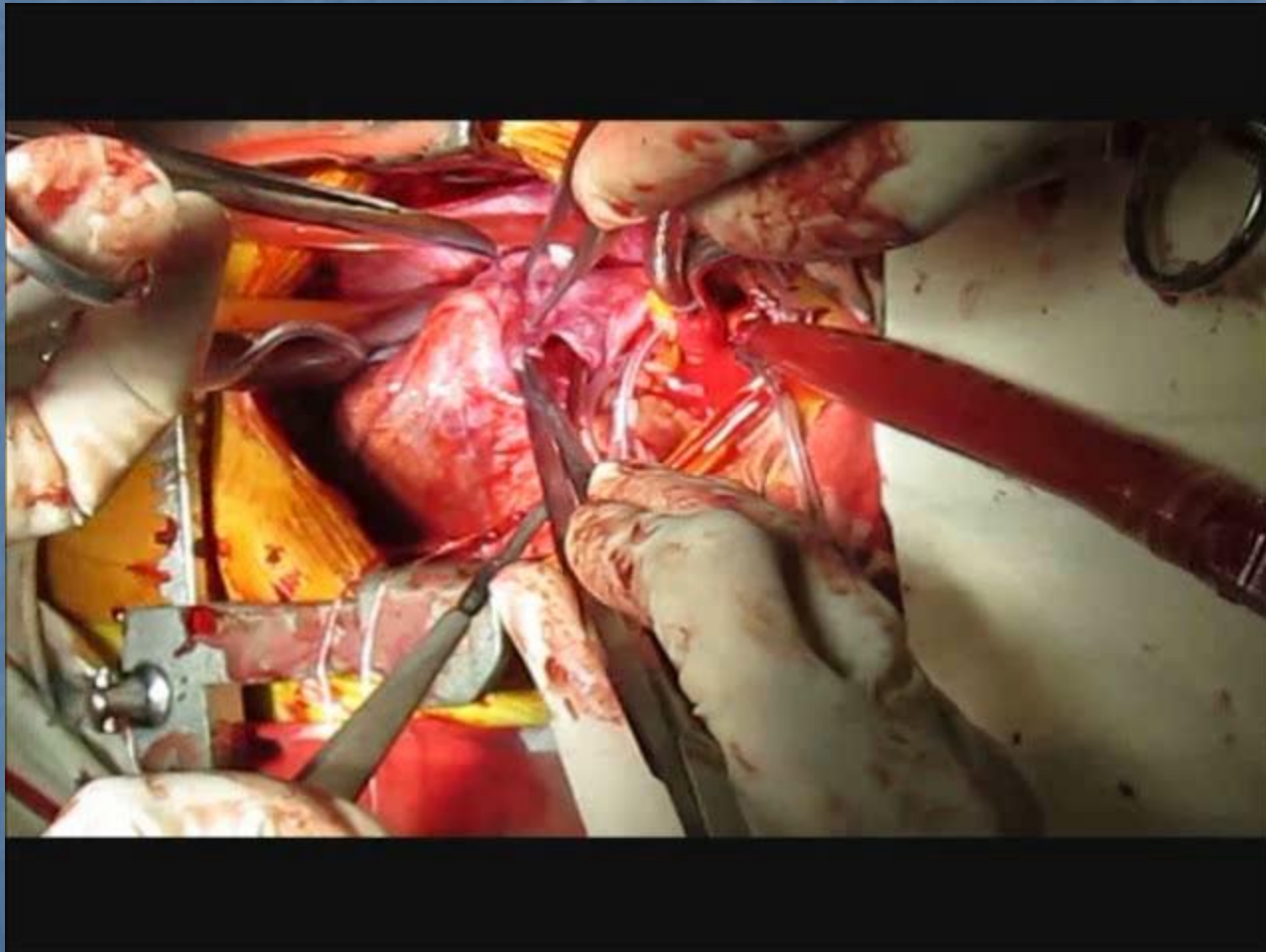
Methods

- Retrospective cohort
- 2002 to 2012
- Pediatric patients (0-18 yrs old)
- Groups:
 - GROUP 1 (low z-score): -3 to -7
 - GROUP 2 (high z-score): 0 to -3

Methods

- Review of immediate postoperative course
- Serial transthoracic 2D echo
 - Early (mean 6.7 days)
 - Intermediate (mean 20.8 months)
- Statistical Analyses:
 - Fisher's exact test
 - Independent T-test
 - Repeated measures ANOVA

Surgical Repair



Results

DEMOGRAPHIC PROFILE

- 59 patients
- 34 (58%) males; 25 (42%) females
- Age at OR: 6.59 ± 3.69 years
- Weight: 19.05 ± 9.05 kg
- Z-score: -2.89 ± 2.03

Results

59 patients

Group 1

Z-score -4.85 ± 1.18
n=25 (42%)

Group 2

Z-score -1.45 ± 1.11
n=34 (58%)

Results

	TOTAL N=59	GROUP 1 N=25	GROUP 2 N=34	p-value
Average age at OR	6.59 ± 3.69 yrs	6.75 ± 3.72 yrs	6.48 ± 3.72 yrs	0.78
Sex				0.44
Males	34 (57.6%)	16 (64%)	18 (53%)	
Females	25 (42.3%)	9 (36%)	16 (47%)	
Weight (in kg)	19.08 ± 9.05 kg	20.29	18.18	0.38
BSA	0.74 ± 0.24	0.79	0.71	0.21
McGoan's score	1.74 ± 0.4	1.78	1.7	0.52
PV annulus (in mm)	10.29 ± 2.98	7.58 ± 1.44	12.26 ± 2.14	0.00
PV z-scores	-2.89 ± 2.03	-4.85 ± 1.18	-1.45 ± 1.11	0.00
Co-morbidities	8 (13.6%)	3 (12%)	5 (15%)	
Procedures pre-op	11 (18.6%)	4 (16%)	7 (21%)	

Significant difference in PV z-scores

Results

Clinical Outcomes

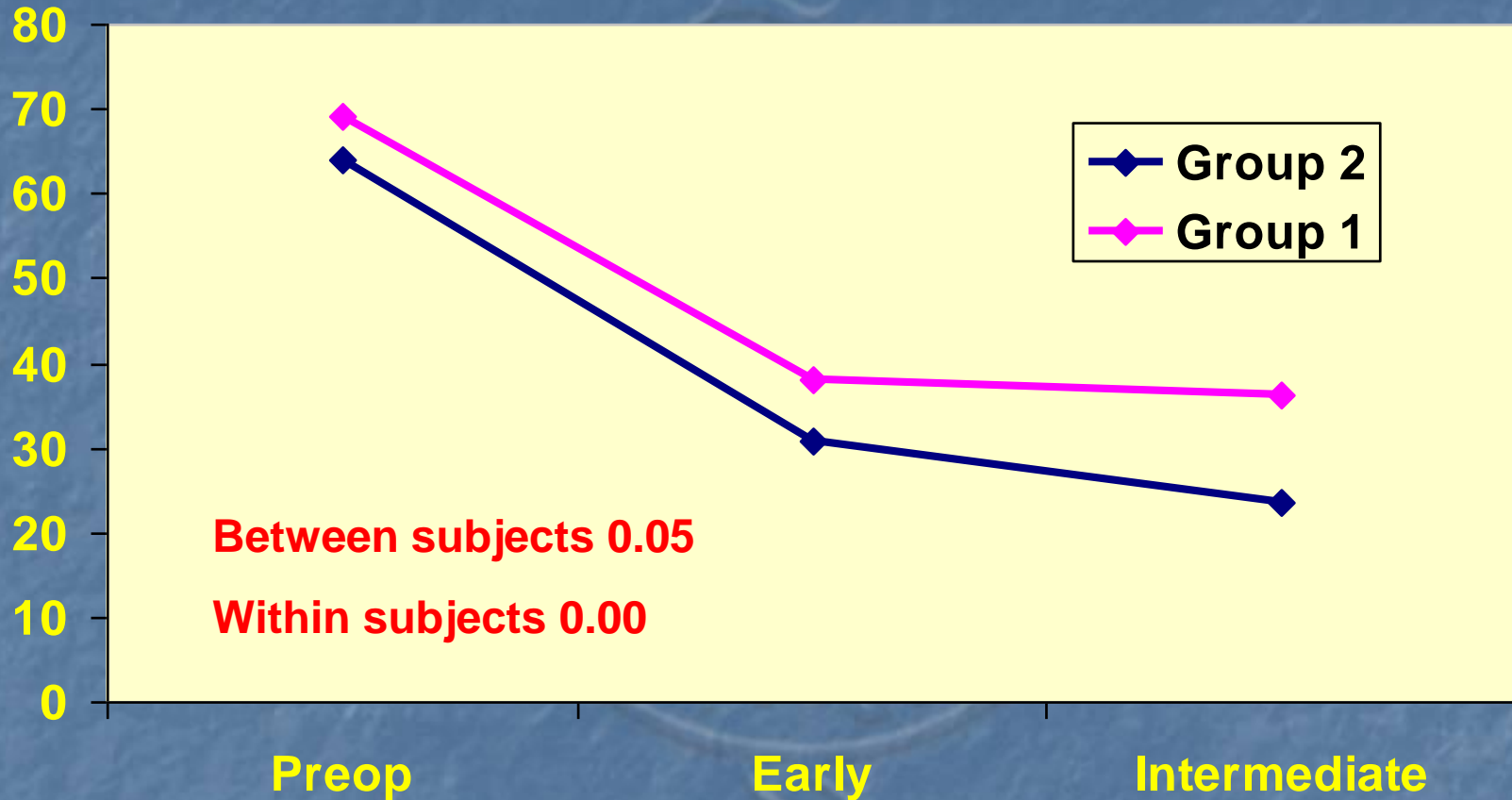
	Group 1 N=25	Group 2 N=34	p-value
Intubation times (days)	1.25 ± 2.01	1.65 ± 2.42	0.51
Mean ICU stay (days)	4.79 ± 2.3	5.59 ± 4.26	0.41
Mean postoperative hospital stay (days)	8.96 ± 6.61	10.06 ± 5.89	0.50
Arrhythmias	4 (16.7%)	10 (29.4%)	0.36
Morbidities	7 (28%)	11 (32.4%)	0.78
Conversion to TAP	0 (0%)	1 (2.9%)	0.50
Re-intervention	7 (28%)	6 (17.6%)	
Early	5 (20%)	5 (14.7%)	0.73
Late	2 (8%)	1 (2.9%)	0.57
Mortality	2 (8%)	1 (2.9%)	0.57

Results

2D Echo Findings

	Group 1	Group 2	p-value
Pulmonic stenosis (PGPV)			
Preoperative	69.23 ± 32.07	64.1 ± 21.88	Between subjects 0.05 Within subjects 0.00
Early	38.09 ± 21.8	30.79 ± 17.19	
Intermediate	36.24 ± 27.63	23.63 ± 14.95	
Pulmonic regurgitation (PR)			
Early	0%	0%	-
Intermediate	11.1% (2/18)	4.8% (1/21)	0.6

Results



Decrease in RVOT obstruction (based on PG PV) in the early and intermediate postoperative periods in the low and high z-score groups.

PG PV: pressure gradient across the pulmonary valve

Discussion

- PVS strategy results in acceptable short-term outcomes
- Mortality rate: 5%

Discussion

- Conventional criteria for PVS:
Z-score of ≥ -2 to -4
- In our study:
Z-scores as low as -7

Discussion

- Patients with low z-scores have similar outcomes as those with high z-scores in the perioperative period
 - intubation times
 - mean ICU and hospital stay
 - morbidities
 - conversion to TAP
 - early re-operations
 - mortalities

Discussion

- Higher degree of residual RVOT obstruction in Group 1
- Similar late re-intervention rates
- Progressive decrease in residual RVOT obstruction through time
- Incidence of PR is low

Discussion

- RECOMMENDATIONS:
 - Spare pulmonary valve complex whenever possible
 - Z-score as a guide
 - Longer follow-up

Summary

- Pulmonary valve-sparing technique results in acceptable early and intermediate outcomes, even in small pulmonary annuli (low z-scores)



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