

Pressure-Wire Guided Hybrid Branch Pulmonary Artery Band Placement for Palliation of Single Ventricle Congenital Cardiac Lesions

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Introduction

- bPAB an early palliation technique for complex SV or BiV circulation
- Historically guided by surrogates for PBF including BP and O₂ saturation
 - These alone may result in suboptimal bPAB placement
- We present a novel hybrid bPAB (hPAB) procedure with intraop angio and pressure wire assessment
- Goal to evaluate hemodynamics and improve outcomes

Methods

- Retrospective review, 23 hPAB patients from 8/2016-5/2022
- Procedure:
 - bPAB placed via traditional approach, then 7Fr sheath in MPA
 - MPA angiography
 - 0.014" pressure wire through 4Fr JB-1 catheter into bPAs
 - Intraoperative band revision based on angiographic appearance or dampened pressures (goal mean bPAP 15-20mmHg)
- Measured PA sizes at hPAB and subsequent cath to map PA growth
- Reviewed subsequent cath and surgical reports for PA reintervention rates

Results

Procedural Characteristics

- hPAB placed: 5 days of age [IQR, 3-12 days]
- hPAB removed: 25 days [IQR 11-72 days]
- Total procedural duration: 190 minutes [IQR, 157-225 min]
- Procedure start to int cards scrub: 58 minutes [IQR, 52-75 min]
- Associated procedures:
 - PDA stent: 3 patients (13%)
 - BAS: 2 patients (9%)
- 10 patients (43%) required intraop revision
 - 6 patients (60%) = severe angiographic obstruction
 - 4 patients (40%) = Borderline angio obstruction & dampened bPAP

Figure 2. MPA angiography after LPA band revision with appropriately tight angiographic appearance

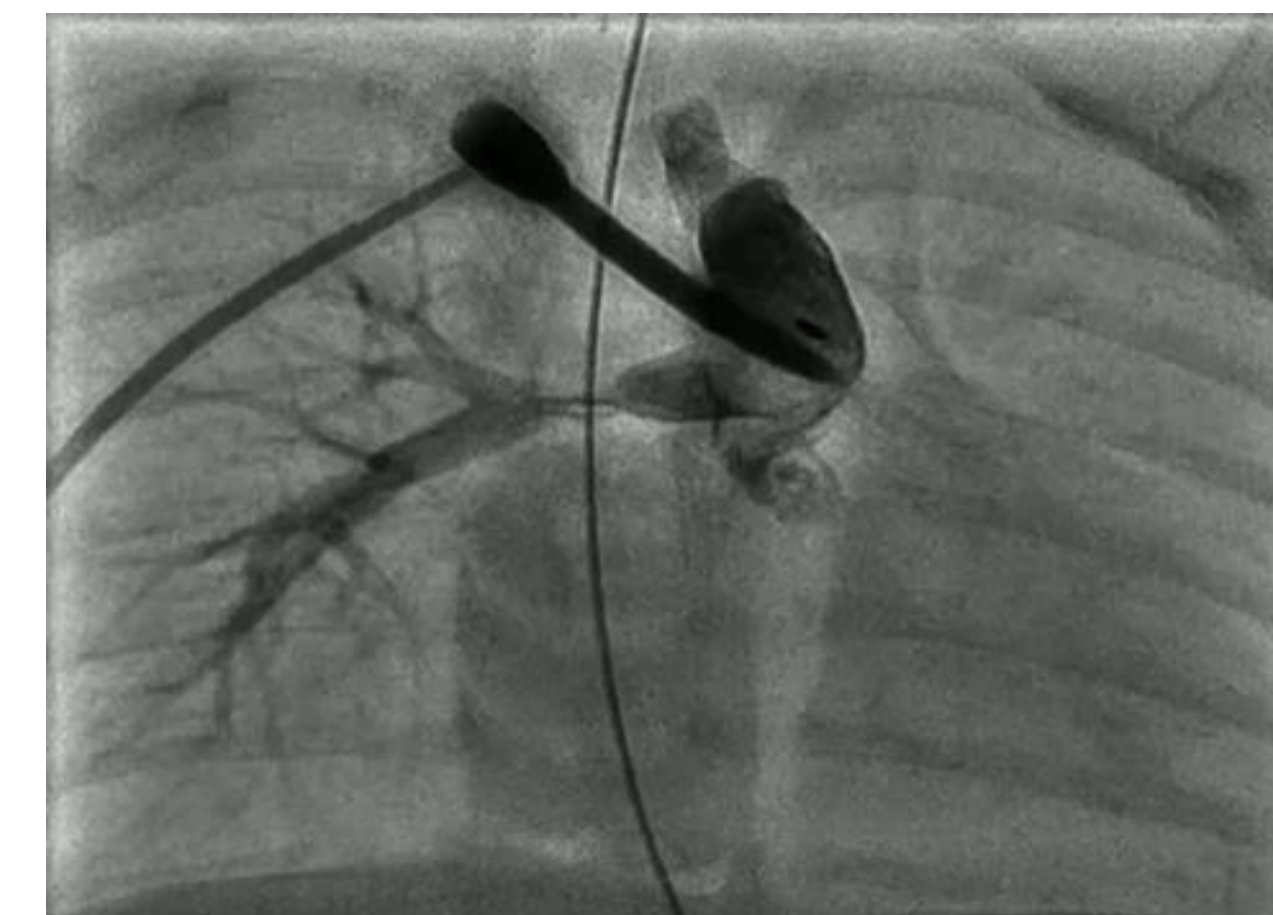


Figure 1. MPA angiography demonstrating complete occlusion of LPA by LPA band



Figure 3. MPA angiography after 2nd LPA revision with similar angiographic appearance but improved pressure

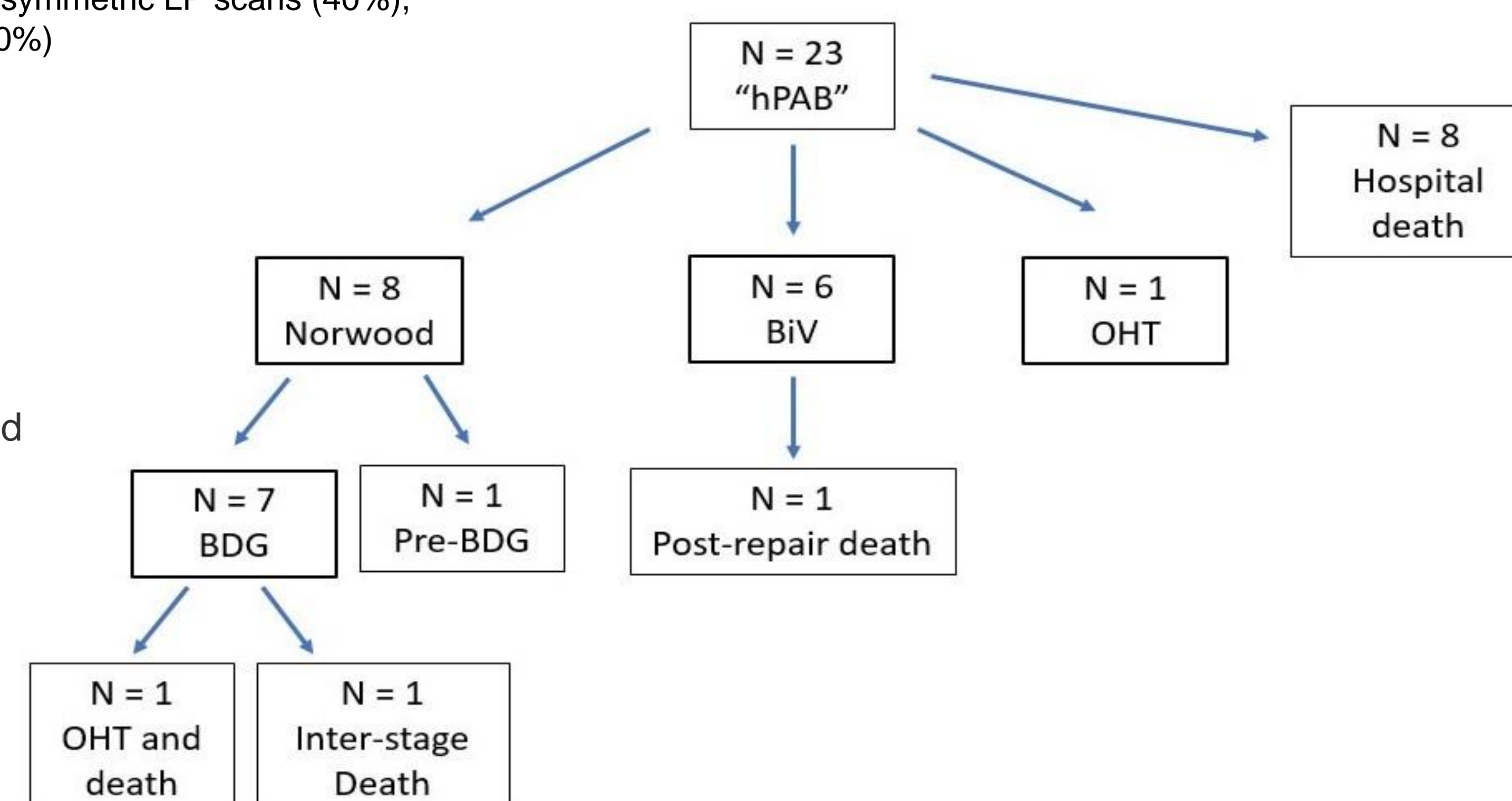
PA Reinterventions

- 6 patients underwent 13 PA reints after hPAB
 - median 2 reints [1-4]
 - 2 patients with 2 reints before debanding: 95 days [IQR, 71-118]
 - all transcath
 - 5 patients with 11 reints after debanding: 7 days [IQR, 7-270 days]
 - 9 (82%) transcath, 2 (18%) operative
- Indications for pre-debanding intervention: desaturation (100%)
- Indications for post-debanding reintervention: increased PA peak gradient on echo (60%), asymmetric LP scans (40%), and depressed vent function (40%)

Pulmonary Artery Size and Growth

- RPA size: 5.1 ± 1.0 mm
- LPA size: 3.2 ± 0.8 mm
 - No difference with intraop revision group
- Nakata indexed growth measurements:
 - "Interstage": 40.7 ± 53.0 mm²/m² per year
 - Post-debanding: 36.1 ± 58.1 mm²/m² per year
- Initial PA size and indexed growth did not differ between SV or BiV patients

Figure 4. Outcomes after hybrid branch PA band



Discussion

- First study to evaluate novel hybrid approach using angiography and pressure wire assessment to guide bPAB placement
- Multiple studies have indicated bPAB patients undergo more PA reintervention
- Our approach seeks to optimize SBP and PBF balance while promoting PA growth and limiting need for reintervention
- Need for PA reintervention might be less secondary to appropriately restrictive bPABs
- Limited by: retrospective single center data without comparison cohort with follow-up of 22 months

Conclusion

- Pressure wire assessment identifies patients who benefit from revision compared to angio alone
- Most hPAB patients did not require PA intervention pre- or post-debanding
- Most post-debanding reinterventions are transcath
- PA size and growth maintained, regardless of circulation type or repair pathway
- Long-term outcomes need further exploration
 - compare hPAB vs traditional bPAB

Disclosures

No disclosures