PDA and RVOT Stenting: Who Needs an AP Shunt?

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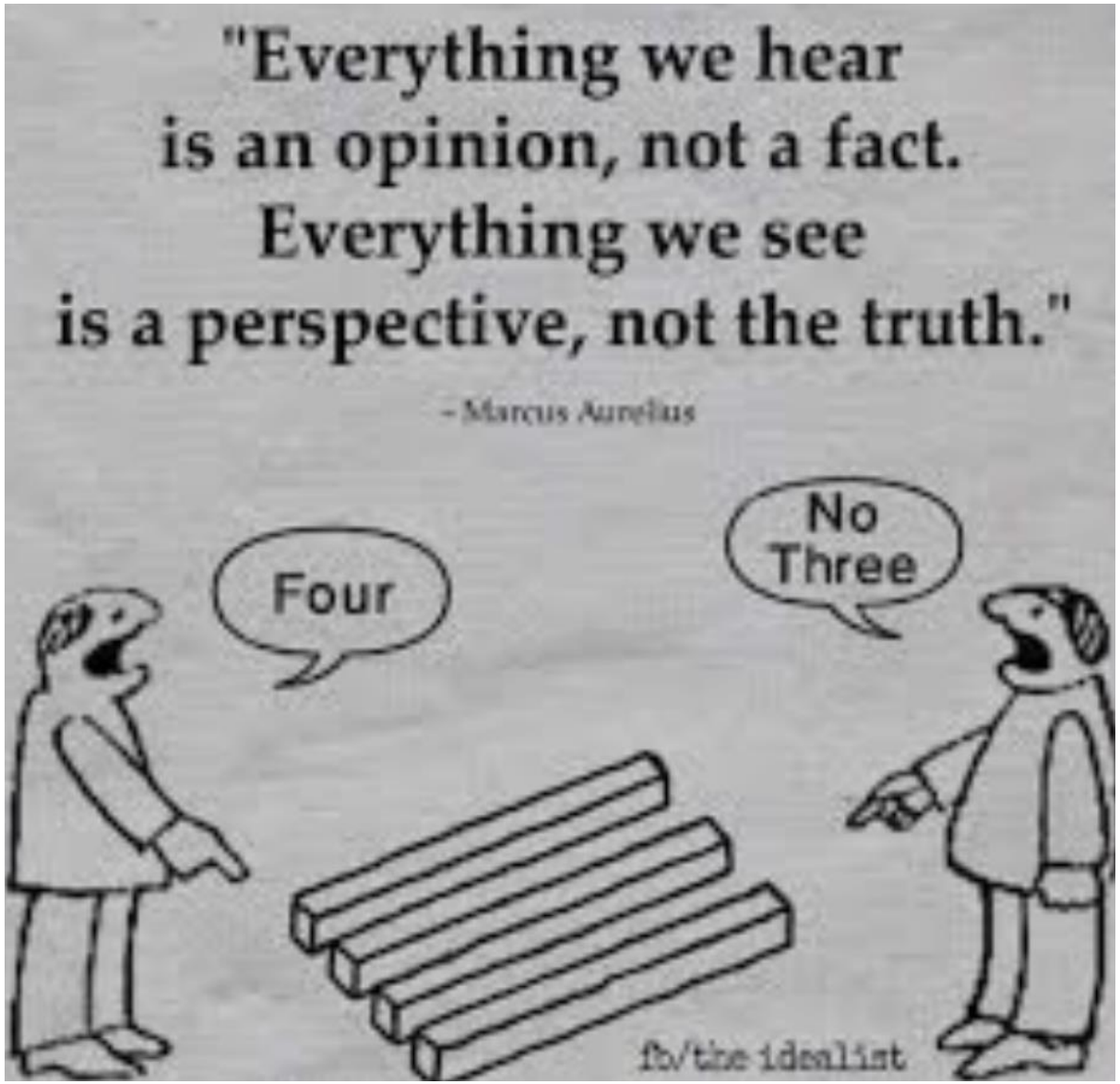
Disclosures

Consultant/Proctor

- Edwards Lifesciences
- Medtronic
- Occlutech
- Venus Medtech


"Everything we hear
is an opinion, not a fact.
Everything we see
is a perspective, not the truth."
- Marcus Aurelius
Four
No
Three
fb/the idealist

*PDA and RVOT Stenting **(in symptomatic neonates)**: Who Needs an AP Shunt? **(nearly everyone and perhaps no-one)***

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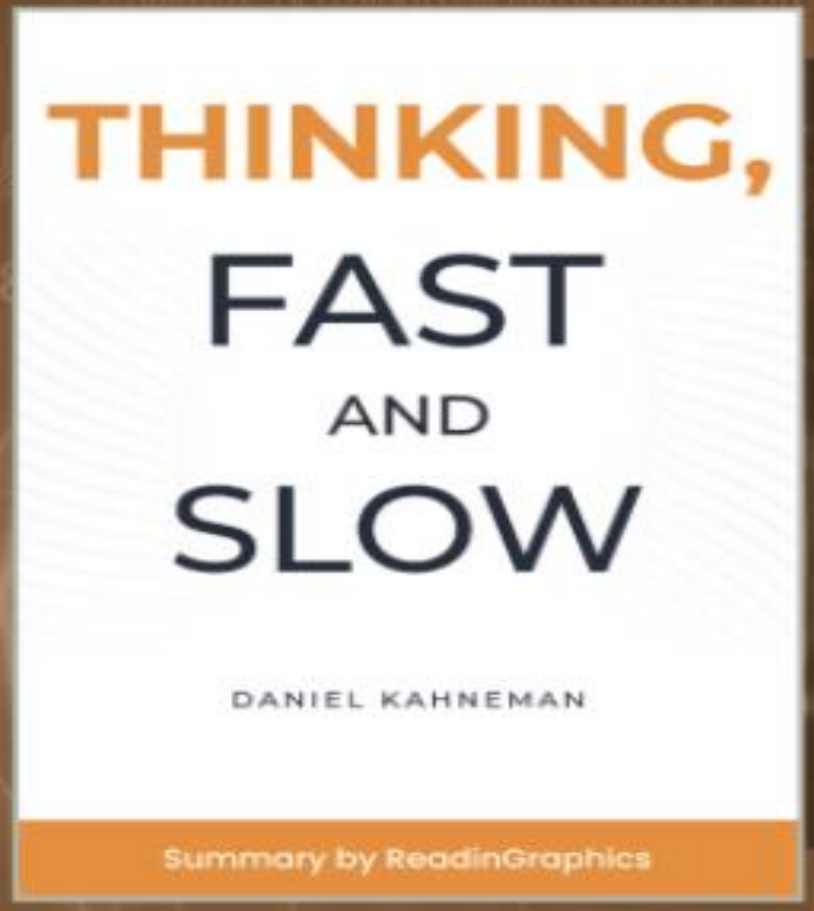
Questions

- Do we have a good indication?
- What are we trying to achieve?
- Do we have the expertise?
- What is the best approach?
- What patient specific factors need to be considered?

4 Types of Interventions

Well Indicated ***Well Executed***	***Well Indicated*** ***Poorly Executed***
Poorly Indicated ***Well Executed***	***Poorly Indicated*** ***Poorly Executed***

Decision Making



Thinking, Fast and Slow

Book Summary

"We humans constantly fool ourselves by constructing flimsy accounts of the past and believing they are true."

- Daniel Kahneman

READINGRAPHICS
Ideas Come Alive

Cognitive Traps in Decision Making

- Heuristics

  unconscious routines we use to enable us to cope with the complexity inherent in decision making

  - Pattern Recognition on Angiography

- Countered by Systematic Disciplined Approach

- Biases
  - Recommendations for Procedure
  - Timing
  - Borderline Indications
  - Emergency Situations
    - Systems 1 Thinking
    - Systems 2 Thinking
- Simulation

Pediatr Cardiol (2018) 39:160–167

Pediatr Cardiol (2018) 39:1281–1289

The greatest threats to complex systems are the result of human rather than technical failures.

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Indications

Neonate	COR	LOE
For the symptomatic neonate with TOF where a decision has been made to perform a palliative surgical procedure, strategies to provide adequate pulmonary blood flow may reasonably include a systemic-to-pulmonary shunt, a right ventricular outflow tract patch, and a right ventricle-to-pulmonary artery conduit.	IIa	C-EO

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Indications

AHA Scientific Statement

Indications for Cardiac Catheterization and Intervention in Pediatric Cardiac Disease

A Scientific Statement From the American Heart Association

Endorsed by the American Academy of Pediatrics and Society for Cardiovascular Angiography and Intervention

Timothy F. Feltes, MD, FAHA, Chair; Emile Bacha, MD; Robert H. Beekman III, MD, FAHA; John P. Cheatham, MD; Jeffrey A. Feinstein, MD, MPH; Antoinette S. Gomes, MD, FAHA; Ziyad M. Hijazi, MD, MPH, FAHA; Frank F. Ing, MD; Michael de Moor, MBBCh; W. Robert Morrow, MD; Charles E. Mullins, MD, FAHA; Kathryn A. Taubert, PhD, FAHA; Evan M. Zahn, MD; on behalf of the American Heart Association Congenital Cardiac Defects Committee of the Council on Cardiovascular Disease in the Young, Council on Clinical Cardiology, and Council on Cardiovascular Radiology and Intervention

(*Circulation*. 2011;123:2607-2652.)

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RVOT Stenting Indications

General Indications
• General considerations: Indications that should strongly be considered: High-risk symptomatic infants requiring pulmonary blood blow augmentation in the setting of tetralogy of Fallot or variants of RVOTO with VSD. Indications that may be considered: Standard risk symptomatic infants with tetralogy of Fallot or variants of RVOTO with VSD. Standard risk asymptomatic infants with tetralogy of Fallot or variants of RVOTO with VSD with severe branch pulmonary stenosis (pulmonary artery z-score < -3) Procedure specific considerations: A transcatheter approach should be strongly considered: In high-risk infants who are poor candidates for either primary repair or surgical systemic to pulmonary shunting following discussion in a multidisciplinary team setting in conjunction with cardiothoracic surgery.
Age specific considerations
• In infants <2kgs, a hybrid transventricular approach to RVOT stenting maybe considered.
Regional considerations
• Transcatheter therapy could be considered in patients in resource limited environments where access to surgical therapy may not be available.
Potential harm or lack of benefit
• Asymptomatic infants with tetralogy of Fallot or variants Malposed great arteries with mitral-pulmonary continuity Coronary artery compression

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What Are We Trying to Achieve?

- Secure acceptable pulmonary blood flow
- Lowest possible 30 Day Mortality
- Branch pulmonary artery growth
- Low Reintervention Rates
- Preservation of native pulmonary valve
- Minimal PA Distortion
- Healthcare Costs/Resources?
- Longer-term Goals
  - Longest Event/Symptom Free survival
  - Least possible number of Re-interventions

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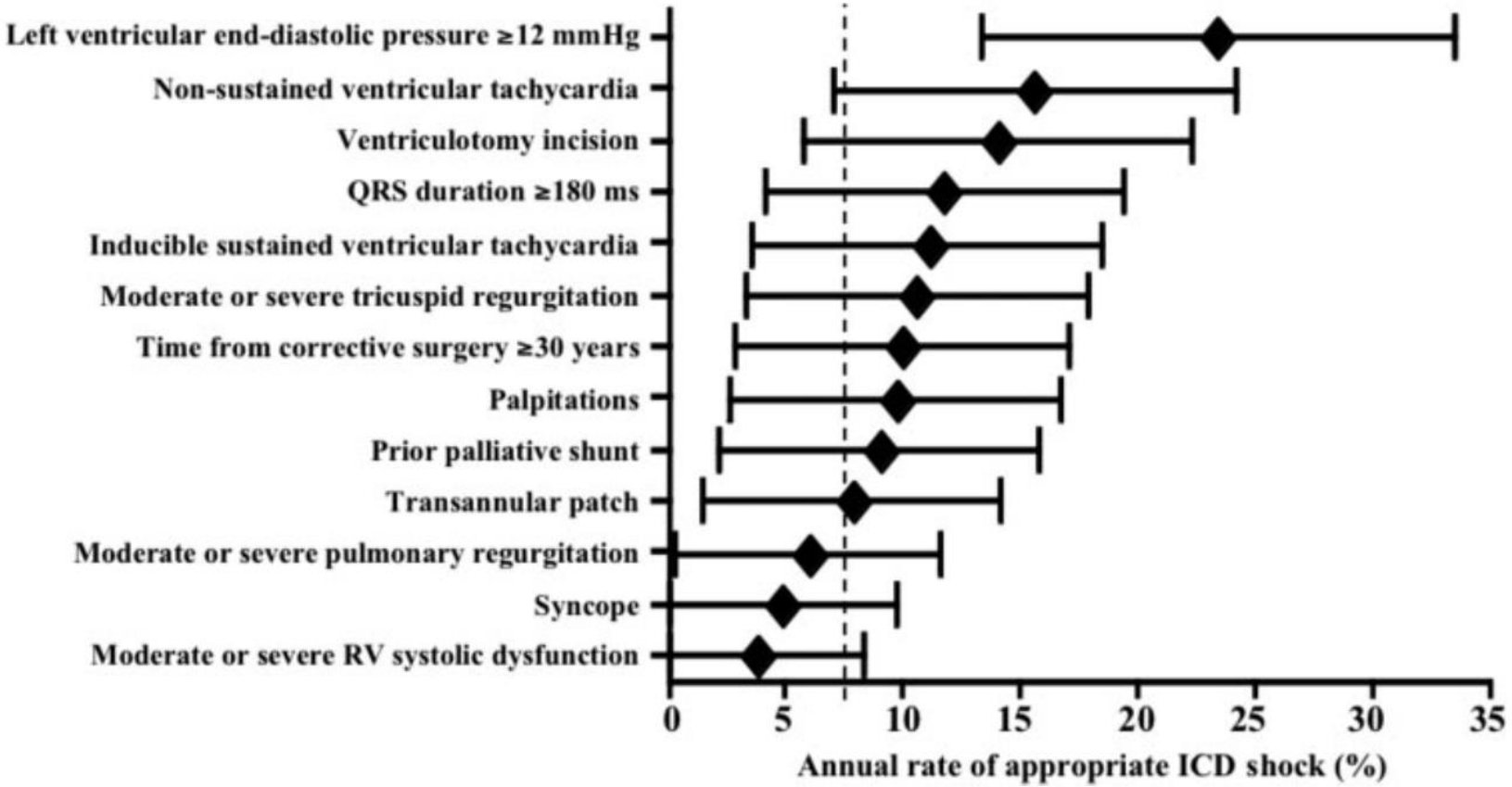
Lifetime Management



Circulation. 2008;117:363-370.

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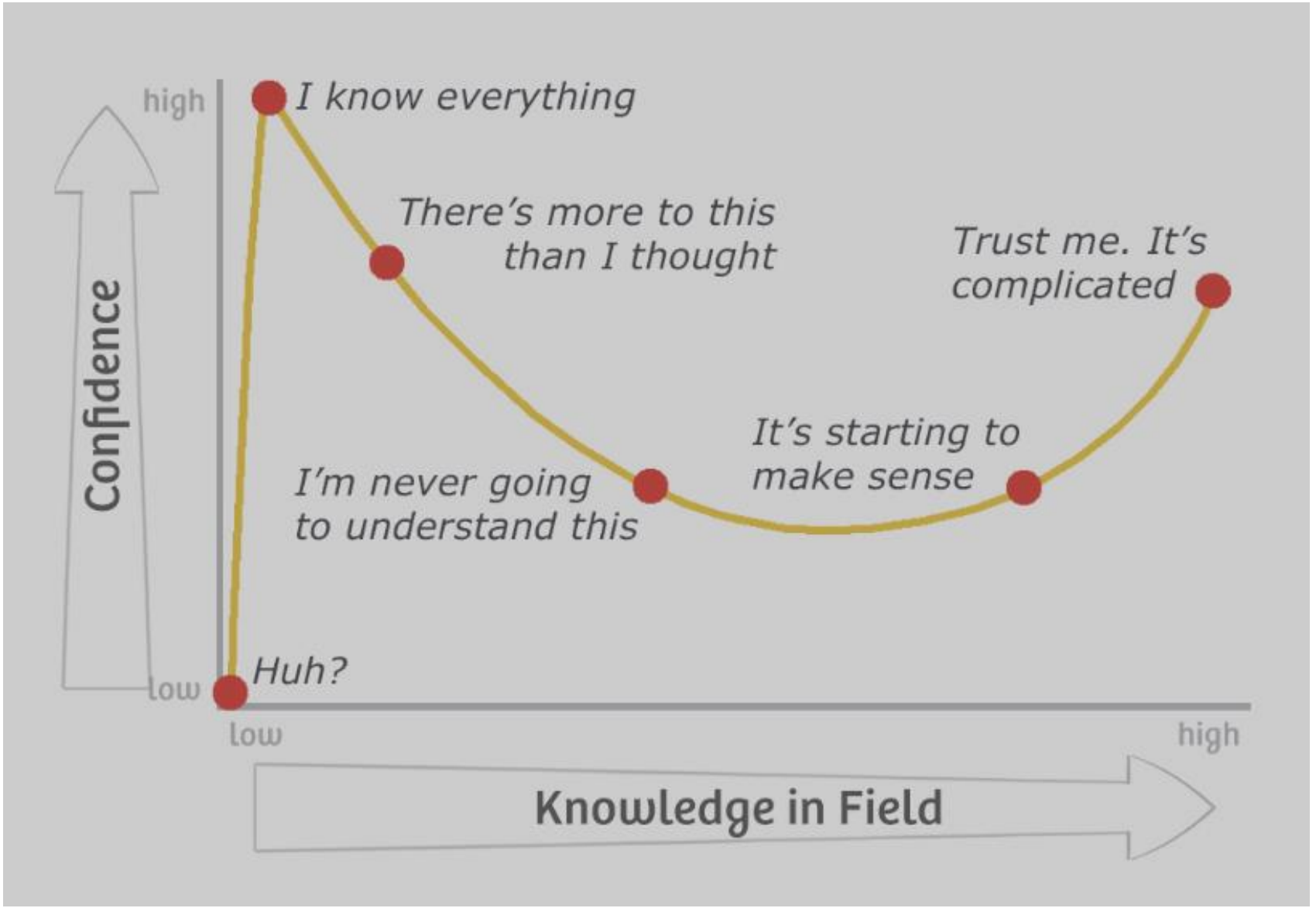
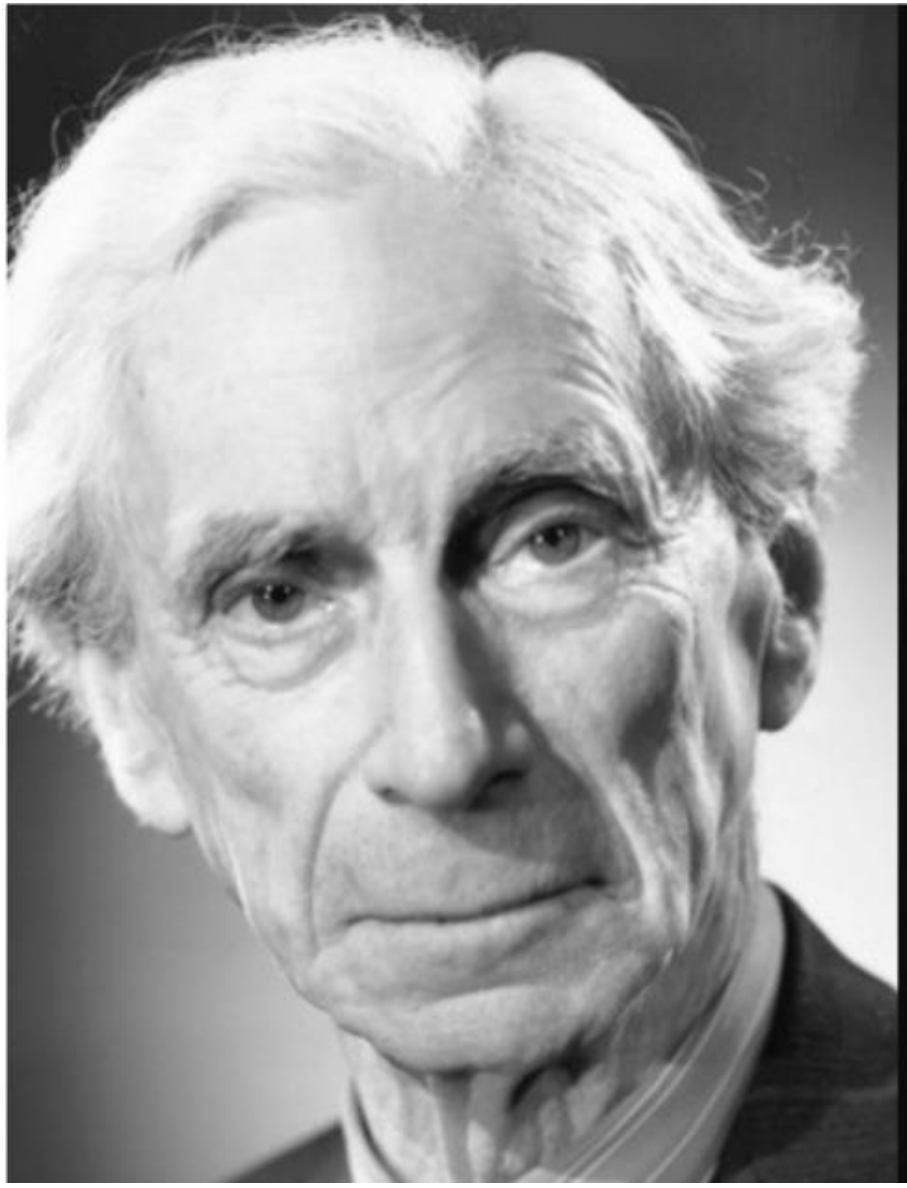
Do We Have the Expertise?


high
I know everything
There's more to this than I thought
Trust me. It's complicated
It's starting to make sense
I'm never going to understand this
Huh?
low
Confidence
low
high
Knowledge in Field



The degree of one's emotions varies inversely with one's knowledge of the facts - the less you know the hotter you get.

— Bertrand Russell —

AZ QUOTES

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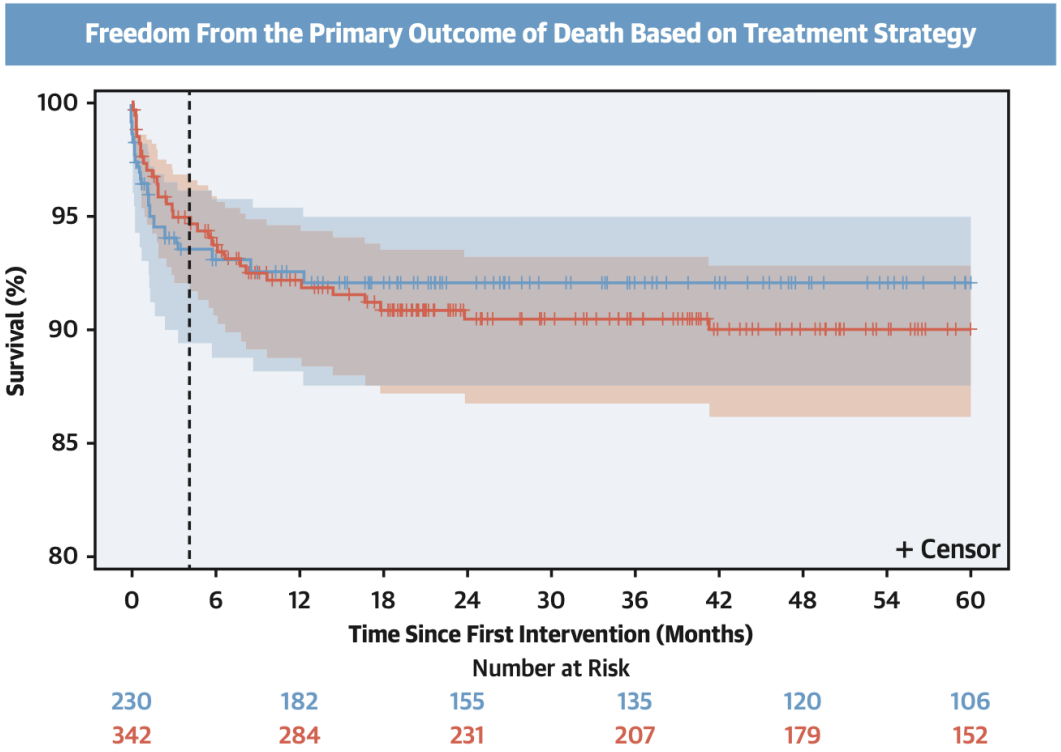
What Is the Best Approach?

(J Am Coll Cardiol 2021;77:1093–106)

Comparison of Management Strategies for Neonates With Symptomatic Tetralogy of Fallot

Bryan H. Goldstein, MD,[a,b,c,d] Christopher J. Petit, MD,[e] Athar M. Qureshi, MD,[f,g] Courtney E. McCracken, PhD,[e] Michael S. Kelleman, MS, MSPH,[e] George T. Nicholson, MD,[h] Mark A. Law, MD,[i] Jeffery J. Meadows, MD,[j] Jeffrey D. Zampi, MD,[k] Shabana Shahanavaz, MD,[l] Christopher E. Mascio, MD,[m,n] Paul J. Chai, MD,[e] Jennifer C. Romano, MD,[k] Sarosh P. Batlivala, MD,[c,d] Shiraz A. Maskatia, MD,[o,p] Ivor B. Asztalos, MD, MSCE,[m,n] Alicia M. Kamsheh, MD,[m,n] Steven J. Healan, MD, MSCI,[h] Justin D. Smith, MD,[k] R. Allen Ligon, MD,[e] Joelle A. Pettus, MPH, MS,[e] Sarina Juma, MPH,[e] James E.B. Raulston, MD,[i] Krissie M. Hock, MSN, RN, CNL,[i] Amy L. Pajk, MBA,[c,d] Lindsay F. Eilers, MD,[f,g] Hala Q. Khan, BS,[f,g] Taylor C. Merritt, RN, BSN,[l] Matthew Canter, MET,[l] Stephan Juergensen, MD,[j] Fatuma-Ayaan Rinderknecht, BA,[j] Holly Bauser-Heaton, MD, PhD,[e] Andrew C. Glatz, MD, MSCE[m,n,q]



CONGENITAL HEART SURGERY:

The Annals of Thoracic Surgery CME Program is located online at http://www.annalsthoracicsurgery.org/cme/home. To take the CME activity related to this article, you must have either an STS member or an individual non-member subscription to the journal.

Staged vs Complete Repair in Tetralogy of Fallot With Pulmonary Atresia

Katerina Boucek, MD,[1] Christopher W. Mastropietro, MD, FCCM,[2] Jonathan Beall, PhD,[3] Everette Keller, MS,[3] Asaad Beshish, MD,[4] Saul Flores, MD,[5] Meghan Chlebowski, MD, MHPE,[6] Andrew R. Yates, MD,[7] Tarif A. Choudhury, MD,[8] Dana Mueller, MD,[9] David M. Kwiatkowski, MD,[10] Karl Migally, MD,[11] Karan Karki, MD,[12] Renee Willett, MD,[13] Monique R. Radman, MD, MAS,[14] Chetana Reddy, MD,[15] Kurt Piggott, MD,[16] Christine A. Capone, MD, MPH,[17] Yamini Kapileshwarkar, MD,[18] Niranjan Vijayakumar, MD,[19] Elizabeth Prentice, DO,[20] Sukumar Suguna Narasimhulu, MD, MPH,[21] Renee H. Martin, PhD,[3] and John M. Costello, MD, MPH[1], for the Collaborative Research from the Pediatric Cardiac Intensive Care Society (CoRe-PCICS) Investigators

(Ann Thorac Surg 2023;115:1463-9)

Congenital heart disease
Original research article

Primary repair versus surgical and transcatheter palliation in infants with tetralogy of Fallot

Dan M Dorobantu [1, 2, 3], Alireza S Mahani [4], Mansour T A Sharabiani [5], Ragini Pandey [1], Gianni D Angelini [3], Andrew J Parry [1], Robert M R Tulloh [1, 3], Robin P Martin [1], Serban C Stoica [1, 3]

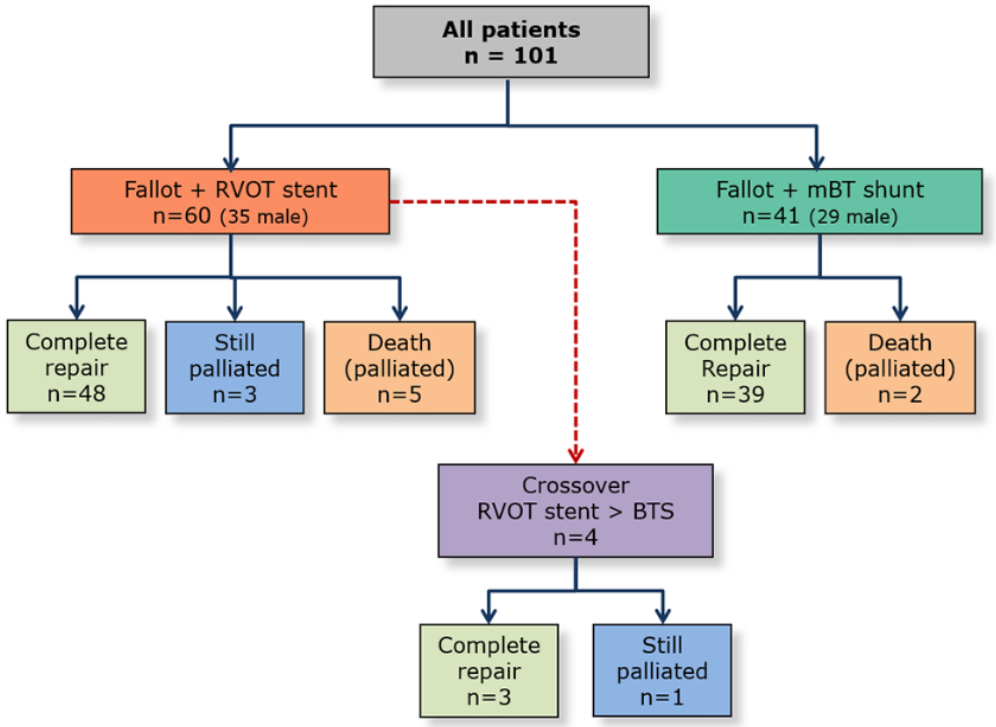
Correspondence to Dr Dan M Dorobantu, Department of Cardiology, "Prof. C.C. Iliescu" Emergency Institute for Cardiovascular Diseases, Bucuresti 022322, Romania; dn.dorobantu@gmail.com

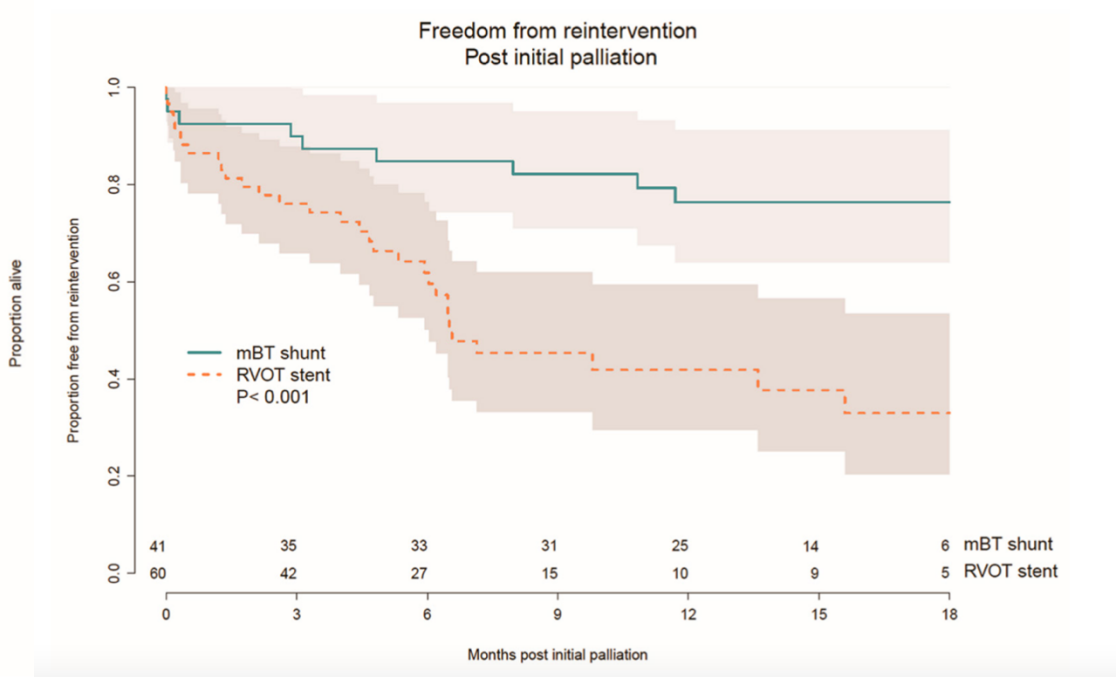
Heart. 2018 Nov;104(22):1864-1870

ORIGINAL RESEARCH ARTICLE

Right ventricular outflow tract stent versus BT shunt palliation in Tetralogy of Fallot

Daniel Quandt,[1,2] Bharat Ramchandani,[1] Gemma Penford,[1] John Stickley,[1] Vinay Bhole,[1] Chetan Mehta,[1] Timothy Jones,[1] David James Barron,[1] Oliver Stumper[1]





Heart 2017;**103**:1985–1991.

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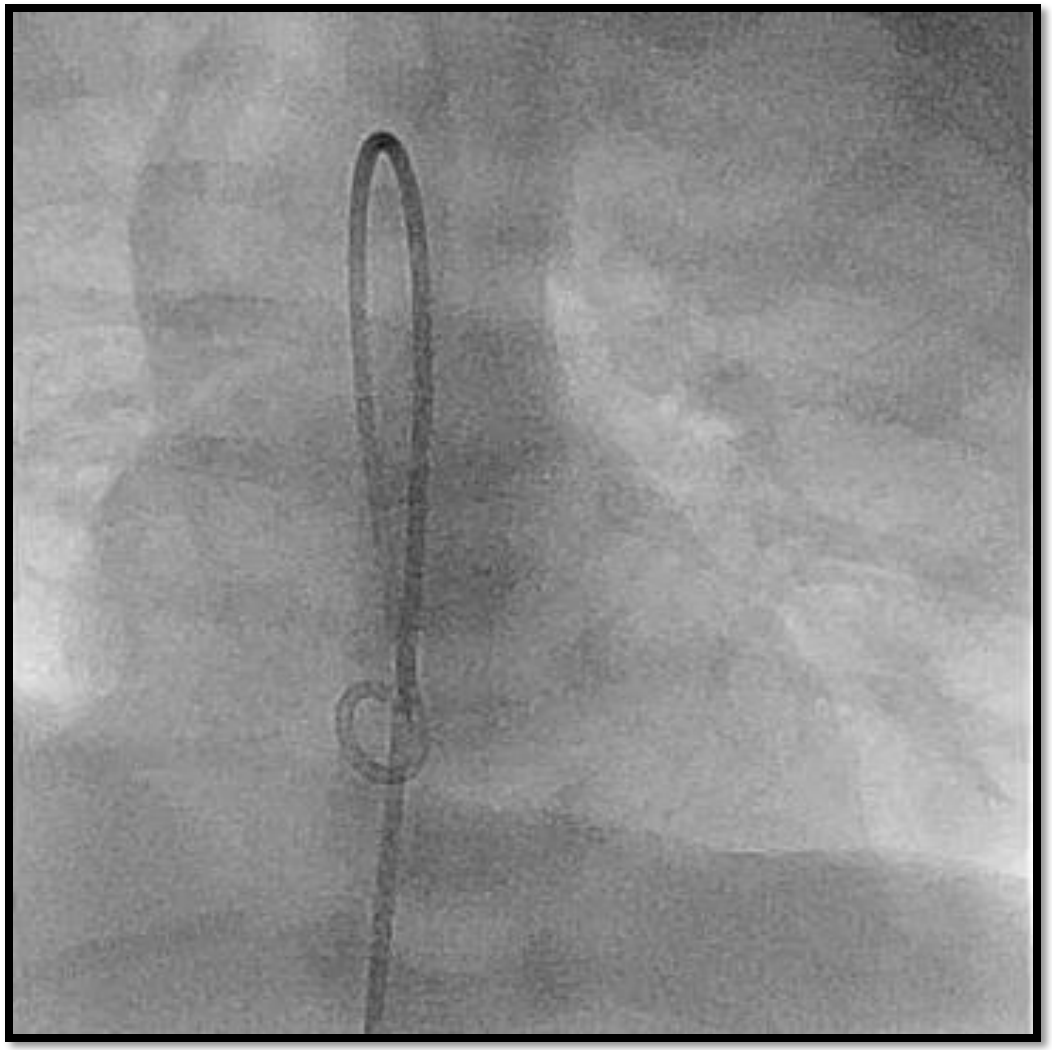
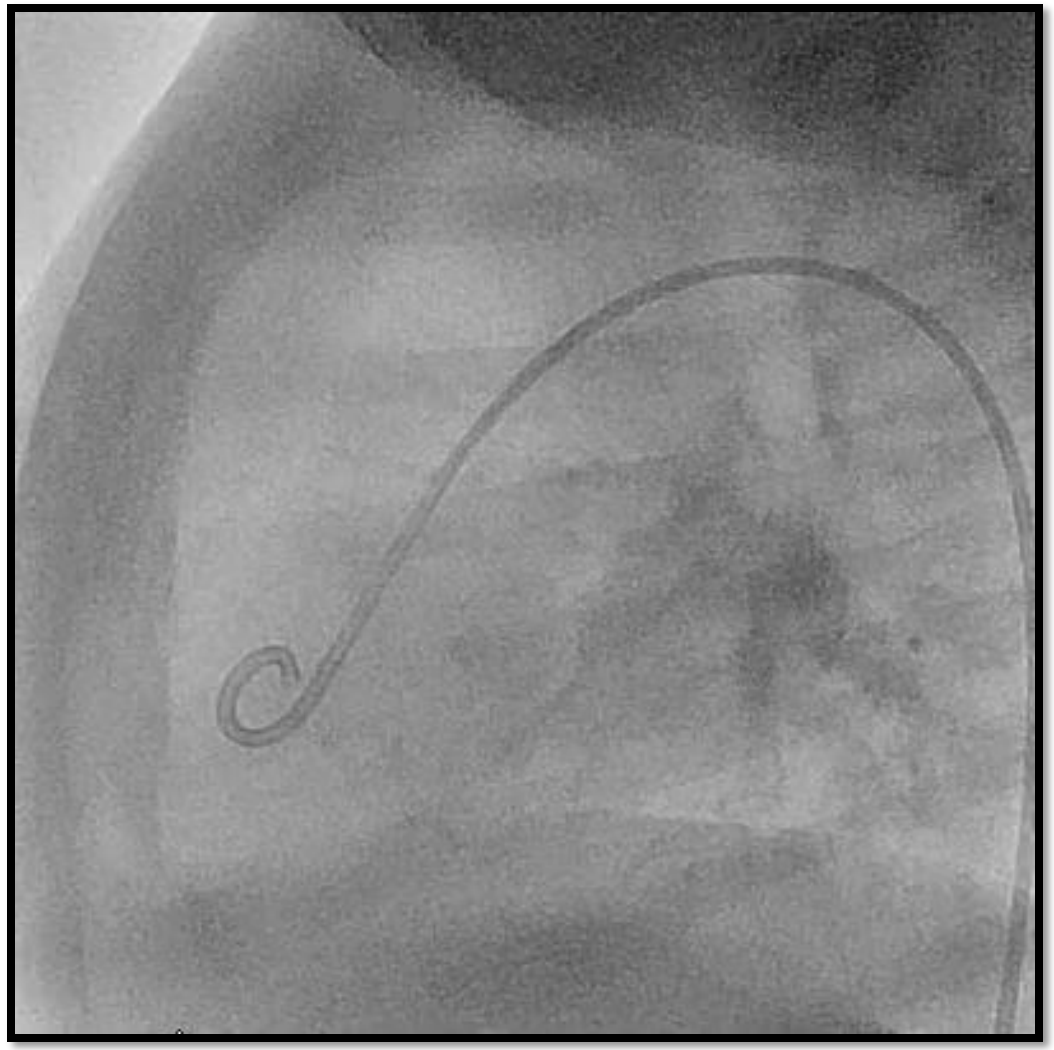
RVOT Stent





Catheter Cardiovasc Interv. 2021 Aug 1;98(2):E275-E281.

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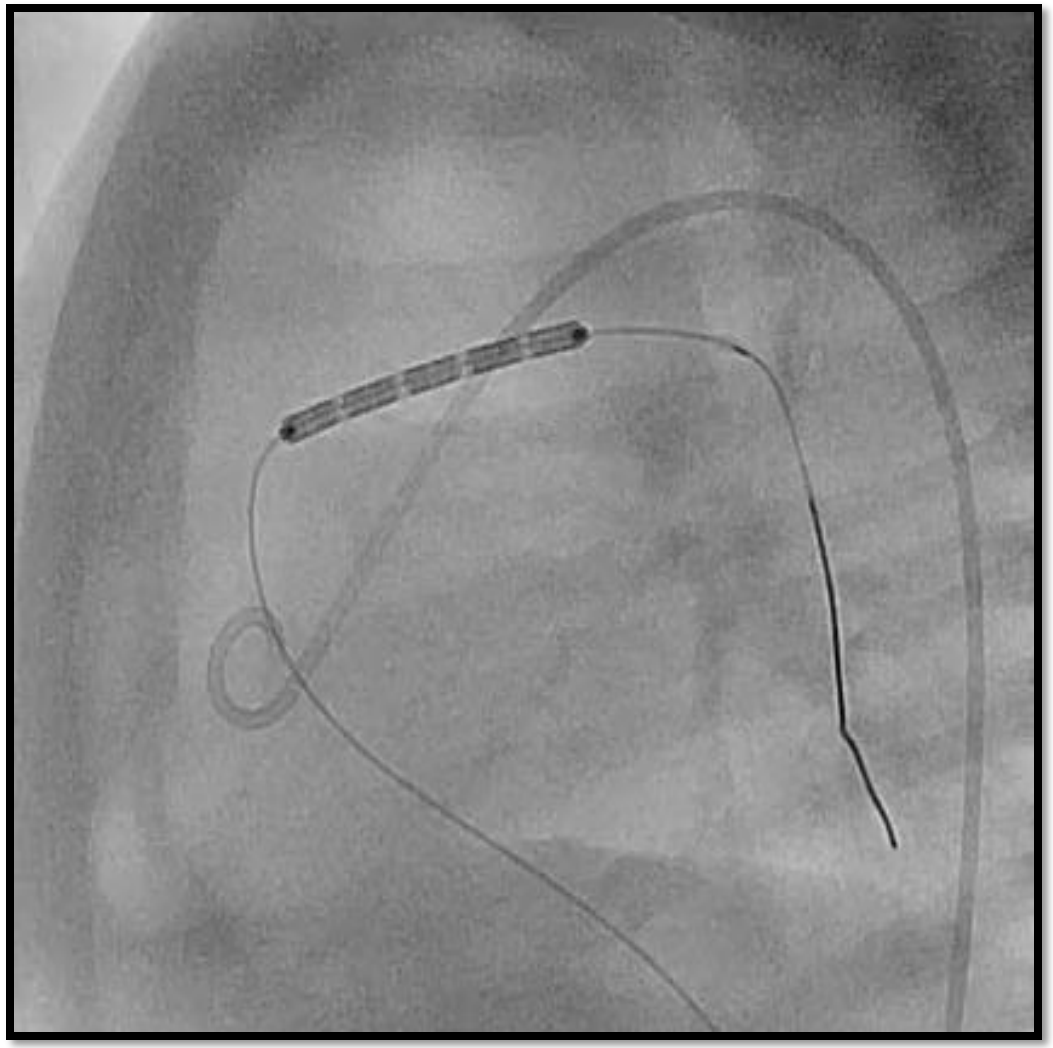
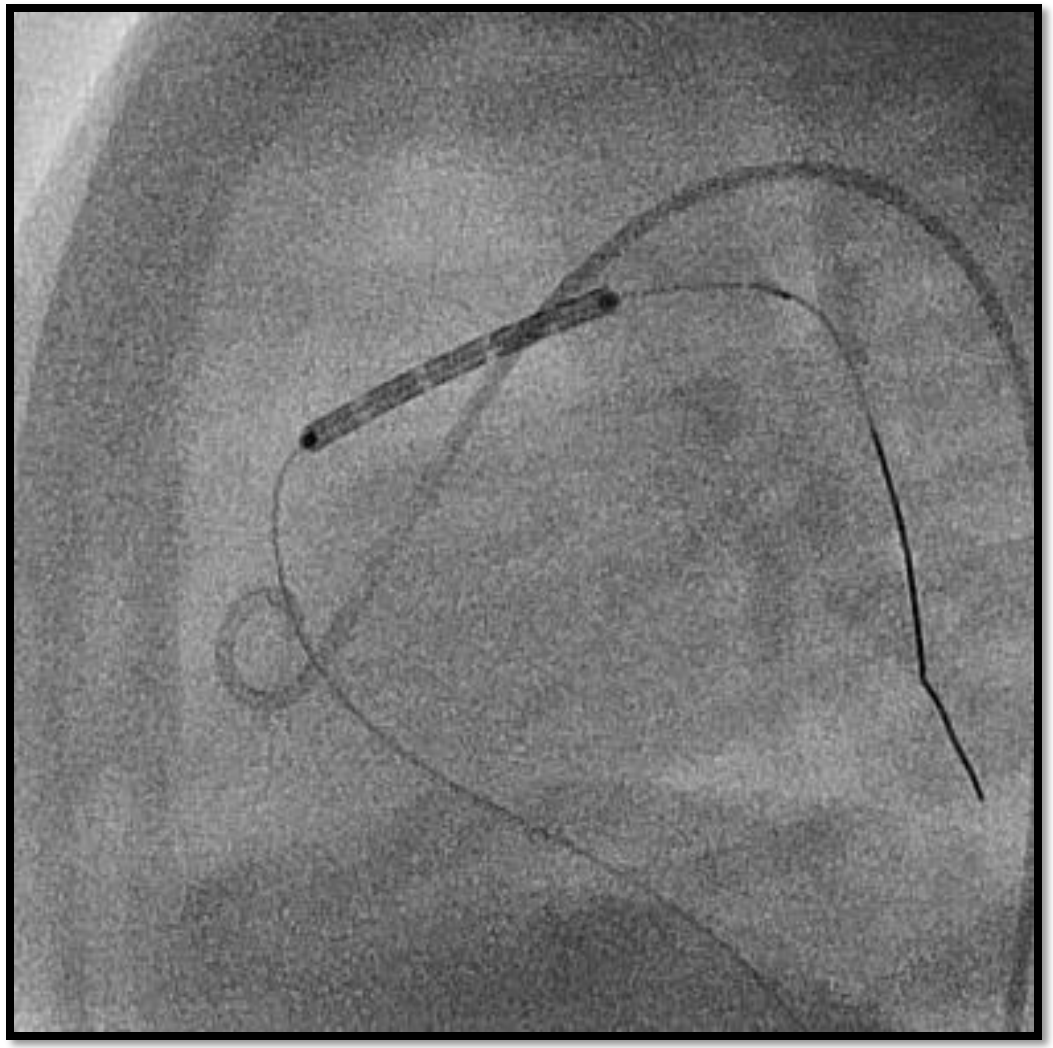
6x20mm F418





Catheter Cardiovasc Interv. 2021 Aug 1;98(2):E275-E281.

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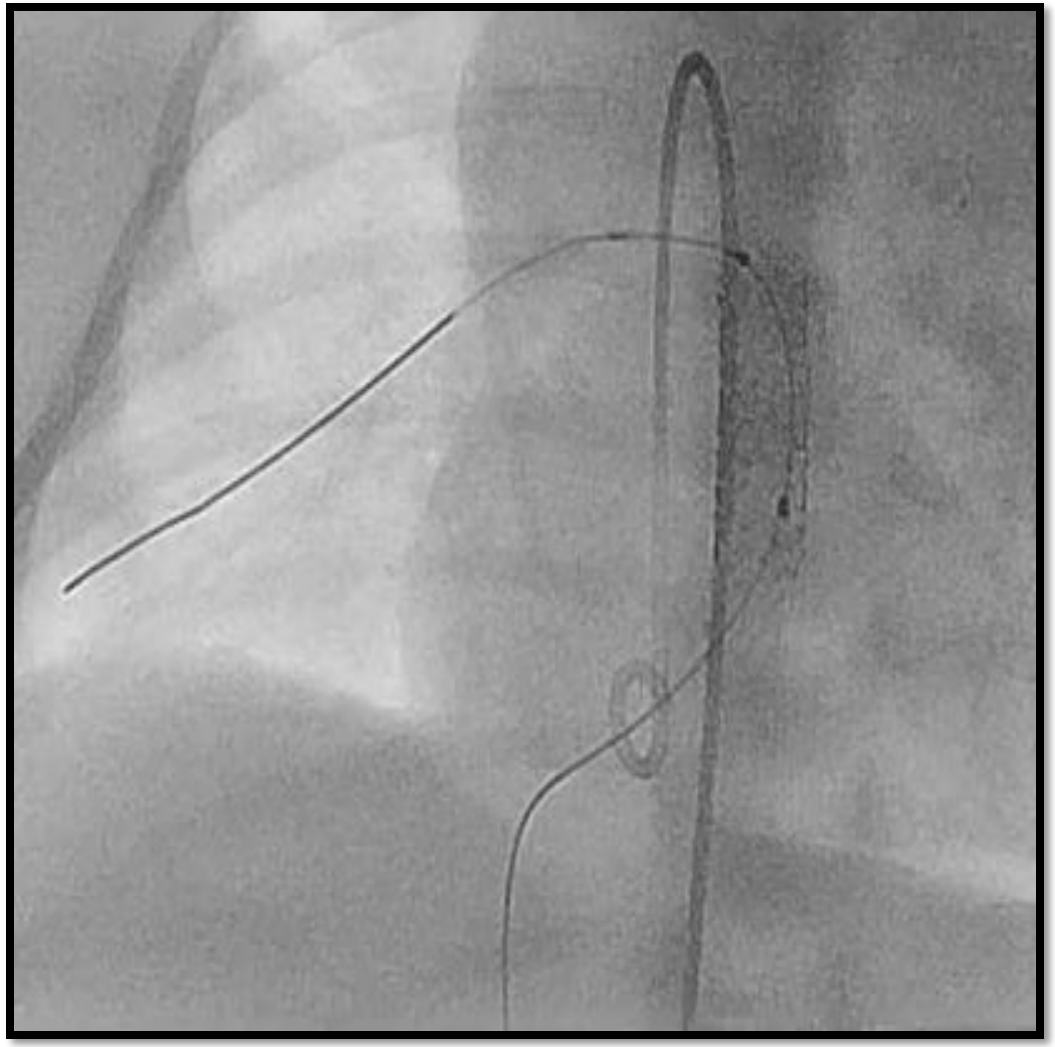
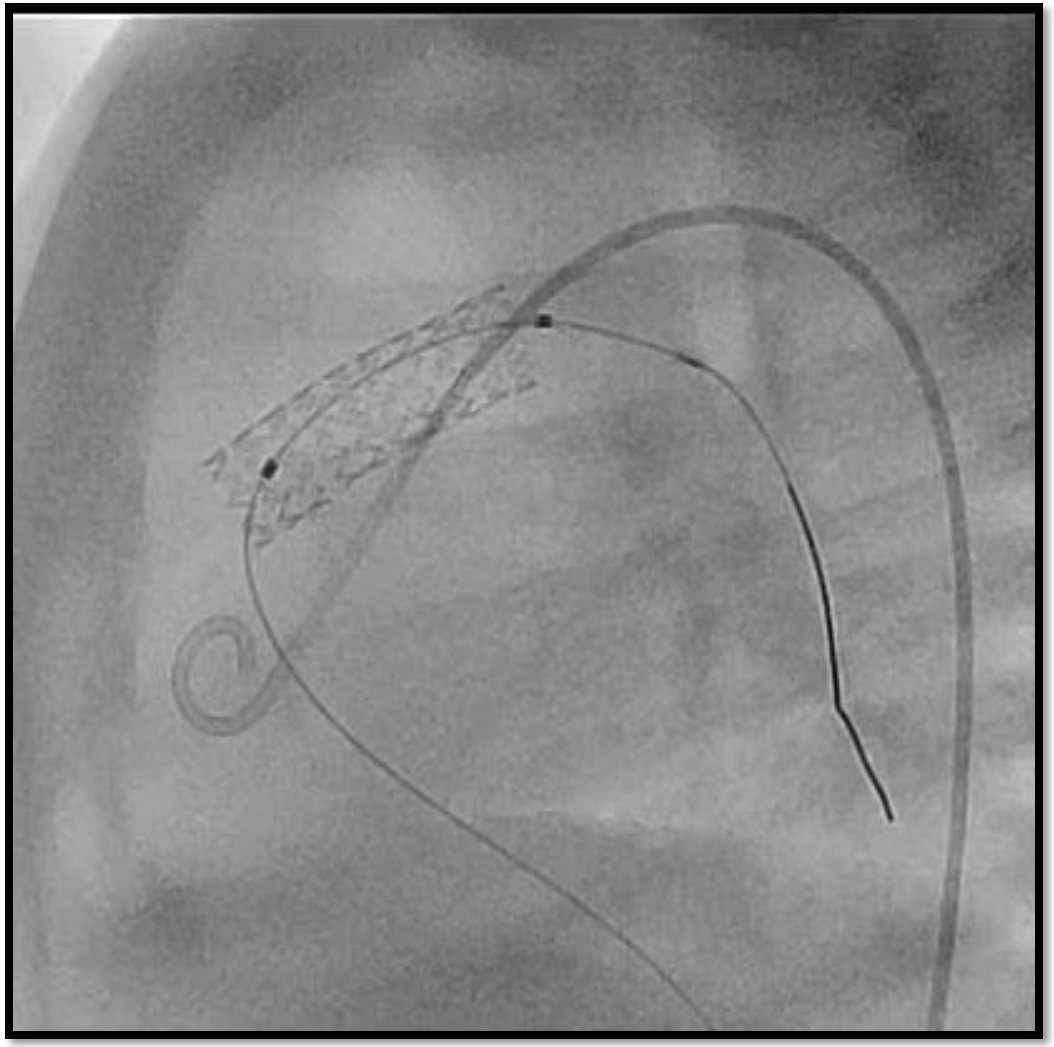
Final Result





Catheter Cardiovasc Interv. 2021 Aug 1;98(2):E275-E281.

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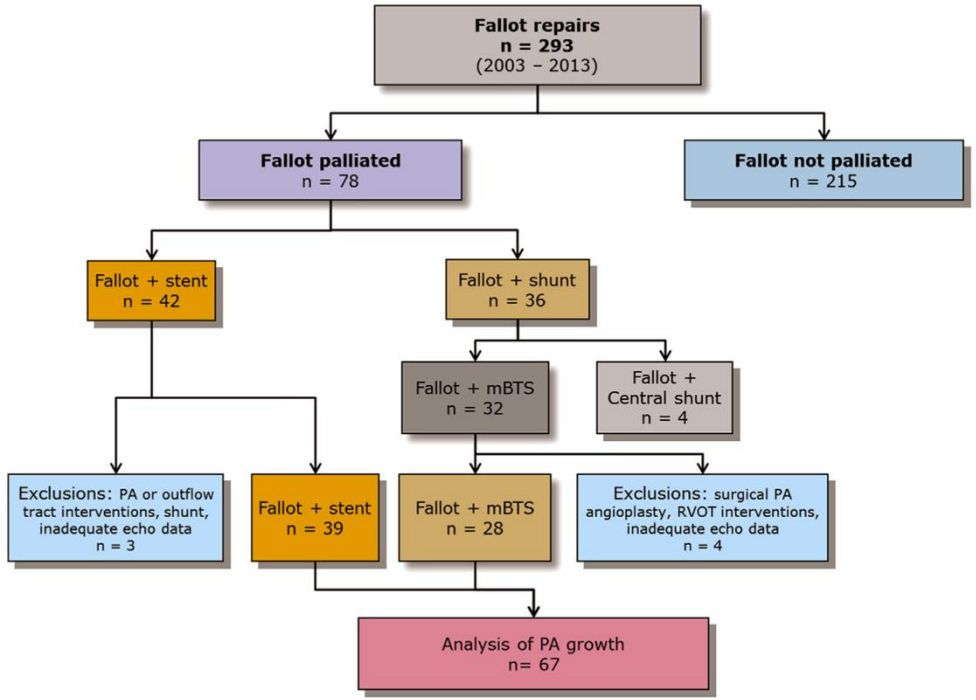
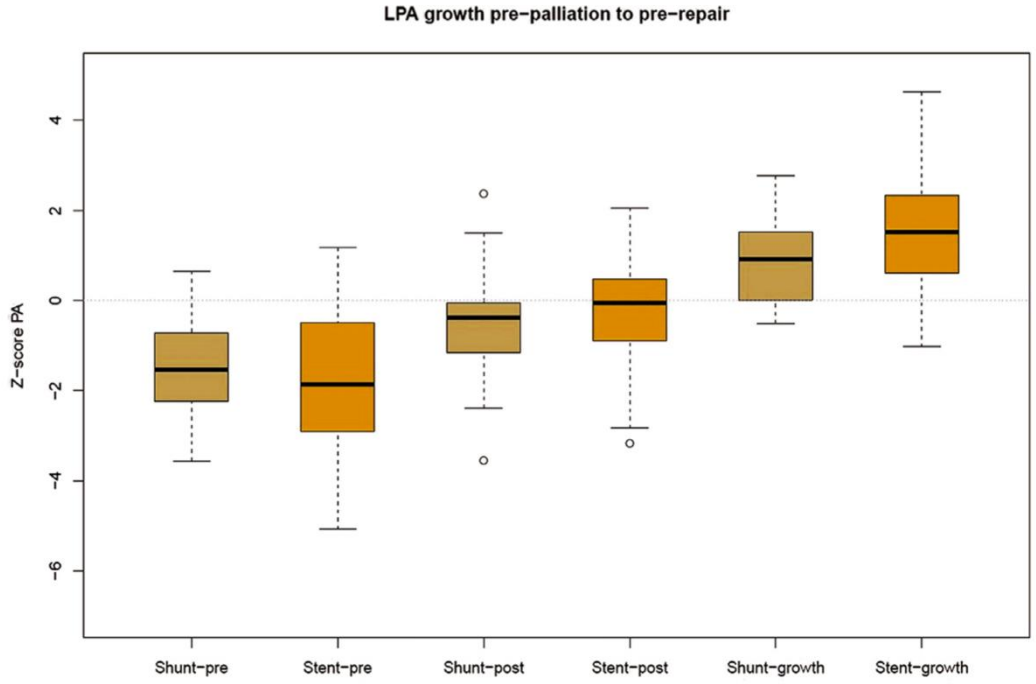
Stenting of the Right Ventricular Outflow Tract Promotes Better Pulmonary Arterial Growth Compared With Modified Blalock-Taussig Shunt Palliation in Tetralogy of Fallot–Type Lesions

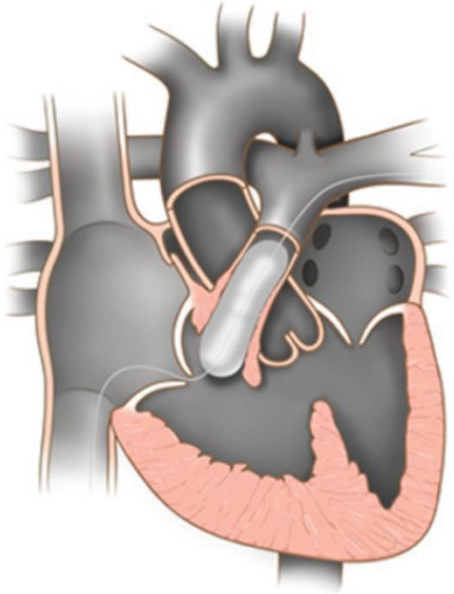
Daniel Quandt, MD, Bharat Ramchandani, MD, John Stickley, Chetan Mehta, MD, Vinay Bhole, MD, David J. Barron, MD, Oliver Stumper, MD, PhD





Transcatheter Approaches to Palliation for Tetralogy of Fallot

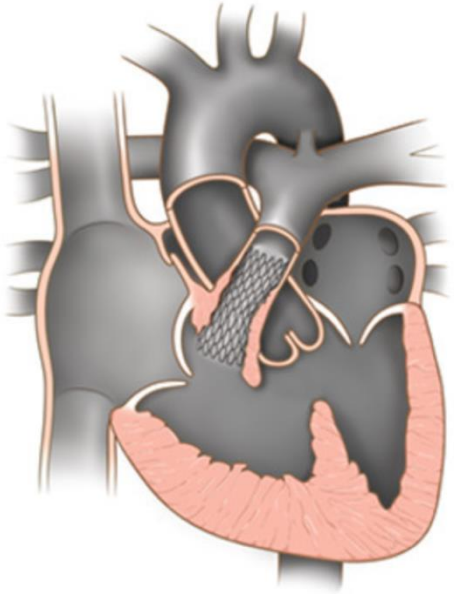
Balloon Pulmonary Valvuloplasty



PRO Technically least challenging

CON High failure rate

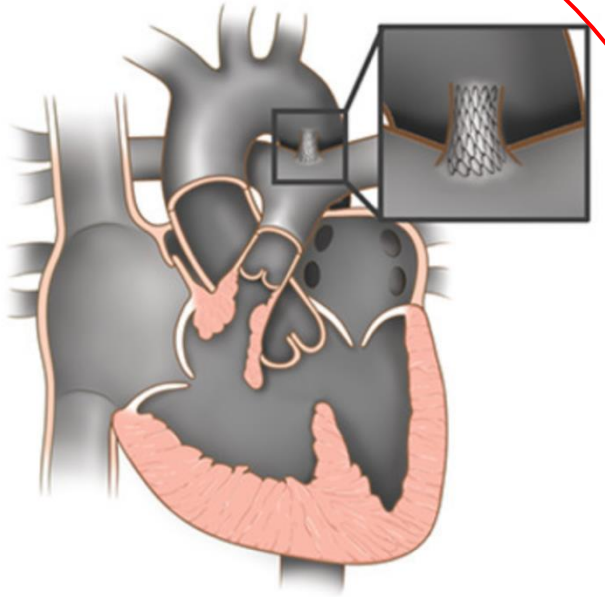
Right Ventricular Outflow Tract Stent



PRO Good PA growth
Most physiologic circulation

CON Stent resection at time of complete repair

Patent Ductus Arteriosus Stent



PRO Good PA growth
Relief of cyanosis

CON Can be technically challenging/ learning curve involved

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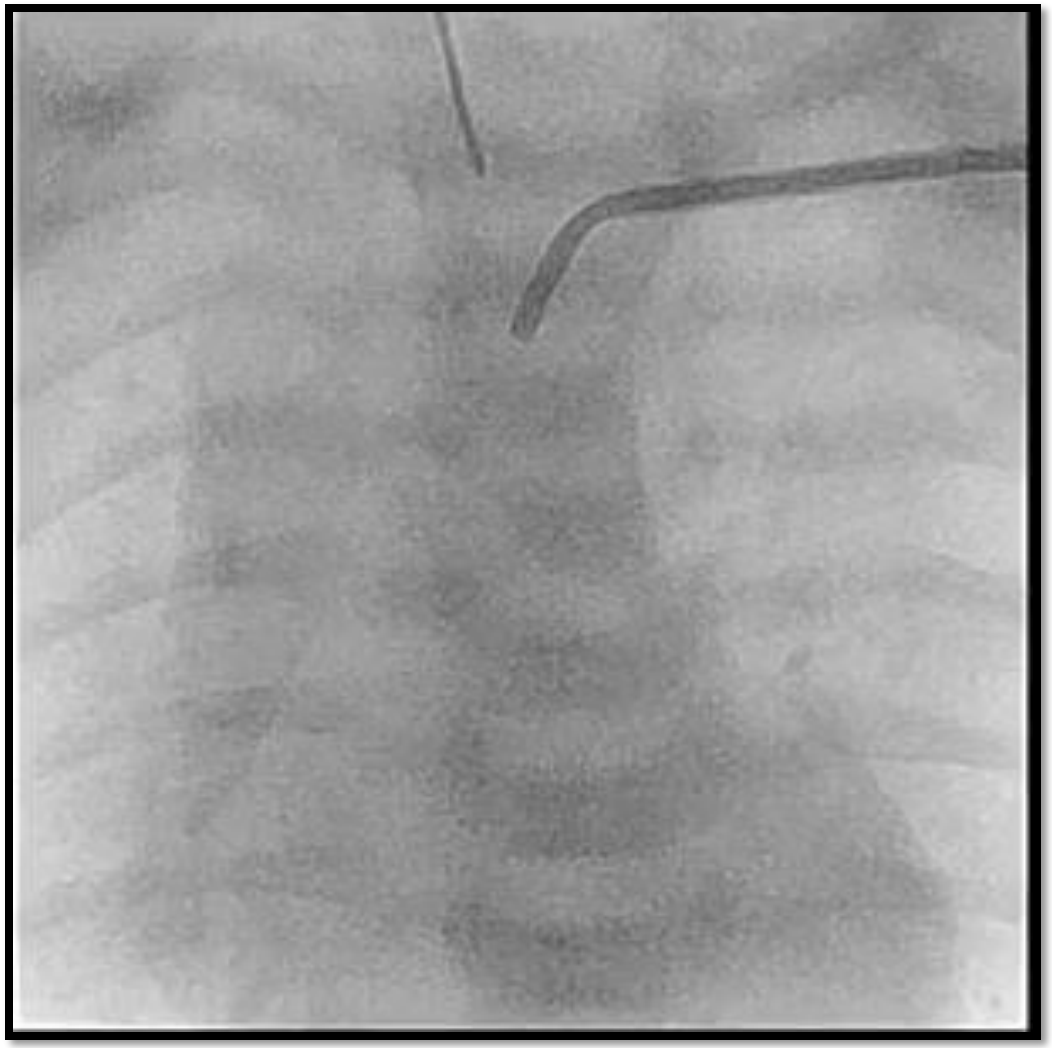
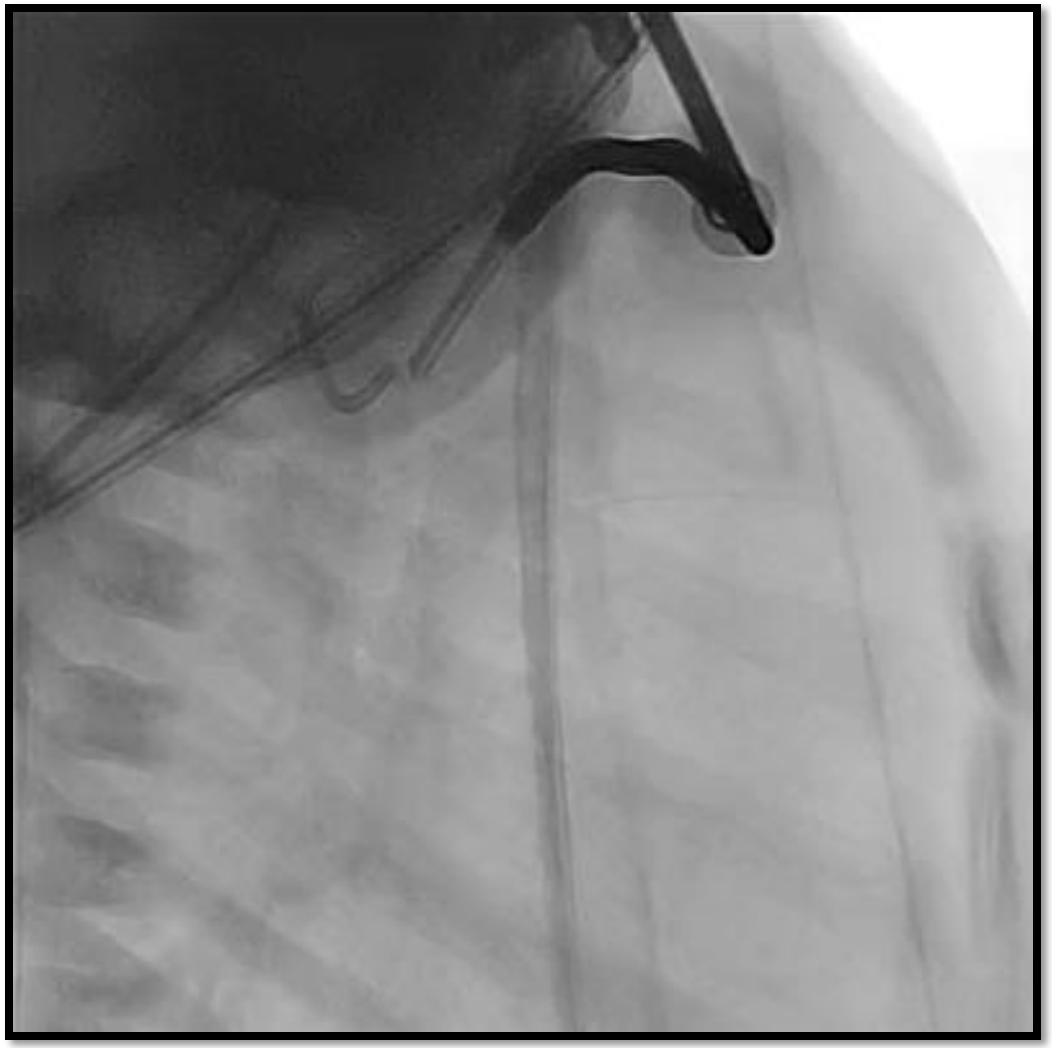
PDA Stent





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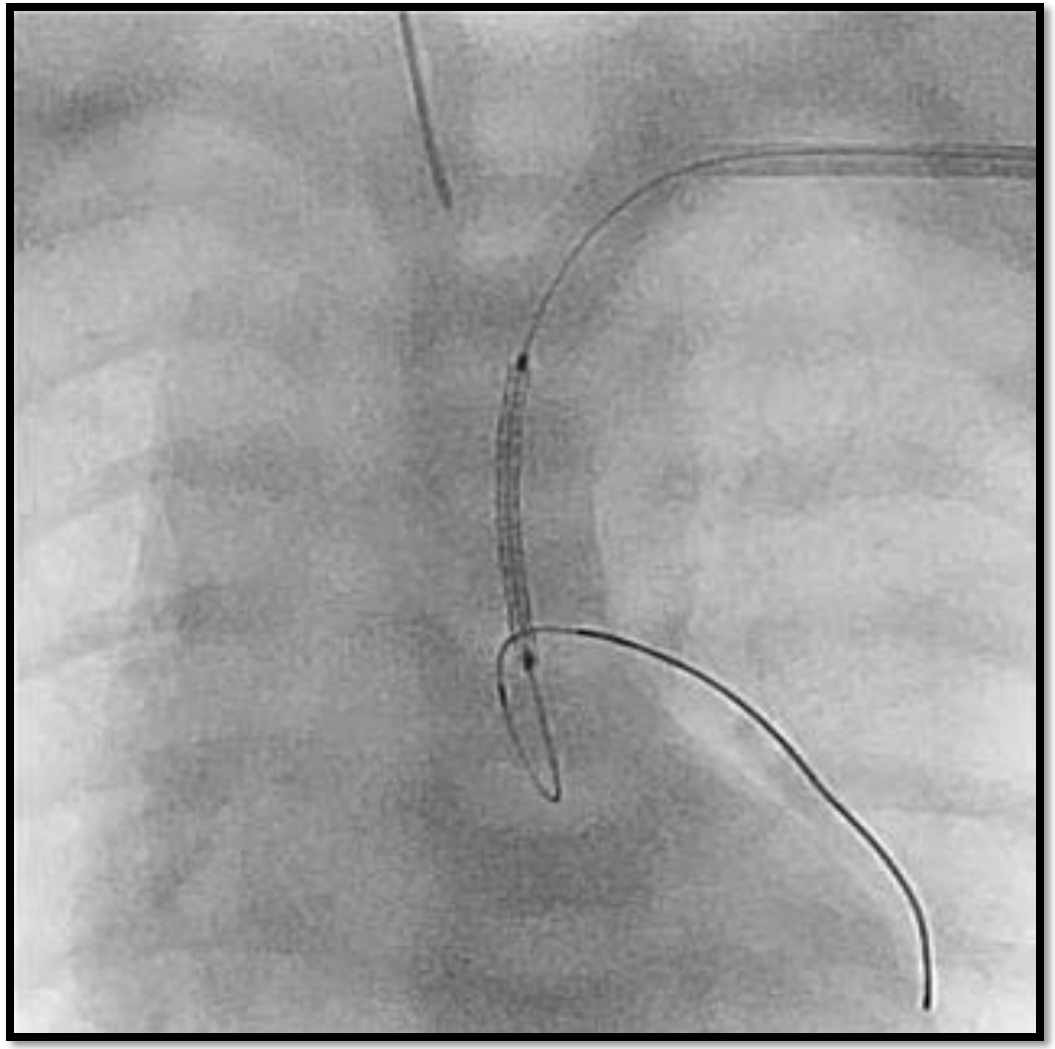
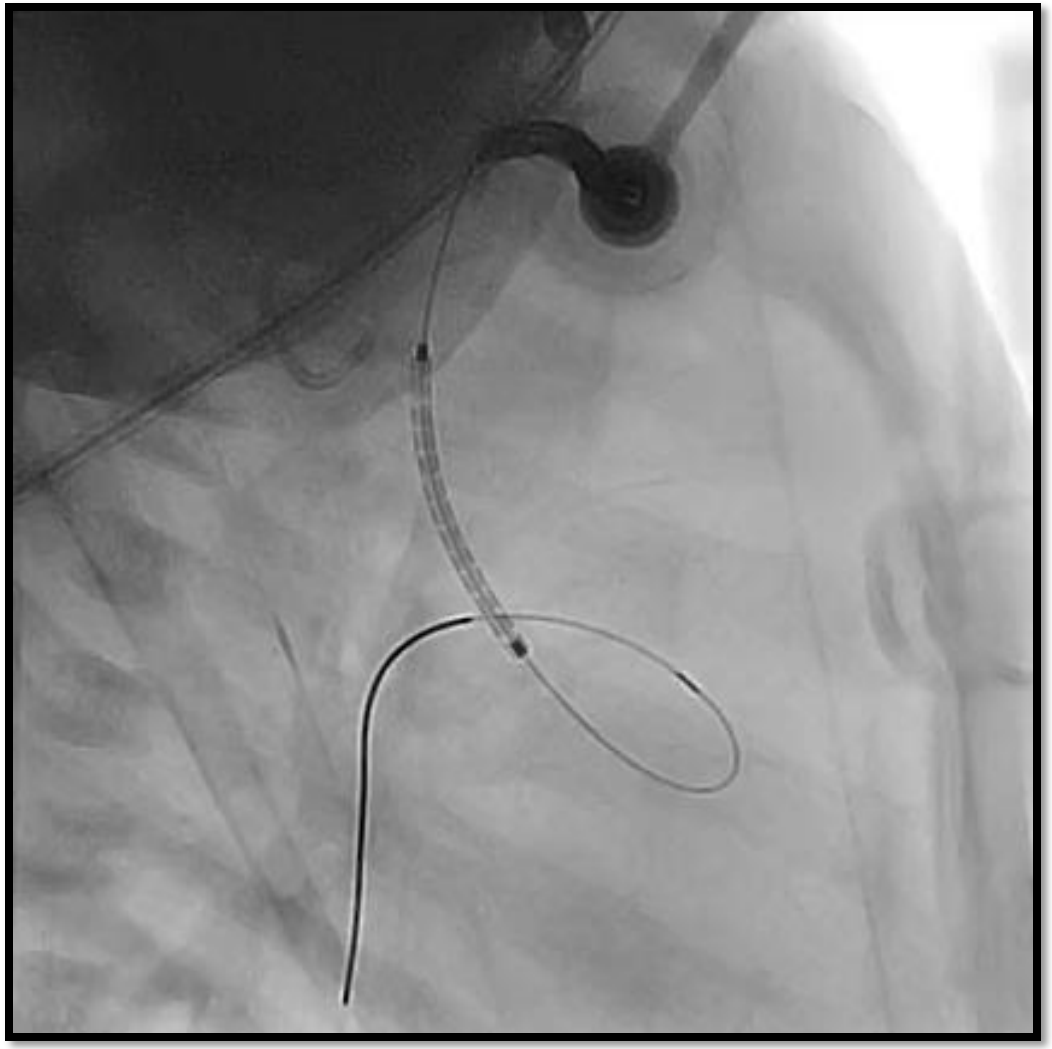
Axillary Approach





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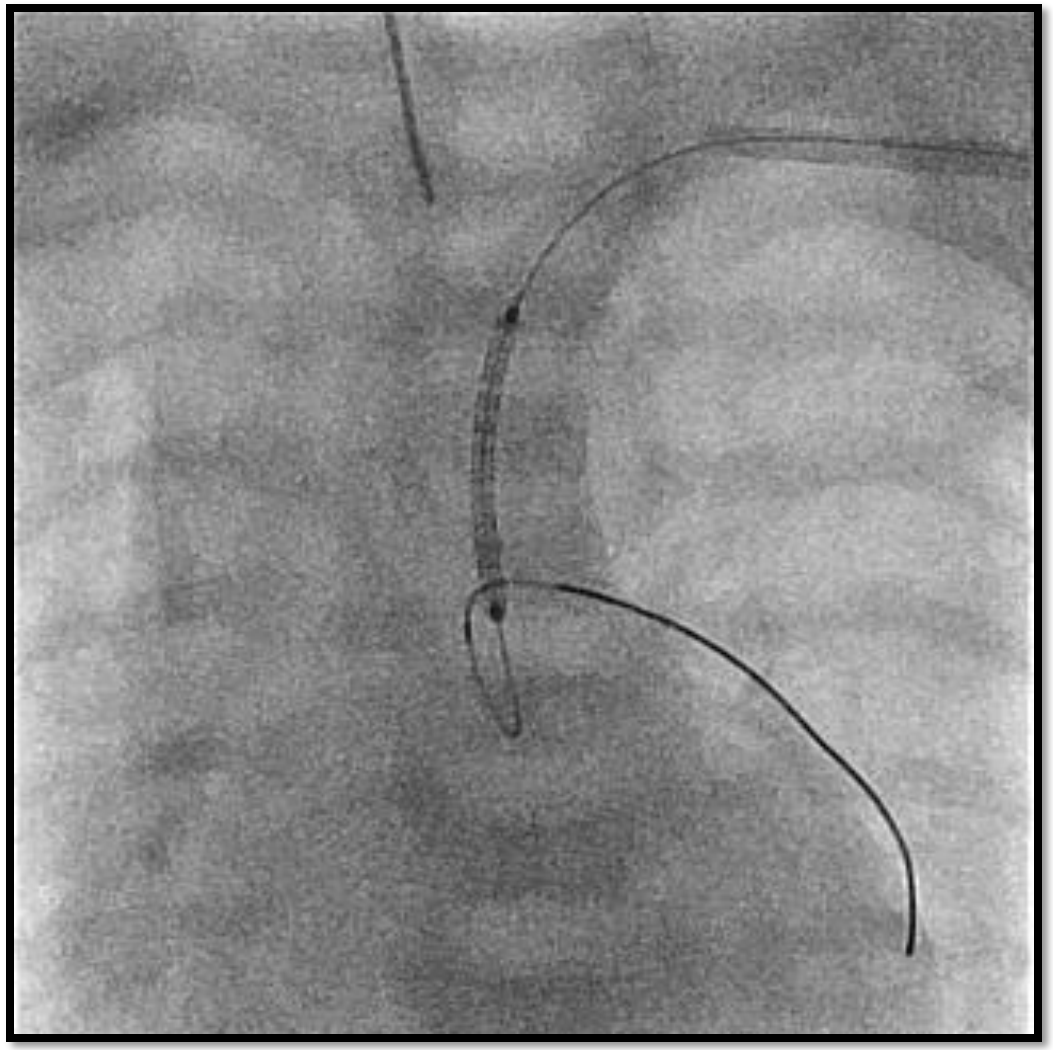
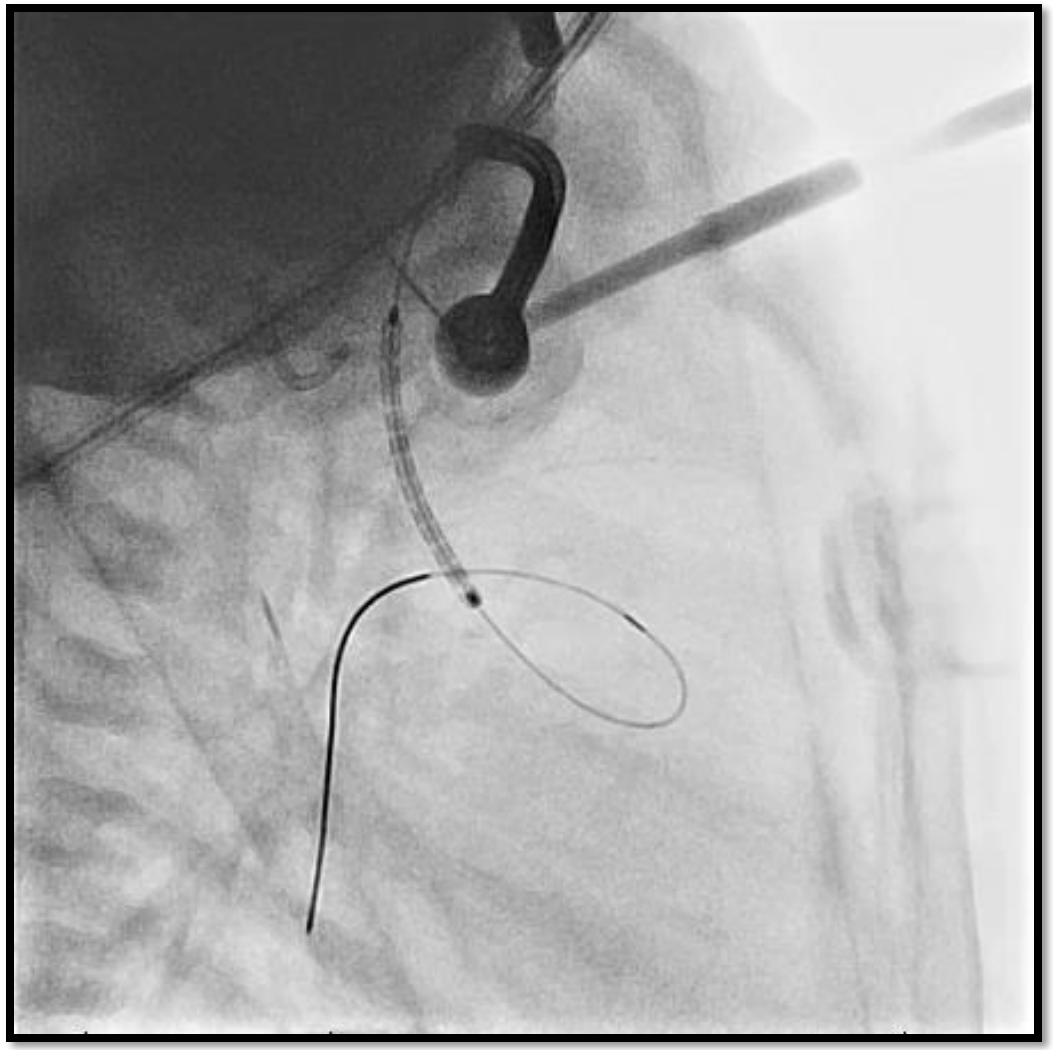
Stent Deployment





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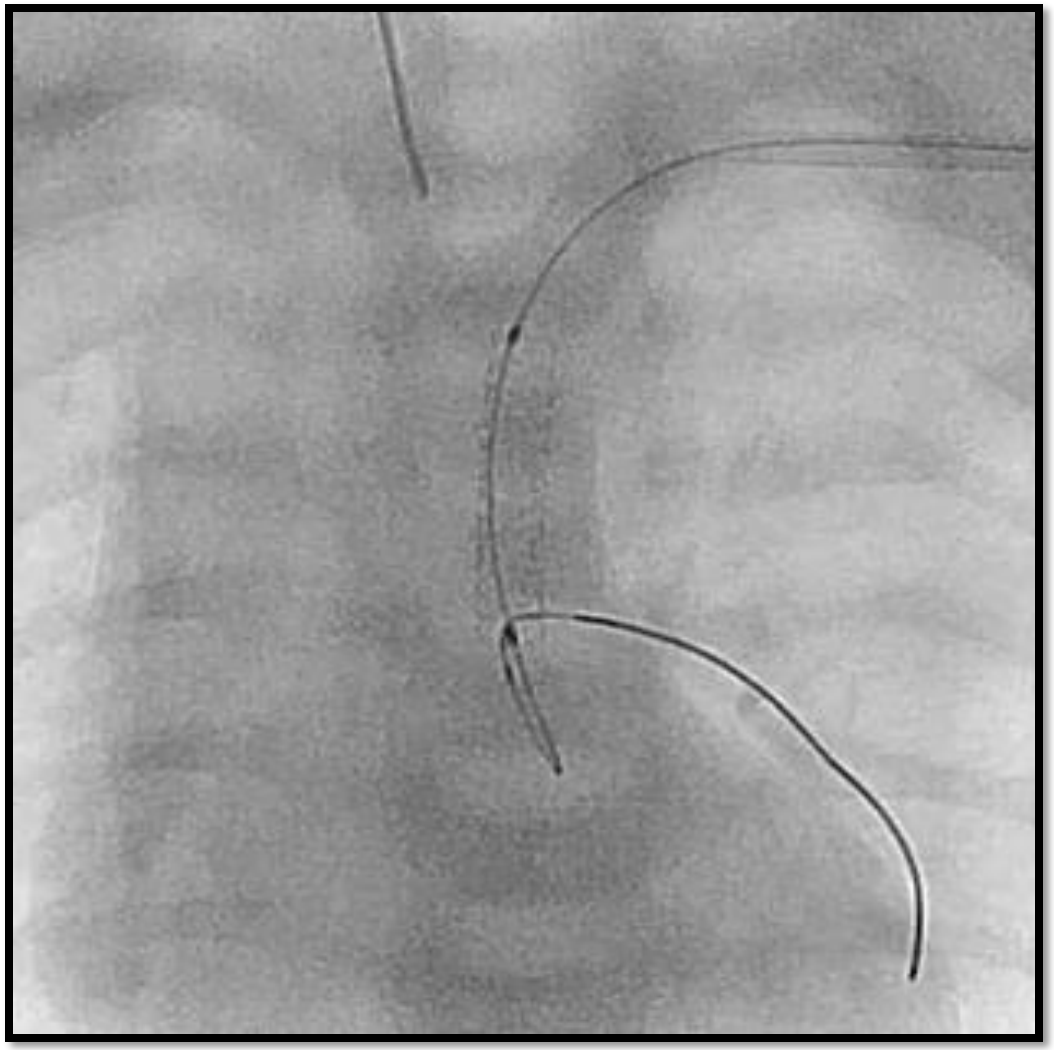
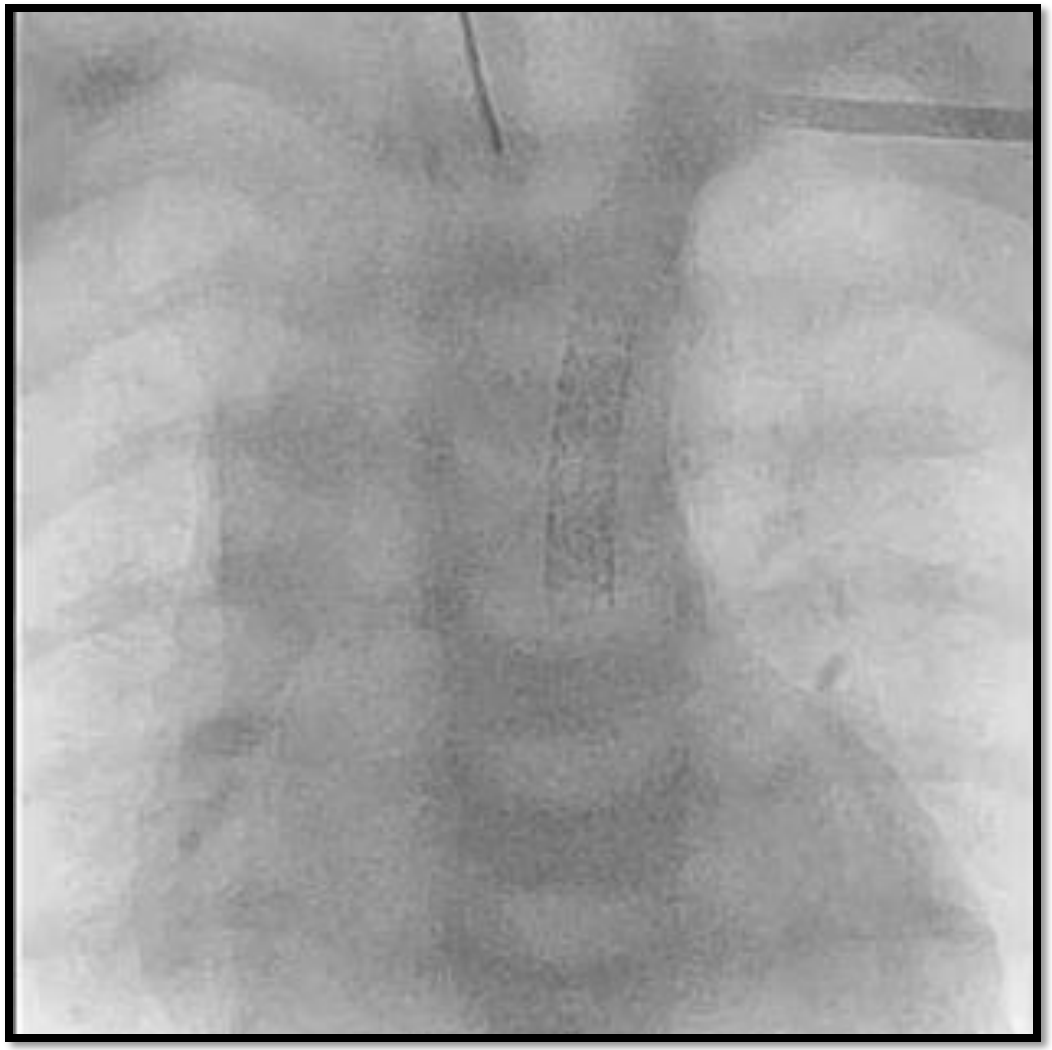
Result





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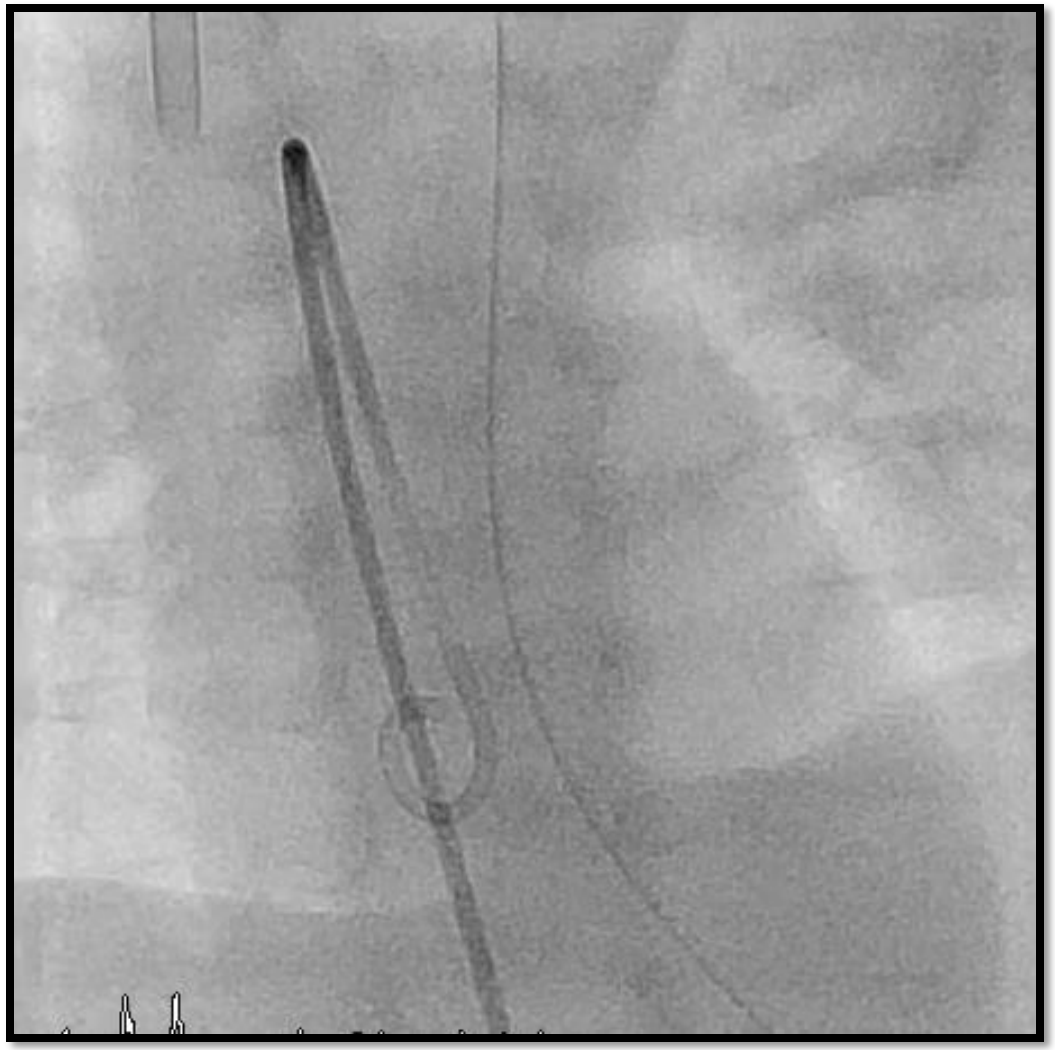
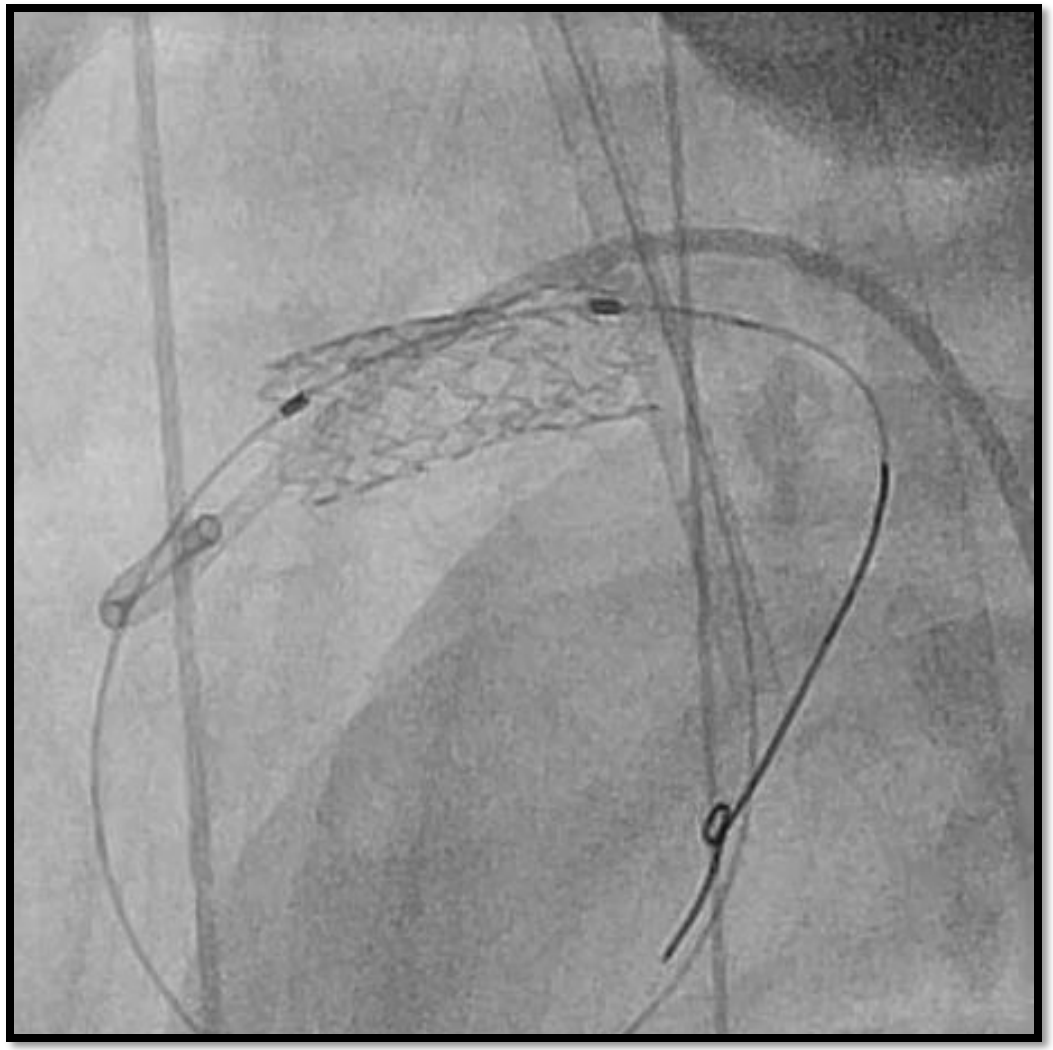
Anterograde Flow and PDA – Which Approach?





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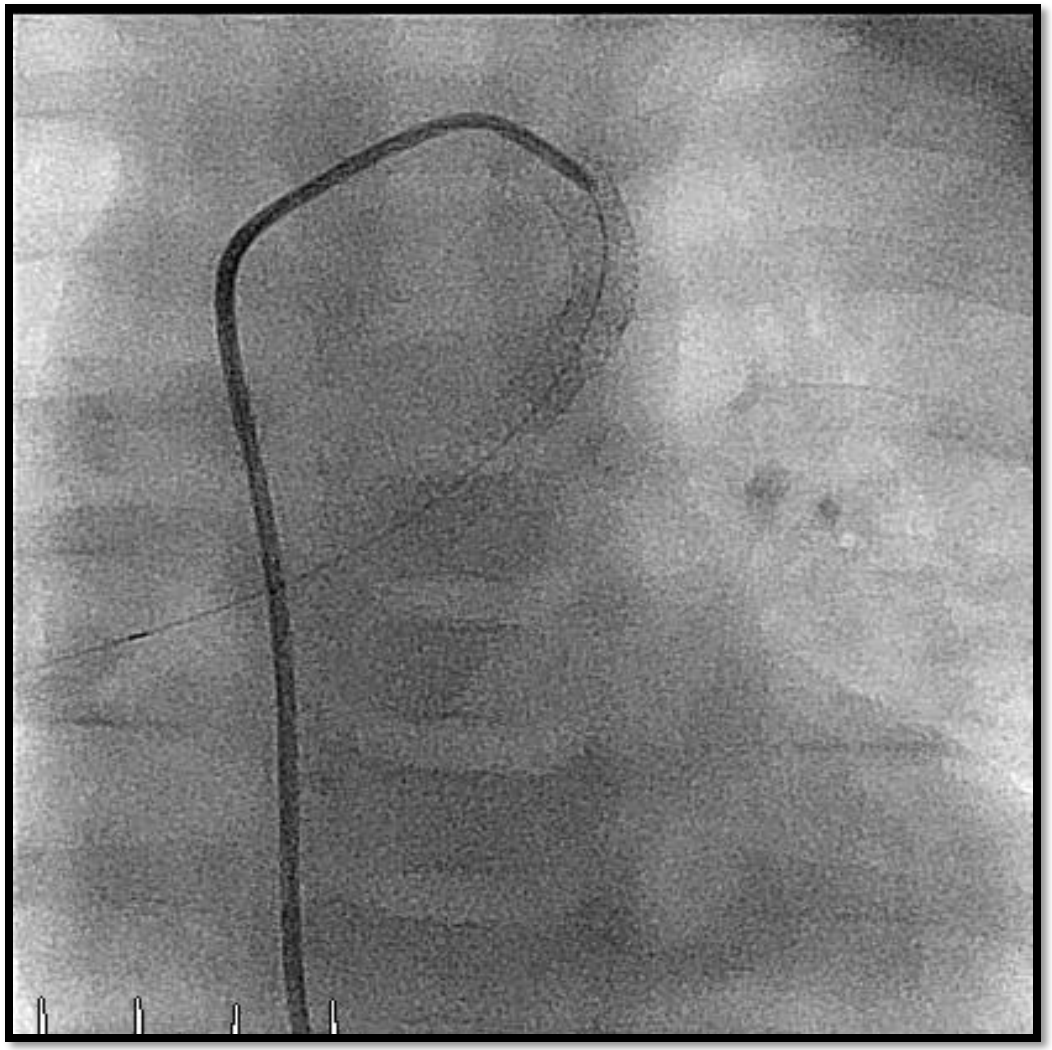
PDA Stenting



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Patient Specific Factors

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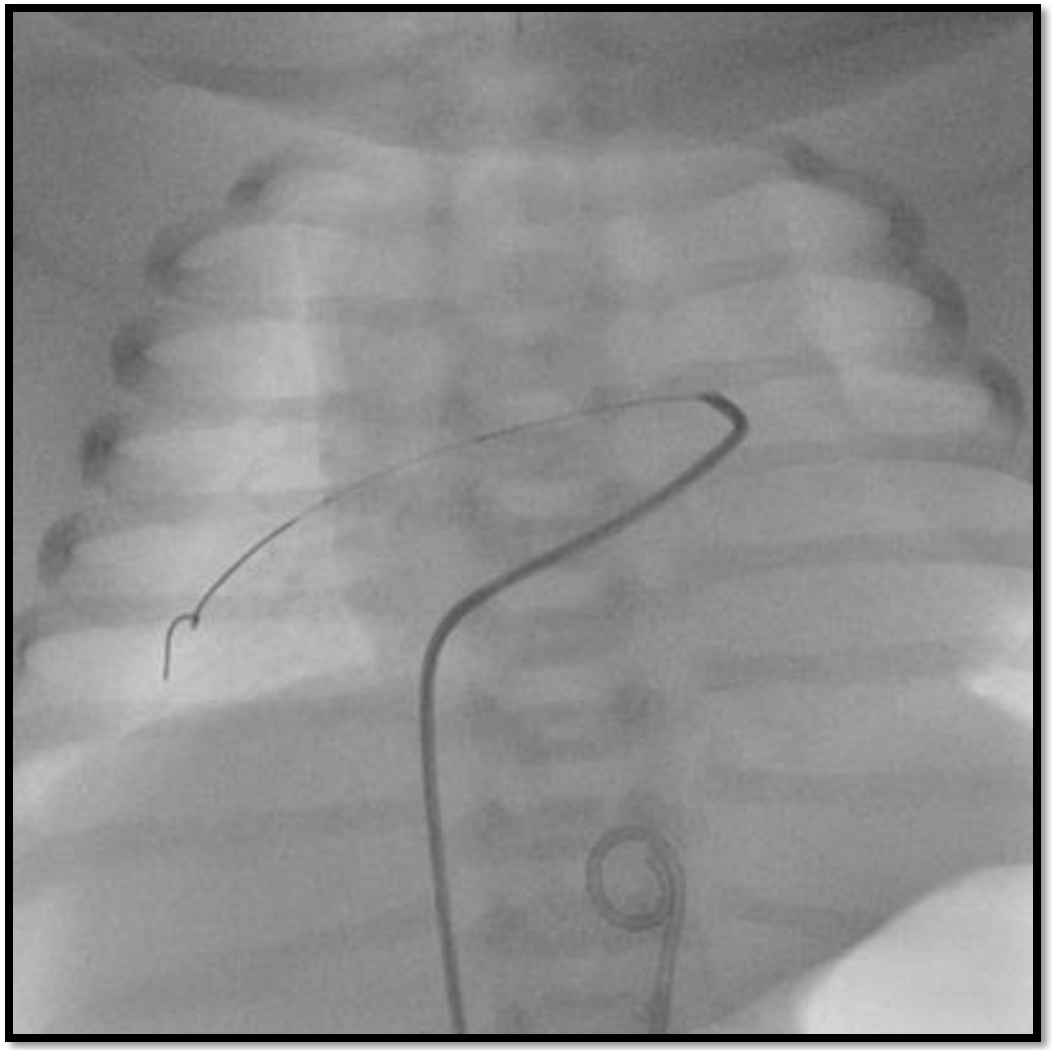
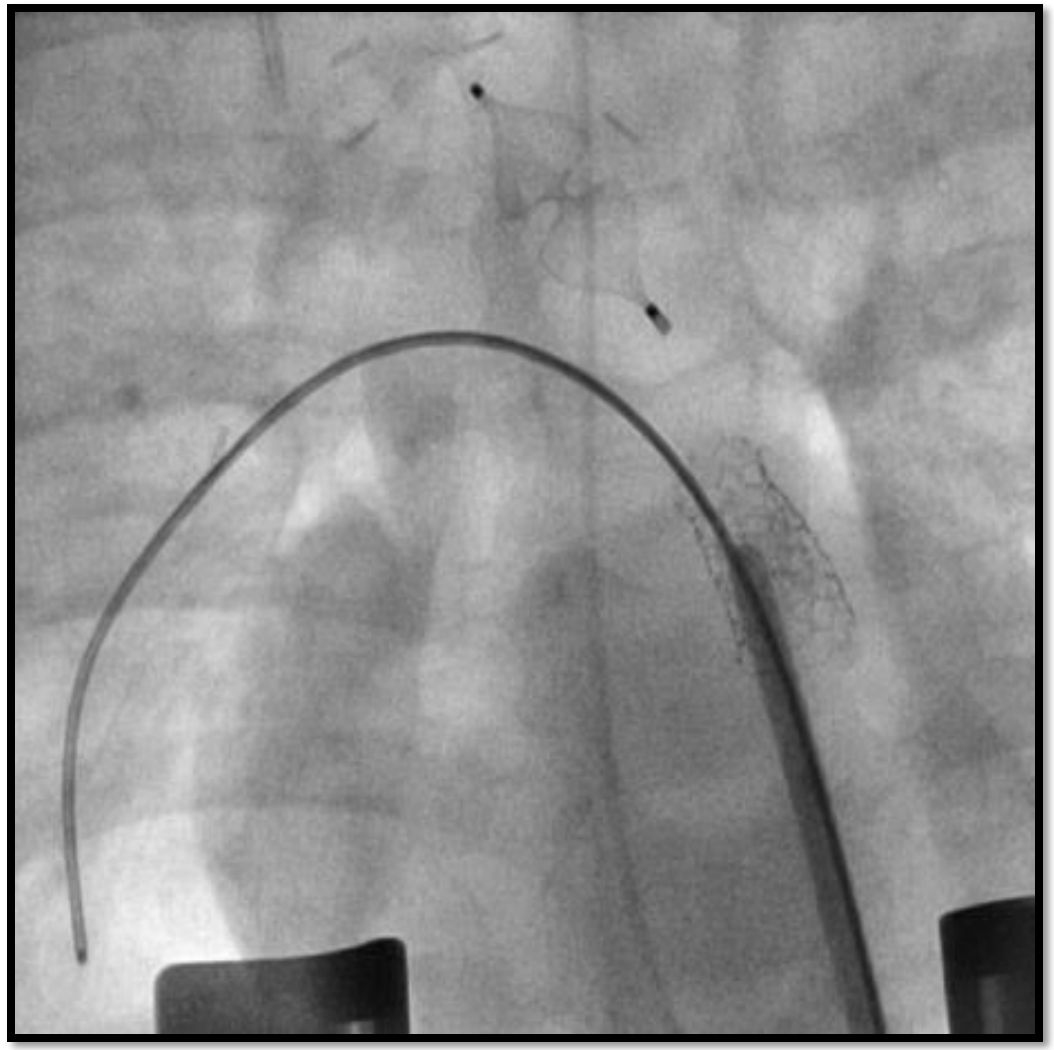
MAPCA's – Grow Native PA's





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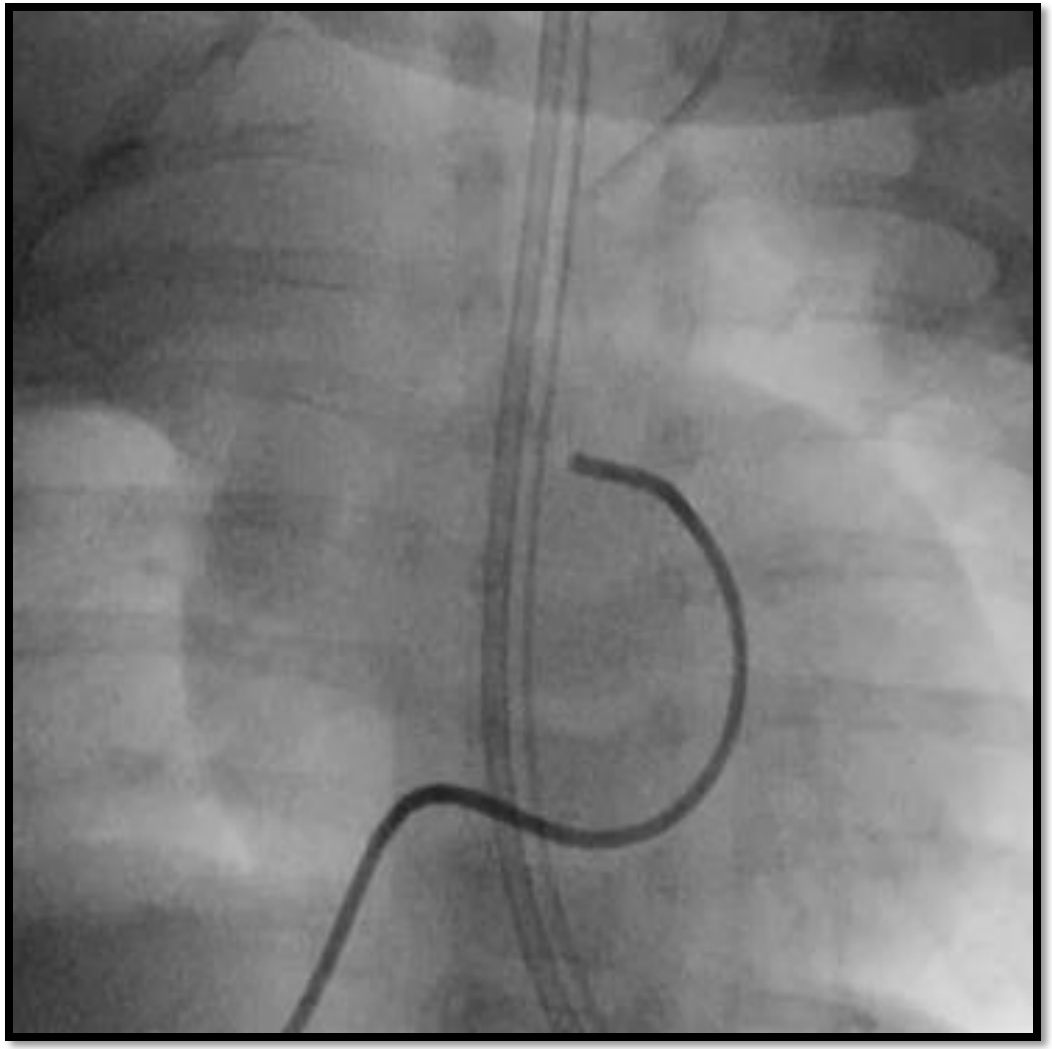
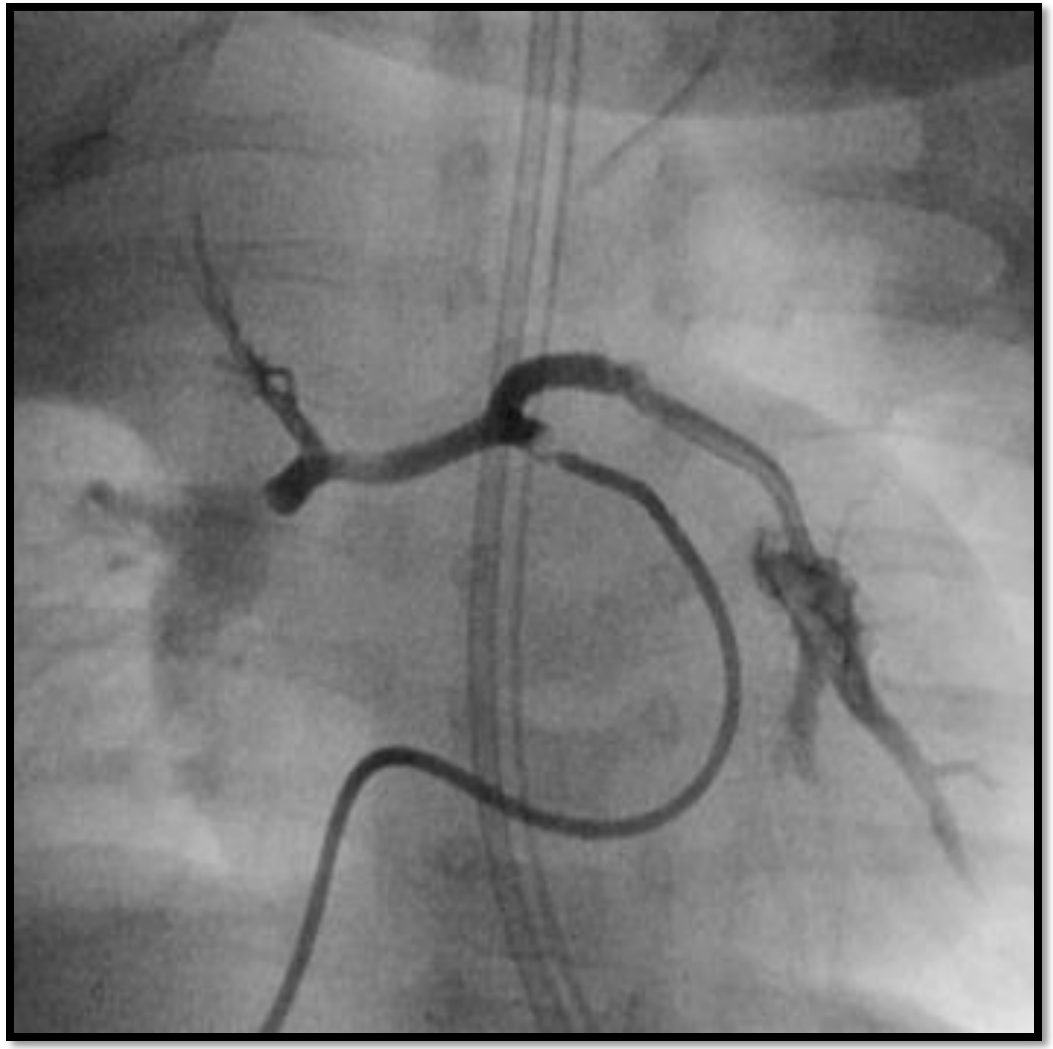
More MAPCA's





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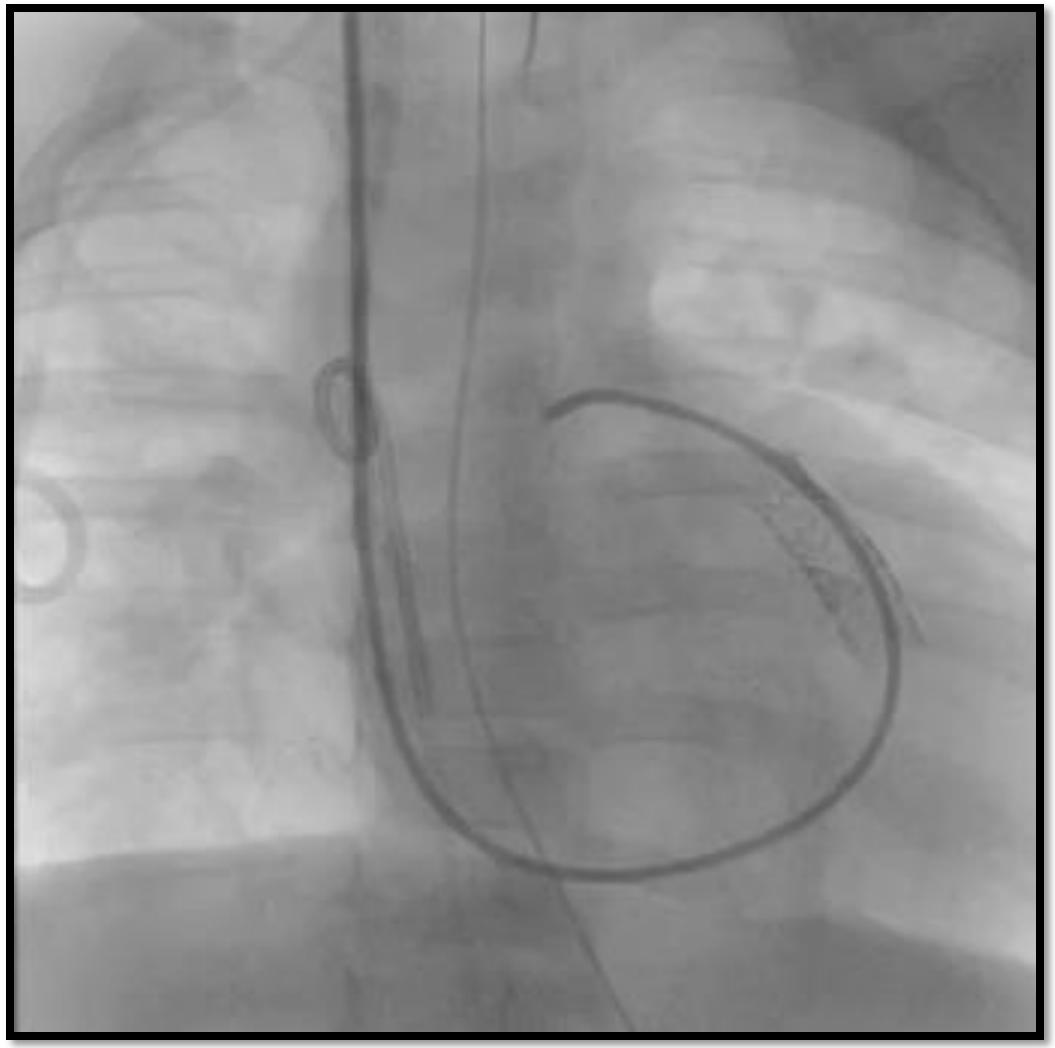
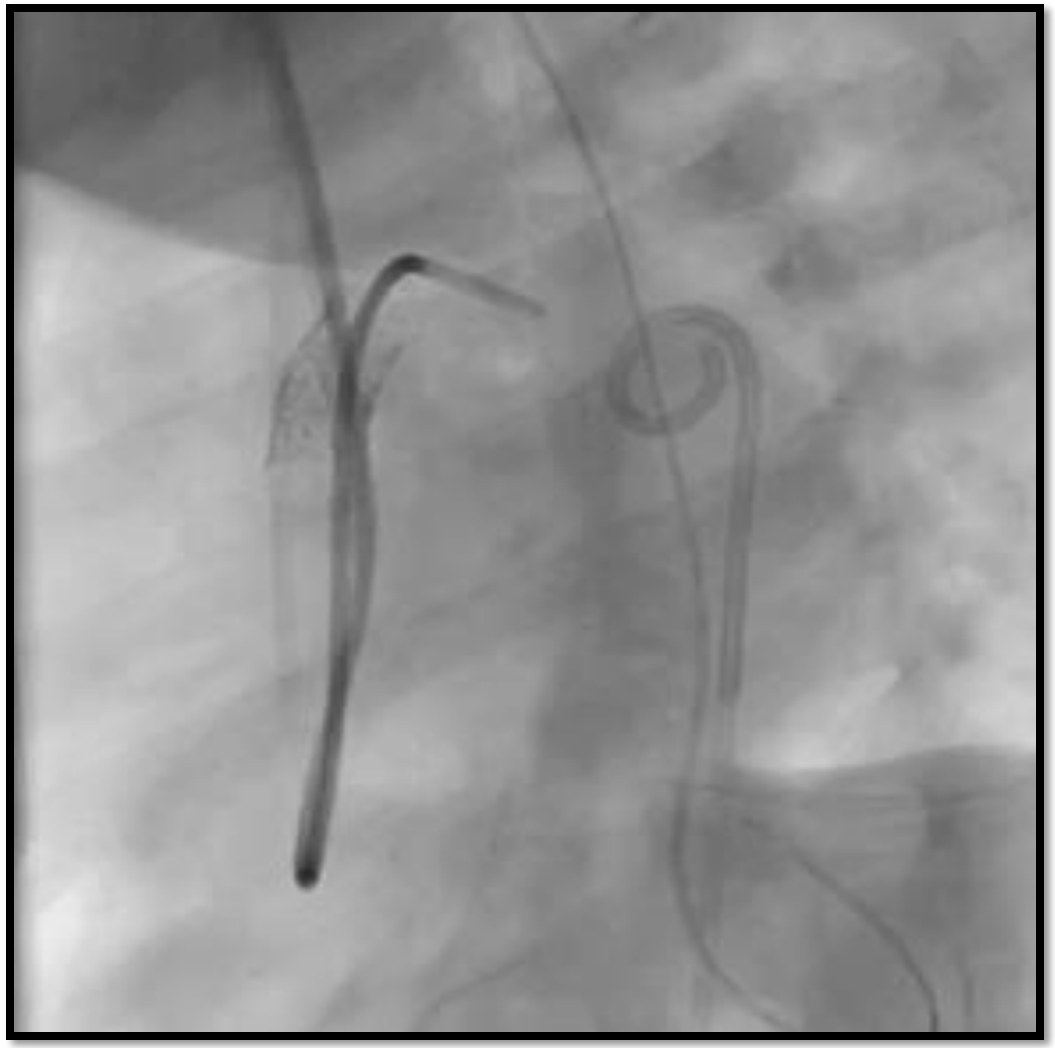
RVOT Stent to Promote PA Growth





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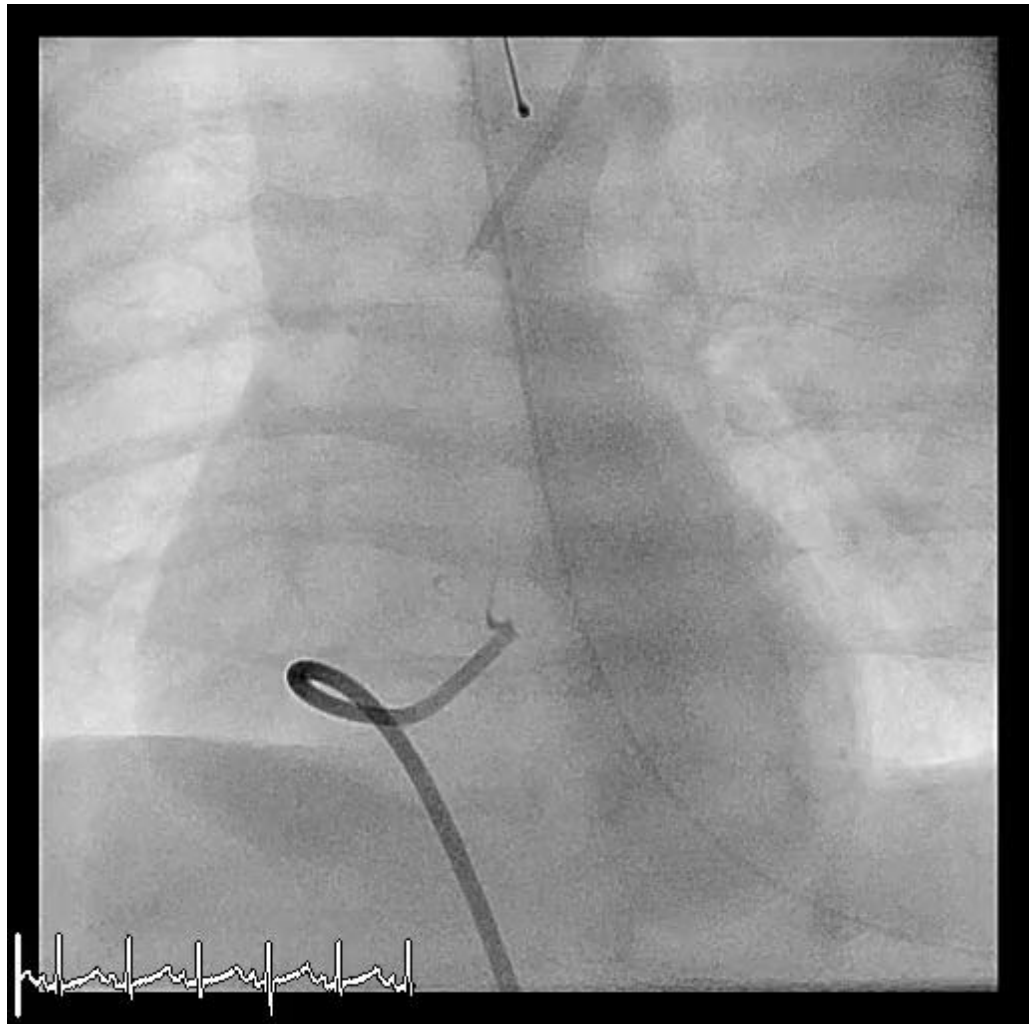
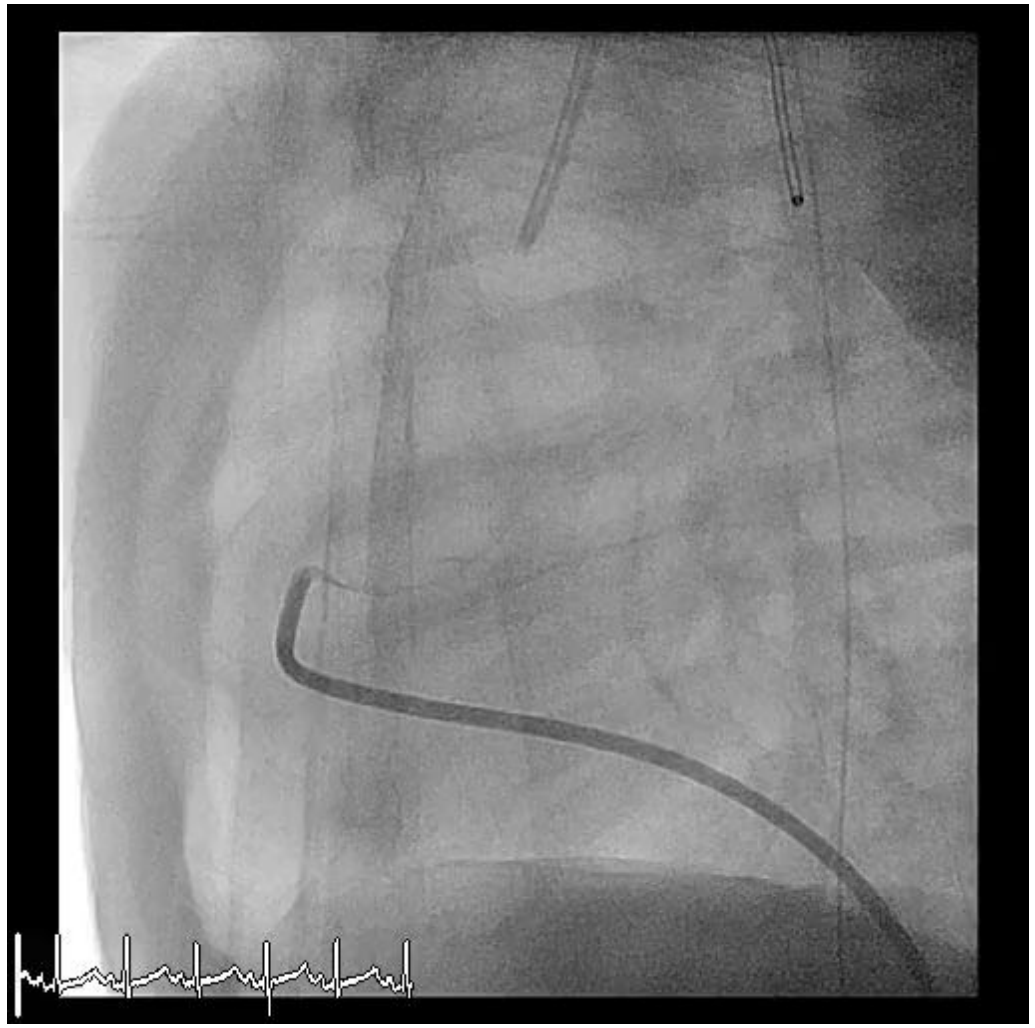
Patient Specific Factors





(J Am Coll Cardiol Case Rep 2024;29:102318)

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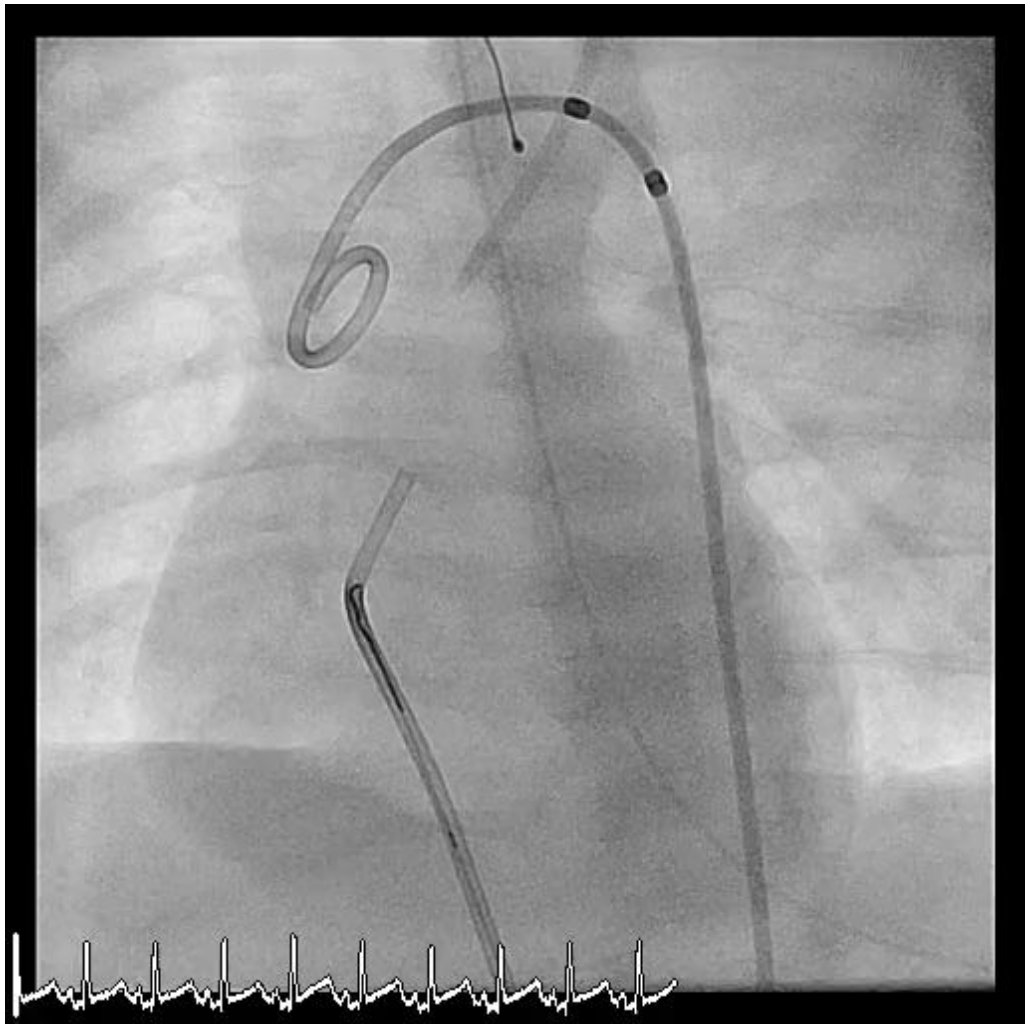
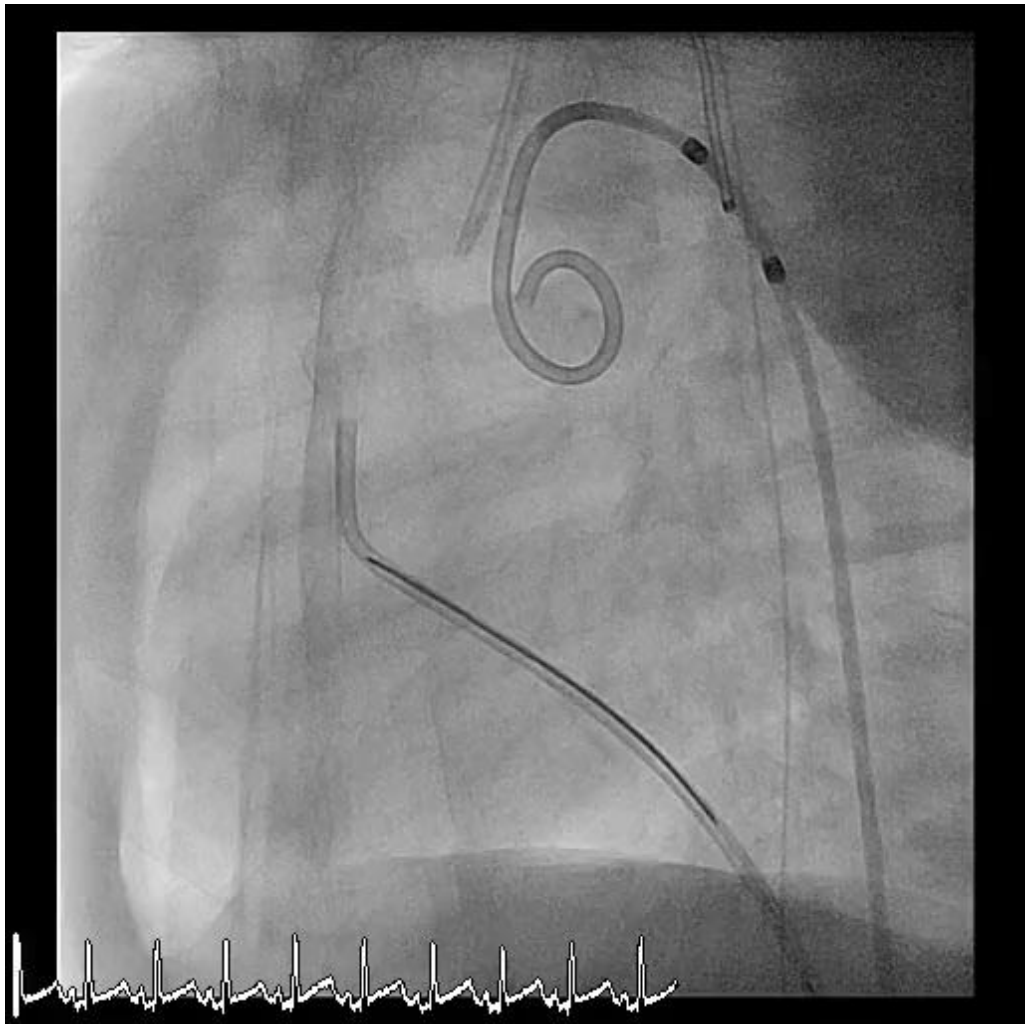
? ARCAPA





(J Am Coll Cardiol Case Rep 2024;29:102318)

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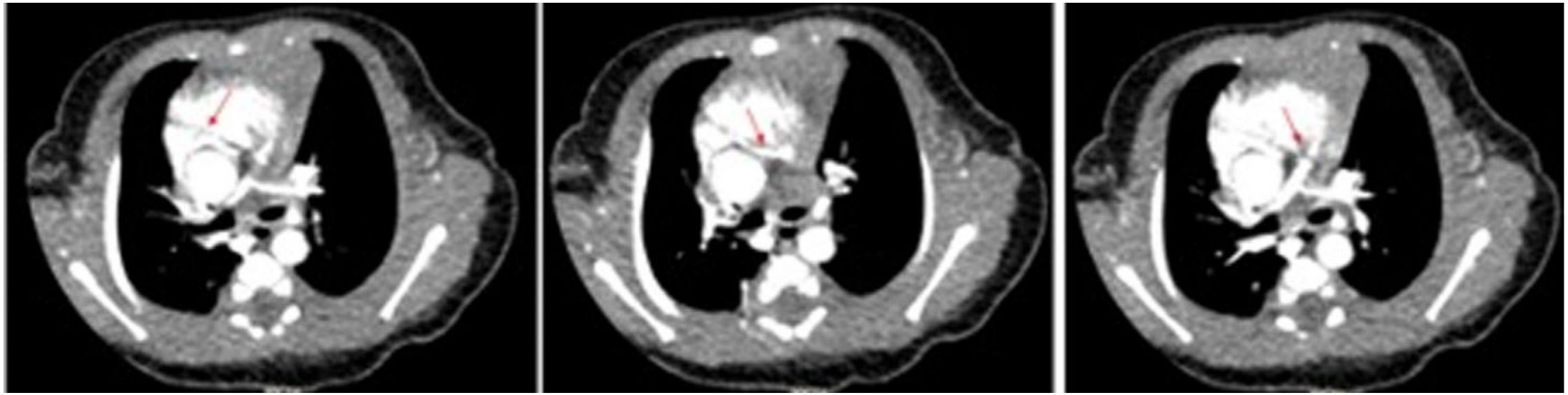
Central Sunt



(J Am Coll Cardiol Case Rep 2024;29:102318)

Catheter Cardiovasc Interv. 2022 Jul;100(1):105-112. doi: 10.1002/ccd.30223. Epub 2022 May 11.

Anomalous coronary artery in Tetralogy of Fallot–Feasibility of right ventricular outflow tract stenting as initial palliation

Ahmed R S A Afifi [1] [2], Chetan Mehta [1], Vinay Bhole [1], Milind Chaudhari [1], Natasha E Khan [3], Timothy J Jones [3], Oliver Stumper [1]

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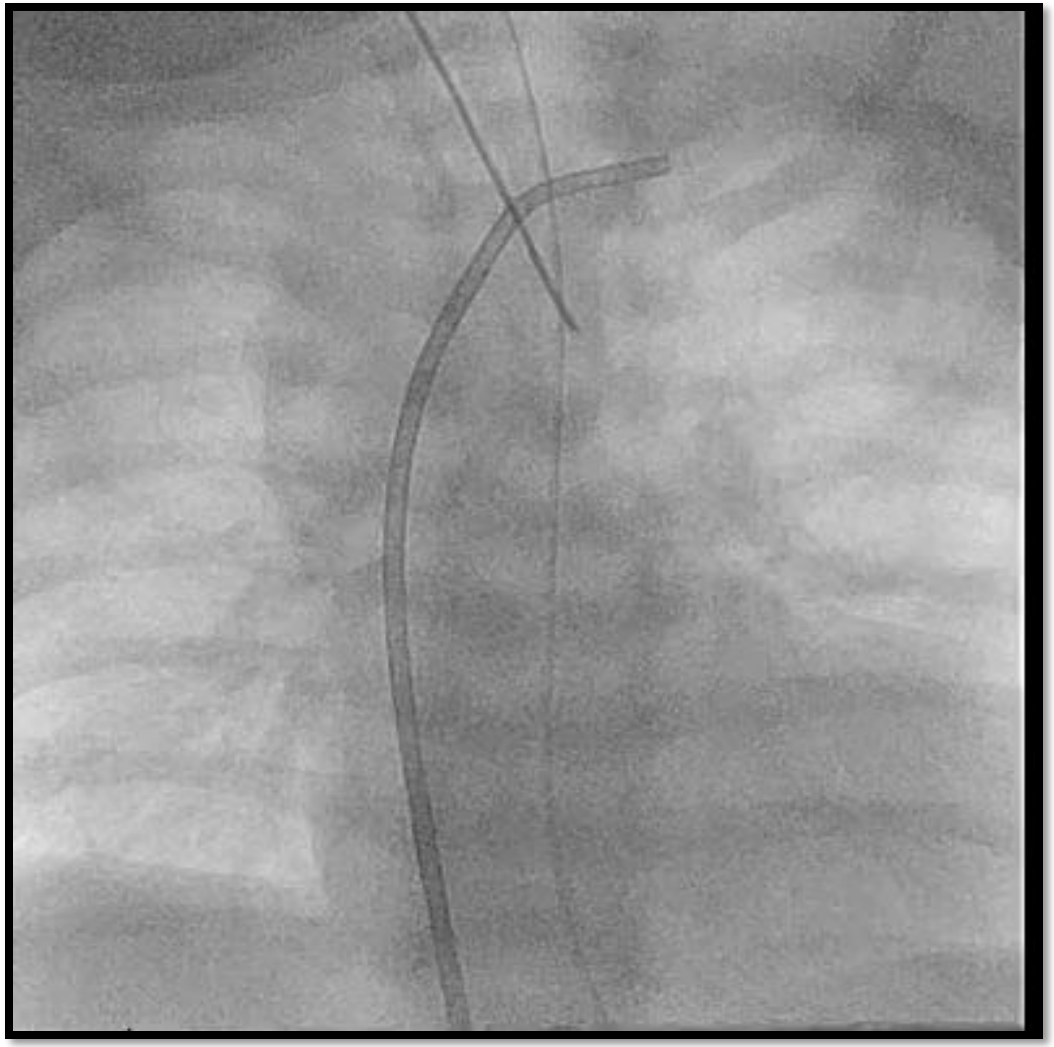
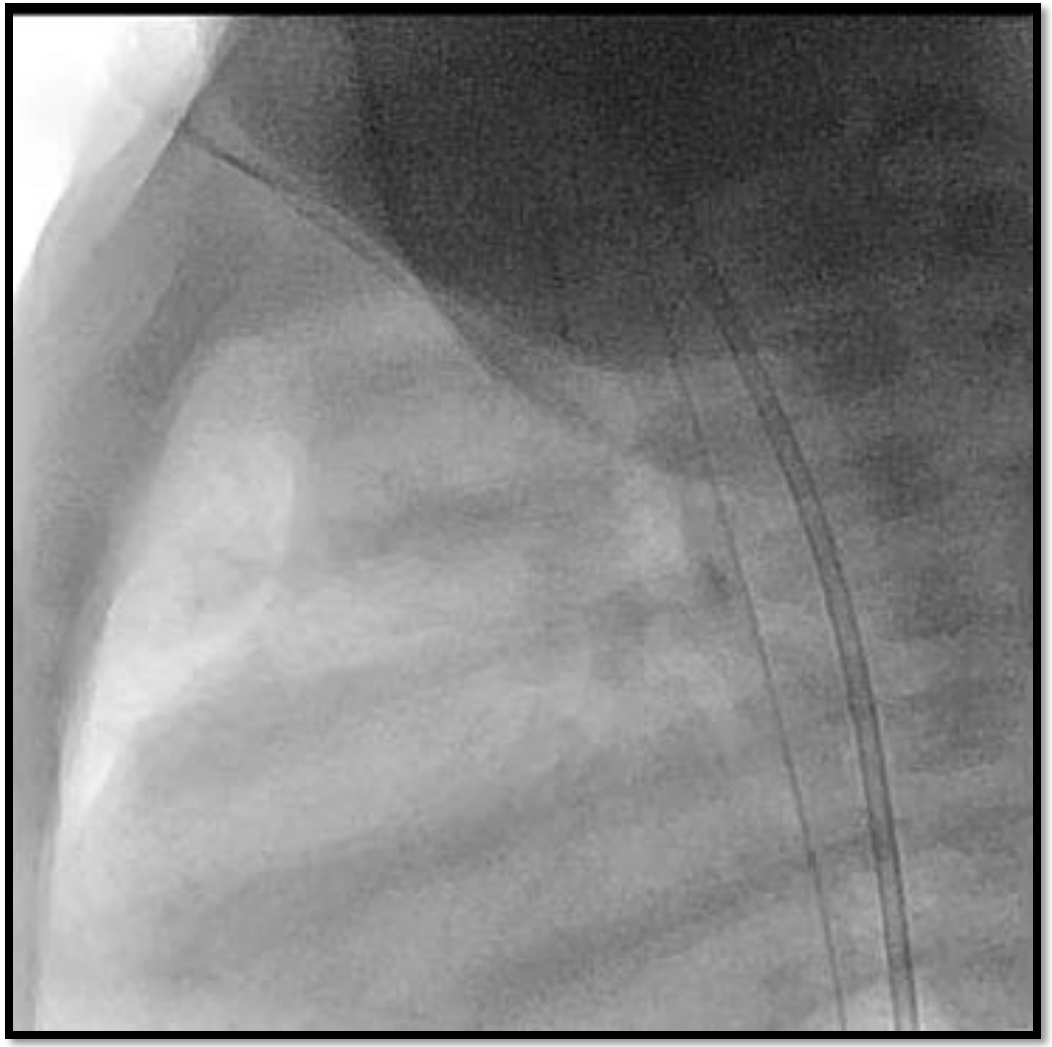
No PDA and No RVOTO





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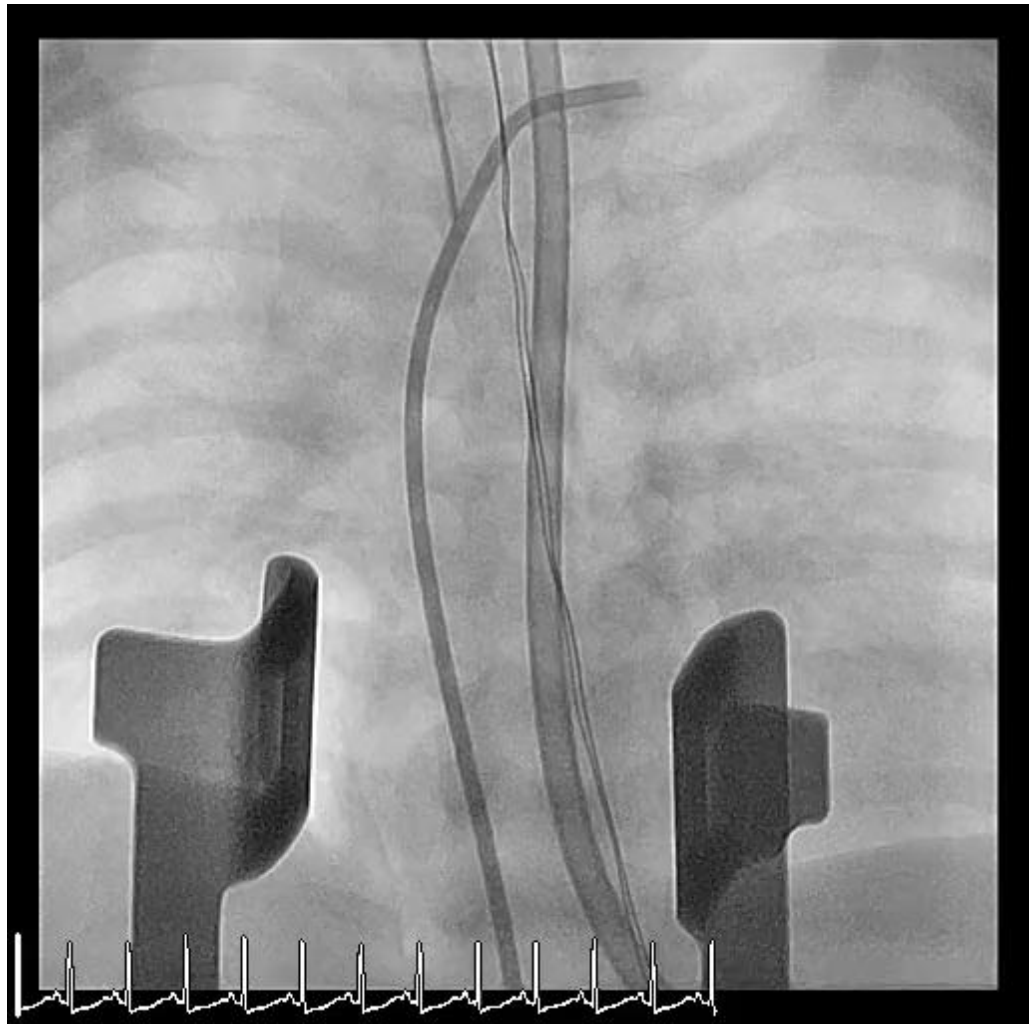
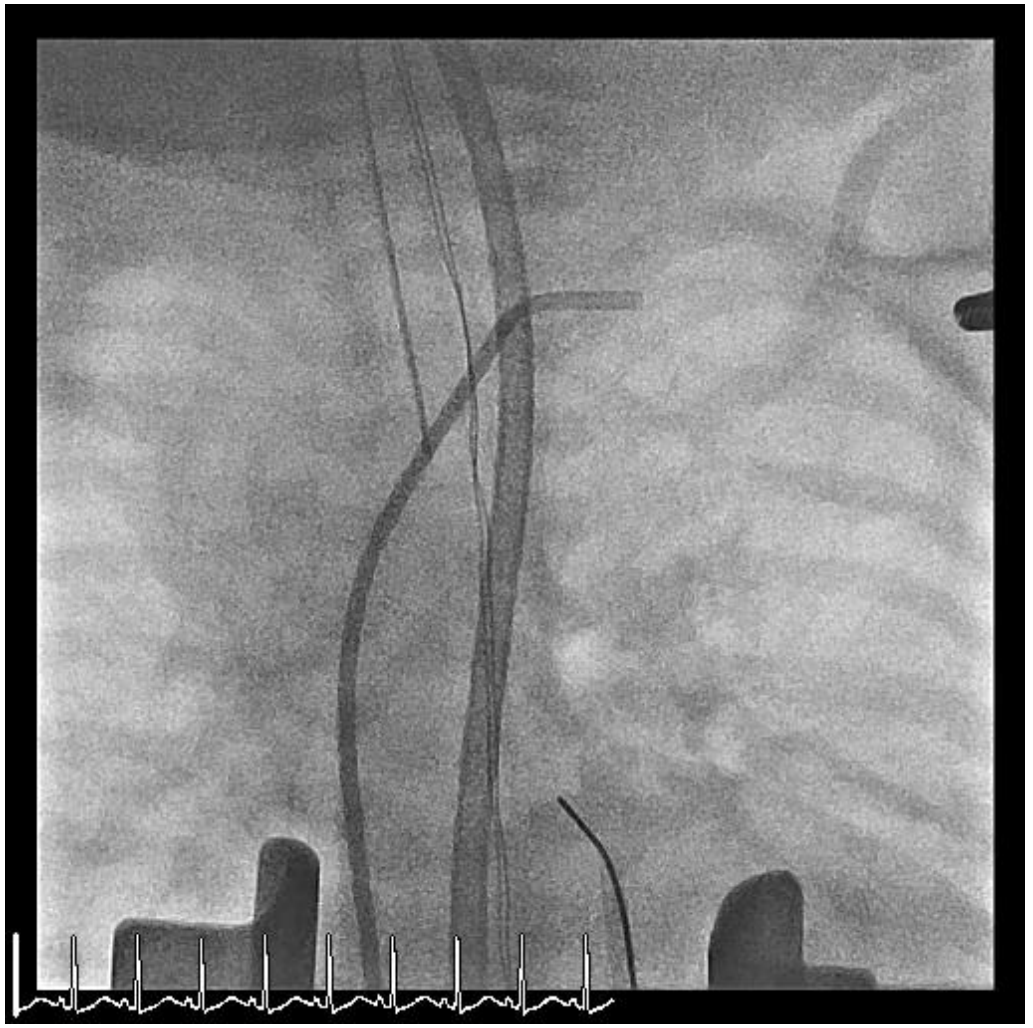
Hybrid Approach





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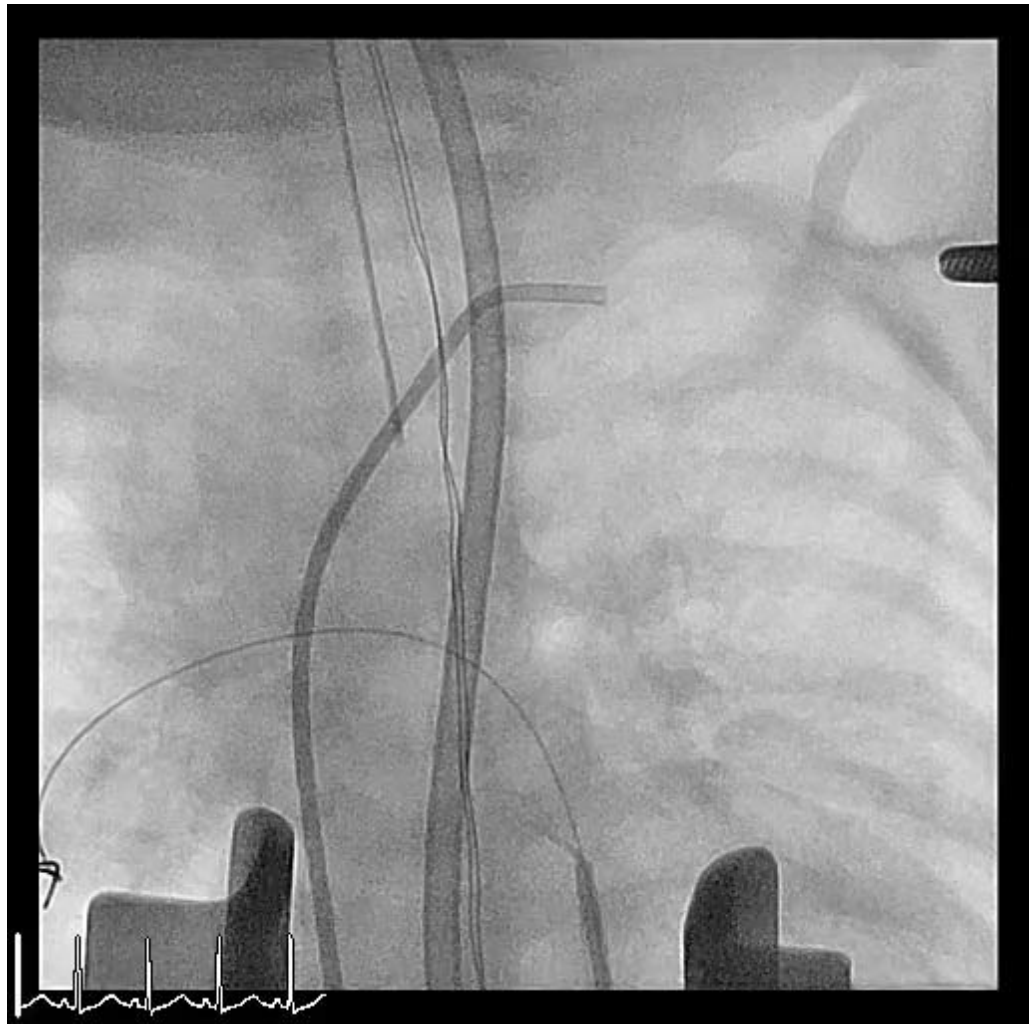
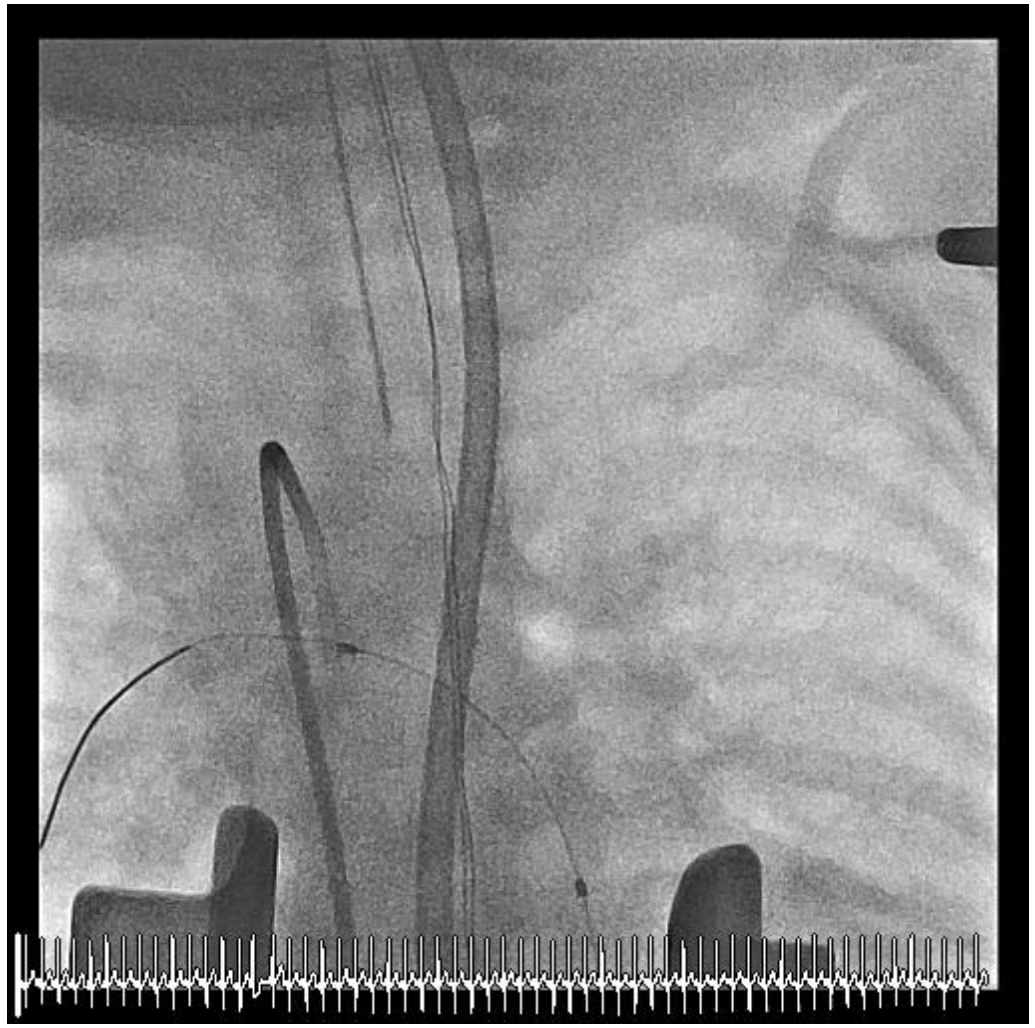
Proximity to Ao and PA Origins





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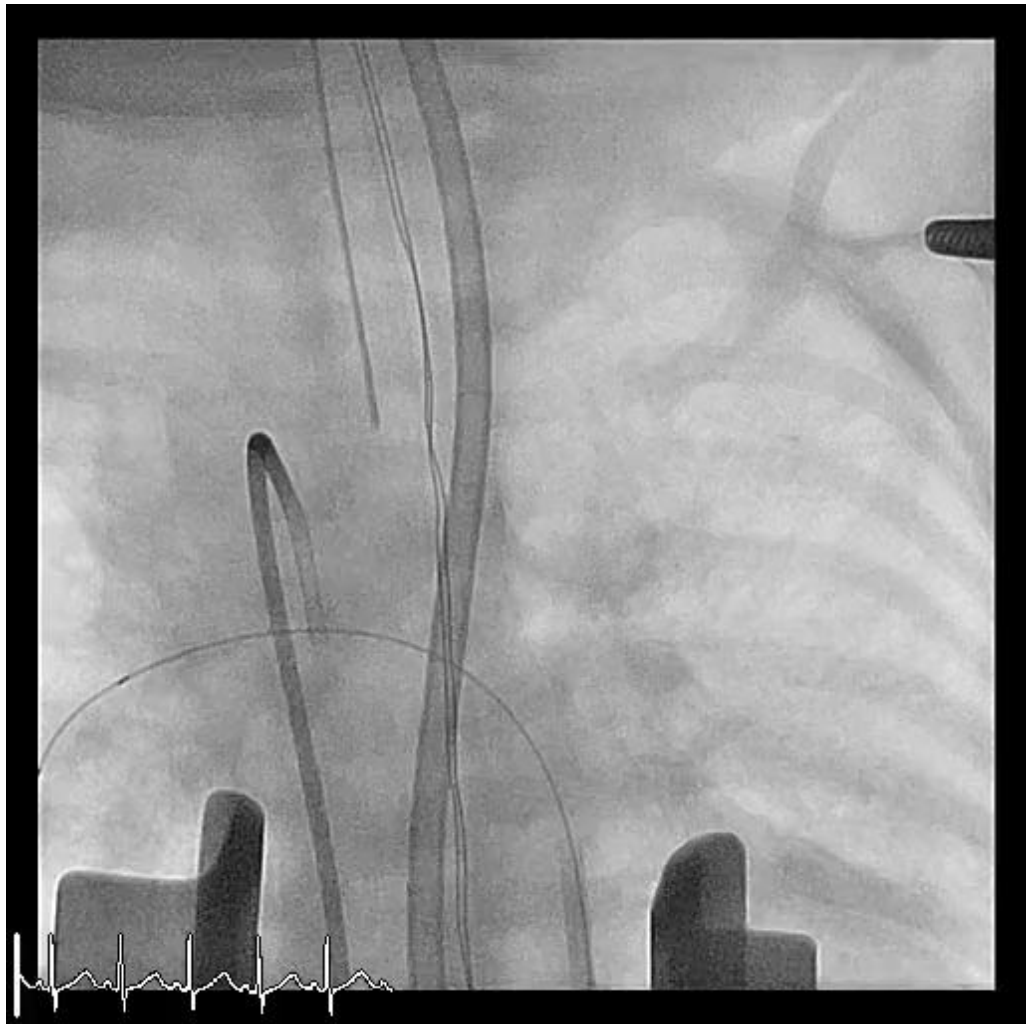
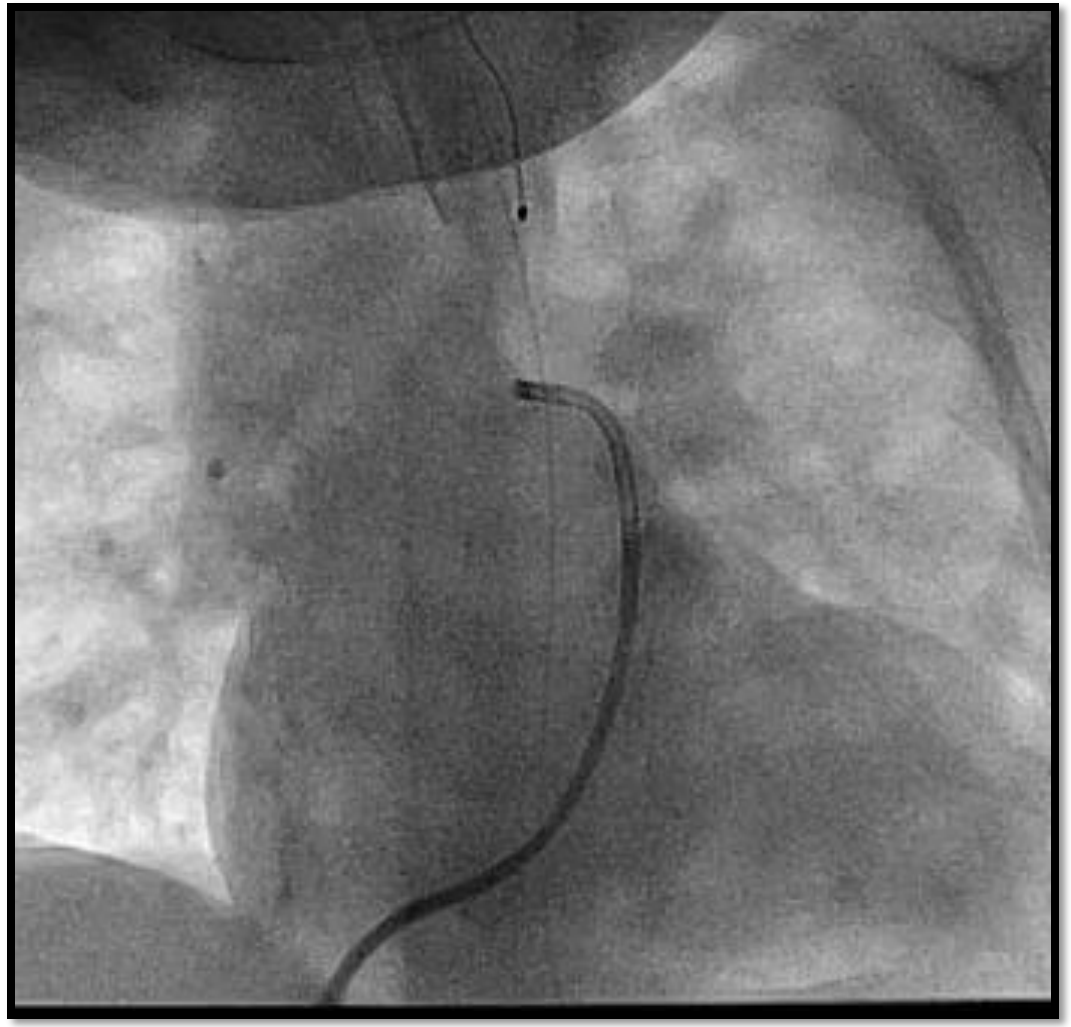
Result and Follow-Up





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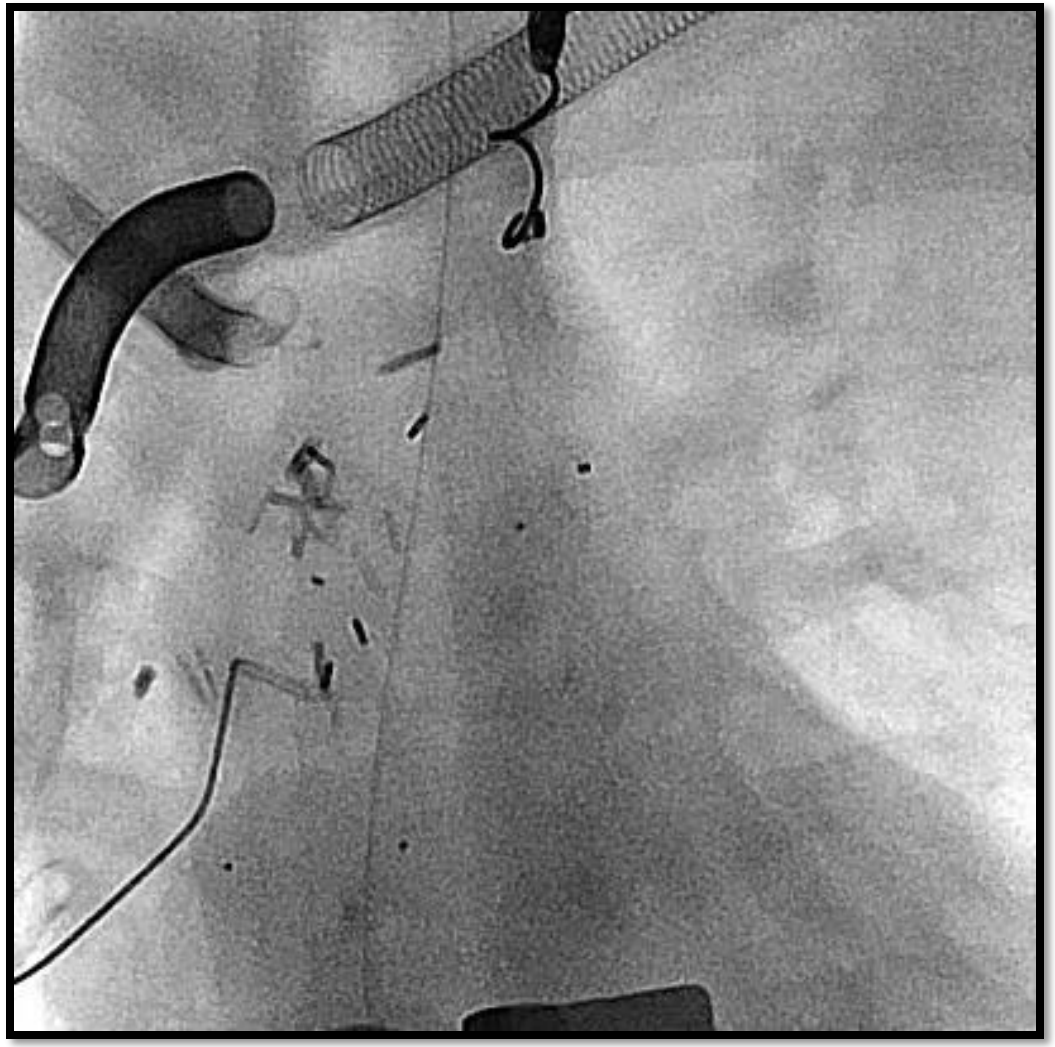
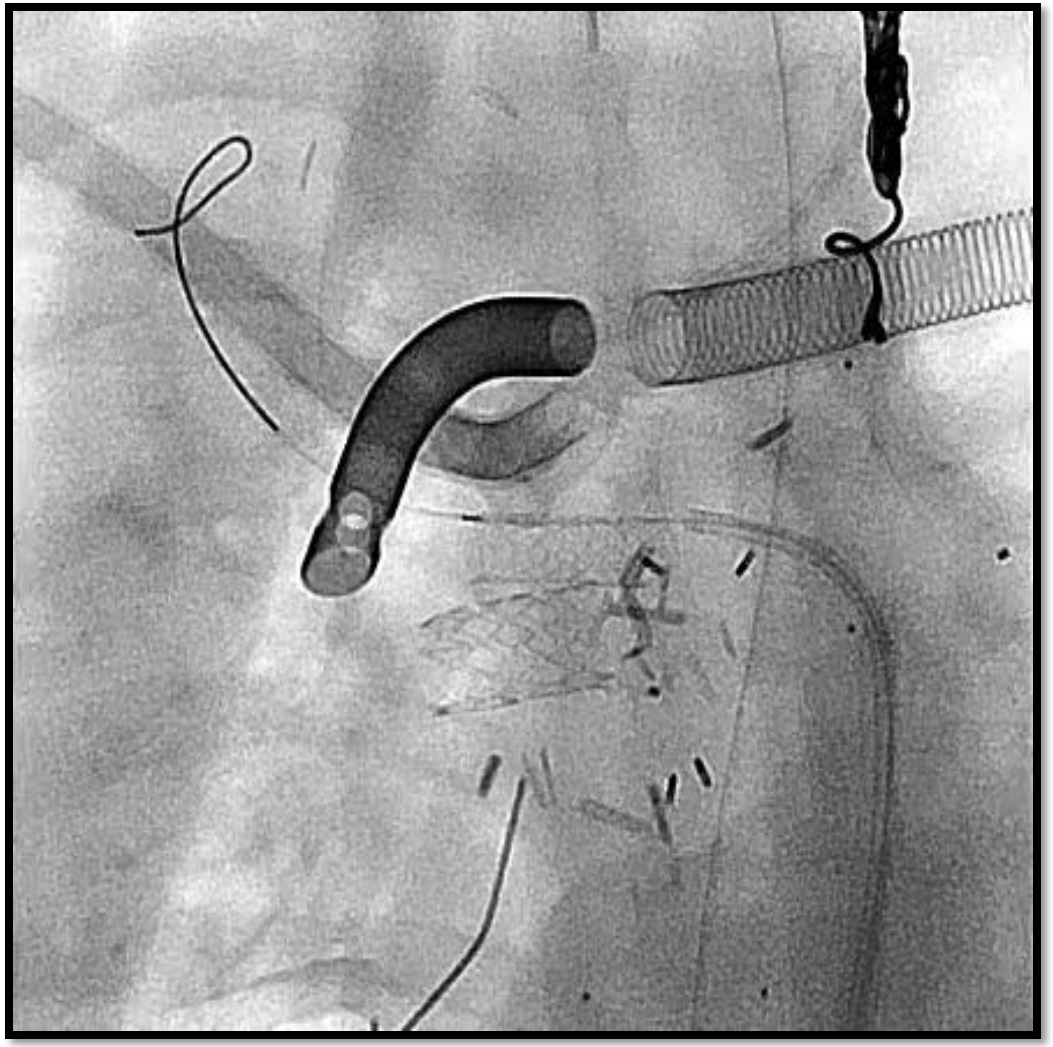
Final Result





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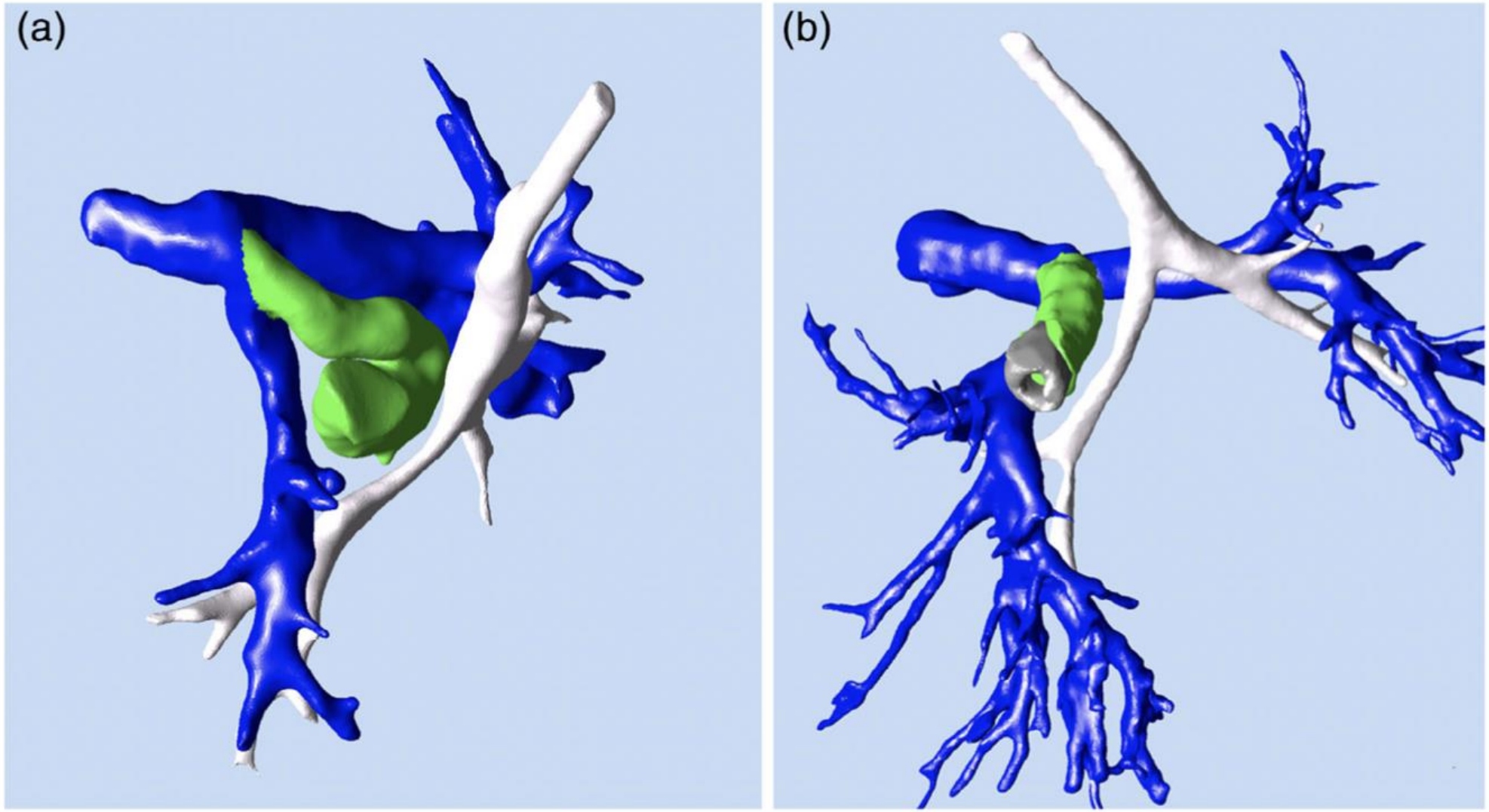

Catheter Cardiovasc Interv. 2020;96:1434–1438.

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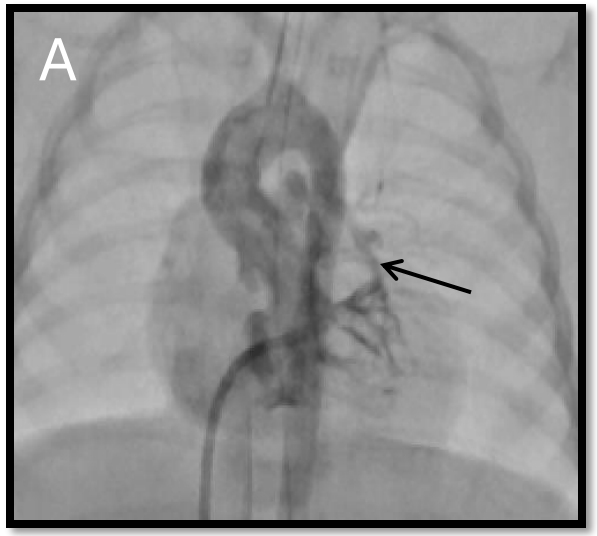

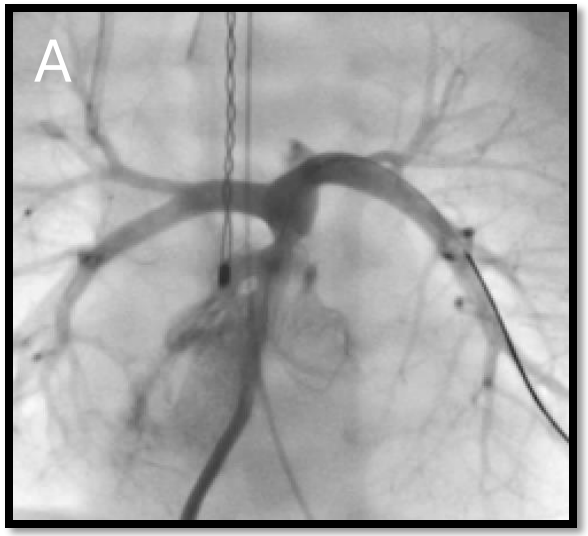

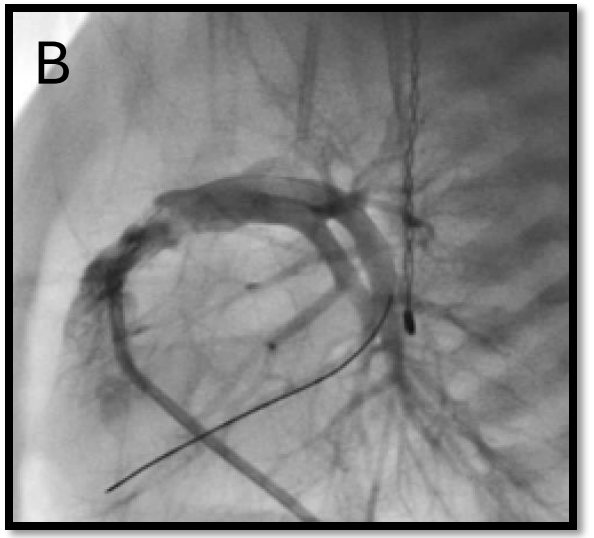

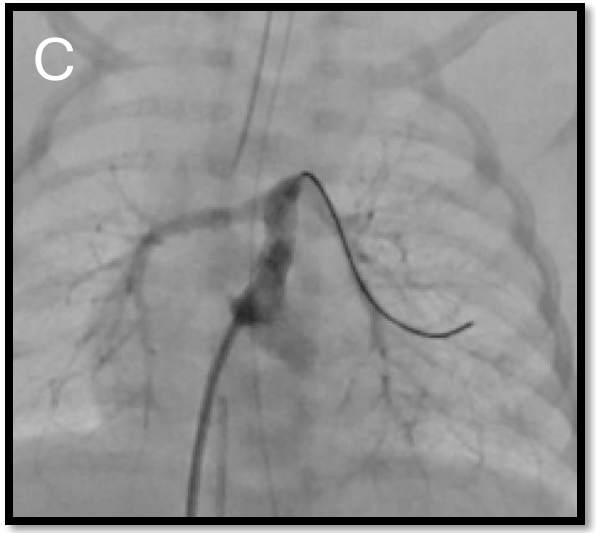

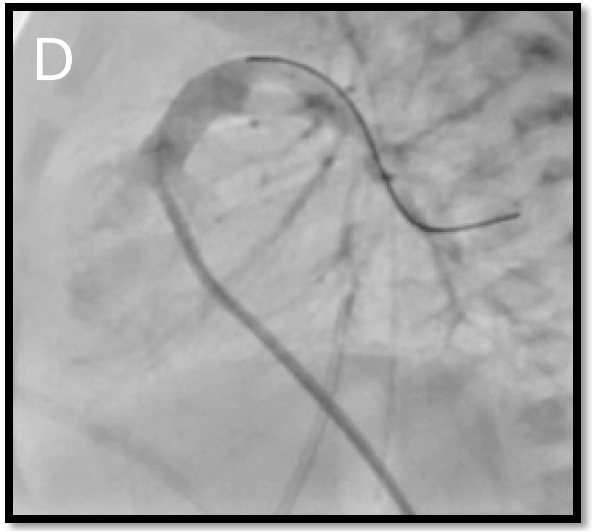

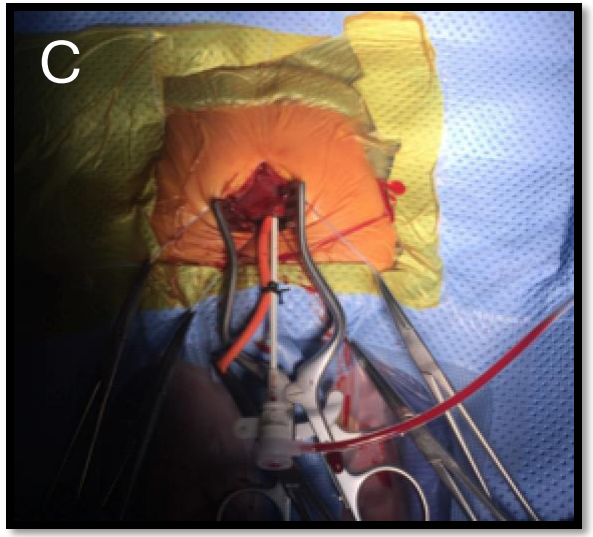

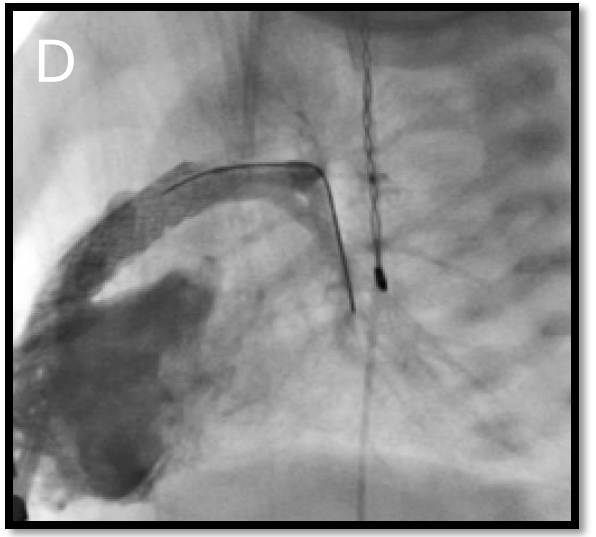

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In Conclusion....

- Staged Repair in symptomatic infants...Indication!
- Intervention as primary approach
- RVOT stent preferable
- Patient specific factors – Collaborate!
- Avoid Myopic Thinking

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