

Impella 5.5 Through Suprasternal Incision in the Pediatric and Congenital Heart Disease Population

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INTRODUCTION

- The Impella 5.5 (Abiomed Inc, Danvers, MA) is an effective bridge to heart transplant (HT) in Adults
- Primary access is often via the right axillary artery
- Use is limited in pediatric and congenital population due to small size of axillary artery and anatomic complexity
- Limited data is published on alternative access via the innominate artery

METHOD

- All Impella 5.5 implants as a bridge to HT in pediatric and congenital patients at our institution were retrospectively reviewed
- The primary outcomes was survival to HT
- Secondary outcomes included duration of support, hospital length of stay and incidence of major complications

OPERATIVE APPROACH

- 3-4 cm vertical incision above the sternal notch for exposure of the innominate artery
- 10 mm graft anastomosis to the innominate artery with tunnelling posterior to the sternocleidomastoid and anterior to the jugular vein to the right lateral neck
- Insertion of the device through the graft

RESULTS

Figure 1:Diagram of Operative Incision

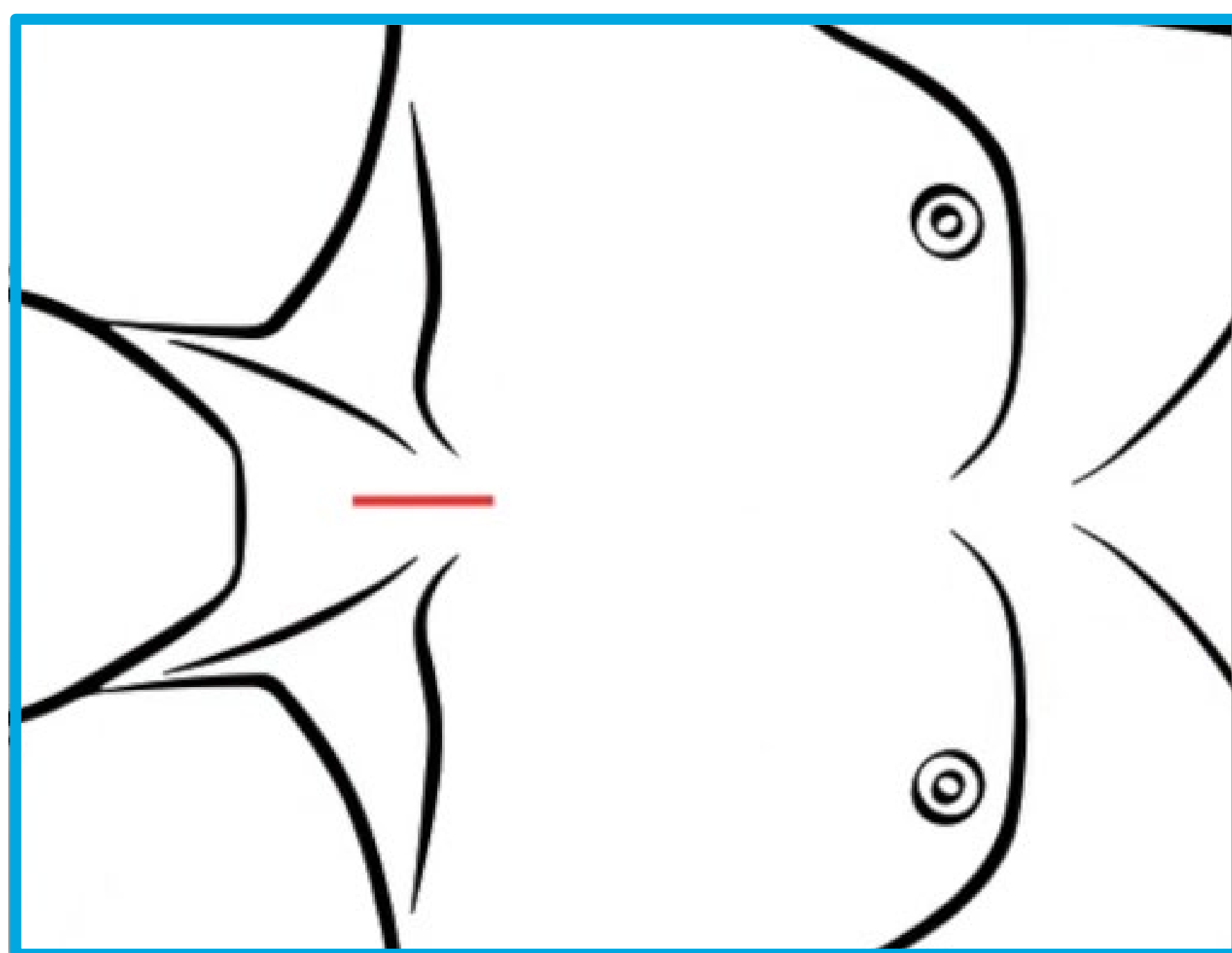


Figure 2. Final Impella placement on TEE Imaging.

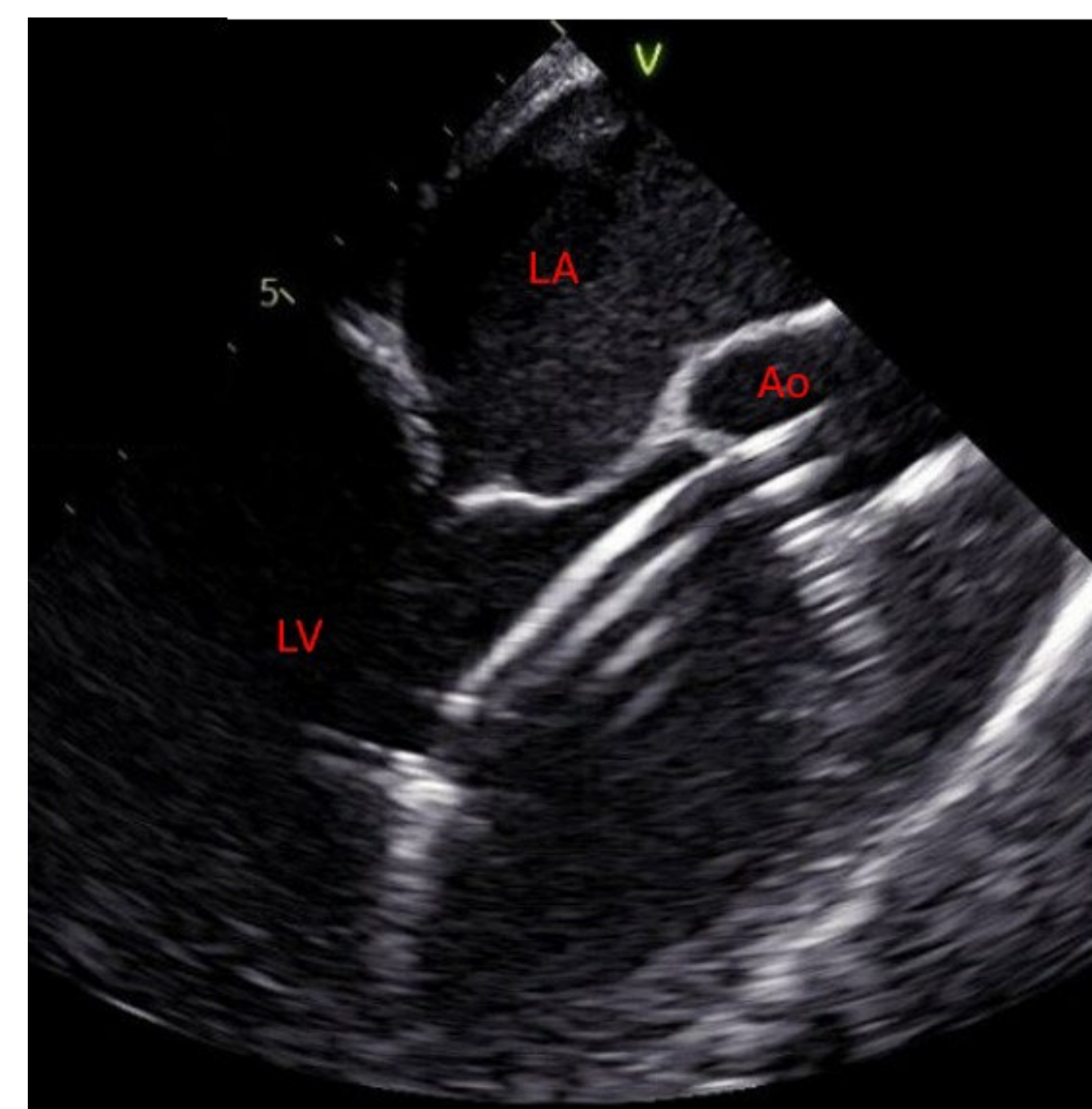


Table 1. Baseline patient characteristics.

Variable	All
Number of implants	7
Age (Years) – median (range)	13 (11-23)
Male-N (%)	4 (57.1)
Weight (kg)- median (range)	60.9 (27.8-94.1)
Height (cm) - median (range)	167.6 (143-177.8)
BSA (m2)- median (range)	1.74 (1.04-2.13)
Diagnosis – N (%)	
DCM	5 (71.4)
HLHS	1 (14.3)
CCTGA	1 (14.3)
Prior sternotomy	2 (28.6)
Preoperative MCS – N (%)	0 (0.0)
No. of preoperative inotropes- N (%)	
One	4 (57.1)
Two	3 (42.9)
Preoperative shock- N (%)	7 (100.0)
Creatinine (mg/dL) - median (range)	1.0 (0.5-1.9)
AST (U/L)- median (range)	21 (20-1136)
Peak Perioperative Lactate (mmol/L) - median (range)	2.3 (0.8-6.1)
INTERMACS Profile- N (%)	
Class 1	2 (28.6)
Class 2	5 (71.4)
Legend: DCM-dilated cardiomyopathy, HLHS-hypoplastic left heart syndrome, CCTGA-Congenitally corrected transposition of the great arteries, BSA-Body surface area, MCS-mechanical circulatory support, AST-Aspartate aminotransferase	

Table 2. Primary and Secondary Outcomes.

Variable	Value
Primary Outcomes	
Survival to Heart Transplant- N(%)	6 (85.7)*
Isolated Heart Transplant	5 (71.4)
Heart-Kidney Transplant	1 (14.3)
Secondary Outcomes	
Hours on ventilator post-op – median (Range)	5 (0-307)
Duration of Impella 5.5 Support – Days – Median (Range)	46.5 (range 13-78)
Hospital LOS- Days – Median (Range)	71 (range 33-211)
Post-HT LOS-Days – Median (Range)	16.2 (range 11-23)
*1 patient remains on support awaiting HT	

Table 3. Impella Complications

Post-Impella Complications	N (%)
AKI requiring renal replacement therapy	1 (14.3)*
Stroke	0 (0.0)
Bleeding requiring reoperation	0 (0.0)
Heparin induced thrombocytopenia	3 (42.9)
Bacteremia	1 (14.3)
Device migration	5 (71.4)
Return to OR for repositioning	1 (14.3)
Pump malfunction	1 (14.3)
Purge cassette leak	1 (14.3)
Clinically significant hemolysis	2 (28.6)
Additional MCS	1 (14.3)
MCS type	Impella RP flex
No. patients requiring blood products	2 (28.6)
*1 additional patient was on renal replacement therapy prior to Impella device placement. This patient ultimately received a heart-kidney transplant.	

RESULTS

Table 4. Transplant Complications.

Post-HT complications	N (%)
Dialysis*	1 (14.3)
Stroke	0 (0.0)
Bleeding requiring reoperation	0 (0.0)
Infection	0 (0.0)
*patient received dual heart-kidney transplant and required dialysis pre-operatively which continued temporarily post operatively	

CONCLUSION

- The Impella 5.5 is an effective bridge to heart transplant in the pediatric and congenital population
- The suprasternal approach overcomes some of the size and anatomic challenges in this population
- This minimally invasive approach avoids unnecessary re-do sternotomy and minimizes blood product use
- Further implementation will provide a better understanding of overall outcomes

REFERENCES

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