

Descending Aortic Cannulation for Aortic Arch Reconstruction with Continuous Warm Bypass

James M. Hammel, Ibrahim Abdullah, Kim F. Duncan
 Children's Hospital and Medical Center, Omaha, Nebraska
 Department of Surgery, University of Nebraska Medical Center, Omaha

Study Design

- Retrospective review of inpatient records
- 142 consecutive newborn patients 2004-2012
- Arch reconstruction requiring cardiopulmonary bypass, all diagnoses
- *Transition in technique of circulatory support*

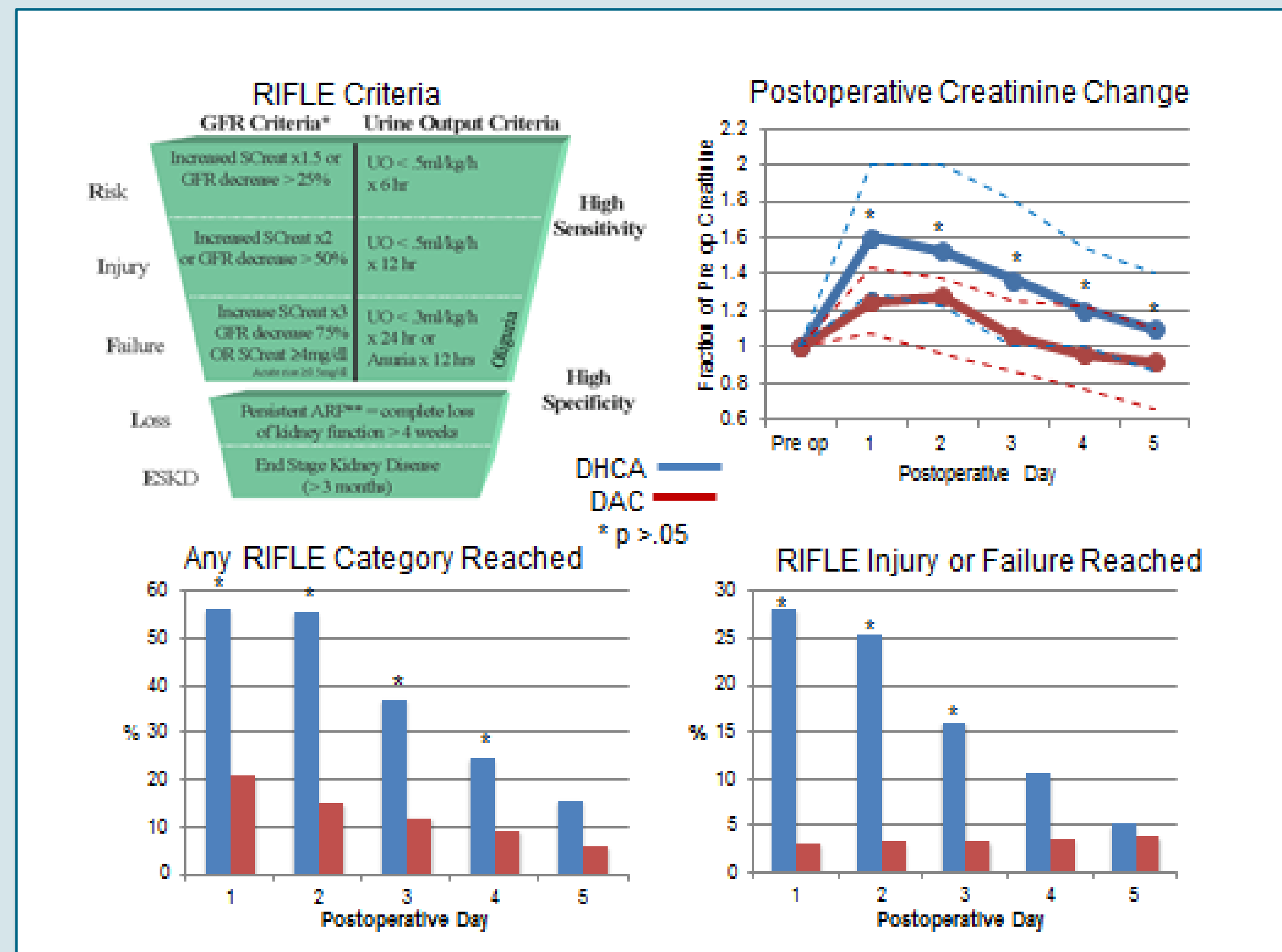
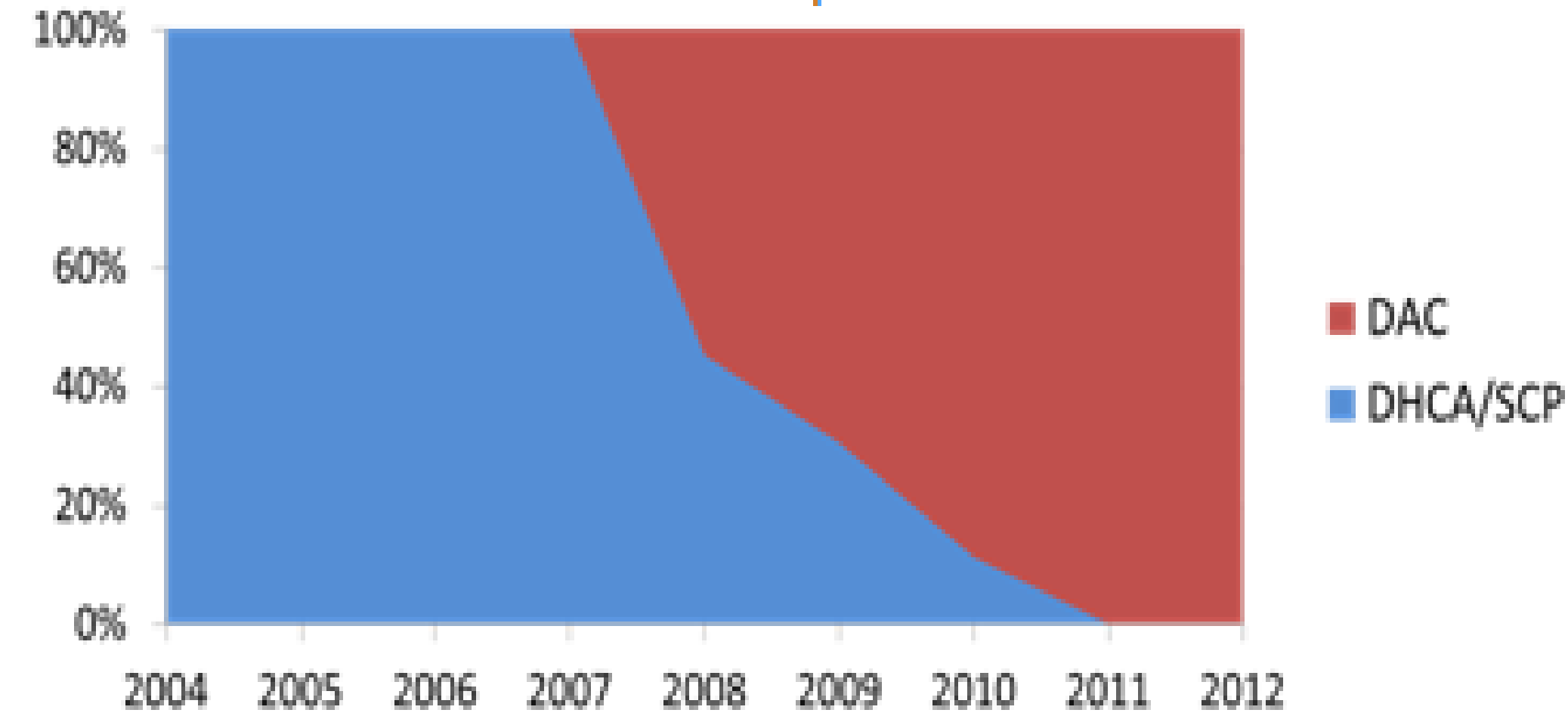
DHCA/SCP

- Radial/ulnar/axillary +/- femoral/umbilical art line
- Ductus cannulation or via MBTS
- Cooling > 30 min, 18 degrees
- DHCA before and after innominate ostial perfusion, or via MBTS
- SCP flow 25-50 ml/kg*min or by pressure

DAC

- Radial/ulnar/axillary + femoral/umbilical art line
- Direct innominate cannulation
- Descending aortic cannulation
- Mild hypothermia to 30-36 degrees, full flow CPB
- Distal arch repair with beating heart

Transition in Technique



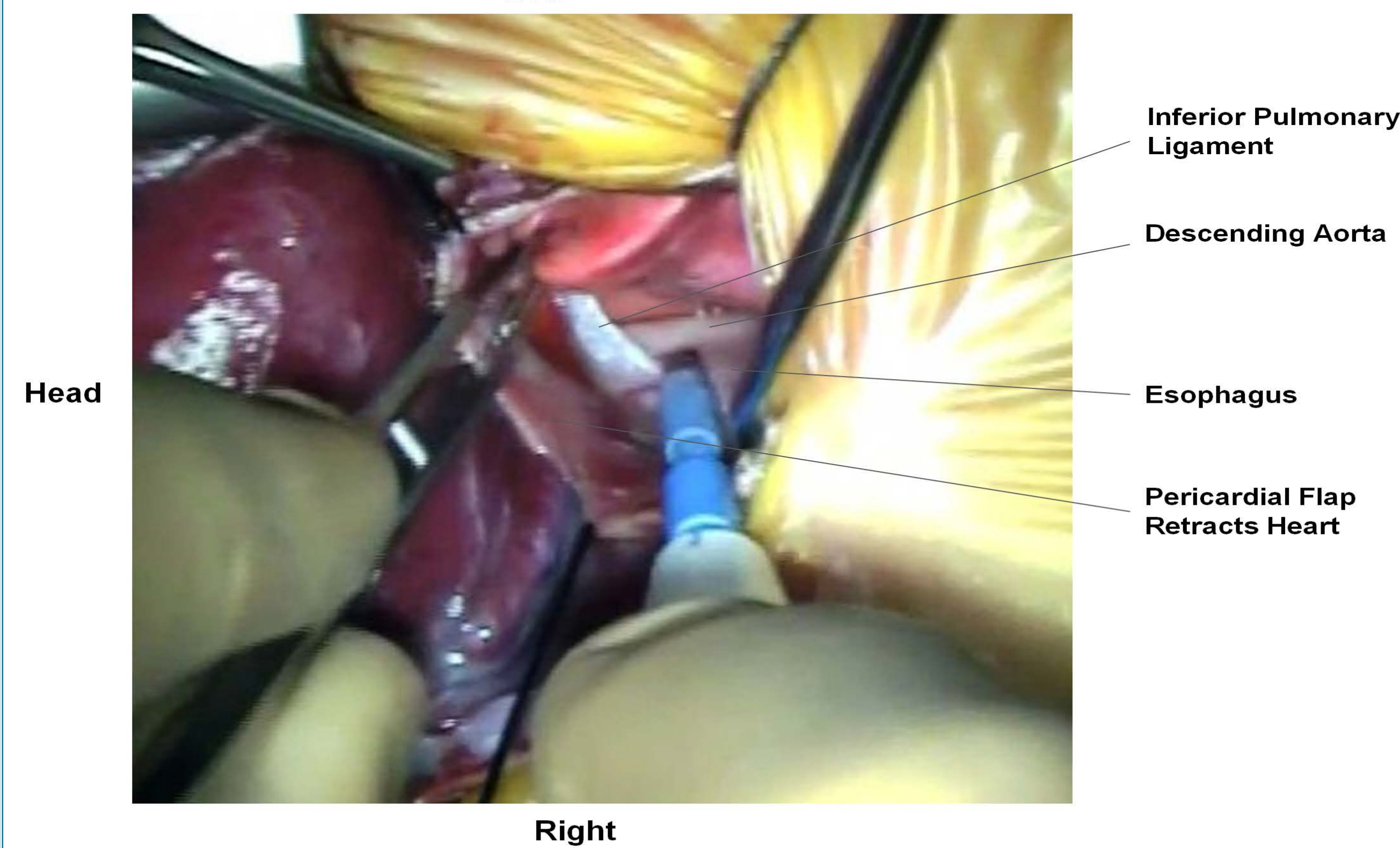
Postoperative Outcomes

	DAC	DHCA/SCP	p
Urine output in 24 hr (ml/kg)	33.2	22.9	<0.001
Fluid balance at 24 hr (ml/kg)	+ 37	+ 69	<0.001
Mechanical ventilation (hrs)	68	113	0.010

Outcomes

	DAC	DHCA/SCP	p
Protamine-Close (min)	60	70	0.096
Inotrope score	5.0	8.0	0.001
Open Chest	30%	58%	0.001
Postoperative ECMO	11.4%	11.1%	0.952
Hospital Mortality	8.6%	12.5%	0.446

Left



Right

Limitations

- Retrospective analysis
- Non-random assignment during overlap
- Historical cohort control
- Single ventricle prevalence in DHCA/SCP group

Caveats

- Lung contusion, pulmonary hemorrhage – snare LPA before dissecting, be gentle
- Left phrenic nerve – visualize and protect
- Right recurrent laryngeal nerve – be aware
- Remove DA cannula during weaning from bypass
- Innominate cannula obstruction during MUF-- move to RA

Preoperative Characteristics

	DAC (n=70)	DHCA/SCP (n=72)	p
M/F gender	35/35	39/33	0.619
Age (days)	9.3 +/- 6.6	8.1 +/- 4.9	0.959
Weight (kg)	3.2 +/- 0.64	3.2 +/- 0.56	0.410
BSA (m ²)	0.21 +/- 0.03	0.21 +/- 0.02	0.199
Single Ventricle	37%	47%	0.168
Aprotinin Use	7%	83%	<0.001

Operative Parameters

	DAC	DHCA/SCP	p
CPB time	113	172	<0.001
Myocardial ischemic time	43	81	<0.001
DHCA/SCP time	0	54	<0.001
DHCA time	0	16	<0.001
Procedure time (min)	269	312	0.012
OR time (min)	378	420	0.003

Predictors of Renal Dysfunction

	Odds Ratio	Confidence Interval	p
DAC	0.17	0.04-0.65	0.0097
Single ventricle	5.7	1.8-17.7	0.0029
Crossclamp /min	1.025 (2.6 at 38 min)	1.006-1.044	0.0092
Aprotinin use			NS
BSA			NS
Operative time			NS
Inotrope score			NS

Conclusions

- Descending Aortic Cannulation may improve kidney protection relative to Deep Hypothermic Circulatory Arrest and Selective Cerebral Perfusion
- Descending Aortic Cannulation may be a component of an overall perfusion strategy that improves perioperative outcomes and efficiency
- Prospective study may be worthwhile