LAB MEDICINE

PEDIATRIC NEPHROLOGY

BACKGROUND

- Acute kidney injury (AKI) frequently occurs in neonates and infants after cardiopulmonary bypass (CPB) and many require renal replacement therapy (RRT).
- Peritoneal dialysis is RRT modality of choice in neonates with AKI after CPB, but continuous veno-venous hemodialysis (CVVHD) may be necessary if PD is ineffective or contraindicated.
- Vascular access is challenging due to small central vein size or thrombosis
- **Risk of malfunction or morbidity associated with** standard dialysis catheters may be excessive in neonates with congenital heart disease.

METHODS

- We report our approach to vascular access for **CVVHD** in five small patients s/p CPB who developed AKI and/or fluid overload.
- All cases had previously been on PD but were changed to CVVHD after PD was ineffective.
- 4 or 5 F hemostasis valve introducer sheaths were placed into separate veins
- **CVVHD** was performed via Gambro Prismaflex machine with heparin anticoagulation.



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NOVEL APPROACH TO HEMODIALYSIS ACCESS USING TWO SINGLE-LUMEN CATHETERS IN INFANTS WITH CARDIAC DISEASE

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RESULTS

The catheters provided excellent blood flow. A C-clamp was required on all return lines as dialysis machine detected low pressures. All patients achieved excellent fluid removal and normalization of metabolic derangements. There was no dialysis discontinuation due to mechanical problems. There were no complications attributable to hemodialysis or the two-catheter vascular access.

CLINICAL DATA										
Patient	Age and Gender	Weight	CHD	Surgery	PD Complications					
1	4days, F	2.5 kg	HLHS	Sano-Norwood	Pleuro-peritoneal communication					
2	7days, M	3.4 kg	DILV, LTGA, CoA	DKS, BT shunt ECMO Berlin Heart	Omental herniation					
3	1year, F	8.5 kg	D-TGA, VSD, Cardiomyopathy	ECMO Berlin Heart	Peritonitis					
4	7days, F	3.7 kg	Aortic arch hypoplasia, ASD, Scimitar Syndrome	Arch Augmentation, ASD closure ECMO	Pleuro-peritoneal communication					
5	15days, F	3.1 kg	D-TGA, VSD	-ASO, VSD Closure -ECMO	Mechanical Obstruction					

VASCULAR ACCESS AND DIALYSIS DATA

Patient	Access Catheter Size & Site	Return catheter Size & Site	Duration of Dialysis	Access/Return Pressure with C-Clamp	Blood Flow/Dialysat e Rate	Net Fluid Balance first 72 hrs
1	5Fr 12cm right atrium	4Fr 7cm left femoral	3 days	Neg 28/ 63	50 mL/min 350 mL/hr	Neg 265mL/kg
2	4Fr 7cm right femoral	4Fr 7cm left femoral	7 days	Neg 40/ 54	50 mL/min 400 mL/hr	Neg 198 mL/kg
3	4Fr 7cm right femoral	5Fr 30 cm left femoral	5 days	Neg 30/ 43	50 mL/min 450 ml/hr	Neg 106 mL/kg
4	4Fr 7cm right IJ	4Fr 7cm right femoral	13 days	Neg 19/ 28	30 then 50 mL/min 200 mL/hr	Neg 136 mL/kg
5	4Fr 7cm left femoral	4Fr 7cm right femoral	3 days	Neg 20/45	50 mL/min 300 mL/hr	Neg 225 mL/kg



Children's of Alabama



4 Fr hemostasis valve introducer sheath Elite HV® B.Braun Interventional Systems (Bethlehem, PA)



Conclusions

Vascular access via two small, singlelumen catheters in separate veins enables consistent and effective dialysis and ultrafiltration in neonates with small vessel size and high risk of vascular thrombosis and obstruction. This is an alternative technique to traditional larger double-lumen catheters that are often ineffective and associated with morbidity in this population.