NICU, Anesthesia and Transport Protocol for PDA Device Closure in Premature Infants in the Catheterization Laboratory

Updated: 5/2022

Premature infants ≥ 1800 grams:

1. *Day before Procedure:*
    a. Echocardiogram to be performed at bedside the day prior to the cath procedure to confirm PDA size and direction of shunt. If a recent echo was obtained (< 4days), check with cardiology to determine if day prior to procedure echo is needed.
    b. Pre-cath labs:
        i. IV access to be obtained in NICU prior to procedure. 2 PIV's or a PIV and PICC if possible.
        i. Type and Cross (1 unit PRBCs), CBC and basic metabolic panel w/in 24 hours.
        ii. PRBC transfusion—If Hct < 25%, transfuse with 15 ml/kg prior to procedure.
        iii. Platelet threshold goal > 75,000. If < 75,000 discussion between cardiology, NICU and anesthesia to determine need for platelet transfusion.
        iv. BMP – check renal function as AKI/renal failure may limit contrast administration during catheterization
    c. Place Cerebral and Renal NIRS to obtain baseline
2. *Day of Procedure:*
    a. Informed consent obtained by cath MD and placed in folder attached to isolette.
    b. NICU nurse and neonatologist/fellow/NNP hand off patient to anesthesia team
        i. Transport patient to and from cath lab per NICU & Anesthesia protocols
        ii. NICU staff/RT/Anesthesia to discuss mode of ventilation – anesthesia machine vs. set up of NICU ventilator in cath lab prior to transport
    c. Prior to Transport Cath lab room temperature must be above 75 degrees. Table with Bair Hugger and warming lights must be at least 82 F degrees. Temp will be verified by digital room thermometer (warming lights are stored in 3rd floor anesthesia work room)
    d. IV/PICC access
        ii. IV access to be obtained in NICU prior to procedure. 2 PIV's or a PIV and PICC if possible.
        i. Infuse dextrose containing fluids to prevent hypoglycemia while NPO

e. Begin hydrocortisone 1mg/kg/dose IV q8h x3. First dose given in NICU prior to procedure. Consider not giving hydrocortisone if recent NSAID use within 72 hours, weighing risk/benefit.
f. Blood will be requested by AFCH Hybrid OR RN and stored ins AFCH Hybrid blood cooler prior to start of case.
g. Endotracheal tube – Anesthesia to intubate in the cath lab unless previously ventilated.
h. Temperature probe to be placed in esophagus prior to draping baby.
i. Blood pressure cuffs to be placed on both legs prior to draping to ensure access to noninvasive BP during case. Connect BP to left leg (assume venous access on right). After venous access, switch connection to right leg if access was obtained on the left.
j. Patient Positioning: Foam padding under head. Head turned toward right shoulder to allow for TTE access. Gauze roll under hips to lift pelvis. Gauze wrap around lower legs to maintain straight, neutral position.
k. Prep with betadine (no chlorhexidine/ChloraPrep). Cleanse with normal saline using sterile technique.

3. *Post Procedure:*
    a. Pt likely to return to NICU intubated
        i. Extubation after 4-6 hours at discretion of Neonatologist
    b. NPO for at least 8 hours post op, then consider beginning trophic (20 ml/kg/day) feeds
        i. Resume pre-op feeding volumes following echo post procedure day 1 or at discretion of neonatologist
    c. CXR upon return to NICU
    d. Assess patient:
        i. Assess site and ipsilateral leg for color, pulses and bleeding;
            1. Q15 minutes for 1 hour
            2. Q 30 minutes for 2 hours
            3. Q 1 hour x2
            4. Then q 4 hours
        ii. If patient has a bradycardia/desaturation event that is not responding, consider device embolization

iii. Place pulse oximeter on lower extremities (not the one the cath was done on) to monitor for desaturation. Order CXR and contact cardiologist if any concerns for device migration.

iv. Monitor Renal and cerebral NIRS

e. Care of the patient:

i. Keep leg used for femoral access elevated to 20 degrees

ii. Monitor leg bandage for signs of bleeding

iii. Minimize leg mobility for the first 4 hours post cath

f. Echocardiogram in the morning on post procedure day 1 to confirm device position and to ensure no obstruction of left pulmonary artery or descending aorta.

g. Repeat/scheduled echo at 1 week and 6 weeks post procedure

h. Labs: No scheduled labs indicated post cath day #1 unless clinically indicated.

i. RN to remove cath dressing post procedure day 1. Call cath MD or cath NP if there are questions/concerns.

Premature infants < 1800 grams:

2. *<u>Day before Procedure:</u>*

a. Echocardiogram to be performed at the bedside the day prior to the cath procedure to confirm PDA size and direction of shunt. If a recent echo was obtained (< 4days), check with cardiology to determine if day prior to procedure echo is needed.

b. Pre-cath labs:

i. IV access to be obtained in NICU prior to procedure. 2 PIV's or a PIV and PICC if possible.

ii. Type and Cross (1 unit PRBC), CBC and basic metabolic panel w/in 24 hours.

iii. PRBC transfusion - If Hct < 25% transfuse with 15 cc/kg prior to procedure.

iv. Platelet threshold goal > 75,000. If < 75,000 discussion between cardiology, NICU and anesthesia to determine need for platelet transfusion.

v. BMP – check renal function as AKI/renal failure may limit contrast administration during catheterization.

c. PICC line:

i. If considering PICC placement - ideally place in upper extremity prior to procedure as upper extremity PICC line can be used as marker for device

placement. If possible, avoid placing a right lower extremity PICC as this is preferred access site for catheterization.

ii. If lower extremity PICC in place do not remove— discuss access issues with cath lab team and anesthesia.

d. Place Cerebral and Renal NIRS to obtain baseline

3. *Day of Procedure:*

a. Informed consent obtained by cath MD and placed in folder attached to isolette.

b. Endotracheal tube

i. Neonatologist and anesthesiologists to discuss intubation of baby the morning of the procedure prior to anesthesia arrival at bedside

ii. NICU staff/RT/Anesthesia to discuss mode of ventilation – anesthesia machine vs. set up of NICU ventilator with extended vent tubbing in cath lab prior to transport

c. NICU nurse and neonatologist to hand off patient to anesthesia team

i. NICU nurse, respiratory therapy and anesthesia team to transport patient to cath lab in isolette w/ transport ventilator

1. NICU nurse to remain w/ baby for entire procedure to assist cath team and anesthesia with meds/pumps/positioning and transport

ii. Transport in isolette with transport ventilator on shuttle

1. No hand bagging of baby during transport

d. Prior to Transport Cath lab room temperature must be above 75 degrees. Table with Bair Hugger and warming lights must be at least 82 F degrees. Temp will be verified by digital room thermometer. (Warming lights are stored in 3rd floor Anesthesia work room)

e. Blood will be requested by AFCH Hybrid OR RN and stored ins AFCH Hybrid blood cooler prior to start of case.

f. Temperature probe to be placed in esophagus prior to draping baby.

g. IV/PICC access

i. IV access to be obtained in NICU prior to procedure. 2 PIV's or a PIV and PICC if possible.

ii. Infuse dextrose containing fluids to prevent hypoglycemia while NPO

h. Begin hydrocortisone 1mg/kg/dose IV q8h x3. First dose given in NICU prior to procedure. Consider not giving hydrocortisone if recent NSAID use within 72 hours, weighing risk/benefit.
i. Blood pressure cuffs to be placed on both legs prior to draping to ensure access to noninvasive BP during case. Connect BP to left leg (assume venous access on right). After venous access, switch connection to right leg if access was obtained on the left.
j. Patient Positioning: Foam padding under head. Head turned toward right shoulder to allow for TTE access. Gauze roll under hips to lift pelvis. Gauze wrap around lower legs to maintain straight, neutral position.
k. Prep with betadine (no chlorhexidine/ChloraPrep). Cleanse with normal saline using sterile technique.
l. NICU RN, RCP and anesthesia to transport infant back to NICU in isolette post procedure.
m. Shuttle and warmer to be plugged in during procedure to keep warm.

4. *Post Procedure:*
    a. Pt to return to NICU intubated
        i. Extubation after 4-6 hours at discretion of Neonatologist
    b. CXR upon return to NICU
    c. NPO for at least 8 hours post op, then consider beginning trophic (20 ml/kg/day) feeds
        i. Resume pre-op feeding volumes following echo post procedure day 1 or at discretion of neonatologist
    d. Assess patient:
        i. Assess site and ipsilateral leg for color, pulses and bleeding;
            1. Q15 minutes for 1 hour
            2. Q 30 minutes for 2 hours
            3. Q 1 hour x2
            4. Then q 4 hours
        ii. If patient has a bradycardia/desaturation event that is not responding, consider embolism
        iii. Place pulse oximeter on lower extremities (not the one the cath was done on) to monitor for desaturation. Order CXR and contact cardiologist if any concerns for device migration.

e. Care of the patient:
    i. Keep leg used for femoral access elevated to 20 degrees
    ii. Monitor leg bandage for signs of bleeding
    iii. Minimize leg mobility for the first 4 hours post cath
f. Echocardiogram in the morning on post procedure day 1 to confirm device position and to ensure no obstruction of left pulmonary artery or descending aorta.
g. Repeat echo at 1 week, 6 weeks post procedure
h. Labs: No scheduled labs indicated post cath day #1 unless clinically indicated.
i. RN to remove cath dressing post procedure day 1. Call cath MD or cath NP if there are questions/concerns.
    i. Do not need to put a Band-Aid on site
    ii. Assess site for signs and symptoms of infection. Call cardiologist if concerned.
    iii. Assess site with each diaper change.