ORIGINAL RESEARCH PAPER

Nursing

KEY WORDS: Aterial switch operation, extracorporeal membrane oxygenation. Trans-position of great vessels, arterialseptaldefect.

TRANSPOSITION OF GREAT ARTERIES AND ARTERIAL SEPTAL DEFECT UNDER GONE FOR ASO +ASD CLOSURE WITH INTEGRATED ECMO SUPPORT

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ABSTRACT

High quality nursing care for children in cardiac intensive care units demands professional nursing knowledge and practiceal skill , due to its specificity and complexity Nurses must
be knowledgeable about the human responses of these children. a many of their responses are physiological, yet there are a multitude of psychological, behavioural and family response that are also very important for the nurse to understand, diagnoses and treatment. Transposition of the great arteries is the most common congenital heart defect among the birth defects that present with cyanosis during the early neonatal period. infants with this cardiac birth defect, in which the aorta originates from the right ventricle and the pulmonary artery originates from the left ventricle, usually do not survive without surgical intervention in the first few days of life. The arterial switch procedure, performed via a median sternotomy incision during cardiopulmonary bypass, restores the aorta and pulmonary artery to their normal anatomic positions. Expert nursing assessment and intervention during the postoperative period is imperative and may reflect on the long-term outcome of these neonates. The Nursing are play in major role in post operative patient in good patient outcome .

Introduction:

Transposition of great vessels is congenital cardiac anomaly in which the aorta arise from the right ventricle and pulmonary artery arise from the left ventricle so that de-saturated venous blood returning from the peripheral tissue is pumped back to the systemic circulation while oxygen rich pulmonary venous blood is pumped back to the pulmonary artery is leads to baby present with cyanosis Baby with Transposition of great vessels must have communication between the systemic circulation and the pulmonary circulation consistent with the life. Ideally these baby have the patient ductus arterious, arterial septal defect and ventricular septal defect for this defect the arterial switch procedure requires cardiopulmonary bypass and aortic cross clamping,the ascending aorta and main pulmonary artery are transected .the left and right coronary artery ostia are visualized and excised from the aortic root with adjacent aortic wall as buttons.the coronary artery buttons are than shifted posteriorly and implanted into the facing sinuses of the main pulmonary artery root. Next the distal pulmonary artery and its branches are brought forward and the distal aorta moved posteriorly. the `distal aorta is now anastomosed to the new aortic root. reconstruction of the pulmonary artery is undertaken next utilizing a patch of cryopreserved pulmonary artery homograft closure of atrial septal defect completes the arterial switch repair.Here (ECMO)*Extra corporal membrane oxygenation* used to reduced the left atrial pressure in order to prevent left ventricular dysfunction.

Case report of a 15 days old male baby complaints of fever,cyanosis while crying and increased respiratory distress, Baby was observed looks lethargic and respiratory distress, vitals are Heart rate-172/mts, Respiratory rate- 62/mts, SPO_2-48%, lung sounds bilaterally crepitus present,left side more than the right side, S1& S2 sounds present loud. Than child intubated and put on SIMV Fi02 80% PEEP-5 Respiratory rate -35/mts, Baby undergone various diagnostic test that Chest x-ray done, ECG taken,ABG analysis done PH-7.31 po2-155.6 mmhg , pco2- 34.2 mmhg,BE- -6.5, HCO3 -17.4 , Lac - 3.6, Na- 142 ,K- 3.56,ca- 0.88 blood sugar -88mg/d blood to investigation done Hb-13.2 ,Tlc-14.8 ,Platlet-1.72 lack, Urea-62, Creatine- 0.9, Na-142,K- 4.7 ,Ca- 8.4 Uric Acid-.3.3, Bilirubin-1.38, SGOT/SGPT- 157/61 Alkaline phosphate-212 CRP-14.1,ESR- 26. child received treatment INJ.Zosyn 210mgTds, INJ. Vancomycin 40 Mg Bd, Inj.Lasix 4mg Bd, IVF-N/3 D5 AT 12.5 ml/hr after 6 hour NG feed 10ml Q2 Hourly started. Emergency monitoring done which is include temperature both core and peripheral, heart rate, respiration, blood pressure, central pulse, peripheral pulse, pupils, hourly I/O chart monitoring

After 15 days of admission, patient received WITH ASO +ASD CLOSURE with integrated ECMO to support With Prvc FIO 260% RR- 35 mts/ min ABG analysis done- PH- 7.29,Po2-66.5, Pco2-48.5, Be- -2.4, HCO3-20.8, Na-140.4, K-5.18, Ca- 1.65, Hb-10.5 Hct-31.5, Lac -4.6, Cl-109 , Vital signs are Bp-52/34 Mmhg,Hr-178 b/mts, RA-4, peripheral temperature-27.3, auxiliary temperature-96 F , Inotrops support inj: NTG 20/50 @ 0.3 ml/hr, inj ADR 2/50@ 0.3 ml/hr, injNOR-ADR2/50 @ 0.3 ml/hr,Heparin 25000/25 @ 0.2 ml/hr, Sedation inj Fentanyl 250mcg/25 @ 0.3 ml/hr .Child received treatment inj; Zosyn 450 mg iv tds, injAmikacin 75 mg iv od, inj; Linezolid 50 mg iv bd,inj:Phenoxy 3mg iv tds(on order), inj: Lasix 2 mg iv tds (on order) syp-Neogardian 5 ml od ,syp-Osteocalcium5ml bd,syp-Crocin 75mg qid, vit k 3.5 mg iv od .RTFeeding q 2 hry EBM started, I/O chart monitored With favorable urine output. The patient regained clear consciousness at 12 hours(but child kept under sedation), acceptable arterial blood pressure (60-80/30-40 mmHg) and favorable findings in chest X-Ray the patient weaned off the ECMO after 24 hours support, and the sternum was closed simultaneously. During the ECMO support, heparin was used to maintain ACT at 200 - 350 s. Platelets were infused daily to keep the platelet level at >50000/L. This patient was extubated at 3 days after operation,but same day child had stridor & labored breathing so he was again intubated and put on Prvc Fi02 -50% Rr-24/Mts.after 2 days baby Weaned Off & extubated from ventilator support than baby kept NICU under observation,after4 weeks baby discharged successfully

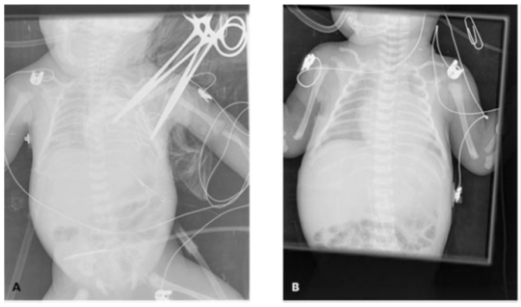

Fig. 1 – A: Anteroposterior chest X-ray (POD1 after ECMO initiation). B: Anteroposterior chest X-ray (POD2 after ECMO discontinuation

Nursing assessment based on system :

1)Cardiac :

- Central pulse present (carotid, apical & femoral pulse)
- Peripheral pulse weak but present with Doppler.
- Baby Peripheral temperature is -27.3 c
- Core temperature is -38.8c
- Baby skin colour, body is pink & lower extremities slightly blue
- Capillary refillis more than 4 sec
- Right atrial pressure is 4 –5 mmHg
- pulmonary artery pressure is 24- 27 mmHg
- urine output is 10-15 ml/hr
- systolic and diastolic pressure is 40 – 60/20-39 mmHg

- baby is having tachycardia Hr- 178 b /mts

2) Respiratory
- Baby is on ventilation support Prvc Fi02 -50% RR-24/Mts.
- Bilateral equal air entry present.
- Oxygen saturation is 98%
- Auscultated crackles lungs sounds present over right side
- Baby endotracheal secretion are thick white present .
- Lactate level is more than 4 mg/dl

3) Neurologic
- Pupillary reflex present
- Corneal reflex present
- Baby is clear conscious
- Spontaneous eye opening present (after tapering off of sedation)
- Head circumference is 28 cm

4) Pain and sedation
- Vital signs
- Developmentally appropriate pain scales

5) Gastrointestinal
- Baby Abdominal girth is 28 cm.
- Bowel sounds present
- Nutritional assessment done Baby height-46 cm,weight-2.4 kg, midarm circumference-8cm

Nursing intervention:

1.Nursing diagnosis: *Decreased cardiac output* related to increased afterload, decreased myocardial contractility and reduced stroke volume, as evidenced by: weak peripheral pulses, decreased peripheral temperature, increased pulmonary vascular resistance.

Expected outcome: to improve the cardiac output

Nursing intervention :

* Checked Peripheral perfusion and temperature.
- Monitored urine output hourly
- Monitored dysarrythimias
- Assessed the heart sounds for gallop
- Monitored Right atrial pressure, systolic and diastolic pressure
- Administered positive inotropic/contractility medications such as adrenaline, nor adrenaline to improve the cardiac output as per physician order.
- Provided appropriate ventilation and oxygenation to reduce pulmonary vascular resistances per physician order
- Administered analgesia and sedation to reduce pulmonary vascular resistances per physician order.
- Administered afterload reducing agents like nitroglycerine as per physician order.
- Rewarming child with incubator &radiant warmer
- Maintained fluid balance by administering IV fluids or diuretics, as appropriate
- Maintained adequate acidbase balance
- Monitored oxygenation with 98%
- Checked atrial blood gas & serum electrolytes 3rd hourly.

Evaluation :
- Patient saturation was maintained
- Pulse and BP maintained normal
- Patient perfusion status was improved.

2.Nursing diagnosis :Impaired gas exchange related respiratory acidosis as evidenced by: decreased pO2, decreased SaO2, and increased pCO2 and excessive thick sputum secretion.

Expected Outcome : Maintain normal oxygen and carbon dioxide level

Nursing Intervention :
- Checked respiaratory rate ,rhythm and breath sounds
- Collected & monitored chest x-ray reports
- Routinely monitored ventilator settings
- Checked all ventilator connections regularly
- Monitored for adverse effects of mechanical ventilation: infection, barotrauma, reduced cardiac output.
- Determine the need for suctioning by auscultating for crackles and bronchi over major airways.
- Monitored patient's respiratory secretions
- Provided respiratory theraphy treatments (nebulizer) as needed.
- Provided semiprone position to improve the lung expansion which enhance ventilation and atrial saturation.
- Provided tactile stimulation to improve the respiratory effort.
- Provided chestphysiotheraphy to loosen and remove respiratory serections.
- Auscultated lung sounds after treatment to note results
- Noted the change in sp02,tital volume and change in arterial blood gas

Evaluation : Saturation was 100%, Po2-154 mmHg, Pco2-34 mmHg, every 4th hourly patient airway cleared by performing suctioning , respiratory secretion color , quantity was assessed , ABG values shows normal

3.*Nursing diagnosis : Risk for bleeding* related to cardiac surgery, ECMO and hemodilution as evidenced by bleeding or oozing from ECMO insertion site & Sternum,
Expected outcome : Minimizing and control of bleeding

- Monitored the patient closely for hemorrhage
- Monitored the bleeding or oozing from ECMO insertion & chest tube insertion site
- Checked hemoglobin/hematocrit levels before and after blood loss, as indicated
- Maintained patent IV access
- Monitored coagulation studies, including activated clotting time (ACT) 3rd hourly,prothrombin time (PT)& partial thromboplastin time (PTT) 12 hourly.
- Monitored for signs and symptoms of persistent bleeding (e.g.; check all secretions for frank or occult blood)
- Performed proper precautions in handling blood products or bloody secretions
- Administered blood products (e.g., platelets , fresh frozen plasma, cropricipitate), as appropriate
- Monitored determinants of tissue oxygen delivery (e.g., PaO2, SaO2, and hemoglobin levels and cardiac output), if available.

Evaluation : Monitoring intake and output chart , Pulse rate , saturation

4. Nursing diagnosis :Deficit fluid volume related cardiac surgery as evidenced by reduced RA pressure and low BP.

Expected Outcome : Maintain normal fluid status

Nursing Intervention :
- Assessed for signs and symptoms of fluid and electrolyte deficit like decreased RA pressure, low BP, hypokalemia, hyponaterimia and hypocalcimia symptoms
- Monitored vital signs and CVP
- Monitored fluid intake hourly
- Checked the urine output hourly
- Monitored intake and output chart in every shift
- Monitored laboratory values like NA, K, Ca, and arterial blood gas 3rd hourly. Replaced the electrolytes losses ,as indicated
- Administered 5% albumin 25 ml bolus to to improve the preload as per physician order
- Administer the IV solution N/5 in D5 @ 5ml/hr as per physician order

Evaluation : Patient Intake and output chart well balance , Pulse and BP normal

5) Nursing Diagnosis Risk for infection evidenced by inadequate

primary defenses (immature immune system, opened sternum and altered peristalsis), inadequate secondary defenses (decreased hemoglobin, increasedenvironmental exposure to pathogens, multiple invasive procedures.

Expected Outcome : Maintaining the aseptic technique and prevention of infection

Nursing Intervention

- Do the observance of universal precautions liks proper handwashing, seperate baby care article,changing of shoes,wearing of sterile gown mask and restriction of visitors.
- appropriate wound care technique
- Monitored for systemic and localized signs and symptoms of infection
- Inspected condition of any surgical incision wound
- Followed aseptic handling of all IV lines Obtain cultures, as needed.
- Followed strict aseptic technique for all invasive & non-invasive procdure
- Monitored absolute granulocyte count, WBC count, and differential results

Evaluation : Monitored the patient WBC, Temperature there was no sign of infection

6. Nursing Diagnosis :Impaired skin integrity related prolonged immobilization (unremoved ET tube, ECMO insertion &opened sternum,) as evidenced by redness & skin peeling over sacrum, scapula and occipt
Expected Outcome : Maintain skin integrity

Nursing Intervention

- Monitored site of impaired tissue integrity atleast 2 times daily for color, changes, redness, swelling, warmth, pain or other sign of infection
- Patient turned every 2 hours as evidence by nursing documentation
- Baby kept on a soft –comfortable ,nestled and cushion basinet to prevent friction especially bony prominence area like sacrum and scapula.
- Applied soft pad under bony prominence area like shoulder blade, sacrum and occipit.
- Kept soft pad under ear cartilage & massage should given with olive oil every 6-8 hours.
- Pt wound will be changed daily per wound care orders and proper hand hygiene will be performed before and after dressing changes

- Evaluation : Assessed skin condition such as color appearance etc …

7) Nursing Diagnosis Altered Nutrition: less than body requirements related to the excessive energy demands required by increased cardiac workload

Expected outcome: to improve the nutritional status of the children

Nursing intervention:

- Assessed baby Height,weight, Head, chest& midarmcircum berence.
- Assessed the level of hydration
- Assessed for sign of hypoglycemia
- Ascultated presence of bowel sounds.
- Provided 140 – 160 Kcal /kg/day which include expressed breast milk via feeding tube10 ml/ 2nd hourly
- Calculated the consumption of calories and electrolytes every day
- Monitored serum albumin,CBC&electrolytes level every 24 hrs.

Evaluation: pt weight measured, baby normal glucose and electrolytes was maintained.

Conclusion : Nurse working in cardiac intensive care unit based on evidence based practice In the current era, the health care facilities are highly sophisticated and nurses are well trained in nursing technology. They monitor round the clock and provide care for the patients. As nurses render close monitoring of the patients with post cardiac surgery patients can be identified in its initial phase itself. Following problem identification, if the nurse could initiate the right intervention in right time the sequelae of complication of surgical procedure could be prevented and better patient outcome.

Conflicts of interest : The Author has declared no conflicts of interest .

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