Case Report

An hybrid Operating Theater setting for major surgery in an Extremly Low Birth Weight Infants: a case report

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Michele Stellabotte[1], Giuseppe Bontorno[2], Alessandra Fornasieri[1], Marcello Monteleone[1], Marco Danelli[1], Monica Capoferri[1], Francesco Macchini[3], Andrea Zanini[4], Stefano Mazzoleni[4], Carlo Ferrari[4], Luigi Montagnini[5], Paolo Augusto Stoia[5,] Marta Somaini[5]

[1] Registered Nurse, Pediatric Operating Theater, ASST Grande Ospedale Metropolitano Niguarda, Milano, Italy (For correspondence: michelestellabotte@gmail.com)
[2] Head Nurse, Pediatric Operating Theater, ASST Grande Ospedale Metropolitano Niguarda, Milano, Italy
[3] MD,Director of Pediatric Surgery, ASST Grande Ospedale Metropolitano Niguarda, Milano, Italy
[4] MD, Pediatric Surgeon, ASST Grande Ospedale Metropolitano Niguarda, Milano, Italy
[5] MD, Pediaric Anesthesiologist, ASST Grande Ospedale Metropolitano Niguarda, Milano, Italy

Abstract

Transfer critically ill newborn to the operating theater is a very difficult challenge for nurses, anesthesiologists, neonatologists and surgeons. Most of these patients are mechanically ventilated and cardiocirculatory supported. The biggest challenge for premature infants that need to leave the incubator, while outside the Neonatal Intensive Care Unit (NICU), is maintaining temperature homeostasis. A male preterm newborn, born at 28 gestational week with a birth weight of 700 g underwent a major surgical procedure due to a type C esophageal atresia. This case report is focused on two points: the multidisciplinary approach and the preparation of the patient and settings. Favorable logistic and expertise of the staff can make a difference in this process. An hybrid OT combines the advantages of both the bedside surgery and the OT setting.

Keywords: Neonates, Neonatal Intensive Care Unit, Operating Theater, Nurses

Background:

Transfer critically ill newborn to the operating theater (OT) is a very difficult challenge for nurses, anesthesiologists, neonatologists and surgeons. Most of these patients are mechanically ventilated and on cardiocirculatory support. The biggest challenge for premature infants that need to leave the incubator, while outside the Neonatal Intensive Care Unit (NICU), is maintaining temperature homeostasis. Therefore, transporting these patients inside the hospital may be contraindicated. For this reason, a lot of centers developed a programs defined "bedside surgery" in order to perform surgical procedure inside the NICU.[1,2]

A recent survey in Italy reported that 81.8% of the centers with a NICU perform some degree of bedside surgery, especially in case of Low Birth Weight preterm infants (<1500 g)[1].

Most of the literature describing bedside surgery report advantages and safety for the patients involved[3,4]. The main contraindication for bedside surgery is the lack of a dedicated area. addition, some studies reported an increased risk of infection in babies subjected to bedside surgery[1,2].

There is no clear evidence in the literature to recommend which patient may benefit from bedside surgery instead of transfer to the OT. Every hospital with a NICU should have a detailed bedside surgery programs in order to evaluate each case with a multidisciplinary approach that involves the NICU and OT staff[1].

In this case report we report a case of an extremely low birth weight infants undergoing a major surgical procedure in the OT.

Description of the case

A male preterm newborn, born at 28 gestational week with a birth weight of 700 g. The neonate was affected by type C esophageal atresia (with distal trachea-esophagus fistula) and tetralogy of Fallot. The baby was intubated at birth with uncuffed 2.5 endotracheal tube, sedated and mechanically ventilated. To prevent atelectasis a closed suction system was used. The ventilation mode was Pressure Control whit Guarantee Volume (PEEP 5 cmH_2O, Pmax 30 cmH_2O, VT 5 ml, RR 50 breath for minute). Due to the congenital heart disease, after the birth the baby receive an infusion of prostaglandin at low dosage to maintain open PDA (patent ductus arteriosus). To provide medications, an Umbilical Venous Catheter was placed at birth. In the first day of life, after a multidisciplinary briefing, the neonate was transferred to the OT to close the tracheo-esophageal fistula and to perform an esophago-esophageal anastomosis, via a muscle sparring thoracotomy approach. The in-hospital transport was carried out with a transport-incubator and a mechanical ventilator with no complications and surgery was performed with the baby inside a NICU incubator. This was achievable because of the short distance between the NICU and the OT same floor (50 mt of distance).

Airways and Ventilation

The NICU ventilator was used in the same modalitye used at birth. The OT ventilator was available to provide anesthesia with Sevorane. We maintained a closed suction system to avoid disconnection from the ventilator. Because of the increased dead space caused by End Tidal CO_2 device, the CO_2 was monitored with a Transcutaneous device.

Hemodynamic monitoring and support

Standard non-invasive monitoring was used in the OT: EKG and Non-Invasive Blood Pressure. A peripheral venous catheter was obtained in the OT. The temperature was simultaneously monitored via a cutaneous sensor and a rectal probe. The radiant warmer of the incubator and a warming blanket were used to keep the baby warm. Urine output was monitored via a 6 Ch urinary catheter placed in the OT.

Anesthesia and cerebral function monitoring

Cerebral Oxygenation was monitored with NIRS (Near Infrared Spectrometry) (by Masimo®). An infusion of Dexmedetomidine at 0.2 mcg/kg/h and Fentanyl at 1 mcg/kg/h were given to the patient in order to maintain sedation and analgesia. A single dose of rocuronium was administered at the start of the surgery to paralyze the neonate.

Positioning of the patient, operating theater setup and staff

The baby was positioned on the left side with anti-decubitus gel cushion (Figure 1). The incubator was positioned in reverse, so that the head of the baby was on the foot side in order to grant access to the airways to the anesthesiology team. The equipe was composed of 3 surgeon, 1 scrub nurse, 1 anesthesia nurse and 1 anesthesiologist. The OT setup was resumed in figure 2.

Figure 1 - Position of the baby

Figure 2 - Set Up of the Operating Theatre.

Conclusion:

The surgical procedure was completed without complication. Transport back to the NICU was carried out by NICU staff. During the transfer the neonate remained stable and the various devices remained in place. No bedsore was reported.

Take Home message:

This case report is focused on two points: the multidisciplinary approach and the preparation of the patient and settings. Favorable logistic and expertise of the staff can make a difference in this process. With the knowledge gained from this case, a flow diagram is proposed in order to guide the equipe in choosing the adequate setting for surgery in preterm neonates (Figure 3).

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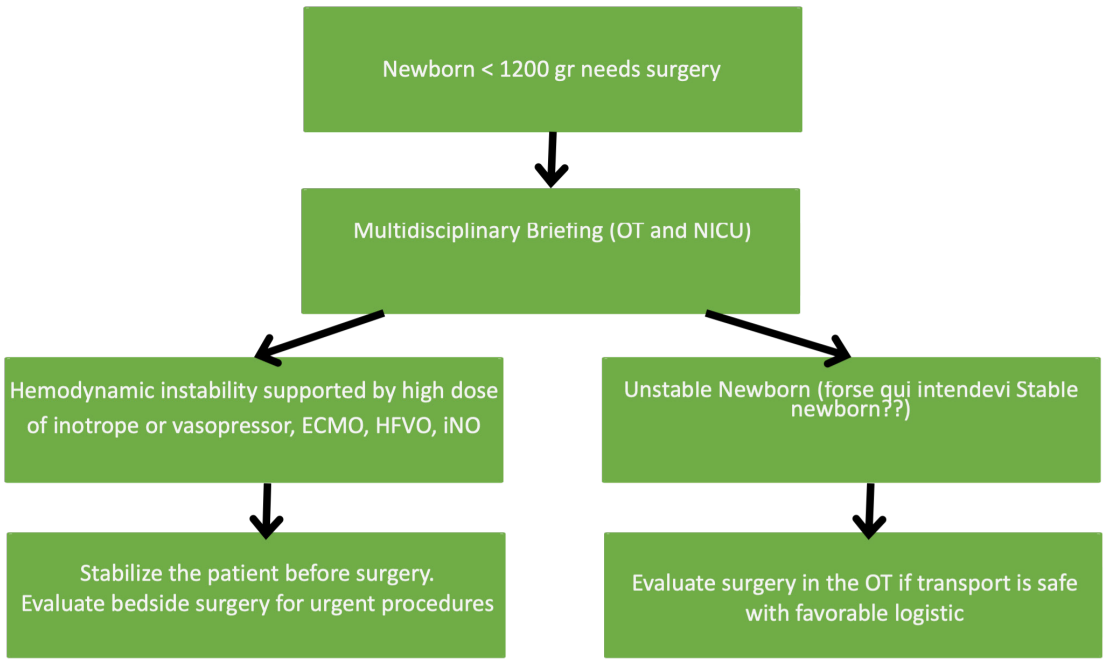

Figure 3 - Flow diagram for decision of the setting for the surgery in low birth weight babies

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