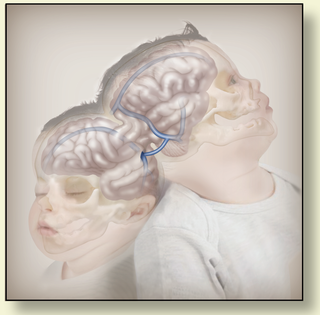
UC DAVIS HEALTH | CHILDREN'S HOSPITAL

The Use of Adjunct Therapies for Pressure Ulcer Reduction in Prolonged Surgical Procedures

Aida M. Benitez, MBA, BSN, RN, CNOR · Christine Evans BSN, RN · Sarah St.Claire, MS, BSN, RN, CNOR

For more information on the twins' journey.



"Abigail" and "Micaela" at 4-months old.

ASSESSMENT:

Studies suggest that perioperative pressure injuries are associated with prolonged surgical procedures relate to positioning, prolonged immobility, and hemodynamics.[1] In December of 2019, craniopagus twins Abigail and Micaela were born at UC Davis Medical Center. Their "connection" was occipital-parietal which presented unique positioning challenges for the surgical team. In addition, with the estimated length of the cranial separation surgery projected to last 24-48 hours, it heightened positioning concerns for the nursing team related to pressure related and positioning injuries for the twins.

FOCUS POINTS of TISSUE PROTECTION:

- Cords, tubes, tubing hubs, hard plastics potentially embedding into skin
- Eyes (preventing corneal abrasion)
- Mouth (pressure from endotracheal tube)
- Bony protruberances
- Tissue in contact with OR table (pressure from body)
- Strictures from cords binding or strangulating tissue
- Creases and folds of linens

PREPARATION and PLANNING:

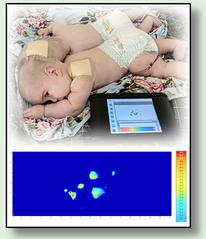
The twins were admitted in June 2020 for cardiac catheterization and implantation of a custom tissue expander in preparation for cranial separation surgery. The nursing team practiced positioning of the twins with mannequins that were taped together to simulate the twins' unique connection and anatomy.

The first surgery only required the twins to be in a prone position for approximately 3.5 hours; however, at the end of the surgery it was noted that Abigail's ear had bent over and been crushed during the procedure. During the debrief of the first surgical case, the department manager suggested the involvement of the wound care team for assistance with positioning devices and use of pressure reduction supplies and equipment.

Four months later, the twins were scheduled for cranial separation surgery on the weekend of October 24th-25th. In preparation for cranial separation surgery, the primary neurosurgeon ordered a CT scan and an MRI/MRA to be completed 3 weeks prior to assess fistula size and the possibility of using image guidance navigation during the surgical procedure. In the weeks leading up to the scans a discussion occurred between the team leaders in which the neurosurgeon requested that the twins remain intubated after their scans so that he could assess if the image guidance system would function through two skulls. At this time, Benitez asked if the nursing team could practice the surgical positioning and pressure mapping with the wound care team.

The day of the scans, authors Benitez and Evans met with members of the wound care team in the Pediatric Intensive Care Unit and used pressure mapping to assess pressure points that could potentially cause injury to the twins. Pressure mapping is used to "evaluate pressure redistribution properties" of various surfaces and sending data to a computer program that displays the results in a "color-coded map, a three-dimensional grid, and a numerical pressure value for each area."[1]

Mannequin Positioning Trials



Pressure Mapping Study

Twins at 7-months Old

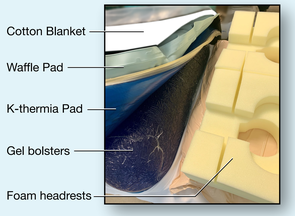
IMPLEMENTATION:

The day of cranial separation surgery, the twins' face, chest, anterior hips, knees and sacrum were padded with 5-layer foam dressings (Mepilex® Border Flex and Mepilex® Border Sacrum) which reduce skin stress and aid in the prevention of pressure and shear injuries. Both twins had soft silicone foam dressings (Mepilex®) placed behind their ears as padding and then a square 4"x 4" Mepilex® Border Flex was placed over each ear to prevent it from bending and becoming crushed. In the supine position, the twins heads were placed on a z-flow pillows and their bodies were placed on an air-inflated static seat cushion.

According to the Kirkland-Walsh et al. study, the air-inflated static seat cushion provides the best reduction of pressure across a skin surface.[1] In the prone position, the heads were placed on pediatric foam prone pillows covered in isolation bags to prevent moisture collection in the foam. Their bodies were on gel bolsters covered with a K-thermia gel pad and air-inflated static seat cushion; their feet were elevated on smaller gel bolsters to prevent pressure on their toes.

The anesthesiology team was responsible for pushing on the air-inflated static seat cushion once per hour to redistribute pressure points. Toboggans were utilized for securing ventilator tubing, lines, and drains to the operating table. Baby blankets and three inch silk tape was used to secure both twins to the operating room table. During each position change, the primary circulators and anesthesiologists were responsible for coordinating and completing the position changes. Team leaders Dhamrait and Benitez were responsible for a final positioning check prior to handing over for surgical prepping and draping.

Prone Positioning Layers



OUTCOME:

The surgical procedure lasted 23 hours and 56 minutes. During this time, the twins underwent five position changes from supine to prone and vice versa. Once surgery was complete all protective dressings and padding was carefully removed and skin was thoroughly assessed. Preventative measures were a success. The twins were delivered to the PICU with no pressure points or redness to face, ears, chin, shoulders, clavicles, chest, iliac crests, knees, feet, toes.

IMPLICATIONS FOR PERIOPERATIVE NURSING:

Patient safety, pressure ulcer prevention, and the reduction of positioning injuries is a multidisciplinary and collaborative team effort. For surgeries anticipated to take longer than 10-12 hours, consult your wound care specialists and use pressure mapping in the patient's preoperative course. Consider the use of adjunct positioning devices and supplies to reduce pressure and other potential positioning injuries.

"Abigail" and "Micaela" at 18 months old.

ACKNOWLEDGEMENTS:

Holly Kirkland-Walsh, RN, Oleg Teleten, RN, Jenny Prevatt, RN, Children's Surgery Center CPT Team, UC Davis Children's Hospital PICU Nurses, Physicians, and Respiratory Therapists, Children's Surgery Center Clinical Staff & Leadership Team, Michael Edwards, MD, Granger Wong, MD, Rajvinder Dhamrait, MD

LILIYA MIROSHNIK

REFERENCES: 1. Kirkland-Walsh et al., 2015, "Pressure mapping comparison of four OR surfaces", AORN Journal, 102(1): 61.e1 - 61.e9.