Total Vertical III Craniopagus Twins; Considerations and Challenges for Positioning and Airway Avoidance during Cerebral Magnetic Resonance Imaging and Angiography

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Background
- Craniopagus twins represent a rare subset of conjoined twins
- Account for only 2-6% of all conjoined twins
- This represents 1.2-5 million live births
- The opportunity to develop expertise in management of such twins is extremely limited
- Radiological investigation is imperative to assess their cranial union and the extent of cross-circulation
- This case reports our management of craniopagus twins in a 5+ hour MRI/MRA scan

Pre-procedural Course
- 27 day old ex-32 5/7 post-conceptual age craniopagus twins delivered via c-section
- Post-delivery course in the Neonatal Intensive Care Unit:
  - Twin A
    - Required positive pressure ventilation and intubation at birth for decreased respiratory effort and bradycardia
    - Later transitioned to CPAP on 70% FIO2
    - Critical airway with micrognathia and glossoptosis
    - PFO with left to right shunting
  - Twin B
    - No cardiopulmonary issues
    - Normal airway anatomy
  - Twin A and B
    - Intermittent signs of significantly decreased perfusion and cardiac output leading to profound hypotension, bradycardia, and desaturation
    - Possibly secondary to acute shifts in blood volume between the two
    - CT demonstrated shared venous circulation in the superior sagittal sinus and dural venous sinus but no shared arterial circulation
    - Brain parenchyma appeared separate

Anticipated Challenges
1. Airway
   - Given Twin A’s oxygen requirements and critical airway, sedation was believed unsafe for MRI
   - Orientation - posed anticipated challenges with mask ventilation and intubation
   - Total vertical III craniopagus type - lying 180 degrees from each other
   - Fused at superior frontal and parietal bones with horizontal axis rotation >40°
2. Positioning
   - MRI/MRA requires very still patients
   - Head movement would distort alignment of imaged brains, skewing pertinent information
3. Cross-circulation
   - Drugs administered: Twin A — Twin B
   - MRI/MRA elucidate description of cross-circulation

Case
- Given the remote location of the MRI suite and the aforementioned challenges, we decided to initially proceed without utilization of anesthetic medications
- A multidisciplinary approach was utilized with personnel from NICU, ENT, MRI, anesthesia, etc. working closely together
- Twins were positioned securely with a bean bag positioner
- Additional head support provided with foam cushions

NICU supplied formula to allow for remote feeding into the scanner via syringe pumps and extension tubing as both twins had NJs in place

- Although this approach may have failed, we felt it was the safest initial step to obtaining imaging

Discussion
- MRI/MRA consisted of 50+ sequences and 5+ hours of scanning
- Only one sequence had to be repeated for motion artifact which is not uncommon even with general anesthesia
- Next, we propose testing of cross-circulation with medications in controlled setting before their utilization in a general anesthetic

References: