**Supplemental Digital Content 1.** Individual cases with severe cerebral desaturation – demographic, operative and event details.

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| **Patient** | **ASA Status** | **PMA at Surgery (weeks)** | **Weight****(kg)** | **Surgical Procedure** | **Nadir of rScO2****(%)** | **Minutes of > 30% rScO2 Decline** | **Minutes of Absolute rScO2 < 50%** | **Details of Events** |
| A | 3 | 47 | 3.85 | Mandibular sagittal osteotomy, external distractor placement | 48 | 0 | 3 | Cerebral desaturation event during induction. Systolic blood pressure 35mmHg and end tidal Sevoflurane 6.3% immediately prior to event. No associated arterial desaturation. Full resolution. |
| B | 2 | 48 | 4.79 | Inguinal hernia repair | 39 | 0 | 6 | Cerebral desaturation during emergence from anesthesia associated with severe arterial desaturation (SpO2 28%) necessitating reintubation. No associated hypotension or bradycardia. Patient kept intubated for 2 days in intensive care. Full resolution. |
| C | 1 | 40 | 6.02 | Inguinal hernia Repair | 45 | 0 | 3 | Intubation-related cerebral desaturation with SpO2 of 55%. At end of case, FiO2 unable to be weaned below 50%. Patient kept intubated and sent to intensive care. Rhinovirus infection diagnosed and patient extubated 8 hours later. Full resolution. |
| D | 3 | 59 | 3.4 | Thoracotomy, esophageal atresia repair | 25 | 14 | 22 | Cerebral desaturation during surgical displacement of mediastinal structures and compression of airway. Associated brief severe arterial desaturation (SpO2 50%) and mild hypotension (MAP 37mmHg). Full resolution. |
| E | 2 | 55 | 6.1 | Exploratory laparotomy | 34 | 0 | 75 | Baseline rScO2 58%. Prolonged cerebral desaturation not associated with arterial desaturation or significant hypotension. End tidal CO2 between 22-28mmHg throughout case. Full resolution. |
| F | 1 | 63 | 8 | Cleft lip repair | 49 | 0 | 5 | Transient cerebral desaturation immediately following extubation with associated SpO2 of 92%. Full resolution. |
| G | 3E | 38 | 2.65 | Cystoscopy, urethral valve resection | 57 | 4 | 0 | Baseline rScO2 87%. Cerebral desaturation during intubation not associated with arterial desaturation. First blood pressure taken 6 minutes after the cerebral desaturation showed MAP of 22mmHg. Full resolution. |
| H | 3E | 37 | 2.8 | Exploratory laparotomy, radical nephrectomy | 56 | 86 | 0 | Baseline rScO2 94%. Gradual decline in rScO2 (minimum of 57%) during case not associated with significant arterial desaturation or hypotension. Extensive surgical bleeding occurred in the case with 3 blood volume replacements. Full resolution. |
| I | 3 | 44 | 4.55 | Kasai procedure | 44 | 10 | 28 | rScO2 below 50% in latter half of Kasai operation with no associated arterial desaturation. Moderate (12 minutes) or severe (4 minutes) hypotension throughout cerebral desaturation period. Full resolution. |

**Key:**

ASA = American Society of Anesthesiologists

PMA = Postmenstrual age at surgery in weeks defined as (date of surgery – estimated date of delivery + 280 days)/7