Post-intubation Tension Pneumothorax in a Neonate: A Case Report

Author(s): UR Parekh, PG Dalal

Affiliation(s): Department of Anesthesiology, Penn State Milton Hershey Medical Center, Hershey, PA17033

Introduction: Neonatal pneumothorax, although uncommon perioperatively, is associated with significant morbidity and mortality. We present an interesting case of a neonate who developed life-threatening tension pneuomothorax immediately following endotracheal intubation requiring immediate decompression and cardio-pulmonary resuscitation.

A 3-day old, ex-35 weeker neonate weighing 1.28kg, born by Caesarean section, was scheduled for an repair of an antenatally diagnosed meningomyelocele. The baby was born with dysmorphic features including microcephaly, low set ears, micrognathia, prominent metopic suture, hydrocephalus and a meningomyelocele. The baby required no ventilatory support and oxygen saturation on room air as measured by pulse oximetry (SpO_2) were noted to be 98%.

Anesthetic management: After attaching appropriate monitoring, the baby was preoxygenated with 100% oxygen and atropine 20mcg/kg was administered intravenously. An inhalation induction was achieved with oxygen and sevoflurane. Mask ventilation with the Jackson Ree's circuit was found to be easy. A check laryngoscopy under deep anesthesia with the patient spontaneously breathing was performed to check for the glottic view, which was found to be grade 3 (Cormack and Lehane classification). Subsequently, rocuronium 1mg was administered intravenously. An initial intubation attempt with a size 2 reinforced tracheal tube over an introducer was unsuccessful. Thereafter, the endotracheal tube (ETT) was successfully railroaded over a 'bougie'. Bilateral chest expansion, auscultation for bilateral equal breath sounds and capnography confirmed endotracheal placement. Shortly after confirming endotracheal placement of the tube, desaturation as seen on pulse oximetry (SpO_2) 92% with FiO_2 of 1.0 was noted. A repeat chest auscultation revealed reduced breath sounds on the left side. Withdrawal of the ETT upto 6cms at the lips did not improve the oxygen saturation as seen by pulse oximetry. Further decrease in SpO_2 to mid-80s with increasing peak airway pressures was noted . Deflation of the stomach was achieved with an orogastric tube. The baby was then reintubated with a new portex size 2.0 ETT. The heart rate by now was 100/min and 30mcg of intravenous atropine was administered. A diagnosis of tension pneumothorax was considered at this time. CPR was commenced and epinephrine 10mcg was administered intravenously twice. Needle thoracocentesis was performed with 22 g 'butterfly needle' and air freely aspirated from the left hemithorax. An immediate improvement in heart rate and an increase in SpO2 to 100% were noted (figure 1). A chest drain was subsequently inserted in the fifth left interspace. The surgery was postponed and the baby was transferred back to the neonatal intensive care (NICU). While in the NICU, the baby developed further left-sided pneumothorax requiring two formal chest drains. Continuing air leak and increasing oxygen requirement necessitated a left posterolateral thoracotomy a day later. Thoracotomy revealed a left pneumothorax but no evidence of any trauma due to the bougie that was used for the initial intubation. The baby was successfully extubated two days later and the meningomyelocele was closed uneventfully after a further two days.

Discussion: Although a life threatening complication peri-operative pneumothorax is uncommon and infrequently reported in premature neonates. The factors contributing to the occurrence of pneumothorax following induction of anesthesia in a premature neonate include but are not limited to: overzealous positive pressure ventilation, endobronchial intubation and trauma due to a bougie or stylet. In our case, although trauma caused by the bougie was initially thought to be the cause of the pneumothorax,

absence of subcutaneous emphysema or evidence of injury during the thoracotomy precluded this assumption. Perhaps, high pressure breaths through an endobronchial tube could have been a contributory factor. It has been found in one study that, a cluster of clinical procedures were performed including reintubation and increases in airway pressure of ventilated neonates before a diagnosis of pneumothorax was made (4). Whether these procedures caused pneumothoraces or were undertaken because an undiagnosed pneumothorax was already causing clinical deterioration is unclear (4). It cannot be emphasised more that in the neonatal peri-operative setting, early diagnosis of a tension pneumothorax will be facilitated by a high index of suspicion, once the other causes of deterioration have been excluded rapidly and in a proper sequence.

References

1 Glaisyer G, Way C. Pediatr Anesth 2005; **15**: 997-1000.
2 Bloch EC, Ossey K, Ginsberg B. Anesth Analg 1988; **67:** 590-592.
3 Hatch DJ. Br J Anaesth 1985; **57:** 672-684.
4 Watkinson M, I Tiron. Arch Dis Fetal Neonatal ED 2001; **85:** F201-F203.