

Review

Birth brain injury: etiology and prevention— Part II: The premature child and cesarean section deliveries

George Malcolm Morley, MB ChB, FACOG

10252 E. Johnson Road

Northport, MI 49670

Phone: +1 231 386 9687 Fax: +1 231 386 9655

Email: obgmmorley@aol.com

Abstract

The physiological transition from placental life support to neonatal independence incurs massive changes in anatomy and physiology. Placental respiration is maintained until the lungs are functioning and cord closure is finalized only after an optimal blood volume is provided by placental transfusion (PT). Premature cord clamping can incur major injury.

The circumstances of premature birth and Cesarean section birth increase the risk of major blood loss from premature cord clamping. The smaller the preemie, the larger the portion of feto-placental blood volume is in the placenta, and larger amounts of PT are required to establish function of the preemie's lungs and other vital organs during transition from placental life support. The germinal matrix is extremely active metabolically providing neurons for growth of the cerebral cortex and is extremely vulnerable to ischemic damage resulting from inadequate PT.

At cesarean birth, especially if it is elective and the uterus is not contracting, the factors that effect PT (uterine contraction and gravity) are absent, and they may be reversed. If the neonate is held above the mother's abdomen, blood may flow down the vein into the placenta that is further distended in the flaccid uterus by the arteries; the result is massive blood loss. The resultant hypovolemic shock may be compounded by persistent fetal circulation and multi-organ dysfunction, retraction respiration and brain infarction.

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