



G21 A Fatal Complication of Vacuum-Assisted Vaginal Delivery

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After attending this presentation, attendees will learn of a fatal complication following vacuum-assisted vaginal delivery.

The presentation will impact the forensic science community by expanding the familiarity with a fatal complication of vacuum-assisted vaginal delivery, neonatal mortality, and conditions associated with retinal hemorrhages.

This presentation will inform attendees of something they do not know—that fatal neonatal subgaleal hemorrhage can result from birth assisted vacuum extraction and have associated extensive retinal hemorrhages.

An Edinburgh professor of obstetrics, James Young Simpson, first introduced a successful obstetric vacuum extractor in 1849. Technical difficulties limited its effectiveness and vacuum extraction (VE) fell from clinical interest until 1956 when the stainless steel cup vacuum device was introduced. While common in Europe, VE did not gain continued popularity in the United States until the 1980s. Early studies showed no significant traumatic complications attributed to VE when limited to 15 minutes and/or two “pop-offs” of the vacuum cap. The “pop-off” presumably served as a safety valve that would protect the neonate from excessive tractional forces. The development of the soft cup VE device with its implied safety caused VE to gain increasing popularity. Currently forceps and VE are used as delivery instruments, but over the past decade VE has replaced forceps as the main delivery instrument in assisted vaginal deliveries. However, controversy continues concerning which instrument is the best to use in specific clinical situations. VE remains popular because of its relative ease of use, lower maternal morbidity, and supposed safety. Nevertheless, severe neonatal complications can occur. The reported incidence of fetal death or severe fetal injury from VE ranges from 0.1-3 cases per 1,000 assisted deliveries. Three cases are presented of neonates who died from complications following vacuum-assisted vaginal delivery.

Case 1: Delivered by vacuum-assisted vaginal delivery, a 2.8 kg, 37-weeks-gestational age neonate had Apgar scores of 7 and 8 at 1 and 5 minutes, respectively. His initial hemoglobin (Hgb) was 17.4 gm/dL, but 5 hours later when he began grunting and developed hypothermia his Hgb was 6.8 gm/dL. He was transferred to a medical center with admitting diagnoses of subgaleal hemorrhage, anemia, hypotension, disseminated intravascular coagulopathy, and respiratory failure. After three weeks in the intensive care unit, the family withdrew care due to his increasingly poor prognosis. At autopsy, he had severe anasarca and hypoxic-ischemic/re-perfusion injury to his heart, liver, spleen, kidneys, and brain. An organizing subgaleal hematoma measured 15 cm and weighed 77 gm. No retinal hemorrhages (RHs) were identified by postmortem monocular indirect ophthalmoscopy (PMIO) and he had no documented clinical fundal examination.

Case 2: Born by vacuum-assisted vaginal delivery due to an arrested second stage of labor and shoulder dystocia, a 4.36 kg term neonate had Apgar scores of 0 at 1, 5, and 10 minutes and 2 at 15 minutes. She experienced immediate respiratory distress, hemodynamic instability, and presumed sepsis. Her initial Hgb was 14.9 gm/dL that later decreased to 10.7 gm/dL. An electroencephalogram demonstrated severe encephalopathy and her condition continued to decline until she died a day later. At autopsy, she had large subgaleal and subscalpular hematomas that were 20 cm in greatest dimension and weighed 54 gm. No skull fractures were present but she had bilateral subdural hematomas as well as subarachnoid hemorrhage. A clinical fundal examination was not done, but PMIO detected extensive bilateral multi-layered RHs.

Case 3: Delivered by cesarean section after a failed vacuum-assisted delivery, a 3.8 kg term neonate had Apgar scores of 3, 5, and 7 at 1, 6, and 10 minutes, respectively. He had respiratory distress, hemodynamic instability, and developed disseminated coagulopathy. The parents withdrew care the following day. At autopsy, extensive subgaleal and subscalpular extravasated blood was present measuring 35 cm in greatest dimension and weighing 140 gm. No skull fractures, epidural, or subdural hemorrhage was identified. PMIO revealed extensive RHs in the right globe and 1 RH in the left fundus; however, no clinical fundal examination was documented in the medical record.

The most common extracranial injuries associated with VE are superficial scalp abrasions, lacerations, and hemorrhage that can occur in 10% of neonates. Two major types of scalp injury are the common, but clinically unimportant, cephalohematomas and the relatively rare, but potentially life threatening, subgaleal (SG) hemorrhage where extravasated blood dissects between the periosteum of the skull and the galea aponeurotica. The mortality rate of SG hemorrhage following VE is estimated at 20%. Vacuum-assisted vaginal delivery is a relatively common procedure and most often benign. However, forensic



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pathologists must be aware that a fatal SG hemorrhage can result from VE and have associated extensive RHs.

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