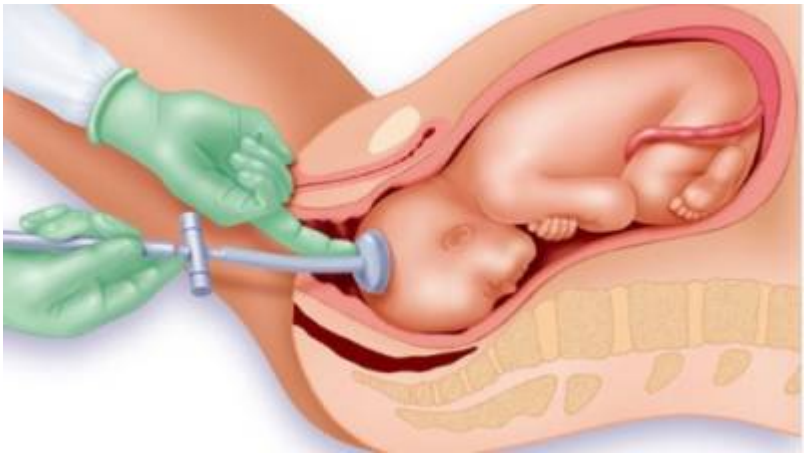
Vacuum assisted delivery



Towner et al. stated that tThe rate of intracranial hemorrhage is higher among infants delivered by vacuum extraction, forceps, or cesarean section during labor than among infants delivered spontaneously, but the rate among infants delivered by cesarean section before labor is not higher, suggesting that the common risk factor for hemorrhage is abnormal labor [1)]

While cranial birth injury in term infants are well recognized, to date, only small case series have been described. In an attempt to further define the spectrum of cranial birth injuries, Pollina et al. analyzed 41 consecutive cranial birth injuries over the period 1991-1998. The most common clinical presentations were apnea (39%) and seizures (37%). Average Apgar scores were 5.7 at 1 min and 7.3 at 5 min; 54% of infants had abnormally low Apgar scores at 1 min and 31% had abnormally low scores at 5 min. The most common intracranial lesion was subdural hematoma, present in 73% of infants; most had either a tentorial subdural hematoma (57%) and/or interhemispheric subdural hematoma (50%) location. Operative treatment was required in 5 infants (12%). Two of the 41 infants (4.8%) died. The study group was compared with a control group of 63 randomly selected births without cranial injury. Using a stepwise logistic regression model, independently significant variables included neonatal birth weight, Apgar scores at 1 and 5 min and mode of delivery. Compared with the controls, the study group had a significantly higher incidence of obstetrical forceps and/or vacuum deliveries. Combining vacuum, forceps and urgent cesarean section deliveries together as 'urgent' and elective cesarean and spontaneous vaginal deliveries as 'nonurgent', they could find no significant differences between these two groups. This data conflict with those of Towner et al. [N Engl J Med 1999;341:1709-1714], and suggest that the method of assisted delivery, rather than the urgency of the delivery or dysfunctional labor per se, is a more important variable in cranial birth injuries [2)].

Birth brachial plexus injury.

Subgaleal hematoma most commonly occurs after vacuum assisted delivery, but may also be seen following head trauma.

Low and mid station vacuum assisted deliveries (VAD) are delicate manual procedures that entail a high degree of subjectivity from the operator and are associated with adverse neonatal outcome. Little has been done to improve the procedure, including the technical development, traction force and the possibility of objective documentation.

Romero et al. aimed to explore if a digital handle with instant haptic feedback on traction force would reduce the neonatal risk during low or mid station VAD.

A two centre, randomised superiority trial at Karolinska University Hospital, Sweden, 2016-2018. Cases were randomised bedside to either a conventional or a digital handle attached to a Bird metal cup (50 mm, 80 kPa). The digital handle measured applied force including an instant notification by vibration when high levels of traction force were predicted according to a predefined algorithm. Primary outcome was a composite of hypoxic ischaemic encephalopathy, intracranial haemorrhage, seizures, death and/or subgaleal hematoma. Three hundred eighty low and mid VAD in each group were estimated to decrease primary outcome from six to 2 %.

After 2 years, an interim analyse was undertaken. Meeting the inclusion criteria, 567 vacuum extractions were randomized to the use of a digital handle (n = 296) or a conventional handle (n = 271). Primary outcome did not differ between the two groups: (2.7% digital handle vs 2.6% conventional handle). The incidence of primary outcome differed significantly between the two delivery wards (4% vs 0.9%, $p < 0.05$). A recalculation of power revealed that 800 cases would be needed in each group to show a decrease in primary outcome from three to 1 %. This was not feasible, and the study therefore closed.

The incidence of primary outcome was lower than estimated and the study was underpowered. However, the difference between the two delivery wards might reflect varying degree of experience of the technical equipment. An objective documentation of the extraction procedure is an attractive alternative in respect to safety and clinical training. To demonstrate improved safety, a multicentre study is required to reach an adequate cohort. This was beyond the scope of the study.

Trial registration: ClinicalTrials.gov NCT03071783 , March 1, 2017, retrospectively registered [3].

A newborn with a large, high parieto-frontally located mass after vacuum extraction. Imaging methods revealed a large subcutaneous collection of cerebrospinal fluid and hemorrhage. Traumatic dura lesions should be considered in neonates presenting with a large head lump after assisted delivery with vacuum extraction [4].

A child who was born by vacuum extraction delivery. Days after the birth, a frontal swelling, which was thought to be a caput succedaneum, enlarged. Imaging revealed an iatrogenic encephalocele with a large subcutaneous CSF collection. Surgical reconstruction was performed. A parasagittal dura defect was closed. There was no involvement of the superior sagittal sinus. Encephalocele is an infrequent complication of vacuum extraction delivery, rarely described in literature. The child had a good recovery after the operation, without neurologic deficits [5].

A newly-born infant with a congenital dural and bony defect and an associated short-segmented duplication of the superior sagittal sinus suffered from herniation and infarction of parietal brain tissue

secondary to vacuum extraction. This ultimately led to the formation of a subgaleal cerebrospinal fluid (CSF) collection. Initial operative closure of the encephalocele was performed by attaching a galeal flap to the periostium surrounding the congenital defect. As the bony defect developed characteristics of a growing fracture later on, dural repair, transplantation of a split-bone flap and, finally, the insertion of a ventriculoperitoneal shunt became necessary. This case affirms that stringent indication and cautious usage of vacuum-assisted delivery is strongly recommended, especially in view of the possibility that undetected congenital cranial, vascular and/or cerebral alterations may be present [6].

Doward W, Sgouros S. Acute subdural haematomas following ventouse-assisted delivery. Pediatr Neurosurg. 2001 Dec;35(6):335. doi: 10.1159/000050448. PMID: 11786704.Doward W, Sgouros S. Acute subdural haematomas following ventouse-assisted delivery. Pediatr Neurosurg. 2001 Dec;35(6):335. doi: 10.1159/000050448. PMID: 11786704.

References

1)

Towner D, Castro MA, Eby-Wilkens E, Gilbert WM. Effect of mode of delivery in nulliparous women on neonatal intracranial injury. N Engl J Med. 1999 Dec 2;341(23):1709-14. doi: 10.1056/NEJM199912023412301. PMID: 10580069.

2)

Pollina J, Dias MS, Li V, Kachurek D, Arbesman M. Cranial birth injuries in term newborn infants. Pediatr Neurosurg. 2001 Sep;35(3):113-9. doi: 10.1159/000050403. PMID: 11641618.

3)

Romero S, Pettersson K, Yousaf K, Westgren M, Ajne G. Perinatal outcome after vacuum assisted delivery with digital feedback on traction force; a randomised controlled study. BMC Pregnancy Childbirth. 2021 Feb 26;21(1):165. doi: 10.1186/s12884-021-03604-z. PMID: 33637058; PMCID: PMC7913459.

4)

Poryo M, Yilmaz U, Linsler S, Gortner L, Meyer S. A newborn with a large mass: vacuum extraction-caused dura lesion. Clin Case Rep. 2015 Dec 6;4(1):101-2. doi: 10.1002/ccr3.428. PMID: 26783449; PMCID: PMC4706397.

5)

Jeltema HR, Hoving EW. Iatrogenic encephalocele: a rare complication of vacuum extraction delivery. Childs Nerv Syst. 2011 Dec;27(12):2193-5. doi: 10.1007/s00381-011-1600-0. Epub 2011 Oct 11. PMID: 21987344; PMCID: PMC3217141.

6)

Neumann JO, Herweh C, Halatsch ME. Congenital duplication of the superior sagittal sinus and parietal encephalocele after vacuum extraction delivery. Acta Neurochir (Wien). 2010 Apr;152(4):713-6. doi: 10.1007/s00701-009-0470-7. Epub 2009 Jul 29. PMID: 19639246.