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**Date:** 31 October 2019

**Sources Searched:** Medline, EMBASE

## Middle Cerebral Artery Infarction

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### 1. Long-term neurodevelopmental outcome after perinatal arterial ischemic stroke and periventricular venous infarction.

**Author(s):** Lõo, Silva; Ilves, Pilvi; Männamaa, Mairi; Laugesaar, Rael; Loorits, Dagmar; Tomberg, Tiit; Kolk, Anneli; Talvik, Inga; Talvik, Tiina; Haataja, Leena

**Source:** European journal of paediatric neurology : EJPN : official journal of the European Paediatric Neurology Society; Nov 2018; vol. 22 (no. 6); p. 1006-1015

**Publication Date:** Nov 2018

**Publication Type(s):** Journal Article

**PubMedID:** 30249407

**Abstract:**BACKGROUND Long-term follow-up data after different vascular types of ischemic perinatal stroke is sparse. Our aim was to study neurodevelopmental outcomes following neonatal and presumed perinatal ischemic middle cerebral artery territory stroke (arterial ischemic stroke, AIS) and periventricular venous infarction (PVI).METHODSA prospective consecutive cohort of 40 term-born children with perinatal stroke (21 AIS, 19 PVI) was identified through the Estonian Paediatric Stroke Database. While 48% of the children with AIS were diagnosed during the neonatal period, all the children with PVI had presumed perinatal stroke. Outcomes based on the Paediatric Stroke Outcome Measure (PSOM) and Kaufman Assessment Battery for Children - Second Edition (K-ABC-II), in relation to extent and laterality of stroke, were defined.RESULTSAt a median age of 7 years 6 months (range 3.6-13y), there was a trend towards worse neurodevelopmental outcome in participants with AIS when compared to PVI (mean total PSOM scores 3.1 and 2.2, respectively;  $p = 0.06$ ). Combined deficits of motor, language and cognitive/behavioural functions were significantly more common among children with AIS (90%) when compared to children with PVI (53%,  $p = 0.007$ ). General cognitive ability (by K-ABC-II) was significantly lower in the AIS subgroup (mean 79.6; 95% CI 72.3-87.0), but children with PVI (91.6; 95% CI 85.5-97.8) also had poorer performance than the age-equivalent normative mean. Large extent of stroke was associated with poorer neurodevelopmental outcome and lower cognitive performance in children following AIS but not in PVI.CONCLUSIONIn this national cohort, poor long-term neurodevelopmental outcome after perinatal ischemic stroke was seen irrespective of the vascular type or time of diagnosis of stroke. However, the spectrum of neurological deficits is different after perinatal AIS and PVI, with combined deficits more common among children following AIS.

**Database:** Medline

## **2. Neurodevelopment After Perinatal Arterial Ischemic Stroke.**

**Author(s):** Wagenaar, Nienke; Martinez-Biarge, Miriam; van der Aa, Niek E; van Haastert, Ingrid C; Groenendaal, Floris; Benders, Manon J N L; Cowan, Frances M; de Vries, Linda S

**Source:** Pediatrics; Sep 2018; vol. 142 (no. 3)

**Publication Date:** Sep 2018

**Publication Type(s):** Multicenter Study Journal Article

**PubMedID:** 30072575

Available at [Pediatrics](#) - from Free Medical Journals . com

Available at [Pediatrics](#) - from Unpaywall

**Abstract:**BACKGROUND AND OBJECTIVESPerinatal arterial ischemic stroke (PAIS) leads to cerebral palsy in ~30% of affected children and has other neurologic sequelae. Authors of most outcome studies focus on middle cerebral artery (MCA) stroke without differentiating between site and extent of affected tissue. Our aim with this study was to report outcomes after different PAIS subtypes.METHODSBetween 1990 and 2015, 188 term infants from 2 centers (London [n = 79] and Utrecht [n = 109]) had PAIS on their neonatal MRI. Scans were reevaluated to classify stroke territory and determine specific tissue involvement. At 18 to 93 (median 41.7) months, adverse neurodevelopmental outcomes were recorded as 1 or more of cerebral palsy, cognitive deficit, language delay, epilepsy, behavioral problems, or visual field defect.RESULTSThe MCA territory was most often involved (90%), with posterior or anterior cerebral artery territory strokes occurring in 9% and 1%, respectively. Three infants died, and 24 had scans unavailable for reevaluation or were lost to follow-up. Of 161 infants seen, 54% had an adverse outcome. Outcomes were the same between centers. Main branch MCA stroke resulted in 100% adverse outcome, whereas other stroke subtypes had adverse outcomes in only 29% to 57%. The most important outcome predictors were involvement of the corticospinal tracts and basal ganglia.CONCLUSIONSAlthough neurodevelopmental outcome was adverse in at least 1 domain with main branch MCA stroke, in other PAIS subtypes outcome was favorable in 43% to 71% of children. Site and tissue involvement is most important in determining the outcome in PAIS.

**Database:** Medline

## **3. Cerebral Infarction and Refractory Seizures in a Neonate with Suspected Zika Virus Infection**

**Author(s):** Jakus J.; Raymond A.

**Source:** Pediatric Infectious Disease Journal; Apr 2018; vol. 37 (no. 4)

**Publication Date:** Apr 2018

**Publication Type(s):** Article

**PubMedID:** 29140935

Available at [Pediatric Infectious Disease Journal](#) - from Ovid (LWW Total Access Collection 2019 - with Neurology)

**Abstract:**Congenital Zika syndrome is a set of congenital anomalies associated with Zika virus infection during pregnancy. We present the unique case of a neonate born to a suspected Zika virus-positive mother that developed an embolic stroke and medication-resistant seizures. This report may impact the evolving definition of congenital Zika syndrome.Copyright © 2017 Wolters Kluwer Health, Inc. All rights reserved.

**Database:** EMBASE

#### **4. Cerebral ischemic infarct as a rare first presentation of hemophilia A in a newborn: A case report**

**Author(s):** Alicea-Marrero M.; Soto-Velez L.

**Source:** Blood Transfusion; Sep 2017; vol. 15

**Publication Date:** Sep 2017

**Publication Type(s):** Conference Abstract

Available at [Blood Transfusion](#) - from Europe PubMed Central - Open Access

**Abstract:**Introduction The middle cerebral artery is the most common site of ischemic infarcts, occurring due to a blockage in blood flow through one of its supplying arteries. In the neonatal period, conditions predisposing to ischemic infarcts are thrombotic events, secondary to an underlying congenital or acquired thrombotic state. In newborns with severe hemophilia A, the most frequently reported complication is cerebral hemorrhage; however, intracranial hemorrhages in full term neonates with hemophilia A are uncommon. Case outline We are reporting the case of a 1 y/o male with severe hemophilia A, presenting during the neonatal period with a left middle cerebral artery ischemic infarct. He was born to an hemophilia A obligate-carrier mother, at term, by spontaneous vaginal delivery. APGAR score was 8 and 9 at 1 and 5 minutes, respectively. Patient presented with right cephalohematoma, despite no history of vacuum or forceps use. At 3 days old, patient developed progressive hypoactivity, severe facial swelling and pallor, requiring admission to NICU. He was found to have severe anemia and PRBC were transfused. A brain MRI showed large MCA ischemic infarct and a large right cephalohematoma. Antihemophilic factor VIII was begun immediately. During hospital course, patient also developed seizures, requiring mechanical ventilation for CNS protection. Pro-thrombotic workup was negative and factor VIII activity was <1%. Due to difficulty weaning from mechanical ventilator, a follow up head CT was done at day 7, showing bilateral subdural hematomas, with left MCA and left PCA territory ischemic infarct and brain edema. A medport catheter was placed, and patient started on prophylaxis with long-acting recombinant factor VIII once a week. Currently, patient is achieving milestones adequately, and without evidence of inhibitors. Conclusion This case depicts a newborn with severe hemophilia A presenting with cerebral ischemic infarct and intracranial bleeding, both rare presentations and complications of hemophilia (Figure presented).

**Database:** EMBASE

## **5. Neurodevelopmental outcome after perinatal arterial ischemic stroke: The importance of vascular distribution**

**Author(s):** Wagenaar N.; Van Der Aa N.E.; Van Haastert I.C.; Groenendaal F.; Benders M.J.N.L.; De Vries L.S.; Martinez-Biarge M.; Cowan F.M.

**Source:** Acta Paediatrica, International Journal of Paediatrics; Jul 2017; vol. 106 ; p. 10-11

**Publication Date:** Jul 2017

**Publication Type(s):** Conference Abstract

Available at [Acta Paediatrica, International Journal of Paediatrics](#) - from Wiley Online Library

**Abstract:**Background: Perinatal arterial ischemic stroke (PAIS) leads to unilateral spastic cerebral palsy in about 30% of affected children but it is also associated with other neurological sequelae. Most studies on outcome in PAIS focus on middle cerebral artery (MCA) stroke without differentiating between site and extent of affected tissue. The aim of this study was to report outcome of different subtypes of PAIS in term-born infants. Design: Between 1990-2015, 174 term-born infants with neurological symptoms or cranial ultrasound abnormalities suggestive of PAIS were admitted to the neonatal intensive care unit or referred for a neurological opinion to the Hammersmith Hospital, London, United Kingdom (n = 64) or University Medical Center, Utrecht, the Netherlands (n = 110). All had PAIS confirmed on their neonatal MRI (median day 5 after birth) and their scans were re-evaluated to determine stroke territory and involvement of the corticospinal tracts (CST) and basal ganglia. At 18-93 (median 36.9) months, adverse neurodevelopmental outcome was recorded: cerebral palsy, cognitive delay (<1SD), post-neonatal epilepsy, behavioral problems, visual field defect or any combination of these. Results: The MCA was most commonly involved in PAIS and affected the main branch or posterior, anterior, middle, cortical or lenticulostriate (LS) branches. Posterior or anterior cerebral artery (PCA/ACA) stroke were less common. Infants who died neonatally (n = 4), whose MRI scan could not be re-evaluated (n = 5) or those lost to follow-up (n = 7) were excluded from further analyses. At their last follow-up, 47% of 158 infants had an adverse outcome (see table). There were no differences in outcome between centers. Main branch MCA stroke resulted in 100% adverse motor outcome and a considerable level of adverse outcomes in other domains, while anterior, middle, posterior, cortical and LS MCA branch, and PCA/ACA stroke resulted in adverse outcomes in 31%, 35%, 46%, 19%, 26% and 56% respectively. Adverse motor outcome was associated with involvement of the basal ganglia (odds ratio [OR] 10.6; 95%CI 2.6-42.6), central sulcus (OR 7.6; 95%CI 2.0-29.1) and descending CST in the brainstem (OR 35.4; 95%CI 6.6-191.1). Conclusion: Although neurodevelopmental outcome was invariably adverse in at least one domain with main branch MCA stroke, in other PAIS subtypes outcome was normal in 44-81% of children. Vascular distribution is most important in determining outcome in newborns with PAIS.

**Database:** EMBASE

## **6. Neurodevelopmental outcome after perinatal arterial ischemic stroke in preterm and fullterm infants: The importance of vascular distribution**

**Author(s):** Wagenaar N.; Benders M.J.N.L.; Groenendaal F.; Van Haastert I.C.; Van Der Aa N.E.; De Vries L.S.

**Source:** European Journal of Pediatrics; 2016; vol. 175 (no. 11); p. 1522

**Publication Date:** 2016

**Publication Type(s):** Conference Abstract

Available at [European Journal of Pediatrics](#) - from SpringerLink - Medicine

Available at [European Journal of Pediatrics](#) - from ProQuest (Health Research Premium) - NHS Version

Available at [European Journal of Pediatrics](#) - from Unpaywall

**Abstract:**Background and aims Perinatal arterial ischemic stroke (PAIS) may result in unilateral spastic cerebral palsy (USCP) in about 30% but is also associated with other neurological sequelae. Most studies on outcome in PAIS focus on middle cerebral artery (MCA) stroke. The aim of this study was to report outcome of different subtypes of PAIS in full-term and preterm infants. Methods Between 1996 and 2014, 141 neonates born at 24.4 - 42.7 weeks of gestation (median 39.3 weeks) were admitted to our neonatal intensive care unit with neurological symptoms or ultrasound abnormalities, confirmed to have PAIS on their neonatal MRI. 29% was born <37 weeks of gestation. All neurodevelopmental outcome data were collected at 12.2 - 75.6 months. Results PAIS was most often diagnosed in the MCA region and affected the main branch, posterior or anterior branch (partial MCA), cortical branch or lenticulostriate (LS) branches. Posterior or anterior cerebral artery (PCA/ACA) stroke was also noted. LS stroke was the most common subtype in preterm infants (68%), whereas in full-terms this was cortical stroke (30%). Five infants had died in the neonatal period and two infants were lost-to-follow-up. At their last follow-up, 47% of 134 infants had adverse outcome (see table). The incidence of adverse outcome was similar for preterms and full-terms. Main branch MCA stroke resulted in adverse outcome in all infants, while partial, cortical, LS, and PCA/ ACA stroke resulted in adverse outcome in 50%, 28%, 31% and 56% Respectively Conclusions Vascular distribution is most important in determining neurodevelopmental outcome in newborn infants with PAIS.(Table Presented).

**Database:** EMBASE

**7. Middle Cerebral Artery Stroke in a Neonate With a Congenital Hypercoagulable Condition Following Repair of an H-type Tracheoesophageal Fistula.**

**Author(s):** Garcia, Megan L; Caldwell, Katharine; Kellund, Anna; Reyes, Cynthia

**Source:** Journal of pediatric hematology/oncology; Oct 2016; vol. 38 (no. 7); p. 529-532

**Publication Date:** Oct 2016

**Publication Type(s):** Case Reports Journal Article

**PubMedID:** 27164518

Available at [Journal of pediatric hematology/oncology](#) - from Ovid (LWW Total Access Collection 2019 - with Neurology)

**Abstract:**We report a case of middle cerebral artery stroke with heterozygosity for 2 separate hypercoagulable conditions following repair of an H-type tracheoesophageal fistula (TEF) in an infant. Neonatal stroke is rare, occurring in 1 in 4000 births annually in the United States. Stroke after pediatric surgery occurs in approximately 0.05% of patients. Etiologies of stroke in neonates include cardiac, hematologic, vascular, traumatic, metabolic, pharmacologic, infectious, and hypoxemic insults. Thrombophilia has been described in 42% to 78% of neonates with neonatal stroke. Stroke after repair of an H-type TEF has not been reported as a postoperative complication. Manipulation of the carotid artery during this operation is presumed to have contributed to a thromboembolic event in this infant with a hypercoagulable state. Whereas preoperative workup may not be indicated due to the low prevalence of neonatal stroke, workup for a congenital hypercoaguable condition may be considered in infants with stroke as a postoperative complication. This report provides a concise review of the etiology and treatment of stroke and hypercoagulable states in neonates as well as presents the case of a previously undescribed complication of repair of an H-type TEF.

**Database:** Medline

## **8. Risk Factors for Neonatal Arterial Ischemic Stroke: The Importance of the Intrapartum Period.**

**Author(s):** Martinez-Biarge, Miriam; Cheong, Jeanie L Y; Diez-Sebastian, Jesus; Mercuri, Eugenio; Dubowitz, Lilly M S; Cowan, Frances M

**Source:** The Journal of pediatrics; Jun 2016; vol. 173 ; p. 62

**Publication Date:** Jun 2016

**Publication Type(s):** Journal Article

**PubMedID:** 27049002

Available at [The Journal of pediatrics](#) - from Patricia Bowen Library & Knowledge Service West Middlesex University Hospital NHS Trust (lib302631) Local Print Collection [location] : Patricia Bowen Library and Knowledge Service West Middlesex university Hospital.

**Abstract:**OBJECTIVE To investigate risk factors for neonatal arterial ischemic stroke (NAIS), and compare them with those present in term controls and infants with hypoxic-ischemic encephalopathy (HIE). STUDY DESIGN Antepartum and intrapartum data were collected at presentation from 79 infants with NAIS and compared with 239 controls and 405 infants with HIE. The relationships between risk factors and NAIS were explored using univariable and multivariable regression. RESULTS Compared with controls, infants with NAIS more frequently had a family history of seizures/neurologic diseases, primiparous mothers, and male sex. Mothers of infants with NAIS experienced more intrapartum complications: prolonged rupture of membranes (21% vs 2%), fever (14% vs 3%), thick meconium (25% vs 7%), prolonged second stage (31% vs 13%), tight nuchal cord (15% vs 6%), and abnormal cardiotocography (67% vs 21%). Male sex (OR 2.8), family history of seizures (OR 6.5) or neurologic diseases (OR 4.9), and  $\geq 1$  (OR 5.8) and  $\geq 2$  (OR 21.8) intrapartum complications were independently associated with NAIS. Infants with NAIS and HIE experienced similar rates though different patterns of intrapartum complications. Maternal fever, prolonged rupture of membranes, prolonged second stage, tight nuchal cord, and failed ventouse delivery were more common in NAIS; thick meconium, sentinel events, and shoulder dystocia were more frequent in HIE. Abnormal cardiotocography occurred in 67% of NAIS and 77.5% of infants with HIE. One infant with NAIS and no infant with HIE was delivered by elective cesarean (10% of controls). CONCLUSIONS NAIS is multifactorial in origin and shares risk factors in common with HIE. Intrapartum events may play a more significant role in the pathogenesis of NAIS than previously recognized.

**Database:** Medline

## 9. Cortical Sparing in Preterm Ischemic Arterial Stroke.

**Author(s):** van der Aa, Niek E; Benders, Manon J N L; Nikkels, Peter G; Groenendaal, Floris; de Vries, Linda S

**Source:** Stroke; Mar 2016; vol. 47 (no. 3); p. 869-871

**Publication Date:** Mar 2016

**Publication Type(s):** Research Support, Non-u.s. Gov't Journal Article

**PubMedID:** 26757751

Available at [Stroke](#) - from Ovid (LWW Total Access Collection 2019 - with Neurology)

Available at [Stroke](#) - from Unpaywall

**Abstract:**BACKGROUND AND PURPOSEResidual injury after perinatal arterial ischemic stroke in the middle cerebral artery territory usually involves the loss of cortical gray matter and subcortical white matter. In this article, we describe a different pattern of residual injury after middle cerebral artery stroke in preterm-born infants, in which the cortex is spared.METHODSMagnetic resonance imaging scans of 40 infants (12 preterm and 28 full-term infants) with a large middle cerebral artery stroke were reviewed and correlated with outcome.RESULTSComplete sparing of the cortex with cavitation of the underlying white matter was observed in 3 preterm infants, and partial sparing was noted in another 4 late preterm-born infants. One full-term infant had partial cortical sparing, and all others showed no sparing. Overall, 86% developed a hemiplegia and 30% had a developmental quotient below 85, but this did not vary between the different types of cortical injury.CONCLUSIONSThe pattern of cortical injury after middle cerebral artery stroke changes with gestational age and may be related to maturational changes of the vascular system. Outcome did not vary between the different patterns of cortical injury.

**Database:** Medline

## 10. Outcome of hemiplegic cerebral palsy born at term depends on its etiology.

**Author(s):** Kitai, Yukihiro; Haginoya, Kazuhiro; Hirai, Satori; Ohmura, Kayo; Ogura, Kaeko; Inui, Takehiko; Endo, Wakaba; Okubo, Yukimune; Anzai, Mai; Takezawa, Yusuke; Arai, Hiroshi

**Source:** Brain & development; Mar 2016; vol. 38 (no. 3); p. 267-273

**Publication Date:** Mar 2016

**Publication Type(s):** Journal Article

**PubMedID:** 26428444

**Abstract:**OBJECTIVESTo elucidate the etiology and its relationship to the outcomes of hemiplegic cerebral palsy (HCP).PARTICIPANTS AND METHODSMR images and outcomes of 156 children with HCP born at term and older than three years were investigated in two major centers for cerebral palsy in Japan. Etiologies were classified into perinatal ischemic stroke (PIS), cerebral dysgenesis (CD), and others. PIS was divided into periventricular venous infarction (PVI) and two types of arterial infarction; middle cerebral artery infarction (MCAI) and deep gray matter infarction (DGMI). Initial signs and the time of presentation were investigated among the three types of PIS. As functional outcomes, laterality of paresis, age at initial walk, affected hand's function, intellectual development, and occurrence of epilepsy were compared among all the four types.RESULTSETIOLOGYPIS was found in 106 children (68%), while CD accounted for 28 (18%). Among PIS, venous infarction was more common than arterial infarction (62:44).OUTCOMESPVI revealed later presentation of motor asymmetry and more involvement of lower extremity as the initial sign among PIS groups. Only MCAI showed right-side predominance in laterality of paresis. DGMI related to better intellectual development and PVI showed lower occurrence of epilepsy, while there was no significant difference in affected hand's function among the four groups. PIS



groups showed significantly earlier attainment of independent walk, better intellectual development, and lower occurrence of epilepsy than CD. CONCLUSION SPVI was the most common cause of HCP born at term, and the etiology closely related to the initial signs of hemiplegia and overall outcomes.

**Database:** Medline

#### **11. Early Wallerian degeneration in a neonate with middle carotid artery stroke.**

**Author(s):** Taraschenko, Olga D; Nichter, Charles; Pugh, John A

**Source:** Pediatric neurology; Feb 2015; vol. 52 (no. 2); p. 252-253

**Publication Date:** Feb 2015

**Publication Type(s):** Journal Article

**PubMedID:** 25443582

**Database:** Medline

#### **12. A review of cognitive outcomes in children following perinatal stroke.**

**Author(s):** Murias, Kara; Brooks, Brian; Kirton, Adam; Iaria, Giuseppe

**Source:** Developmental neuropsychology; 2014; vol. 39 (no. 2); p. 131-157

**Publication Date:** 2014

**Publication Type(s):** Research Support, Non-u.s. Gov't Journal Article Review

**PubMedID:** 24571931

Available at [Developmental neuropsychology](#) - from EBSCO (Psychology and Behavioral Sciences Collection)

**Abstract:** Perinatal stroke is a significant cause of congenital neurological disability. Although motor deficits and epilepsy are relatively easy to identify, developmental and behavioral co-morbidities are more complex and challenging to define. We provide an overview of perinatal stroke syndromes and theories relating injury in the developing brain to long-term outcomes. We present a comprehensive overview of the effects on intelligence and other specific cognitive domains, as well as investigations relating clinical features and neuroimaging to deficits. Better understanding of the impact of early stroke has potential to elucidate processes of brain development, in addition to providing guidance for prognosis and rehabilitation.

**Database:** Medline

### **13. Bilateral perinatal arterial stroke in a neonate.**

**Author(s):** Sashikumar, Palaniappan; Gupta, Rajesh; Conry, Brendon

**Source:** BMJ case reports; Mar 2014; vol. 2014

**Publication Date:** Mar 2014

**Publication Type(s):** Case Reports Journal Article

**PubMedID:** 24675801

Available at [BMJ case reports](#) - from Europe PubMed Central - Open Access

Available at [BMJ case reports](#) - from ProQuest (Health Research Premium) - NHS Version

Available at [BMJ case reports](#) - from Unpaywall

**Database:** Medline

### **14. Neonatal stroke.**

**Author(s):** Rutherford, M A; Ramenghi, L A; Cowan, F M

**Source:** Archives of disease in childhood. Fetal and neonatal edition; Sep 2012; vol. 97 (no. 5); p. F377

**Publication Date:** Sep 2012

**Publication Type(s):** Research Support, Non-u.s. Gov't Journal Article Review

**PubMedID:** 22933099

Available at [Archives of disease in childhood. Fetal and neonatal edition](#) - from BMJ Journals - NHS

**Abstract:** Neonatal stroke encompasses a range of focal and multifocal ischaemic and haemorrhagic tissue injuries. This review will concentrate on focal brain injury that occurs as a consequence of arterial infarction, most frequently the left middle cerebral artery, or more rarely as a consequence of cerebral sinus venous thrombosis (CSVt). Both conditions are multifactorial in origin. The incidence of both acquired and genetic thrombophilic disorders in both mothers and infants is high although rarely causal in isolation. Neurodevelopmental morbidity occurs in over 50% of children. Specific therapy in the form of anticoagulation is currently only recommended in CSVt and needs to be carefully monitored in the presence of haemorrhage.

**Database:** Medline

### **15. Clinical outcomes of cerebral infarctions in neonates.**

**Author(s):** Yi, Yoon Young; Lee, Jun Sook; Jang, So Ick; Song, Joon Sup; Yang, Seung; Kim, Sung Koo; Lim, Kyoung Ja; Hwang, Il Tae

**Source:** Pediatric neurology; Dec 2011; vol. 45 (no. 6); p. 368-372

**Publication Date:** Dec 2011

**Publication Type(s):** Journal Article

**PubMedID:** 22114997

**Abstract:**Cerebral infarctions are uncommon in neonates. However, they should be considered among causes of neonatal seizures. We describe seven neonates with cerebral infarctions. Clinical presentations, perinatal history, perinatal risk factors, cranial magnetic resonance imaging and electroencephalography findings, thrombophilic factors, and clinical outcomes were reviewed. Six patients manifested seizures, whereas one exhibited cyanosis. Six neonates manifested left middle cerebral artery infarctions, and one exhibited a borderzone infarction between the anterior cerebral and middle cerebral arteries. Electroencephalograms indicated epileptiform discharges on the left hemisphere in three neonates with left middle cerebral artery territory infarctions, and epileptiform discharges on both hemispheres in one patient. At most recent follow-up visit, five patients had achieved normal development, whereas one exhibited right hemiparesis and aphasia, and another manifested toe-in gait. These findings may help predict neurodevelopmental outcomes in neonates with cerebral infarctions.

**Database:** Medline

### **16. Two newborn infants with middle cerebral artery infarct presenting with seizures**

**Author(s):** Gibson J.; Bharti D.

**Source:** Tennessee medicine : journal of the Tennessee Medical Association; Aug 2010; vol. 103 (no. 7); p. 53-56

**Publication Date:** Aug 2010

**Publication Type(s):** Article

**PubMedID:** 20853642

**Database:** EMBASE

### **17. Do vacuum-assisted deliveries cause intracranial vessel injuries?**

**Author(s):** Ng, Yan-Yan; Su, Pen-Hua; Chen, Jia-Yuh; Lee, Inn-Chi

**Source:** Journal of child neurology; Feb 2010; vol. 25 (no. 2); p. 222-226

**Publication Date:** Feb 2010

**Publication Type(s):** Case Reports Journal Article

**PubMedID:** 19564646

**Abstract:** Vacuum-assisted deliveries are fairly commonly used in obstetrical practice. Most newborns who have a vacuum-assisted delivery undergo extracranial birth traumas that have no residual consequences. Vacuum-assisted deliveries that complicate intracranial vascular infarction are rarely reported. We present 2 cases of intracranial vessel infarction after vacuum-assisted deliveries. One newborn, with scalp erosion, showed an unusual left middle cerebral artery infarct, and the other, with a severe subgaleal hematoma, had a venous thrombosis. Before the diagnosis, made using brain ultrasonography, neither had specific observable neurological symptoms. In conclusion, vacuum-assisted deliveries should be given special attention, especially when they are combined with a severe extracranial birth trauma.

**Database:** Medline

### **18. Ischemic perinatal stroke secondary to chorioamnionitis: a histopathological case presentation.**

**Author(s):** Dueck, Christine C; Grynszpan, David; Eisenstat, David D; Caces, Rebecca; Rafay, Mubeen F

**Source:** Journal of child neurology; Dec 2009; vol. 24 (no. 12); p. 1557-1560

**Publication Date:** Dec 2009

**Publication Type(s):** Research Support, Non-u.s. Gov't Case Reports Journal Article

**PubMedID:** 19955347

**Abstract:** Ischemic perinatal stroke is a serious potential complication of delivery. In utero infection may be responsible for an underestimated proportion of perinatal stroke. Limited literature identifies objective evidence of ischemic perinatal stroke as a consequence of uterine infection. The authors report a neonate with ischemic stroke and documented findings of severe chorioamnionitis with umbilical vein thrombosis. A term neonate, after uneventful pregnancy and delivery, presented on the third day of life with seizures. Investigations for metabolic, electrolyte, infectious, and hypercoagulability derangements were normal. Extensive acute infarction in the left middle cerebral artery territory was diagnosed by magnetic resonance imaging (MRI). Placental histopathology confirmed the presence of chorioamnionitis. On follow-up assessments, mild residual neurologic deficits have persisted. Chorioamnionitis has been correlated with ischemic perinatal stroke. In addition to the recognized inflammatory cascade of in utero infection, umbilical vein thrombosis with subsequent "paradoxical" embolization may represent one mechanism responsible for this association.

**Database:** Medline

### **19. Motor cortex plasticity in ischemic perinatal stroke: a transcranial magnetic stimulation and functional MRI study.**

**Author(s):** Walther, Michael; Juenger, Hendrik; Kuhnke, Nicola; Wilke, Marko; Brodbeck, Verena; Berweck, Steffen; Staudt, Martin; Mall, Volker

**Source:** Pediatric neurology; Sep 2009; vol. 41 (no. 3); p. 171-178

**Publication Date:** Sep 2009

**Publication Type(s):** Research Support, Non-u.s. Gov't Journal Article

**PubMedID:** 19664531

**Abstract:**To assess motor cortex plasticity after constraint-induced movement therapy in patients with ischemic perinatal stroke, functional MRI and transcranial magnetic stimulation were applied. Seven hemiparetic patients with ischemic perinatal stroke of the middle cerebral artery and preserved crossed corticospinal projections to the paretic hand were studied before and after 12 days of constraint-induced movement therapy. After therapy, all patients demonstrated improved manual motor function. Transcranial magnetic stimulation of the motor cortex of the affected hemisphere revealed a significant increase of motor-evoked potential amplitude recorded from the paretic hand, whereas no significant change was detected in the nonparetic hand after transcranial magnetic stimulation of the contralesional hemisphere. Functional MRI revealed increased activation of the contralateral central region (including primary sensorimotor cortex) and supplementary motor area during active movement of the paretic hand. No change in functional MRI activation was detected during passive movement of the paretic hand or during active and passive movement of the nonparetic hand. In ischemic perinatal stroke with crossed corticospinal projections, constraint-induced movement therapy induces neuroplastic changes on the synaptic level, detected as increased excitability (transcranial magnetic stimulation) and increased task-related brain activation (functional MRI) in the primary motor cortex of the lesioned hemisphere.

**Database:** Medline

### **20. Patterns of cerebral injury and neurodevelopmental outcomes after symptomatic neonatal hypoglycemia.**

**Author(s):** Burns, Charlotte M; Rutherford, Mary A; Boardman, James P; Cowan, Frances M

**Source:** Pediatrics; Jul 2008; vol. 122 (no. 1); p. 65-74

**Publication Date:** Jul 2008

**Publication Type(s):** Research Support, Non-u.s. Gov't Journal Article

**PubMedID:** 18595988

Available at [Pediatrics](#) - from Patricia Bowen Library & Knowledge Service West Middlesex University Hospital NHS Trust (lib302631) Local Print Collection [location] : Patricia Bowen Library and Knowledge Service West Middlesex university Hospital.

**Abstract:**BACKGROUND Symptomatic neonatal hypoglycemia may be associated with later neurodevelopmental impairment. Brain injury patterns identified on early MRI scans and their relationships to the nature of the hypoglycemic insult and neurodevelopmental outcomes are poorly defined. METHODS We studied 35 term infants with early brain MRI scans after symptomatic neonatal hypoglycemia (median glucose level: 1 mmol/L) without evidence of hypoxic-ischemic encephalopathy. Perinatal data were compared with equivalent data from 229 term, neurologically normal infants (control subjects), to identify risk factors for hypoglycemia. Neurodevelopmental outcomes were assessed at a minimum of 18 months. RESULTS White matter abnormalities occurred in 94% of infants with hypoglycemia, being severe in 43%, with a predominantly posterior pattern in 29% of cases. Cortical abnormalities occurred in 51% of infants; 30% had white matter hemorrhage,

40% basal ganglia/thalamic lesions, and 11% an abnormal posterior limb of the internal capsule. Three infants had middle cerebral artery territory infarctions. Twenty-three infants (65%) demonstrated impairments at 18 months, which were related to the severity of white matter injury and involvement of the posterior limb of the internal capsule. Fourteen infants demonstrated growth restriction, 1 had macrosomia, and 2 had mothers with diabetes mellitus. Pregnancy-induced hypertension, a family history of seizures, emergency cesarean section, and the need for resuscitation were more common among case subjects than control subjects. CONCLUSIONS Patterns of injury associated with symptomatic neonatal hypoglycemia were more varied than described previously. White matter injury was not confined to the posterior regions; hemorrhage, middle cerebral artery infarction, and basal ganglia/thalamic abnormalities were seen, and cortical involvement was common. Early MRI findings were more instructive than the severity or duration of hypoglycemia for predicting neurodevelopmental outcomes.

**Database:** Medline

## **21. Perinatal cerebral arterial infarction associated with a placental chorioangioma.**

**Author(s):** Das, Samrat; Ankola, Pratibha; Chiechi, Maria; Sandhu, Jagbir

**Source:** American journal of perinatology; Jun 2008; vol. 25 (no. 6); p. 381-383

**Publication Date:** Jun 2008

**Publication Type(s):** Case Reports Journal Article

**PubMedID:** 18521777

**Abstract:** Placental chorioangiomas are benign vascular tumors. Large chorioangiomas cause several obstetric complications, including premature labor, placental abruption, polyhydramnios, fetal hydrops, fetal growth restriction, fetal hepatosplenomegaly, cardiomegaly, congestive heart failure, and fetal death. The neonatal complications are hydrops fetalis, microangiopathic hemolytic anemia, and thrombocytopenia. The cause of perinatal cerebral arterial infarction remains unclear in the majority of cases. Investigators have reported a number of obstetric and neonatal complications in the setting of perinatal stroke, including birth asphyxia, preeclampsia, chorioamnionitis, cardiac anomalies, polycythemia, systemic infection, and genetic thrombophilias. We present a rare case of perinatal cerebral infarction associated with placental chorioangioma.

**Database:** Medline

## **22. Cortical reorganization of language functioning following perinatal left MCA stroke.**

**Author(s):** Tillema, Jan-Mendelt; Byars, Anna W; Jacola, Lisa M; Schapiro, Mark B; Schmithorst, Vince J; Szaflarski, Jerzy P; Holland, Scott K

**Source:** Brain and language; May 2008; vol. 105 (no. 2); p. 99-111

**Publication Date:** May 2008

**Publication Type(s):** Research Support, N.i.h., Extramural Clinical Trial Journal Article

**PubMedID:** 17905426

Available at [Brain and language](#) - from PubMed Central

Available at [Brain and language](#) - from Unpaywall

**Abstract:**OBJECTIVEFunctional MRI was used to determine differences in patterns of cortical activation between children who suffered perinatal left middle cerebral artery (MCA) stroke and healthy children performing a silent verb generation task.METHODSTen children with prior perinatal left MCA stroke (age 6-16 years) and ten healthy age matched controls completed an executive language activation task. fMRI scans were acquired on a 3T scanner using T2\* weighted gradient echo, echo-planar imaging (EPI) sequence. Random effects analysis and independent component analysis (ICA) were used to compute activation maps.RESULTSBoth analysis methods demonstrated alternative activation of cortical areas in children with perinatal stroke. Following perinatal stroke, typical left dominant productive language areas in the inferior frontal gyrus were displaced to anatomical identical areas in the right hemisphere ( $p=.001$ ). In addition, stroke patients showed more bilateral activation in superior temporal and anterior cingulate gyri and increased activation in primary visual cortex when compared to healthy controls. There was no relation between lesion size and the degree of right hemisphere activation. ICA showed that the healthy controls had a negative correlation with the time course in the right inferior frontal gyrus in the same region that was activated in stroke subjects.INTERPRETATIONThis functional MRI study in children revealed novel patterns of cortical language reorganization following perinatal stroke. The addition of ICA is complementary to Random Effects Analysis, allowing for the exploration of potential subtle differences in pathways in functional MRI data obtained from both healthy and pathological groups.

**Database:** Medline

### **23. Cerebral palsy after perinatal arterial ischemic stroke**

**Author(s):** Golomb M.R.; Garg B.P.; Saha C.; Azzouz F.; Williams L.S.

**Source:** Journal of Child Neurology; Mar 2008; vol. 23 (no. 3); p. 279-286

**Publication Date:** Mar 2008

**Publication Type(s):** Article

**PubMedID:** 18305317

**Abstract:**The frequency of cerebral palsy, degree of disability, and predictors of disability were assessed in children in a perinatal arterial stroke database. Risk factors were assessed at the univariate level using the Pearson chi2 and Fisher exact test and at the multivariate level using logistic regression analysis. Seventy-six of 111 children with perinatal stroke (68%) had cerebral palsy, most commonly hemiplegic (66/76; 87%). Multivariate analysis of the entire cohort showed both delayed presentation (OR, 9.96; 95% CI, 3.10-32.02) and male sex (OR, 2.55; 95% CI, 1.03-6.32) were associated with cerebral palsy. In subgroup multivariate analyses: in children with neonatal presentation, bilateral infarcts were associated with triplegia or quadriplegia (OR, 5.33; 95% CI, 1.28-22.27); in children with unilateral middle cerebral artery infarcts, delayed presentation (OR, 10.60; 95% CI, 2.28-72.92) and large-branch infarction (OR, 8.78; 95% CI, 2.18-43.67) were associated with cerebral palsy. These data will aid physicians in planning long-term rehabilitative care for children with perinatal stroke. © 2008 Sage Publications.

**Database:** EMBASE



## **24. Cognitive outcome at early school age in term-born children with perinatally acquired middle cerebral artery territory infarction.**

**Author(s):** Ricci, Daniela; Mercuri, Eugenio; Barnett, Anna; Rathbone, Rachel; Cota, Francesco; Haataja, Leena; Rutherford, Mary; Dubowitz, Lilly; Cowan, Frances

**Source:** Stroke; Feb 2008; vol. 39 (no. 2); p. 403-410

**Publication Date:** Feb 2008

**Publication Type(s):** Journal Article

**PubMedID:** 18162627

Available at [Stroke](#) - from HighWire - Free Full Text

Available at [Stroke](#) - from Ovid (LWW Total Access Collection 2019 - with Neurology)

**Abstract:**BACKGROUND AND PURPOSETo assess cognitive outcome at early school age in term-born children with middle cerebral arterial (MCA) territory infarction of perinatal onset and examine the correlation between cognitive abilities and the extent of lesions as seen on neonatal MRI, epilepsy, and hemiplegia.METHODSThirty-one children were seen as newborns with an acutely evolving MCA territory infarction documented on neonatal MRI scan. IQ was assessed (WIPPSI/WISC where appropriate) and they had a standardized neurological examination at early school age. Lesion(s) site was recorded from the neonatal images.RESULTSTwenty-eight of 31 children were assessed (median age 5.75 range 5.33 to 10.33 years); 1 child died and 2 were abroad. IQ was within the normal range (mean 104, range 82 to 144) in 21 (78%); 1 child did not complete all tests but had a normal PIQ; 3 had a low and 3 an exceptionally low IQ. Verbal IQs were more varied and lower than performance IQs especially in children from multilingual backgrounds. There was no consistent association between cognitive impairment, side, or extent of the MCA lesion. Cognitive impairments were more frequent in children with seizures or hemiplegia. All 6 children with low IQ also had behavioral problems or unusual associated clinical or scan features.CONCLUSIONSIn our cohort a low IQ at early school age did not occur in children with the common presentation of neonatal unilateral MCA territory infarction. Cognitive impairment appeared more frequently when an MCA arterial territory infarction, even if relatively small, was associated with other risk factors.

**Database:** Medline

## **25. Neuropsychologic outcomes in a case series of twins discordant for perinatal stroke.**

**Author(s):** Talib, Tasneem L; Pongonis, Stephen J; Williams, Linda S; Garg, Bhuwan P; Sokol, Deborah K; Saha, Chandan; Golomb, Meredith R

**Source:** Pediatric neurology; Feb 2008; vol. 38 (no. 2); p. 118-125

**Publication Date:** Feb 2008

**Publication Type(s):** Research Support, Non-u.s. Gov't Research Support, N.i.h., Extramural Twin Study Journal Article

**PubMedID:** 18206793

**Abstract:**Perinatal stroke may affect cognitive development, but few studies have addressed the details of cognitive function after perinatal stroke. The present study was designed to compare the neuropsychologic features of five sets of twins discordant for perinatal stroke. All of the affected children had unilateral middle cerebral artery infarction (two left, three right); four of the five infarcts were large-branch, affecting the entire M1 territory. Three of the five affected children had comorbid epilepsy. Measures of intelligence, memory, language, attention, executive function, visual-motor integration, and fine motor skills were administered to children at a median age of 5 years (range, 5-8 years). Relative to their unaffected co-twins, the twins with perinatal stroke exhibited lower levels of full scale ( $p=0.005$ ), verbal ( $p=0.006$ ), and nonverbal ( $p=0.005$ ) intelligence. Children with perinatal stroke also showed significant deficits on tests of verbal memory ( $p=0.041$ ), receptive language ( $p=0.011$ ), verbal fluency ( $p=0.019$ ), and visual attention ( $p=0.011$ ), compared with their unaffected co-twins. Twin gestation may be a risk factor for poor cognitive outcome after perinatal stroke. Large infarct size and comorbid epilepsy may have contributed to some of the poor cognitive outcomes in this cohort.

**Database:** Medline

## **26. Symptomatic epilepsy in children with poroencephalic cysts secondary to perinatal middle cerebral artery occlusion.**

**Author(s):** Guzzetta, Francesco; Battaglia, Domenica; Di Rocco, Concezio; Caldarelli, Massimo

**Source:** Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery; Aug 2006; vol. 22 (no. 8); p. 922-930

**Publication Date:** Aug 2006

**Publication Type(s):** Comparative Study Clinical Trial Journal Article

**PubMedID:** 16816980

Available at [Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery](#) - from SpringerLink - Medicine

**Abstract:**BACKGROUND Perinatal cerebral artery occlusion is responsible for ischemic cerebral infarction leading to brain cavitation and gliosis; the territory of the middle cerebral artery is most frequently involved. The resulting poroencephalic cysts are frequently associated with hemiplegia and epilepsy; that can be managed medically in most cases, only 6-7% of them being refractory to medical treatment. This particular subset of congenitally hemiplegic children will be possible candidates for electrophysiological investigation and eventually for resective surgery. Whatever the kind of surgical treatment, surgery should be performed as soon as possible to optimize functional brain reorganization. CLINICAL MATERIAL Twelve children with poroencephalic cysts and refractory epilepsy were studied and operated on at the Divisions of Child Neurology and Pediatric Neurosurgery, the Catholic University Medical School, Rome. The hemiparesis ranged from mild to moderate; the developmental delay was of mild degree in three cases, moderate in four cases and severe in the remaining five. Behavioral disorders were observed in patients with mental retardation; two of them also manifested autistic features. All the children presented with a severe epileptic syndrome (starting almost invariably during the first year of life); six patients presented with a West syndrome followed by symptomatic partial epilepsy; the other six presented with partial epilepsy, followed in two cases by continuous spike-waves during sleep. The electroencephalograph (EEG) recordings disclosed focal unilateral interictal epileptiform abnormalities that usually corresponded to the side of the cystic lesion; however, paroxysmal activity often spread synchronously over the contralateral hemisphere. The selection of candidates for surgical treatment was based on neuroimaging and video-EEG monitoring; in particular, we did not use invasive intraoperative neurophysiologic techniques. The convergence of neuroimaging and neurophysiologic findings guided us in performing a limited cortical excision corresponding to the malacic cortex (cyst "membrane"). RESULTS All the patients underwent excision of the cyst wall. Careful attention was paid not to enter the body of the lateral ventricle to avoid ventriculo-subarachnoid fistulas, eventually responsible for subdural hygroma or cerebrospinal fluid leak. There was one surgery-related death secondary to disseminated intravascular coagulation, following an otherwise uneventful surgical procedure. An elevated systemic blood pressure, secondary to repeated adrenocorticotrophic hormone therapy, can represent a possible concurrent factor for this event. No major complications were recorded among the remaining 11 children. Seizure control was excellent in all the 11 survivors in the early postoperative period. Two children presented a relapse of seizures, after an initial improvement, respectively 3 and 4 years after the operation. These two children underwent subsequently a functional hemispherectomy. Overall, seizure outcome was excellent in all the cases. Seven patients (including the two who underwent functional hemispherectomy) are seizure-free (Engel's class Ia), and in one of them antiepileptic therapy has been weaned. In the remaining five children, seizures are sporadic and definitely improved (Engel's class II). An improvement of developmental delay, in particular of cognitive competence, was registered in 8 out of the 11 patients. Two of the four severely retarded children, who also presented behavioral abnormalities, did not show any cognitive improvement, whereas some mild improvement of their basal abilities was demonstrated in the other two. All the remaining children, even though

maintaining a moderate retardation, definitely improved their abilities; in particular, one of them reached an almost borderline level. The three patients with unchanged neurodevelopmental delay presented also persistent seizures. On the other hand, two children with persistent seizures presented neurodevelopmental improvement. **CONCLUSION** Simple surgical excision of the cyst "membrane" of epileptogenic porencephalic cysts can represent an excellent means to control epilepsy in affected children. However, postoperative seizure persistence and late recurrences, although rare, do not allow to exclude that hemispherectomy or partial resections (based on electrocorticography findings) might represent the good answer at least in some cases.

**Database:** Medline

## **27. Pathways of neonatal stroke and subclavian steal syndrome.**

**Author(s):** Beattie, L M; Butler, S J; Goudie, D E

**Source:** Archives of disease in childhood. Fetal and neonatal edition; May 2006; vol. 91 (no. 3); p. F204

**Publication Date:** May 2006

**Publication Type(s):** Case Reports Journal Article

**PubMedID:** 16632648

Available at [Archives of disease in childhood. Fetal and neonatal edition](#) - from BMJ Journals - NHS

Available at [Archives of disease in childhood. Fetal and neonatal edition](#) - from Europe PubMed Central - Open Access

**Abstract:** Neonatal stroke may occur silently. Identification of potential embolic pathways unique to the neonate is important when investigating the aetiology of infarction and arterial occlusion, and preventing further episodes. This is a case report of an infant with venous thrombus embolising across the foramen ovale causing cerebral infarction and subclavian artery steal syndrome, without neurological signs.

**Database:** Medline

## **28. Schizencephaly with occlusion or absence of middle cerebral artery.**

**Author(s):** Fernández-Bouzas, A; Harmony, T; Santiago-Rodríguez, E; Ricardo-Garcell, J; Fernández, T; Avila-Acosta, D

**Source:** Neuroradiology; Mar 2006; vol. 48 (no. 3); p. 171-175

**Publication Date:** Mar 2006

**Publication Type(s):** Research Support, Non-u.s. Gov't Case Reports Journal Article

**PubMedID:** 16391916

Available at [Neuroradiology](#) - from SpringerLink - Medicine

Available at [Neuroradiology](#) - from ProQuest (Health Research Premium) - NHS Version

**Abstract:** In a study of 160 infants with prenatal and/or perinatal risk factors for brain damage, we observed three cases of schizencephaly. All cases were unilateral, and the clefts had open lips. In two cases, magnetic resonance angiography showed occlusion or absence of the middle cerebral artery (MCA) on the affected side. Two of the patients, including one with absent flow in the MCA of the affected side, had ipsilateral cerebellar atrophy.

**Database:** Medline

### **29. Functional magnetic resonance imaging reveals atypical language organization in children following perinatal left middle cerebral artery stroke**

**Author(s):** Jacola L.M.; Schapiro M.B.; Byars A.W.; Strawsburg R.H.; Schmithorst V.J.; Holland S.K.; Szaflarski J.P.; Plante E.

**Source:** Neuropediatrics; Feb 2006; vol. 37 (no. 1); p. 46-52

**Publication Date:** Feb 2006

**Publication Type(s):** Conference Paper

**PubMedID:** 16541368

Available at [Neuropediatrics](#) - from PubMed Central

Available at [Neuropediatrics](#) - from Unpaywall

**Abstract:**We used verb generation and story listening tasks during fMRI to study language organization in children (7, 9 and 12 years old) with perinatal left MCA infarctions. Healthy, age-matched comparison children (n = 39) showed activation in left Broca's area during the verb generation task; in contrast, stroke subjects showed activation either bilaterally or in the right hemisphere homologue during both tasks. In Wernicke's area, comparison subjects showed left lateralization (verb generation) and bilateral activation (L > R) (story listening). Stroke subjects instead showed bilateral or right lateralization (verb generation) and bilateral activation (R > L) (story listening). Language is distributed atypically in children with perinatal left hemisphere stroke. © Georg Thieme Verlag KG Stuttgart.

**Database:** EMBASE

### **30. Magnetic resonance image correlates of hemiparesis after neonatal and childhood middle cerebral artery stroke.**

**Author(s):** Boardman, James P; Ganesan, Vijeya; Rutherford, Mary A; Saunders, Dawn E; Mercuri, Eugenio; Cowan, Frances

**Source:** Pediatrics; Feb 2005; vol. 115 (no. 2); p. 321-326

**Publication Date:** Feb 2005

**Publication Type(s):** Research Support, Non-u.s. Gov't Comparative Study Journal Article

**PubMedID:** 15687439

Available at [Pediatrics](#) - from Patricia Bowen Library & Knowledge Service West Middlesex University Hospital NHS Trust (lib302631) Local Print Collection [location] : Patricia Bowen Library and Knowledge Service West Middlesex university Hospital.

**Abstract:**OBJECTIVE Motor impairment after neonatal and childhood-onset ischemic stroke (IS) is common, although the prevalence and type of hemiparesis differs between the 2 age groups. Lesion topography is an important predictor of hemiparesis after neonatal IS, but it is not known if the same topographic predictors of adverse motor outcome apply to childhood-onset IS. We used a consistent approach to define lesion topography and evaluate motor outcome in both age groups to (1) investigate whether early topographic predictors of hemiparesis after unilateral middle cerebral artery-territory stroke are the same in neonates and older children and (2) compare the prevalence of dystonia and loss of independent finger movements between the 2 age groups. DESIGN Twenty-eight patients with neonatal-onset IS (Hammersmith Hospital, London, United Kingdom) were studied together with 43 patients with childhood-onset IS (Great Ormond Street Hospital, London, United Kingdom). All patients had exclusive unilateral middle cerebral artery-territory IS. Lesion topography was studied by using the first magnetic resonance image acquired after the onset of symptoms and was coded for involvement of cerebral cortex (CC), posterior limb of the internal capsule (PLIC), basal ganglia (BG), and white matter. The primary outcome was hemiparesis, and

secondary outcomes were dystonia and loss of age-appropriate independent finger movements. **RESULTS** Hemiparesis was more common after childhood-onset IS (56%) than neonatal-onset IS (24%). In neonatal-onset IS, concomitant involvement of BG, CC, and PLIC predicts the development of hemiparesis (odds ratio: 99; 95% confidence interval: 5.2-1883.8), and no child with 1 or 2 of these structures involved developed hemiparesis. In contrast, in childhood-onset IS, concomitant BG, CC, and PLIC lesions tended to be associated with hemiparesis (9 of 11), but this adverse outcome was seen also among patients with 1- or 2-site involvement. However, hemiparesis was less likely if the infarction involved BG only (odds ratio: 0.162; 95% confidence interval: 0.036-0.729). Dystonia was present in 15 of 24 in the childhood-onset group with hemiparesis but was not seen after neonatal-onset IS. In both age groups upper-limb impairment was more severe than lower-limb impairment, with frequent loss of independent hand function among hemiparetic patients. **CONCLUSIONS** In neonatal and childhood-onset IS, early magnetic resonance imaging provides useful prognostic information about subsequent motor outcome. There are differences in the functional response of the neuromotor system to injury between the 2 age groups that cannot be attributed to methodological differences alone.

**Database:** Medline

### **31. Congenital hemiparesis and seizures secondary to perinatal occlusion of the middle cerebral artery.**

**Author(s):** Caldarelli, Massimo; Tamburrini, Giampiero; Di Rocco, Concezio

**Source:** Pediatric neurosurgery; Oct 2002; vol. 37 (no. 4); p. 220

**Publication Date:** Oct 2002

**Publication Type(s):** Journal Article

**PubMedID:** 12372918

Available at [Pediatric neurosurgery](#) - from ProQuest (Health Research Premium) - NHS Version

**Database:** Medline

### **32. Internal carotid artery thrombus: an underdiagnosed source of brain emboli in neonates?**

**Author(s):** Alfonso, I; Prieto, G; Vasconcellos, E; Aref, K; Pacheco, E; Yelin, K

**Source:** Journal of child neurology; Jun 2001; vol. 16 (no. 6); p. 446-447

**Publication Date:** Jun 2001

**Publication Type(s):** Case Reports Journal Article

**PubMedID:** 11417613

**Abstract:** We report a full-term neonate with a left middle cerebral artery infarct, narrowing of the internal carotid artery detected by magnetic resonance angiography and B-mode ultrasonography, and a large thrombus at the origin of the internal carotid artery detected by B-mode ultrasonography. Internal carotid arterial thrombus is seldom considered the source of middle cerebral arterial embolus in neonates. We suggest that B-mode ultrasonography of the carotid artery be included in the diagnostic evaluation of middle cerebral artery infarcts in neonates.

**Database:** Medline

### **33. Diffusion-weighted MRI of middle cerebral artery stroke in a newborn.**

**Author(s):** Löfvblad, K O; Ruoss, K; Guzman, R; Schroth, G; Fusch, C

**Source:** Pediatric radiology; May 2001; vol. 31 (no. 5); p. 374-376

**Publication Date:** May 2001

**Publication Type(s):** Case Reports Journal Article

**PubMedID:** 11373930

Available at [Pediatric radiology](#) - from SpringerLink - Medicine

Available at [Pediatric radiology](#) - from ProQuest (Health Research Premium) - NHS Version

**Abstract:**Diffusion-weighted MRI of the brain is becoming clinically available as a tool to investigate cerebral ischaemia. We report a newborn girl presenting with seizures in whom diffusion-weighted MRI showed a large hyperintensity in the area perfused by the left middle cerebral artery. Short-term neurological follow-up before discharge was uneventful and the patient was discharged without sequelae. On follow-up clinical examination, right-sided spastic signs were noted which disappeared with time.

**Database:** Medline

### **34. Old middle cerebral infarction in a neonate**

**Author(s):** Hatzidaki E.; Prassopoulos P.; Korakaki E.; Evangeliou A.; Voloudaki A.; Giannakopoulou C.

**Source:** Radiology and Oncology; 2000; vol. 34 (no. 3); p. 281-284

**Publication Date:** 2000

**Publication Type(s):** Conference Paper

**Abstract:**Background. Cerebral arterial thrombosis is a relatively rare occurrence in the neonatal period. Some children having this condition as neonates, present recurrent local seizures with radiological evidence of acute infarction. Several studies have shown this to be a rare cause of neonatal seizures. Case report. We describe the case of a newborn infant with localized clonic seizures of the lower right extremity on the fourth day of life. Ultrasound examination of the brain showed only mild abnormalities. However Magnetic Resonance Imaging showed evidence of a middle left cerebral arterial infarction. Conclusions. The newer imaging methods, such as central nervous system Magnetic Resonance Imaging can be helpful in the diagnosis of rarer disturbances and can further reveal cases which would otherwise pass unnoticed even where ultrasound imaging is negative.

**Database:** EMBASE

### 35. Neonatal cerebral ischaemia with elevated maternal and infant anticardiolipin antibodies

**Author(s):** Mellor D.; Chow G.

**Source:** Developmental Medicine and Child Neurology; 2000; vol. 42 (no. 6); p. 412-413

**Publication Date:** 2000

**Publication Type(s):** Article

**PubMedID:** 10875528

Available at [Developmental medicine and child neurology](#) - from Wiley Online Library

**Abstract:** A baby girl born by elective lower segment caesarean section was found to have left-sided focal seizures at 48 hours after birth. Her mother had previously had a neonatal death at 26 weeks' gestation and another child born at 32 weeks' gestation had a congenital right hemiplegia with a left middle cerebral artery infarct on CT scan. The mother had raised anticardiolipin IgG antibodies at the time of delivery of her second child, with no thrombotic symptoms. Therefore, during this pregnancy, she had been treated with low molecular weight heparin and aspirin. The baby's mother had raised IgG and IgM anticardiolipin antibodies and the baby had IgG anticardiolipin antibodies at the upper range of normal 4 days after delivery. The seizures were controlled with phenobarbitone and phenytoin. CT and MRI scans showed evidence of cerebral ischaemia. A repeat MRI scan at 4 months of age was normal, anticonvulsants were discontinued, and her latest neurological examination at 5 months was normal.

**Database:** EMBASE

### 36. Perinatal cortical infarction within middle cerebral artery trunks.

**Author(s):** Govaert, P; Matthys, E; Zecic, A; Roelens, F; Oostra, A; Vanzieleghem, B

**Source:** Archives of disease in childhood. Fetal and neonatal edition; Jan 2000; vol. 82 (no. 1); p. F59

**Publication Date:** Jan 2000

**Publication Type(s):** Journal Article

**PubMedID:** 10634844

Available at [Archives of disease in childhood. Fetal and neonatal edition](#) - from Europe PubMed Central - Open Access

Available at [Archives of disease in childhood. Fetal and neonatal edition](#) - from Unpaywall

**Abstract:** AIM To define neonatal pial middle cerebral artery infarction. METHOD A retrospective study was made of neonates in whom focal arterial infarction had been detected ultrasonographically. A detailed study was made of cortical middle cerebral artery infarction subtypes. RESULTS Forty infarctions, with the exception of those in a posterior cerebral artery, were detected ultrasonographically over a period of 10 years. Most were confirmed by computed tomography or magnetic resonance imaging. Factor V Leiden heterozygosity was documented in three. The onset was probably antepartum in three, and associated with fetal distress before labour in one. There were 19 cases of cortical middle cerebral artery stroke. The truncal type (n=13) was more common than complete (n=5) middle cerebral artery infarction. Of six infarcts in the anterior trunk, four were in term infants and five affected the right hemisphere. Clinical seizures were part of the anterior truncal presentation in three. One of these infants, with involvement of the primary motor area, developed a severe motor hemisindrome. The Bayley Mental Developmental Index was above 80 in all of three infants tested with anterior truncal infarction. Of seven patients with posterior truncal infarction, six were at or near term. Six of these lesions were left sided. Clinical seizures were observed in three. A mild motor hemisindrome developed in at least three of these infants due to involvement of parieto-temporal non-primary cortex. CONCLUSIONS Inability to differentiate between truncal and complete middle cerebral artery stroke is one of the explanations



for the reported different outcomes. Severe motor hemisindrome can be predicted from neonatal ultrasonography on the basis of primary motor cortex involvement. Clinical seizures were recognised in less than half of the patients with truncal infarction; left sided presentation was present in the posterior, but not the anterior truncal type of infarction. Asphyxia is a rare cause of focal arterial infarction.

**Database:** Medline

**37. Neonatal middle cerebral artery infarction: association with elevated maternal anticardiolipin antibodies.**

**Author(s):** Akanli, L F; Trasi, S S; Thuraisamy, K; Bergtraum, M P; Thantu, A; Fischer, R F; Cohen-Addad, N

**Source:** American journal of perinatology; Jun 1998; vol. 15 (no. 6); p. 399-402

**Publication Date:** Jun 1998

**Publication Type(s):** Case Reports Journal Article

**PubMedID:** 9722063

**Abstract:**A full-term neonate was born to a 41-year-old woman via elective primary cesarean section for frank breech presentation after a 41-week pregnancy. Starting at 6 hr of age the infant presented with multiple episodes of apnea and cyanosis, in association with moderate hypotonia, subsequently requiring assisted ventilatory support for 2 days. Computerized axial tomography of the brain revealed infarction in the distribution of the left middle cerebral artery. Magnetic resonance imaging of the brain showed a left middle cerebral artery territory infarct and also a small right posterior-temporal infarct. Magnetic resonance angiography of the head and neck was normal, however, inferring that the vascular infarction was peripheral in location. Maternal anticardiolipin antibodies were elevated. This is only the fifth reported case of cerebral infarction in a newborn in association with elevated maternal anticardiolipin antibodies.

**Database:** Medline

### **38. Cerebral infarction as multifocal clonic seizures in a term neonate.**

**Author(s):** Balcom, T A; Redmond, B G

**Source:** The Journal of the American Board of Family Practice; 1997; vol. 10 (no. 1); p. 43-49

**Publication Date:** 1997

**Publication Type(s):** Case Reports Journal Article Review

**PubMedID:** 9018662

**Abstract:****BACKGROUND**The incidence of neonatal stroke in full-term infants has been cautiously estimated as 1:10,000, but infants can initially have few symptoms, and the condition has the potential for underdiagnosis. Follow-up studies of known full-term neonatal stroke victims beyond 3 years of age indicate that most develop some form of hemiparesis, seizure disorder, cognitive difficulties, or developmental delay during childhood.**METHODS**The case of a full-term infant who had a left middle cerebral artery infarction and who developed multifocal clonic seizures 9 hours after delivery is described and discussed.**RESULTS**Head sonograms first showed evidence of disease when the infant was 72 hours old. Computed tomography (CT) of the head when the infant was 82 hours old showed an ischemic infarction in the distribution of the left middle cerebral artery. Subsequent magnetic resonance angiography showed a resolving embolus in the left middle cerebral artery.**CONCLUSIONS**Serial sonograms and CT scans of the infant's head, along with magnetic resonance angiography, were useful in making the diagnosis of cerebral infarction. A late intrauterine placental thromboembolus was the most likely cause. Maternal history of a previous cesarean section could be a risk factor. More studies are needed to define the incidence of this disease and to describe the risk factors.

**Database:** Medline

### **39. Neonatal stroke involving the middle cerebral artery in term infants: clinical presentation, EEG and imaging studies, and outcome.**

**Author(s):** Koelfen, W; Freund, M; Varnholt, V

**Source:** Developmental medicine and child neurology; Mar 1995; vol. 37 (no. 3); p. 204-212

**Publication Date:** Mar 1995

**Publication Type(s):** Journal Article

**PubMedID:** 7890125

**Abstract:**Six children with neonatal cerebral infarction of the middle cerebral artery are reported. Seizures or respiratory distress were the initial symptoms. In some cases abnormal findings appeared earlier on EEG than on ultrasound. The EEG changes were concordant with the localization of the lesion. Ultrasound examinations revealed an echodense structure within the vascular territory, after a phase of appearing to be normal, highly suggestive of cerebral infarction. The diagnosis was confirmed by CT scan. Findings on EEG, cranial ultrasound and CT suggested that the stroke represented a late intra-uterine event. At long-term follow-up, six children had failed to develop normally for age and had become obviously hemiplegic as gross motor development proceeded. Four of the patients had developed epilepsy. These data indicate that the outcome of neonatal stroke may not be as positive as previously reported.

**Database:** Medline

**40. Late thalamic atrophy in infarction of the middle cerebral artery territory in neonates. A prospective clinical and radiological study in four children.**

**Author(s):** Giroud, M; Fayolle, H; Martin, D; Baudoin, N; André, N; Gouyon, J B; Nivelon, J L; Dumas, R

**Source:** Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery; Mar 1995; vol. 11 (no. 3); p. 133-136

**Publication Date:** Mar 1995

**Publication Type(s):** Journal Article

**PubMedID:** 7773971

Available at [Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery](#) - from SpringerLink - Medicine

**Abstract:**We report four cases of progressive thalamic atrophy following ipsilateral cerebral infarction in the territory of the middle cerebral artery in neonates, with prospective radiological and clinical follow-up. This type of atrophy appears within 6 months after the onset of cerebral infarction. In the short term, this atrophy has no action on sensory and memory function and/or on sensory evoked potentials. This atrophy is not the result of secondary ischemic neuronal damage. Judging from several other experimental studies, thalamic atrophy may primarily result from retrograde degeneration. It would be interesting to observe the consequences of this atrophy on sensory and memory function over a long period.

**Database:** Medline

**41. Fetal stroke associated with elevated maternal anticardiolipin antibodies.**

**Author(s):** Silver, R K; MacGregor, S N; Pasternak, J F; Neely, S E

**Source:** Obstetrics and gynecology; Sep 1992; vol. 80 (no. 3); p. 497-499

**Publication Date:** Sep 1992

**Publication Type(s):** Case Reports Journal Article

**PubMedID:** 1495720

**Abstract:**Middle cerebral artery infarction explains some cases of congenital hemiparesis with or without neonatal stroke. The etiology of the stroke is often obscure. We describe two infants with imaging evidence of middle cerebral artery infarction whose mothers had elevated anticardiolipin antibody levels after delivery. We speculate that these antibodies may have been responsible for intrauterine thromboembolic stroke.

**Database:** Medline

#### **42. Outcome of neonatal strokes.**

**Author(s):** Sran, S K; Baumann, R J

**Source:** American journal of diseases of children (1960); Oct 1988; vol. 142 (no. 10); p. 1086-1088

**Publication Date:** Oct 1988

**Publication Type(s):** Journal Article

**PubMedID:** 3177305

**Abstract:**We examined the clinical outcome of 17 children, 1 to 11 years of age, who experienced major cerebral artery infarctions (strokes) as neonates. Nine of the 17 children had left middle cerebral artery (MCA) infarctions, five had right MCA infarctions, two had bilateral MCA infarctions, and one had a left posterior cerebral artery infarction. Fourteen of the 17 children developed seizures as neonates. Most of these children who developed seizures were neurologically abnormal as neonates, became seizure free and neurologically normal early in the first year of life, and their anticonvulsant therapies were discontinued. After a seizure-free period of one to eight years, three of the 14 patients again required anticonvulsant therapy for seizure control. Two of the 16 surviving children continue to be severely handicapped while 11 of the 16 are making apparently normal developmental progress. One of the two children presently attending school has cognitive deficits appropriate to the site affected by the original infarction. Most children with neonatally diagnosed strokes appear to have a good short-term outcome, but later onset of seizures and subsequent recognition of cognitive deficits may not be uncommon.

**Database:** Medline

## Strategy 743112

#	Database	Search term	Results
1	Medline	("middle cerebral artery" ADJ2 (occlusion* OR infarct* OR stroke OR emobol*)).ti,ab	14312
2	Medline	exp "INFARCTION, MIDDLE CEREBRAL ARTERY"/	8251
3	Medline	(1 OR 2)	16958
4	Medline	(perinatal OR fetus OR foetal OR fetal OR neonate* OR newborn).ti,ab	492710
5	Medline	exp FETUS/	154885
6	Medline	exp "INFANT, NEWBORN"/	591329
7	Medline	(4 OR 5 OR 6)	965530
8	Medline	(3 AND 7)	343
9	EMBASE	("middle cerebral artery" ADJ2 (occlusion* OR infarct* OR stroke OR emobol*)).ti,ab	18029
10	EMBASE	*"MIDDLE CEREBRAL ARTERY OCCLUSION"/	4121
11	EMBASE	(9 OR 10)	19364
12	EMBASE	(perinatal OR fetus OR foetal OR fetal OR neonate* OR newborn).ti,ab	607934
13	EMBASE	exp NEWBORN/	512461
14	EMBASE	exp FETUS/	187510
15	EMBASE	exp "FETUS BRAIN"/	1151
16	EMBASE	(12 OR 13 OR 14 OR 15)	966159

