

Management of perinatal cervical spine injury using custom-fabricated external orthoses: design considerations, narrative literature review, and experience from the Hospital for Sick Children. Illustrative cases

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BACKGROUND Cervical spine injuries in neonates are rare and no guidelines are available to inform management. The most common etiology of neonatal cervical injury is birth-related trauma. Management strategies that are routine in older children and adults are not feasible due to the unique anatomy of neonates.

OBSERVATIONS Here, the authors present 3 cases of neonatal cervical spinal injury due to confirmed or suspected birth trauma, 2 of whom presented immediately after birth, while the other was diagnosed at 7 weeks of age. One child presented with neurological deficits due to spinal cord injury, while another had an underlying predisposition to bony injury, infantile malignant osteopetrosis. The children were treated with a custom-designed and manufactured full-body external orthoses with good clinical and radiographic outcomes. A narrative literature review further supplements this case series and highlights risk factors and the spectrum of birth-related spinal injuries reported to date.

LESSONS The current report highlights the importance of recognizing the rare occurrence of cervical spinal injury in newborns and provides pragmatic recommendations for management of these injuries. Custom orthoses provide an alternate option for neonates who cannot be fitted in halo vests and who would outgrow traditional casts.

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KEYWORDS cervical spine injury; orthoses; neonate

Neonatal spine injury is rare, with an estimated incidence of 1 case per 29,000.¹ Furthermore, injury to the spinal cord was identified in 10% of perinatal neonatal deaths or stillbirths at autopsy.² Birth-related spinal cord injury (SCI) is thought to occur secondary to excessive extraction, rotation, or hyperextension of the neck during delivery; as such, shoulder dystocia, breech position, and forceps or vacuum assistance have emerged as risk factors for neonatal SCI. The clinical manifestation of SCI in this population can be significant, with a ranging spectrum of sensorimotor deficits and sometimes apnea, necessitating ventilation.¹ Neonates are at higher risk of upper cervical spine injuries because of underdeveloped muscles and ligaments, relative craniocervical size mismatch, and incomplete mineralization of the vertebrae.³ Based on existing

literature, the prognosis of birth-related SCI in neonates is poor, with a high mortality rate and long-term neurological morbidity among surviving patients.^{1,4,5}

SCI in the pediatric population can be classified based on the radiographic appearance: fracture, fracture with subluxation, subluxation alone, and SCI without radiographic abnormality.⁶ Treatment is centered around providing appropriate immobilization, reduction, and stabilization in order to achieve spinal stability while mitigating permanent neurological deficits and long-term sequelae, including joint contractures, fractures, and scoliosis.^{7,8} Current treatment modalities include surgical stabilization and external immobilization systems.⁹ Surgery is particularly challenging in newborns due to their unique anatomy, the potential impact on growth, and difficulty achieving adequate

ABBREVIATIONS CT = computed tomography; MRI = magnetic resonance imaging; OTS = off-the-shelf; SCI = spinal cord injury.

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Preventability Of Perinatal Injury

Karlis Adamsons, Howard A. Fox



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Preventability of Perinatal Injury Karlis Adamsons, Howard A. Fox, 1975 **Costs and Benefits of Electronic Fetal Monitoring** Henry David Banta, 1979 Healthy People : the Surgeon General's Report on Health Promotion and Disease Prevention : Background Papers Institute of Medicine (U.S.), 1979 **Health Services Reports** United States. Health Services and Mental Health Administration, 1973 **PREVENTABILITY OF PERINATAL INJURY- PROCEEDINGS OF A SYMPOSIUM MOUNT SINAI SCHOOL OF MEDICINE- NATIONAL FOUNDATION MARCH OF DIMES.** , *Current Catalog* National Library of Medicine (U.S.), First multi year cumulation covers six years 1965 70 *Better Health for Our Children: Background papers* United States. Select Panel for the Promotion of Child Health, 1981 *Fetal and Neonatal Neurology and Neurosurgery* Malcolm I. Levene, Frank A. Chervenak, 2009-01-01 The definitive reference work on the developing brain from conception through the first year of life this book provides specialists involved in the management of the fetus and the neonate with the latest information on the developmental neurology and pathology of the developing central nervous system Current Bibliography of Epidemiology , 1976 Monthly with annual cumulations Comprehensive current index to periodical medical literature intended for use of practitioners investigators and other workers in community medicine who are concerned with the etiology prevention and control of disease Citations are derived from MEDLARS tapes for Index medicus of corresponding date Arrangement by 2 sections i e Selected subject headings and Diseases organisms vaccines No author index **Neonatal Neural Rescue** A. David Edwards, Denis V. Azzopardi, Alistair J. Gunn, 2013-04-04 Worldwide more than one million babies die annually from perinatal asphyxia and its associated complications such as neonatal encephalopathy one of the major causes of cerebral palsy and cognitive deficiencies in children aside from prematurity Cooling the head or the entire body minimizes neuronal death enabling the neonatal brain to be rescued thus greatly improving developmental outcomes Hypothermic neural rescue therapy has revolutionized the treatment of this condition and is a major recent achievement in neonatal medicine This landmark book provides a brief scientific underpinning of hypothermic neural rescue therapy and lays out the evidence base for good practice Internationally recognized authorities give practical advice drawn from personal experience on how to deliver hypothermia in the neonatal intensive care unit A valuable addition to any neonatal unit this is essential reading for neonatologists neonatal nurses and paediatric neurologists Cumulated Index Medicus , 1976 *Perinatal Nursing* Glenda Fregia Butnarescu, Delight Mocas Tillotson, Patricia Padulo Villarreal, 1978 Human Communication Eldon L. Eagles, William George Hardy, Francis I. Catlin, National Institute of Neurological Diseases and Blindness (U.S.), 1968 **Bibliography of Medical Reviews** , 1976 *Essential Neonatal Medicine* Sunil Sinha, Lawrence Miall, Luke Jardine, 2017-06-23 Providing a comprehensive yet concise guide for trainee doctors neonatal nurses and midwives Essential Neonatal Medicine continues to be an indispensable resource that combines the depth and breadth of a textbook with the efficiency of a revision guide Extensively updated and

full colour throughout this edition includes new chapters on neonatal transport and palliative care as well as further content on pathophysiology and embryology quality improvement and risk management infection control and non invasive ventilation With an improved artwork programme and a new glossary of terms Essential Neonatal Medicine is ideal for all trainee health professionals new to neonatology or looking for a comprehensive aid to support them **Monthly Bibliography of**

Medical Reviews ,1976 *Cerebral Palsy and Related Developmental Disabilities--prevention and Early Care; an Annotated Bibliography: 1975: includes items published from 1974 through 1975* E. N. Roth,1975 Suicidal behavior and depression among perinatal women: Research, Prevention, Intervention and Treatment Yari Gvion,Sami Hamdan ,Vita

Poštuvan,2024-10-01 Suicide is a multifaceted phenomenon with numerous contributing and facilitating factors and variables Despite motherhood serving as a potential protective factor against suicidal tendencies a notable prevalence of suicidality persists among pregnant and postpartum women making suicide a leading cause of death among women with postpartum depression PDD Furthermore numerous women experience emotional challenges during pregnancy which often persist into the postpartum phase thus making them also susceptible to depression and suicidality This Research Topic is dedicated to studies exploring various approaches to suicidal behavior depression as well as of non suicidal self injury NSSI among pregnant and postpartum women The purpose of this Research Topic is to elucidate comprehensive analyses of extant knowledge and empirical data about models theories and specific dimensions and variables that may help us increase the understanding of suicidal phenomena among perinatal women pregnant and postpartum The specific goal is to identify characteristics that may be used to develop prevention and intervention methods among this at risk population *The Epidemiology and Prevention of Childhood Injuries* Hamid Soori,Martha Orendu Oche Attah,2025-05-20 The Epidemiology and Prevention of Childhood Injuries An Overview takes a comprehensive approach to understanding and addressing childhood injuries Integrating global research and practice the book aims to significantly advance injury prevention among children With detailed chapters on epidemiological measures risk factors and prevention strategies it offers a thorough review of childhood injury contexts The book covers injuries related to transport home school play sports workplace violence and disasters It discusses first aid essentials accountability and collaboration concluding with methodologies data collection techniques and outcome assessments This resource is invaluable for researchers pediatricians public health experts and policymakers seeking to protect children Offers a reliable up to date resource for understanding and addressing epidemiology risk factors prevention strategies and interventions of childhood injuries Discusses how different social identities can intersect and contribute to disparities in injury rates and outcomes Explores how social determinants of health such as race ethnicity socioeconomic status and access to healthcare contribute to disparities in injury rates and outcomes Equips readers with actionable insights multidisciplinary approaches and technological innovations that can be applied in various settings to create safer environments for children *Maternity Nursing* Glenda Fregia Butnarescu,Delight Mocas

Tillotson, 1983

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