UPDATE IN ANESTESIA OSTETRICA

Dr. Marco Aversano

U.O.S.D. Anestesia e Rianimazione Ostetrica

Ospedale Isola Tiberina – Gemelli Isola


COAGULOPATIE
PIASTRINOPENIE
PATOLOGIE NEUROLOGICHE

COAGULOPATIE

DISTURBI DELL'EMOSTASI

- EREDITARI
  - Deficit dei fatt. della coagulazione
  - Pistrinopenie ereditarie
- ACQUISITI
  - Anticoagulanti
  - Difetti legati alla gravidanza

Alterazioni fisiologiche della coagulazione in gravidanza

Stato IPERcoagulativo e IPOfibrinolitico

- ✓ **ATTIVAZIONE PIASTRINICA**
- ✓ **PROTEINA S: ↓ 40/50%**
- ✓ **FATTORI DELLA COAGULAZIONE:**

⇈	➔	⇊
Fibrinogeno	F. II	F. XI
F. VII	F. V	F. XIII
F. VIII		
F. X		
F. IX / XII		

- ✓ ⇈ **INIBITORE DELL'ATTIVATORE DEL PLASMINOGENO (PAI -1 e PAI - 2)**
- ✓ ⇊ **ATTIVATORE DEL PLASMINOGENO TISSUTALE (tPA)**

Test di screening dei disturbi dell'emostasi

Patient with bleeding tendency

Personal and family history

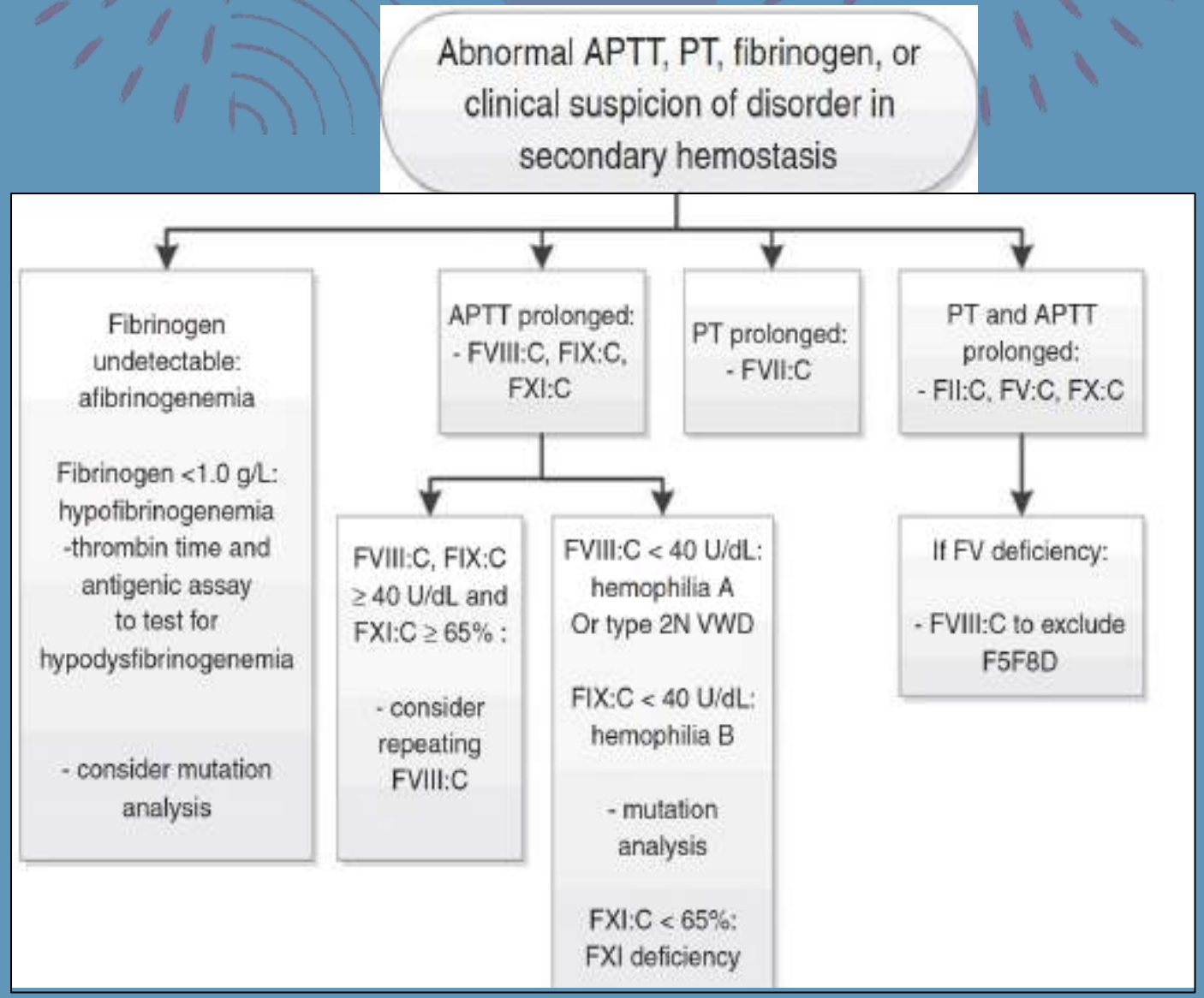
ISTH – BAT

Physical examination

Full blood count

Liver and kidney function

APTT, PT, fibrinogen



Journal of thrombosis and haemostasis : JTH, *14*(8), 1507–1516

Caso Clinico

Donna di 37 anni, IV G PARA 0 (3 AS a 4 settimane)

- **DEFICIT EREDITARIO del FVII** in forma severa (valori basali < 10%) e LAC +
- Rischio emorragico medio-elevato, non necessariamente legato ai valori dell' INR / FVII
- In anamnesi: metrorragie importanti nei primi mesi del menarca, poi risoltesi. Nessun intervento chirurgico

- Gravidanza insorta con PMA, decorso regolare, ha assunto cardiaASA fino a 32 sett, poi EBPM
- 30/05 ricovero per induzione a 38 sett+ 4 (ultima assunzione EBPM il 29/05)
- 31/05: INR 1,54

Caso Clinico PROTOCOLLO DI GESTIONE

- Somministrare FVII 15mcg/kg PRIMA dell'analgesia neuroassiale

- Al momento del parto → ac. tranexamico 1 gr

- Se evidenza di EPP → FVII 90 mcg/kg

Caso clinico

01/06 posizionato CRB, poi rimosso, proseguita induzione con MISOPROSTOLO

Dopo VI dose di MISOPROSTOLO, intensa attività contrattile. Trasferimento in sala parto

Ore 01:50 somministrato FVII al dosaggio di 15 mcg/kg

Ore 03:40 dell 02/06 : collo centralizzato, appianato, DC 3 cm, PP cefalica – 2, MAC rotte, liquido chiaro
Presenza di attività contrattile dolorosa → si richiede partoanalgesia, INR 0.72

Travaglio regolare, continua induzione con ossitocina

Ore 19: 58 PARTO OPERATIVO con ventosa per esaurimento delle forze materne, secondamento spontaneo

Al momento del parto, somministrate:
X UI ossitocina, 1 fiala di SULPROSTONE 500 mcg in IC, 1 gr di ac. tranexamico, FVII 15 mcg/kg.
PERDITE EMATICHE STIMATE: 400 ml
INR post parto 0.72, controlli successivi 0.97. Rimosso catetere peridurale, iniziata profilassi con EBPM.
In III GPP → Dimissione, INR 1.39

TROMBOCITOPENIA E GRAVIDANZA

ORIENTAMENTO DIAGNOSTICO

La prevalenza di una conta piastrinica **< 150 X 10^9** nel T3 di gravidanza è compresa tra il 6,6 e l'11,6%

	PREGNANCY - SPECIFIC	NOT PREGNANCY - SPECIFIC
Isolated thrombocytopenia	**Gestational thrombocytopenia (70 – 80%)**	Primary ITP (1- 4%) Secondary ITP (< 1%) * Drug – induced thrombocytopenia Type IIB vW disease Congenital thrombocytopenia
Thrombocytopenia associated with systemic disorders	**Severe Preeclampsia (15 – 20%)** HELLP Syndrome (< 1%) AFLP (< 1%)	TTP / HUS ** LES ** Antiphospholipid** syndrome Viral infection ** Nutritional deficiency ** Splenic sequestration Thyroid disordes **

* Secondary ITP: includes isolated thrombocytopenia secondary to some infections (HIV, HCV, H. pylori) and to other autoimmune disorders such as systemic lupus erythematous.
** Rare (probably <1%)

slido

Quale è l’incidenza di Ematoma Spinale dovuto a procedure neuroassiali in ambito ostetrico?

ⓘ Start presenting to display the poll results on this slide.

Quale è l'incidenza di Ematoma Spinale dovuto a procedure neuroassiali in ambito ostetrico?

- 0,3%
- 1%
- 0,005%
- 3%

SPECIAL ARTICLE

The Society for Obstetric Anesthesia and Perinatology Interdisciplinary Consensus Statement on Neuraxial Procedures in Obstetric Patients With Thrombocytopenia

Melissa E. Bauer, DO,* Katherine Arendt, MD,† Yaakov Beilin, MD,‡ Terry Gernsheimer, MD,§ Juliana Perez Botero, MD,‖ Andra H. James, MD,¶ Edward Yaghmour, MD,# Roulhac D. Toledano, MD, PhD,** Mark Turrentine, MD,†† Timothy Houle, PhD,‡‡ Mark MacEachern, MLIS,§§ Hannah Madden, BS,‡‡ Anita Rajasekhar, MD, MS,‖‖ Scott Segal, MD,¶¶ Christopher Wu, MD,## Jason P. Cooper, MD, PhD,§ Ruth Landau, MD,*** and Lisa Leffert, MD‡‡

See Article, p 1527

Because up to 12% of obstetric patients meet criteria for the diagnosis of thrombocytopenia in pregnancy, it is not infrequent that the anesthesiologist must decide whether to proceed with a neuraxial procedure in an affected patient. Given the potential morbidity associated with general anesthesia for cesarean delivery, thoughtful consideration of which patients with thrombocytopenia are likely to have an increased risk of spinal epidural hematoma with neuraxial procedures, and when these risks outweigh the relative benefits is important to consider and to inform shared decision making with patients. Because there are substantial risks associated with withholding a neuraxial analgesic/anesthetic procedure in obstetric patients, every effort should be made to perform a bleeding history assessment and determine the thrombocytopenia etiology before admission for delivery. Whereas multiple other professional societies (obstetric, interventional pain, and hematologic) have published guidelines addressing platelet thresholds for safe neuraxial procedures, the US anesthesia professional societies have been silent on this topic. Despite a paucity of high-quality data, there are now meta-analyses that provide better estimations of risks. An interdisciplinary taskforce was convened to unite the relevant professional societies, synthesize the data, and provide a practical decision algorithm to help inform risk-benefit discussions and shared decision making with patients. Through a systematic review and modified Delphi process, the taskforce concluded that the best available evidence indicates the risk of spinal epidural hematoma associated with a platelet count ≥70,000 × 10^6/L is likely to be very low in obstetric patients with thrombocytopenia secondary to gestational thrombocytopenia, immune thrombocytopenia (ITP), and hypertensive disorders of pregnancy in the absence of other risk factors. Ultimately, the decision of whether to proceed with a neuraxial procedure in an obstetric patient with thrombocytopenia occurs within a clinical context. Potentially relevant factors include, but are not limited to, patient comorbidities, obstetric risk factors, airway examination, available airway equipment, risk of general anesthesia, and patient preference. **Endorsed by the American Society of Regional Anesthesia and Pain Medicine (ASRA), American College of Obstetricians and Gynecologists (ACOG), and the Society for Maternal-Fetal Medicine (SMFM).** (Anesth Analg 2021;132:1531–44)

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Conflicts of Interest: See Disclosures at the end of the article.

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On October 9, 2020, the American Society of Hematology (ASH) affirmed that this consensus statement has value for hematologists. The consensus panel that developed the statement included three ASH representatives, and the final statement was reviewed by the Guideline Oversight Subcommittee and Committee on Quality. ASH did not otherwise have input into the development of this consensus statement.

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Reprints will not be available from the authors.

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- Up to 12% of obstetric patients meet criteria for the diagnosis of thrombocytopenia
- not infrequent anesthesiologist must decide whether to proceed with a neuraxial procedure in an affected patient
- substantial risks associated with withholding a neuraxial analgesic/anesthetic procedure in obstetric patients
- bleeding history assessment and determine the thrombocytopenia etiology before admission for delivery
- risk of spinal epidural hematoma associated with a platelet count ≥70,000 × 106/L is likely to be very low in obstetric patients
- gestational thrombocytopenia, immune thrombocytopenia (ITP), and hypertensive disorders of pregnancy in the absence of other risk factors

Trombocitopenia e Gravidanza

ITP – EVIDENZE SCIENTIFICHE


BJOG An International Journal of Obstetrics and Gynaecology

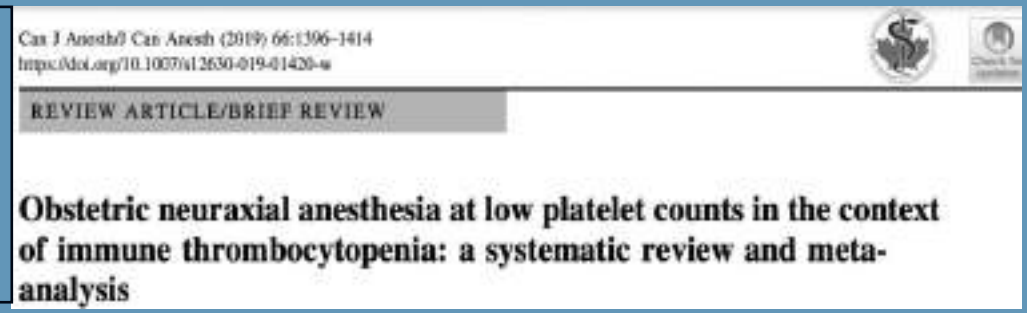
Intrapartum care

Severe primary autoimmune thrombocytopenia in pregnancy: a national cohort study

A Care,* S Peveler,* M Knight,† Z Alfirevic*

- Studio prospettico di coorte
- 107 pazienti con ITP → conta piastrinica MEDIA 64 x 10^9/l
- 14 pazienti sottoposte a ADP → 6 pz avevano PLT ↓ 80 x10^9/l
- **<u>0 casi di ematoma perimidollare / 21% EPP grave</u>**

- Review, **291** pz con ITP e PLT < 100 X 10^9/l
- 166 sottoposte APD, di cui **61 con PLT < 80 x10^9/l**
- **11 pz con PLT < 50 x10^9/l**
- **<u>0 casi di ematoma perimidollare</u>**


Can J Anesth/J Can Anesth (2019) 66:1396–1414
https://doi.org/10.1007/s12630-019-01420-w

REVIEW ARTICLE/BRIEF REVIEW

Obstetric neuraxial anesthesia at low platelet counts in the context of immune thrombocytopenia: a systematic review and meta-analysis

- Nella ITP si verifica un'accelerata distruzione delle piastrine, ma **la funzione delle piastrine rimane tipicamente intatta.**

Anesth Analg 2007; 104: 416-20.

Trombocitopenia e Gravidanza - HELLP


REVIEW ARTICLE

Anesthetic considerations in HELLP syndrome

H **H**emolysis
E **E**levated
L **L**iver Enzymes
L **L**ow
P **P**latelet count

- *Incidenza 2 - 12% di tutte le gravidanze, 10 - 20% dei casi di PE*
- *30% dei casi insorge nel puerperio, entro 48 h*
- *LDH ≥ 600 UI/l*
- *AST / ALT > 2N*
- *PLT <100 x 10^9/l*

GESTIONE ANESTESIOLOGICA

- ANESTESIA NEUROASSIALE se PLT stabili o PLT > 80 x 10^9/l
- Per tecniche CSE → ATTENZIONE alla rimozione del catetere peridurale
- Se non ci sono segni di ematoma spinale, rimuoverlo il prima possibile
- Se sanguinamento nel punto di inserzione del catetere → lasciarlo in sede e correggere coagulopatia
- EO neurologico POSITIVO: Eseguire TC / RMN


International Journal of Gynecology & Obstetrics

Anesthesia in pregnant women with HELLP syndrome

- 36 pazienti con sindrome HELLP e PLT < 100 x 10^9/l
- In 12 pz, PLT < 50 x 10^9/l
- **<u>0 casi di ematoma perimidollare</u>**

Trombocitopenia e Gravidanza

QUAL E' IL CUT – OFF PIASTRINICO PER ESEGUIRE ANESTESIA NEUROASSIALE?

In caso di ↓ **PLT NOTA, ISOLATA e STABILE** al termine della gravidanza: **PLT > 75 x 10^9 NON è una controindicazione all'APD.**
Al di sotto di questo valore, valutare rapporto rischio/beneficio.

SFAR

RECOMMANDATIONS POUR LA PRATIQUE CLINIQUE

Les blocs périmédullaires chez l'adulte

Société française d'anesthésie et de réanimation

In caso di Preeclampsia con ↓ **PLT STABILE, senza deficit della coagulazione associati:**
APD se PLT > 80 x 10^9
AS se PLT > 50 x 10^9
Procedura eseguita da anestesista esperto.

SYSTEMATIC REVIEW ARTICLE

Neuraxial Anesthesia in Obstetric Patients Receiving Thromboprophylaxis With Unfractionated or Low-Molecular-Weight Heparin: A Systematic Review of Spinal Epidural Hematoma

Lisa R. Leffert, MD,* Heloise M. Dubois, BS,* Alexander J. Butwick, MBBS, FRCA, MS,† Brendan Carvalho, MBBCh, FRCA, MDCH,† Timothy T. Houle, PhD,* and Ruth Landau, MD‡

Venous thromboembolism remains a major source of morbidity and mortality in obstetrics with an incidence of 29.8/100,000 vaginal delivery hospitalizations; cesarean delivery confers a 4-fold increased risk of thromboembolism when compared with vaginal delivery. Revised national guidelines now stipulate that the majority of women delivering via cesarean and women at risk for ante- or postpartum venous thromboembolism receive mechanical or pharmacological thromboprophylaxis. This practice change has important implications for obstetric anesthesiologists concerned about the risk of spinal epidural hematoma (SEH) among anticoagulated women receiving neuraxial anesthesia. We conducted a systematic review of published English language studies (1952–2016) and of the US Anesthesia Closed Claims Project Database (1990–2013) to identify cases of SEH associated with neuraxial anesthesia and thromboprophylaxis. We also report on SEH in obstetric patients receiving thromboprophylaxis and neuraxial anesthesia without adherence to the American Society of Regional Anesthesia (ASRA) recommendations. In our review, we initially identified 736 publications of which 10 met inclusion criteria; these were combined with the 5 cases of SEH identified in 546 obstetric Anesthesia Closed Claims reviews. None of these publications revealed SEH associated with neuraxial anesthesia and thromboprophylaxis with unfractionated heparin or low-molecular-weight heparin in obstetric patients. Based on data from 6 reports, 28 parturients had their neuraxial blockade before the minimum ASRA recommended time interval between the last anticoagulant dose and the neuraxial procedure. Based on data from 2 reports, 52 parturients received neuraxial anesthesia without their low-molecular-weight heparin dose being discontinued during the intrapartum period. Although the very low level of evidence and high heterogeneity in these reports make it difficult to draw quantitative conclusions from this systematic review, it is encouraging that this comprehensive search did not identify a single case of SEH in an obstetric patient receiving thromboprophylaxis and neuraxial anesthesia. Analysis of large-scale registries (eg, the Anesthesia Incident Reporting System of the Anesthesia Quality Institute) with more granular clinical and pharmacological data is needed to assess the impact of these practice changes on obstetric SEH incidence. In the interim, optimal care of obstetric patients depends on multidisciplinary planning of anticoagulation dosing to facilitate neuraxial anesthesia and thoughtful weighing of the relative risks and benefits of providing versus withholding neuraxial in favor of general anesthesia.
(Anesth Analg 2017;125:223–31)

Venous thromboembolism (VTE) remains a major source of morbidity and mortality in the obstetric population with an incidence of 29.8/100,000 vaginal delivery hospitalizations in 2012.[1] Cesarean delivery confers a 4-fold increased risk of thromboembolism when compared with vaginal delivery.[2] Revised national guidelines now stipulate that the majority of women delivering via cesarean and of women at risk for VTE ante- and postpartum receive mechanical or pharmacological thromboprophylaxis.[3–5] While some inpatient antepartum and postoperative obstetric patients will be treated with mechanical compression devices, an increasing number of obstetric patients will receive thromboprophylaxis with low-molecular-weight heparin (LMWH) and/or unfractionated heparins (UFHs). These practice changes will have a major impact on how anesthesiologists provide care to women during the peripartum period. Key decisions that will be affected include the timing of neuraxial blockade for labor analgesia or cesarean delivery anesthesia, the use of neuraxial analgesia for postoperative pain management, and the timing of epidural catheter removal. Neuraxial blockade remains the technique of choice for optimal labor pain management and cesarean delivery anesthesia due to its high reliability, superior pain relief, patient satisfaction,[6–8] and very low incidence of complications.[9,10]

From the *Department of Anesthesia, Critical Care and Pain Medicine, Massachusetts General Hospital, Boston, Massachusetts; †Department of Anesthesia, Stanford University School of Medicine, Stanford, California; and ‡Department of Anesthesiology, Columbia University College of Physicians and Surgeons, New York, New York.

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Review of relevant published literature (1952–2016) and of the Anesthesia Closed Claims Project Database (1950–2013)

No a single case of SEH after neuraxial blockade in obstetric patients receiving thromboprophylactic doses of UFH or LMWH

Small number of cases in which the neuraxial procedure was done with the continuation of intrapartum thromboprophylaxis or with a shorter time interval between last dose and anesthetic procedure than is recommended in the ASRA or ESA guidelines

2002 survey of 226 obstetric units in the United Kingdom revealed that 16% to 20% were willing to perform a “central nerve block” within 4 hours of a dose of LMWH

Ospedale Isola Tiberina
GEMELLI ISOLA

1 in 251,463 obstetric patients developed SEH

,837 obstetric patients developed this
ication

7 of the 62,450 nonobstetric patients developed SEHs

ORIGINAL INVESTIGATIONS IN EDUCATION

BRIEF REPORT

PAIN AND REGIONAL ANESTHESIA

Anesthesiology 2004; 101:950–9 © 2004 American Society of Anesthesiologists, Inc. Lippincott Williams & Wilkins, Inc.

Severe Neurological Complications after Central Neuraxial Blockades in Sweden 1990–1999

Vibeke Moen, M.D., Nils Dahlgren, M.D., Ph.D.,† Lars Irestedt, M.D., Ph.D.‡*

Background: **Central neuraxial blockades find widespread applications. Severe complications are believed to be extremely rare, but the incidence is probably underestimated.**

Methods: **A retrospective study of severe neurologic complications after central neuraxial blockades in Sweden 1990–1999 was performed. Information was obtained from a postal survey and administrative files in the health care system. During the study period approximately 1,260,000 spinal blockades and 450,000 epidural blockades were administered, including 200,000 epidural blockades for pain relief in labor.**

Results: **The 127 complications found included spinal hematoma (33), cauda equina syndrome (32), meningitis (29), epidural abscess (13), and miscellaneous (20). Permanent neurologic damage was observed in 85 patients. Incidence of complications after spinal blockade was within 1:20–30,000 in all patient groups. Incidence after obstetric epidural blockade was 1:25,000; in the remaining patients it was 1:3600 ($P < 0.0001$). Spinal hematoma after obstetric epidural blockade carried the incidence 1:200,000, significantly lower than the incidence 1:3,600 females subject to knee arthroplasty ($P < 0.0001$).**

Conclusions: **More complications than expected were found, probably as a result of the comprehensive study design. Half of the complications were retrieved exclusively from administrative files. Complications occur significantly more often after epidural blockade than after spinal blockade, and the complications are different. Obstetric patients carry significantly lower incidence of complications. Osteoporosis is proposed as a previously neglected risk factor. Close surveillance after central neuraxial blockade is mandatory for safe practice.**

CENTRAL neuraxial blockades (CNB) find widespread application in anesthesia as well as in postoperative and labor analgesia. Recent studies also suggest a reduction in postoperative mortality when CNB are used in major surgery.[1] The use of CNB will probably increase in the future, as serious complications have been reported to be extremely rare.[2] Studies are scarce, and their results difficult to compare.[3–8] Many complications are known through case reports, and these rare events might not be evenly distributed within the patient population. Because the enormous number of patients needed to perform prospective studies exceeds feasibility, it is important that retrospective studies try to minimize the inherent weakness of such study designs. Underreporting is common in retrospective studies, causing underestimation of risk. In recent years, interest has focused on spinal hematoma after administration of low molecular weight heparin (LMWH).[9–12] To investigate the incidence of serious neurologic complications after CNB in Sweden from 1990 to 1999, all available sources of information were searched. The aim was also to identify subgroups of patients with higher or lower prevalence of risk factors.

This article is accompanied by an Editorial View. Please see: Auroy Y, Benhamou D, Amaberti R: Risk assessment and control require analysis of both outcomes and process of care. ANESTHESIOLOGY 2004; 101:815–7.

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slido

In quali di queste condizioni è assolutamente controindicata ogni procedura neuroassiale?

ⓘ Start presenting to display the poll results on this slide.

Neurological Disorders

Epilepsy	• Epilepsy is the most common serious neurological disorder in pregnant - • 6.85 per 1000 women
Multiple sclerosis	• immune-mediated, chronic, demyelinating disorder of the central nervous system (CNS) • three times more common in women; the mean age at diagnosis is 30 yrs
Cerebrovascular disorders	• Multi-disciplinary expertise is essential during the acute presentation, and if still pregnant, to choose the safest mode of delivery, options for anaesthesia, and prevent deterioration of maternal and fetal conditio
Myasthenia gravis	• is an autoimmune condition where the body produces antibodies against the alpha subunit of the nicotinic acetylcholine receptors in the neuromuscular junction. • fatigability of skeletal muscles which can affect some muscle groups more than others making clinical symptoms variable
Spinal dysraphisms	• congenital malformations involving the vertebral arches, spinal cord and meninges • Women with repaired open dysraphisms frequently have their phylum terminale released at the same time. These patients are unlikely to have a patent, or even present, epidural space, and their ligamentum flavum may not be present.

Epilepsy

- **dosing of medications** may need to be altered during pregnancy
- primary management goals are **control of seizures**
- concerns related to dose-dependent **teratogenicity** of AEDs
- 15% of women there was deterioration in seizure control, which was more likely to occur among women with focal epileptic disorders
- All AEDs possess some teratogenic potential
- growing evidence monotherapy with lamotrigine or levetiracetam may be safer for both fetus and mother
- Hormonal changes, increased volume of distribution and protein binding of AEDs, hyperemesis gravidarum, insomnia and psychological stress may result in the need of **frequent adjustments** of therapy to maintain seizure control and pre- vent SUDEP
- **Neuraxial analgesia for labour is recommended to reduce sleep deprivation and labour pain-induced stress and dehydration**.

Multiple sclerosis

- The hallmark of the disease is **periventricular inflammatory lesions**, which eventually cause **demyelination and axonal damage**
- anywhere in the CNS, hence the myriad of symptoms in the clinical presentation
- Symptoms of MS are usually intermittent (relapsingeremitting)
- 10-15% it will have a slowly progressive course
- Women may present with a **variety of neurological symptoms,** including sensory and motor deficits, bladder dysfunction, visual disturbance, mood changes and cognitive decline
- The number of relapses usually reduces during pregnancy
- the anaesthetic antenatal assessment should focus on a thorough history and neurological examination and documentation of **existing neurological deficits.**
- the Pregnancy in Multiple Sclerosis study (PRIMS) found no correlation between the use of neuraxial techniques and relapses of MS in the postpartum period

Cerebrovascular disorders

Intracranial haemorrhage

- More than half of all pregnancy-related strokes and is A major cause of morbidity
- Commonly result of ruptured cerebral aneurysms or arteriovenous malformation
- Almost half of the women with ICH of any cause have A history of pre-eclampsia, eclampsia or HELLP syndrome

Cerebral aneurysms

- Obstetric and anaesthetic management does not need to be modified in asymptomatic
- If an aneurysm bleeds, early intervention (E.G. Clipping or coiling) improves maternal and fetal outcomes

Arteriovenous malformations

- The risk of AVM haemorrhage is increased during pregnancy (up to 8.1%)
- Requiring more proactive management
- Non-pregnant women who have experienced A bleed from an AVM should undergo an intervention (coiling, clipping, surgery) before becoming pregnant

Acute ischaemic stroke

- Rarer form of stroke in pregnancy and is usually related to risk factors
- Treatment focuses on preserving brain tissue by identification of the affected vessel, reperfusion, and pre-vention of recurrency
- Obstetric management is usually expectant unless there are difficulties in achieving haemodynamic targets to improve cerebral perfusion, and fetal delivery is judged to be of benefit to the mother

Cerebral venous sinus thrombosis

- Rare cause of stroke
- Pregnancy is usually the sole risk factor for developing CVT
- Anticoagulation is the mainstay of therapy, and the prognosis is better than in CVT not related to pregnancy

Miastenia Gravis

- antibodies against the alpha subunit of the nicotinic acetylcholine receptors in the neuromuscular junction.
- fatigability of skeletal muscles which can affect some muscle groups more than others
- clinical symptoms variable e ptosis, diplopia, dysphagia, respiratory weakness.
- one in 5000 and it affects twice as many women as men
- Treatment of MG is usually symptomatic and includes anticholinesterase drugs such as pyridostigmine, and immunosuppressants such as steroids, intravenous immunoglobulins, azathioprine, mycophenolate and methotrexate
- Thymectomy has been shown to reduce the fre- quency of exacerbations and reduce the need for steroids
- During pregnancy one third of women may have wors- ening of symptoms
- **Epidural analgesia is recommended to minimise the risk of myasthenic crisis caused by pain.**
- higher levels of sensitive block can precipitate respiratory weakness and require ventilatory support
- Up to a third of neonates born to seropositive mothers with MG may develop transient neonatal MG (TNMG)

Key Points

- Neurological conditions are the third leading cause of maternal mortality in the UK.
- Epilepsy is the most common neurological dis- order encountered in pregnancy.
- Neuraxial anaesthesia is not contraindicated in patients with multiple sclerosis.
- Physiological changes of pregnancy put women at higher risk of acute cerebrovascular disorders and the anaesthetist is best placed to coordinate the management of these in the immediate setting.
- Spinal pathology may preclude the use of neuraxial techniques for labour analgesia and anaesthesia.

Classification of Spinal Dysraphisms

OPEN SPINAL DYSRAPHISMS

- MYELOMENINGOCELE
- MYELOCELE
- HEMIMYELOMENINGOCELE
- HEMIMYELOCELE

CLOSED SPINAL DYSRAPHISMS

WITH SUBCUTANEOUS MASS

LUMBOSACRAL
- LIPOMAS WITH DURAL DEFECT
  - LIPOMYELOMENINGOCELE
  - LIPOMYELOCELE
- TERMINAL MYELOMENINGOCELE
- MENINGOCELE

CERVICOTHORACIC
- NON-TERMINAL MYELOCYSTOCELE
- MENINGOCELE

WITHOUT SUBCUTANEOUS MASS

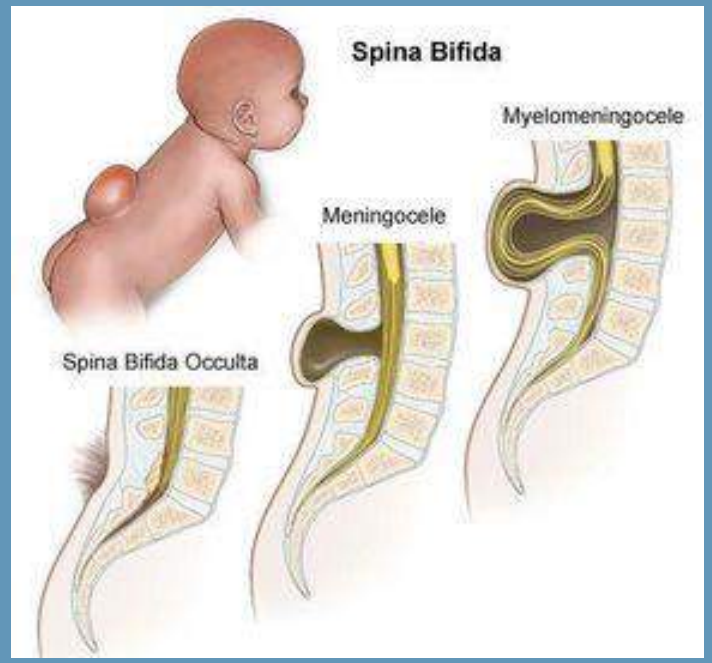
SIMPLE DYSRAPHIC STATES
- INTRADURAL LIPOMA
- FILAR LIPOMA
- TIGHT FILUM TERMINALE
- PERSISTENT TERMINAL VENTRICLE
- DERMAL SINUS

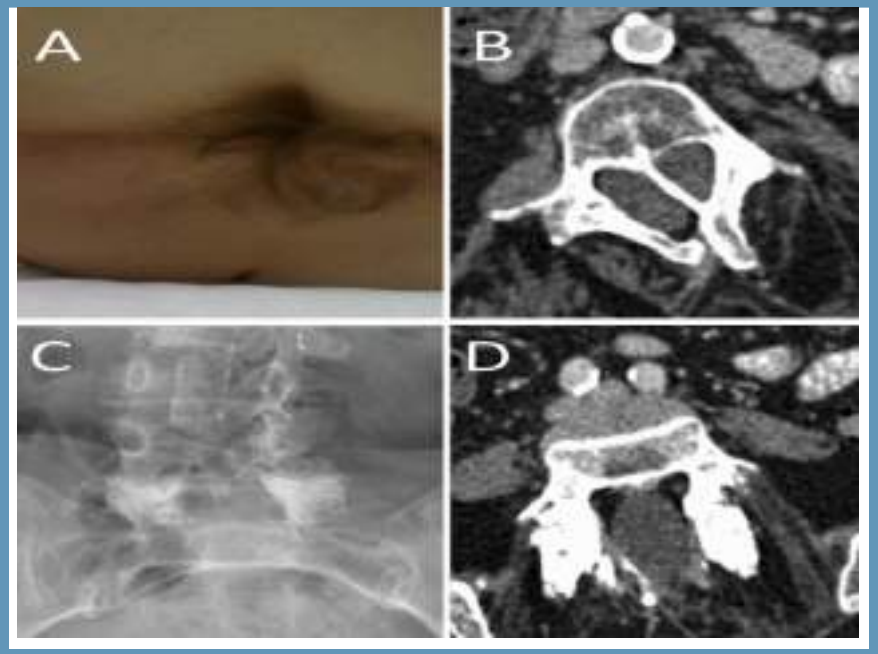
COMPLEX DYSRAPHIC SYNDROMES

DISORDERS OF MIDLINE NOTOCHORDAL INTEGRATION
- DORSAL ENTERIC FISTULA
- NEURENTERIC CYSTS
- DIASTEMATOMYELIA

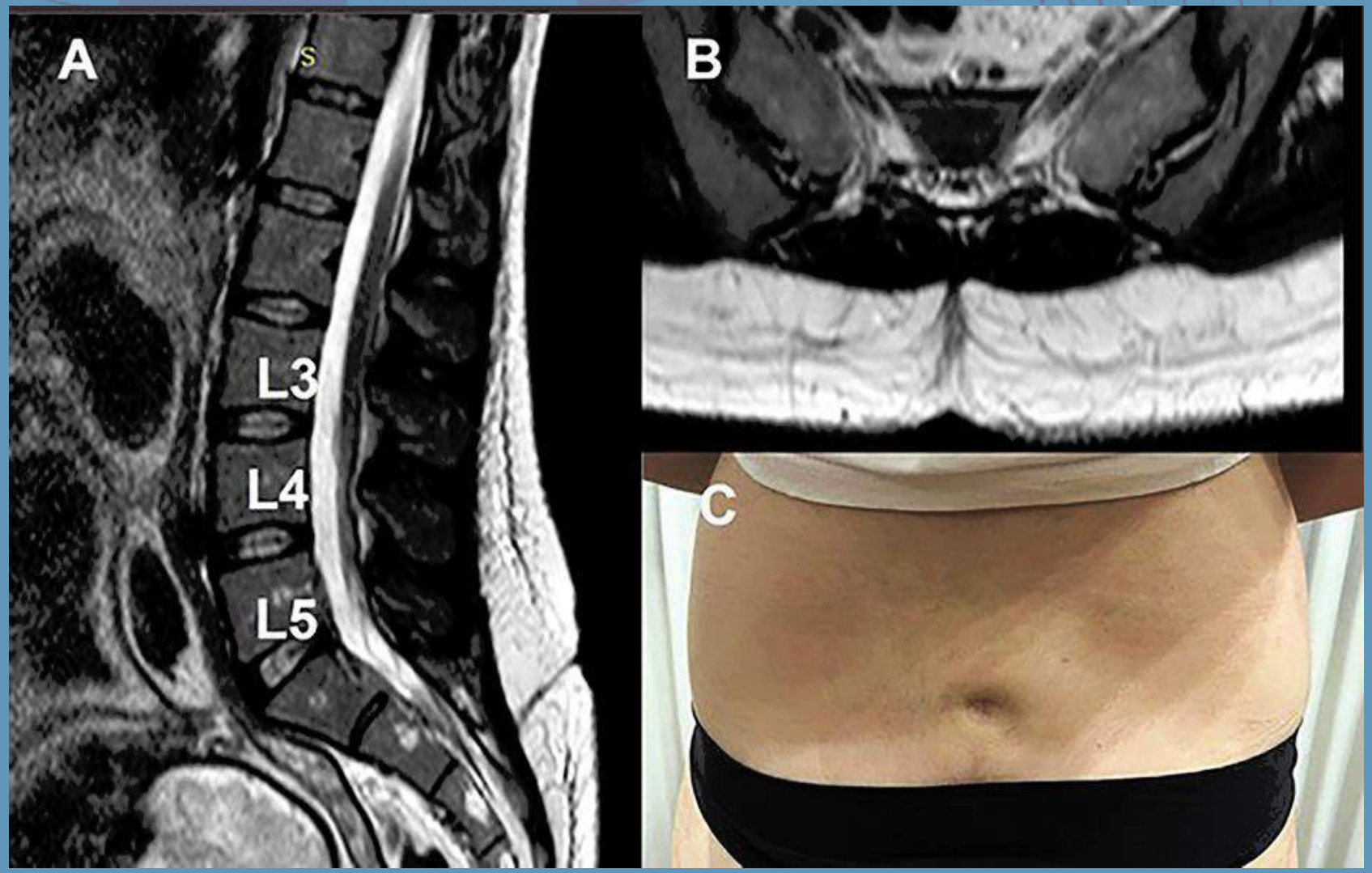
DISORDERS OF NOTOCHORDAL FORMATION
- CAUDAL AGENESIS
- SEGMENTAL SPINAL DYSGENESIS


Vertebra
Meningi
Midolla spinale
Fluido cspn
Spina bifida aperta


Spina Bifida
Myelomeningocele
Meningocele
Spina Bifida Occulta


A
B
C
D

Case report



- 30-year-old
- ASA 2
- 38 weeks of gestation
- skin dimple in the sacral area
- EON neg
- MRI revealed a tethered cord syndrome
- interrupted sacral posterior neural arch located at S2
- abnormally low posi- tioned conus medullaris

Epidural analgesia was selected to avoid a possible spinal cord injury using combined spinal-epidural technique.

epidural catheter was inserted at L2-L3 level

10mcg epidural sufentanyl bolus followed by

intermittent top-up 15-20ml ropivacaine 0.1-0.2% injections

optimal pain management during the labour.

No complications and adverse effects occurred in the postpartum period

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Anaesthesia and neurological disorders in pregnancy

Y. Metodiev[1,*] and F.

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*Corresponding author: yavor.r.metodiev

Keywords: maternal medicine; anaesthesia

Learning objectives

- Describe common neur encountered in the peripart
- Identify the interplay of the of pregnancy with specific n
- Explain the anaesthetic imp neurological conditions in th

Advances in the medical and s neurological disorders have impro life, and reduced the incidence of consequence, increasing numbers age have existing neurological dise logical changes of pregnancy, such mune response, a procoagulant stat demands, may affect the progres neurological disorders. This may otherwise be a normal pregnancy Mothers and Babies: Reducing R Confidential Enquiries across the neurological conditions were foun common indirect and third overall the UK.[1] This represents a slight

Yavor Metodiev MD PhD FRCA is a anaesthetist at University Hospital of member of the editorial board of the stetric Anesthesia.

Ferne Braveman MD CM is a profes University of Minnesota, where she is of obstetrical anesthesiology in the dep professor and vice chair at both the Uni and Yale School of Medicine. At Yale obstetrical anesthesiology and she is a institution.

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Yakhup et al. JA Clinical Reports (2023) 9:56
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JA Clinical Reports

ORIGINAL ARTICLE Open Access

Anesthesia outcomes of pregnant women with spinal diseases: a single-center case-series study

Adila Yakhup[1], Hisako Okada[2,3*], Izumi Kawagoe

Abstract

Background Neuraxial anesthesia is widely used as
However, there is a concern that neuraxial anesthesia
with spinal disease. Therefore, this study aimed to inv
among pregnant women with spinal diseases and th

Methods The subjects of this study were pregnant
pital between April 2017 and December 2020. After
from patients' medical records.

Results Of the 2682 pregnant women who delivere
eries in 39 pregnant women with spinal diseases (1.7
preanesthetic evaluation). The diagnoses included ac
(23.1%), and others. The mode of delivery was the ele
cases, and vaginal delivery in 29 cases. Only one case
the neuraxial block was inadequate in 3 cases (7.9%)
complained of no lower extremity neuropathy, infect

Discussion Neuraxial anesthesia was an option in m
disease, if an anesthesiologist's plan before delivery a

Keywords Neuraxial anesthesia, Labor analgesia, Pre

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International Journal of Obstetric Anesthesia 137

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Anaesthetic management for caesarean section of a parturient with a known difficult airway and closed spinal dysraphism

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ABSTRACT
Many anaesthetists consider patients with existing neurological deficits, untreated spinal pathology or those having undergone major spinal intervention to be precluded from undergoing neuraxial anaesthesia. While this is partly rooted in fears of litigation there is also a lack of consensus of the best practice in the anaesthetic management of these patients.
We present our management of a parturient who attended our institution, having a number of anaesthetic complexities including a known difficult airway, spinal fusion and persistent spinal cord tethering. She successfully underwent delivery under neuraxial blockade for the delivery of her fourth child.
We believe that by undergoing a thorough multidisciplinary clinical evaluation, including the extensive use of neuroimaging and ultrasound, it may be possible to plan and perform safe neuraxial anaesthesia.

Keywords: Neuraxial anaesthesia; Scoliosis; Harrington rods; Spinal dysraphism; Spinal cord tethering

Case report

We present the case of a 36-year-old para 3, gravida 2^{+1} woman who presented for the delivery of her fourth child. She had undergone a two-stage scoliosis repair using Harrington rods, inserted from the sixth cervical to the second lumbar vertebrae at the age of 12. She had associated closed spinal dysraphism, requiring multiple surgeries to de-tether her spinal cord at the fifth lumbar and first sacral levels. Neurologically she had persistent unilateral left leg numbness, however bladder, bowel and motor function were subjectively normal.

Obstetrically her first two pregnancies were normal, having delivered spontaneously without neuraxial blockade. Her third pregnancy, however, was complicated by the diagnosis of a heterotopic pregnancy requiring laparoscopy. Intubation was difficult, with two failed attempts using an Airtraq video laryngoscope and ultimately, she was intubated using a McCoy laryngoscope. She was documented as a Cormac and Lehane grade three view.[1] Her remaining viable pregnancy was a delivery by emergency caesarean section at 28 weeks' gestation, due to concerns about an evolving uterine scar dehiscence. This was performed under general anaesthesia following an awake fibreoptic intubation. Unfortunately, due to neonatal prematurity, this child did not survive past 36 hours. Our patient described the whole event, including awake fibreoptic intubation, as "horrible".

Anaesthetic management

This patient was assessed at our high-risk anaesthetic clinic. She had reduced neck extension, poor mouth opening of 2 cm and a Mallampati score of 4.[1] Thyromental distance was 6.5 cm and prognathism was normal. Examination of her back revealed a scar from the C6 to the L2 vertebrae, corresponding to her previous scoliosis repair; and a scar overlying the L5/S1 vertebral levels, from her previous spinal cord

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ORIGINAL ARTICLE

Pregnancy in spina bifida patients: a comparative analysis of peripartum procedures and complications

Bao Y. Sciscent[1,2] · Debarati Bhanja[1,2] · Lekhaj C. Daggubati[1] · Casey Ryan[1] · David R. Hallan[1] · Elias B. Rizk[1]

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Abstract
Purpose Spina bifida (SB) is caused by a f
paralysis, and hydrocephalus. Medical ad
and pregnancy-associated complications
procedures and complications in patients
Methods A national de-identified databas
general population. Procedures and comp
of pregnancy diagnosis.
11,405 SB patients were identifie
o undergo cesarean delivery (1.20
[0.383–0.431]). Additionally, pati
thromboembolism (VTE) (3.490;
ents with hydrocephalus and Chia
se comorbid conditions. This sub-g
th hydrocephalus: 12.55%, S.B. w
.74%, 2.43% vs. 0.81%). There we
ia, but the sample size was insuffic
sion SB patients were more likely
ithout SB.

ds Meningocele · Mothers · Myel

duction

ifida (SB) is a congenital disorde
evelopment is impaired by incom
[1]. The life expectancy of pati
ically increased over the last few d
% of patients surviving into adulth
health complications of surviving S
a of urological and orthopedic

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REVIEW ARTICLE

Spinal dysraphisms in the parturient: implications for perioperative anaesthetic care and labour analgesia

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[b]Mater Misericordiae University Hospital, Dublin, Ireland
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[d]School of Medicine and Medical Sciences, University College Dublin, Belfield, Dublin, Ireland

ABSTRACT
Anaesthetists may encounter parturients with a spectrum of anatomical and functional abnormalities secondary to spinal dysraphisms, which are among the most common neurodevelopmental anomalies. These range from surgically corrected open dysraphisms to previously undiagnosed closed dysraphisms. Both bony and neural structures may be abnormal. In true bony spina bifida, which occurs in up to 50% of the population, failure of fusion of the vertebral arch is seen and neural structures are normal. Ninety percent of such cases are confined to the sacrum. In open dysraphisms, sensory preservation is variable and may be present even in those with grossly impaired motor function. Both epidural and spinal blockade have been described for labour analgesia and operative anaesthesia in selected cases but higher failure and complication rates are reported. Clinical assessment should be performed on an outpatient basis to assess neurological function, evaluate central nervous system shunts and determine latex allergy status. Magnetic resonance imagining is recommended to clarify anatomical abnormalities and to identify level at which neuraxial techniques can be performed. Of particular concern when performing neuraxial blockade is the possibility of a low-lying spinal cord or conus medullaris and spinal cord tethering. Previous corrective detethering surgery frequently does not result in ascent of the conus and re-tethering may be asymptomatic. Ultrasound is not sufficiently validated at the point of care to reliably detect low-lying cords. Epidurals should be performed at anatomically normal levels but spread of local anaesthetic may be impaired by previous surgery.

Introduction

Spinal dysraphism refers to an extremely heterogeneous group of disorders of the vertebral arches, spinal cord and meningeal layers which have multiple implications for the provision of peripartum anaesthetic care.[1] It encompasses a range of conditions that have been described as spina bifida aperta, cystica, manifesta and occult spinal dysraphisms. Analysis of reports in the anaesthetic literature show that neuraxial blocks are possible in select cases but challenging with a relatively high incidence of failure and complications for both epidural and spinal techniques. This review aims to identify issues relevant to labour ward analgesia and operative anaesthesia.

Classification

Interpretation of the existing literature is rendered difficult by inconsistent definitions and variable use of terminology, which have caused confusion since the first descriptions of spina bifida were published.[2–4] Unfortunately, there is to date no universally agreed classification of spina bifida and its variants. The recently proposed classification by Tortori-Donati uses a combination of clinical and radiological assessment (Table 1).[5] Clinical assessment determines whether a mass is present and whether the overlying skin is intact. Accordingly, lesions are classified as open or closed spinal dysraphism, with or without a mass. Masses are either simple or complex. Radiological investigations determine the nature of the lesion and associated anatomical abnormalities. This classification supersedes previous systems, which used the terms spina bifida aperta, cystica and occulta. The term spina bifida occulta is a particular source of confusion as it has been used to describe a spectrum of conditions, which range

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- asymmetric block
- dural puncture
- exces- sive block height
- suboptimal analgesia
- rapid onset block
- spinal catheter migration
- pain on needle placement

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REVIEW ARTICLE

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C.J. Murphy,[a] E. Stanley,[b] E. Kavanagh,[b,d] P.E. Lenane,[b,c] C.L. McCaul[a,b,d]
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