Magas az adrenalinszint a szülőszobán és a műtőben

Orbán Ágnes

SZTE AITI

Szeged, 2026. 04. 17.

Klasszifikáció

Urgency of caesarean section: a new classification

D N Lucas FRCA S M Yentis MD FRCA S M Kinsella FFARCSI[1] A Holdcroft MD FRCA[2] A E May FRCA[3] M Wee FRCA[4] P N Robinson FRCA[5]

J R Soc Med 2000;93:346–350

- **Előreesett köldökzsinór**
- **Teljes lepényleválás**
- **Uterus ruptura**
- **Anyai nagy vérzés**
- **Perimortem császármetszés**
- **Tartós magzat bradycardia**

Elektív
Sürgős

Sürgősség	Definíció
(1) Azonnali	Magzat/anya azonnali életveszély
(2) Sürgős	Magzat/anya veszélyeztetett, de nem azonnali
(3) Tervezett	Nincs anyai/magzati veszélyeztetettség, de s.c. kell
(4) Elektív	Anya/team számára megfelelő

Piros kód **30’**

Sárga Kód **75’**

Zöld kód

30 perces szabály

- Nincs erős evidencia, RCT
- Magzati kimenetel (Apgar, sav-bázis) és a DDI (decision-to-delivery) közötti kapcsolat nem mindig korrelált
- Magzati distressz megállapítása CTG alapján (alacsony a specifitás)
- Magazati distressz=szülészeti distressz= sürgős s.c?

„Stresszmentes” Anesztézia


Anaesthesia
Peri-operative medicine, critical care and pain
Association of Anaesthetists Great Britain & Ireland
Free Access
Whose distress is it anyway? 'Fetal distress' and the 30-minute rule
S. M. Yentis
First published: 14 July 2003 | https://doi.org/10.1046/j.1365-2044.2003.03349.x | VIEW METRICS

Magzati distressz, mint s.c indikáció:
1980-ban 6.4%
1999-ben: 13%
2001-ben 20-24%

Magzati distressz oka

ORIGINAL RESEARCH

Urgent Cesarean Delivery for Fetal Bradycardia

Leung, Tak Yeung MRCOG, MD; Chung, Pui Wah MBChB; Rogers, Michael Scott FRCOG, MD; Sahota, Daljit Singh PhD; Lao, Terence Tzu-Hsi FRCOG, MD; Hung Chung, Tony Kwok FRCOG, MD

Author Information

Obstetrics & Gynecology 114(5):p 1023-1028, November 2009. | *DOI:* 10.1097/AOG.0b013e3181bc6e15

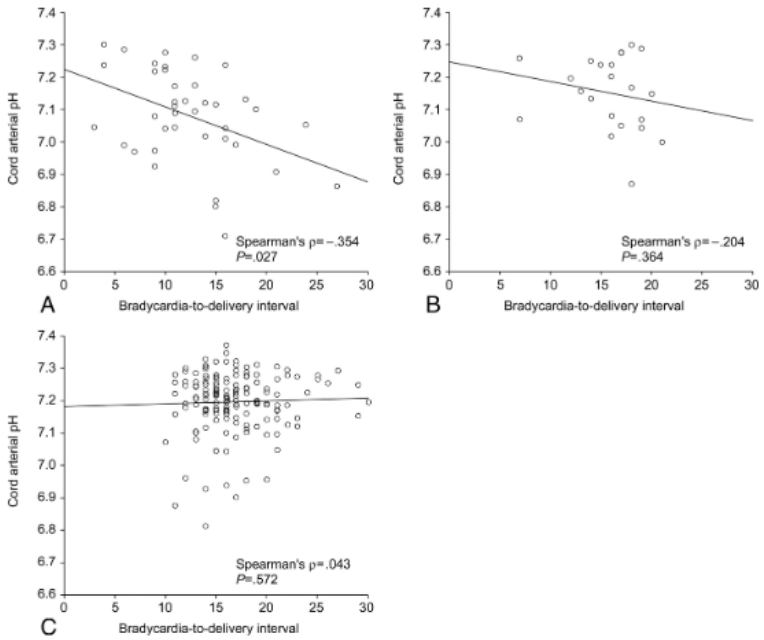


Fig. 1. A. Change of cord arterial pH with bradycardia-to-delivery interval in cases with irreversible causes of fetal distress (Irreversible group). **B.** Change of cord arterial pH with bradycardia-to-delivery interval in cases with potentially reversible causes of fetal distress (Potentially Reversible group). **C.** Change of cord arterial pH with bradycardia-to-delivery interval in cases without identifiable causes of fetal distress (Unknown group).

Leung. Urgent Cesarean Delivery for Fetal Bradycardia. Obstet Gynecol 2009.

Irreverzibilis vagy potenciálisan reverzibilis ok

Table 2. Comparison of Maternal Demographics, Fetal Outcomes, and Delivery Intervals Between Groups

	Irreversible Group (n=39)	Potentially Reversible Group (n=22)	Unknown Group (n=174)	*P*
Nulliparity	23 (59)	20 (90.9)	138 (79.3)	.006*
Maternal age (y)	30 (25–35)	28 (25–32)	30 (26–34)	.517
Gestation (wk)	39.1 (37.3–40.4)	40.7 (39.1–41.3)	39.9 (38.7–40.9)	.012*
Birth weight (g)	3,165 (2,785–3730)	3,265 (2,908–3,649)	3,128 (2,844–3,380)	.570
Fetal heart rate (bpm)	80 (60–92)	67 (62–80)	70 (60–80)	.140
BDI (min)	11 (9–16)	16.5 (14–18.3)	16 (14–19)	<.001*
DDI (min)	10 (9–12)	11.5 (10.8–13.3)	11 (10–13)	.001*
Cord arterial pH	7.094 (6.991–7.216)	7.162 (7.064–7.251)	7.210 (7.161–7.255)	<.001*
Cases with cord arterial pH less than 7	10 (25.6)	1 (4.5)	8 (4.6)	<.001*
Cord base excess	−10.0 (−5.6 to −13.1)	−9.5 (−5.3 to −11.9)	−6.3 (−4.5 to 8.3)	.001†
Cases with cord base excess less than −12	12 (30.8)	5 (22.7)	12 (6.9)	<.001†

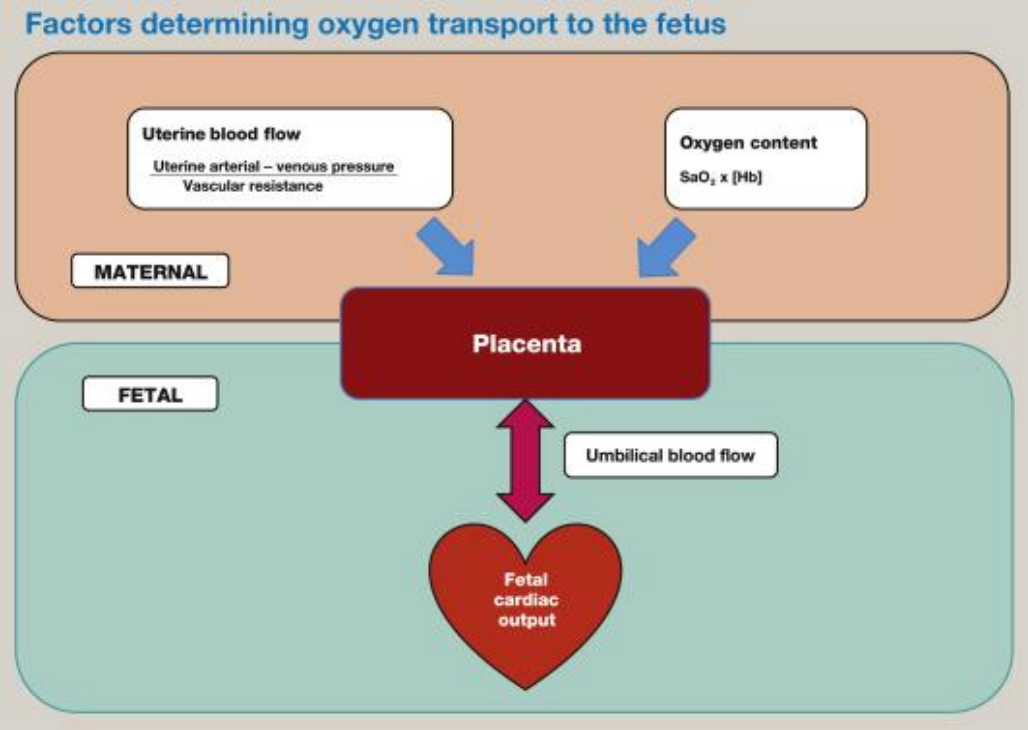
BDI, bradycardia-to-delivery interval; DDI, decision-to-delivery interval.

Table 1. List of Conditions and Number of Cases Categorized Into Irreversible Causes, Potentially Reversible Causes, and Unknown Cause for Fetal Bradycardia

Condition	Number of Cases (%)
Irreversible conditions	39 (16.6)
Placental abruption	9 (3.8)
Cord prolapse	21 (8.9)
Uterine rupture	0 (0)
Preeclampsia	3 (1.3)
Failed instrumental delivery	6 (2.6)
Potentially reversible conditions	22 (9.4)
Iatrogenic uterine hyperstimulation	13 (5.6)
Hypotension after epidural anesthesia	5 (2.1)
After external cephalic version (without abruption)	4 (1.7)
Aortocaval compression	0 (0)
Unknown cause for fetal bradycardia	174 (74.0)

Intrauterin magzati resuscitáció

- A magzati oxigenizáció biztosítása
- Magzat uteroplacentalis keringés (= anya) dependens



- Szülő nő oldalra fordul
- O2 szupplementáció
- Iv. folyadék
- Iv. vasopressor
- Oxytocin leállítás, tocolytikum adása

Review Article

Intrauterine fetal resuscitation: from maternal repositioning to the latest pharmacological strategies

Stefania Fieni, Giovanni Morganelli, Edwin Chandraharan, Andrea Dall'Asta & Tullio Ghi

Article: 2502977 | Received 14 Jan 2025, Accepted 02 May 2025, Published online: 18 May 2025

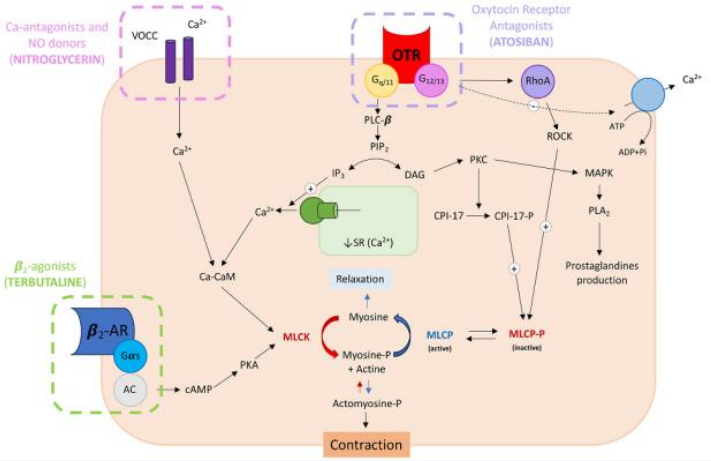


Table 1. Summary of current evidence, indications and recommendations on principal intrauterine fetal resuscitation measures.

Measure	Intervention	Indication	Mechanism	Guidelines including recommendation	Quality of evidence
Maternal repositioning	Lateral left or right recumbent [4] knee-chest position [5]	Repetitive and/or prolonged decelerations Maternal hypotension	Relieve of aorto-caval and/or cord compression 29% improvement in fetal blood oxygenation [4]	ACOG, DSOG, NICE, NWIHP, RANZCOG, SOGC	⊕⊕⊕⊕ (High)
Intravenous fluid	Intravenous infusion of saline solution 1000cc over 20 minutes [6]	Maternal hypotension (volume depletion, labor analgesia)	Maternal volume expansion and blood pressure optimization Increased placental perfusion and fetal oxygenation [4]	ACOG, NICE, RANZCOG, SOGC	⊕⊕⊕ (Moderate)
Amnioinfusion	Transcervical back-filling of amniotic cavity with 250–500 cc saline solution via Foley catheter	Recurrent variable decelerations [7–9] Meconium stained amniotic fluid [10]	Relieve of cord compression Dilution of meconium stained amniotic fluid [10]	ACOG, DSOG*, SOGC *not recommended nor discouraged	⊕⊕ (Low)
Maternal hyperoxygenation	Maternal O_2 administration, 10 l/min via face mask [11]	Maternal hypoxemia [10]	Improvement of placental oxygenation	ACOG, SOGC	⊕⊕ (Low)
Tocolysis	Stop oxytocin infusion Administration of tocolytic drugs (see Table 3)	Tachysystole or hyperstimulation [12], acute/subacute hypoxia	Uterine activity reduction Intervillous space re-oxygenation [13]	ACOG, DSOG*, NICE, NWIHP, RANZCOG *only "stop oxytocin infusion"	⊕⊕⊕⊕ (High)

Abbreviations. ACOG. American college of obstetricians and gynecologists; DSOG. the dutch society of obstetrics and gynaecology; NICE. National institute for health and clinical excellence; NWIHP. National women and infants health programme; RANZCOG. Royal Australian and New Zealand college of obstetricians and gynaecologists; SOGC. Society of obstetricians and gynaecologists of Canada.

OBSTETRICS

The effect of a program to shorten the decision-to-delivery interval for emergent cesarean section on maternal and neonatal outcome

Eran Weiner, MD; Jacob Bar, MD, MSc; Nataly Fainstein, MD; Avi Ben-Haroush, MD; Oscar Sadan, MD; Abraham Golan, MD; Michal Kovo, MD, PhD

1. Pontos dokumentáció- idő
2. GA (ha nincs EDC)
3. Minden eset megbeszélése
4. Posthoc stratégia felállítás

TABLE 2
DDIs before (P1) and after (P2) program implementation

Variable	P1 n = 292	P2 n = 301	*P* value
Mean DDI, min	21.7 ± 9.1 (7–62)	12.3 ± 3.8 (5–30)	< .001
ECS within DDI <30 min	241 (82.5)	299 (99.3)	< .001
ECS within DDI <20 min	166 (56.8)	282 (93.7)	< .001
Mean surgery duration, min	35.3 ± 11.8 (18–105)	34.6 ± 18.9 (16–120)	.609
Epidural anesthesia	143 (49)	128 (42.5)	.115
General anesthesia	70 (24)	139 (46.2)	< .001
Spinal anesthesia	79 (27)	34 (11.3)	< .001

All data are shown as number (%) or mean ± standard deviation (range). Mean surgery duration (min) defined as the time interval from incision to skin closure.

TABLE 3
Maternal intraoperative and postoperative complications before (P1) and after (P2) program implementation

Variable	P1 n = 292	P2 n = 301	*P* value
Maternal hospitalization time, d	4.7 ± 1.5	4.3 ± 1.3	.646
Intraoperative complications			
Surgical extensions >3 cm	34 (11.6)	31 (10.3)	.694
Intraoperative bleeding necessitating blood transfusions	4 (1.4)	3 (1)	.072
Injuries to adjacent organ	1 (0.4)	1 (0.3)	> .99
Composite intraoperative complications	39 (13.4)	35 (11.6)	.537
Postoperative complications			
Endometritis	10 (3.4)	9 (3)	.819
Pelvic abscess	1 (0.4)	0	.492
Anemia necessitating blood transfusions	5 (1.7)	4 (1.3)	.749
Wound infection/hematoma	15 (5.1)	9 (3)	.214
Relaparotomy	2 (0.7)	2 (0.7)	> .99
PDPH	8 (2.8)	5 (1.7)	.413
Composite postoperative complications	41 (14)	29 (9.6)	.099

All data are shown as number (%) or mean ± standard deviation.

PDPH, postdural-puncture headache.

Weiner. Program to shorten the decision-to-delivery interval. Am J Obstet Gynecol 2014.

TABLE 4
Neonatal outcome before (P1) and after (P2) program implementation

Variable	P1 n = 292	P2 n = 301	*P* value
Neonatal hospitalization time, d	7.4 ± 11.1	6.6 ± 8.3	.290
NICU admission	86 (29.5)	78 (25.9)	.350
Umbilical cord pH ≤7.1	31 (10.7)	16 (5.3)	.016
5-min Apgar score ≤7	17 (5.8)	7 (2.3)	.031
Respiratory morbidity[a]	35 (12)	18 (6.0)	.01
Cerebral morbidity[b]	4 (1.4)	3 (1)	.721
Neonatal sepsis	11 (3.8)	3 (1)	.026
Necrotizing enterocolitis	1 (0.4)	0 (0)	.492
Blood transfusions	10 (3.4)	4 (1.3)	.093
Phototherapy[c]	30 (10.3)	15 (5)	.015
Neonatal death	3 (1)	4 (1.3)	.734
Composite of adverse neonatal outcome[d]	94 (32.2)	47 (15.6)	< .001

All data are shown as number (%) or mean ± standard deviation.

NICU, neonatal intensive care unit.

[a] Defined as respiratory distress syndrome, transient tachypnea of the newborn, mechanical ventilation or need for respiratory support; [b] Defined as intraventricular hemorrhage, seizures or hypoxic-ischemic encephalopathy; [c] Phototherapy alone occurred in 15 (5.1%) neonates in P1 and in 10 (3.3%) in P2; [d] Composite neonatal outcome, without neonates with phototherapy alone remained significantly higher in P1 vs P2, *P* < .001.

Weiner. Program to shorten the decision-to-delivery interval. Am J Obstet Gynecol 2014.

Választott anesztézia

Rapid Sequence Spinal ⟷ Általános anesztézia

- SOAP 5% alatt GA
- RCOA 1% alatt elektív s.c. esetén és 5% alatt sürgős s.c. esetén

Rapid sequence spinal

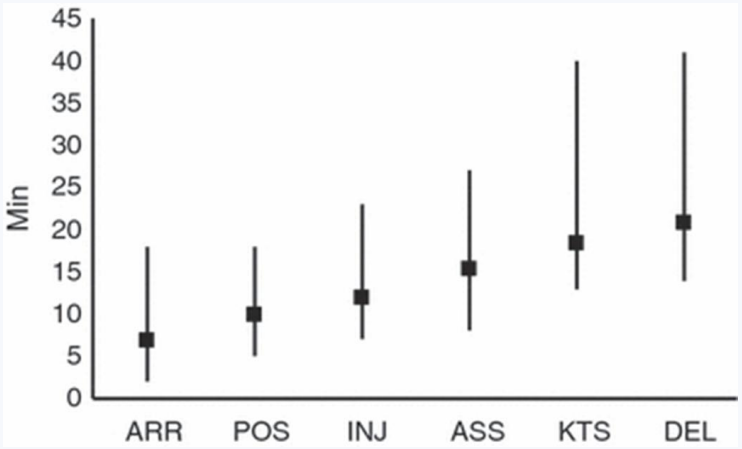
Anaesthesia
Journal of the Association of Anaesthetists of Great Britain and Ireland
Anaesthesia, 2010, **65**, pages 664–669 doi:10.1111/j.1365-2044.2010.06368.x

ORIGINAL ARTICLE

Rapid sequence spinal anaesthesia for category-1 urgency caesarean section: a case series

S. M. Kinsella,[1] K. Girgirah[2] and M. J. L. Scrutton[1]

1 Consultant Anaesthetist, 2 Clinical Fellow Anaesthetist, St Michael's Hospital, Bristol, UK



- Aneszteziológus informálja a teamet
- Tájékoztatja a szülő nőt
- Iv, monitor, antacid profilaxis, O_2
- Ülő pozíció, bal oldalt fekvő (jobb a hemodinamika)
- Asepsis, antisepsis szabályok
- Lidocain helyi infiltráció elhagyható
- Opioid adása elhagyható (esetleg Fentanyl), nagyobb dózis LA?
- 1x próbálkozás
- Sikertelen → team és szülőnő informálása

RSS alkalmazását gondos kockázatelemzéshez kötik, melyet nem javasolnak kezdő szakembereknek vagy nehéznek jósolt technikák esetén. A módszer hatékony csapatmunkával 6–8 perc alatt biztosít megfelelő érzéstelenítést az 1-es kategóriájú császármetszésekhez.

GA társuló anyai mortalitás/komplikáció

ANESTHESIOLOGY

Frequency and Risk Factors for Difficult Intubation in Women Undergoing General Anesthesia for Cesarean Delivery: A Multicenter Retrospective Cohort Analysis

Sharon C. Reale, M.D., Melissa E. Bauer, D.O., Thomas T. Klumpner, M.D., Michael F. Aziz, M.D., Kara G. Fields, M.S., Rachel Hurwitz, B.S., Manal Saad, B.S., Sachin Kheterpal, M.D., M.B.A., Brian T. Bateman, M.D., M.Sc.; Multicenter Perioperative Outcomes Group Collaborators*

ANESTHESIOLOGY 2022; 136:697–708

14748 → 295 (1:49)

14748 → 18 (1:808)

Intraoperatív halálozás nem volt

British Journal of Anaesthesia 104 (1): 67–70 (2010)
doi:10.1093/bja/aep356

BJA

OBSTETRICS

Mallampati class changes during pregnancy, labour, and after delivery: can these be predicted?

M. Boutonnet[1], V. Faitot[1], A. Katz[1], L. Salomon[2] and H. Keita[1]*

[1]Service d'Anesthésie and [2]Département de Santé Publique, Assistance Publique Hôpitaux de Paris, Hôpital Louis Mourier, 178 rue des Renouillers, F-92701 Colombes, France

*Corresponding author. E-mail: hawa.keita@lmr.aphp.fr

Background. An increase in Mallampati class is associated with difficult laryngoscopy in obste-

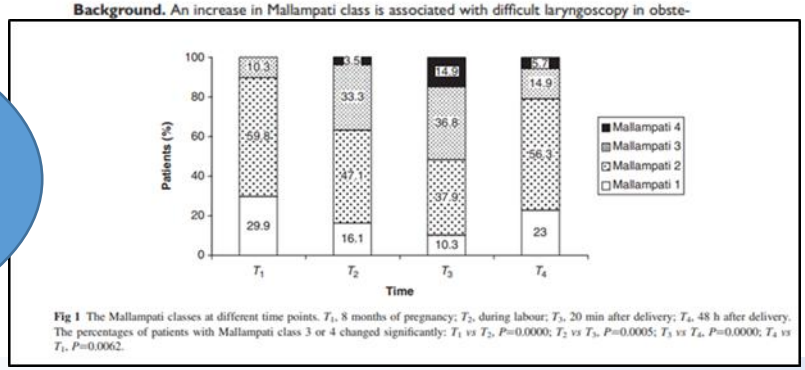


Fig 1 The Mallampati classes at different time points. T_1, 8 months of pregnancy; T_2, during labour; T_3, 20 min after delivery; T_4, 48 h after delivery. The percentages of patients with Mallampati class 3 or 4 changed significantly: T_1 *vs* T_2, P=0.0000; T_2 *vs* T_3, P=0.0005; T_3 *vs* T_4, P=0.0000; T_4 *vs* T_1, P=0.0062.

Mallampati III-IV

28% → 50%

GA probléma

British Journal of Anaesthesia **113** (4): 549–59 (2014)
Advance Access publication 9 September 2014 · doi:10.1093/bja/aeu313

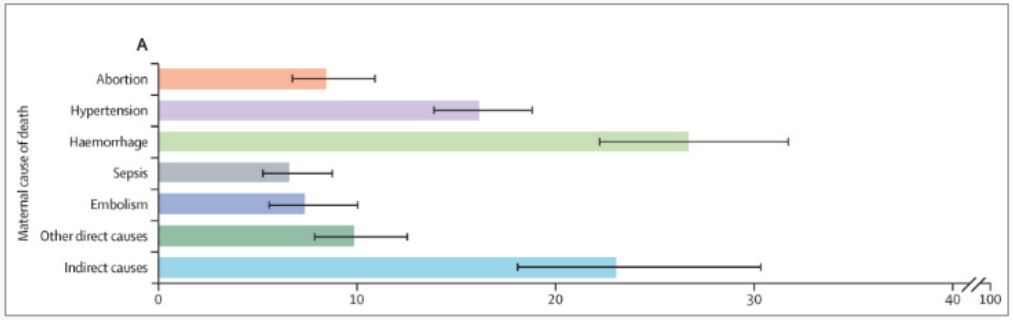
BJA

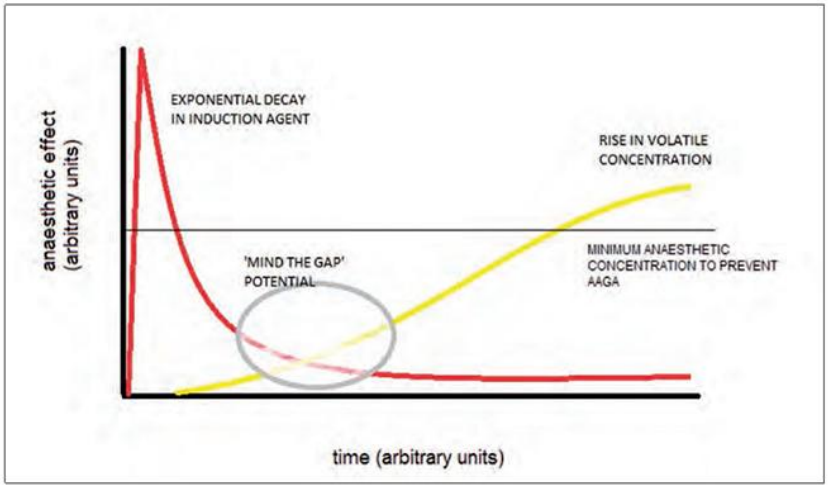
5th National Audit Project (NAP5) on accidental awareness during general anaesthesia: summary of main findings and risk factors†‡

J. J. Pandit[1]*, J. Andrade[2], D. G. Bogod[3], J. M. Hitchman[4], W. R. Jonker[5], N. Lucas[6], J. H. Mackay[7], A. F. Nimmo[8], K. O'Connor[9], E. P. O'Sullivan[10], R. G. Paul[11], J. H. M. G. Palmer[12], F. Plaat[13], J. J. Radcliffe[14], M. R. J. Sury[15], H. E. Torevell[16], M. Wang[17], J. Hainsworth[18] and T. M. Cook[19] on behalf of the Royal College of Anaesthetists and the Association of Anaesthetists of Great Britain and Ireland

Global and regional causes of maternal deaths 2009–20: a WHO systematic analysis

Jenny A Cresswell, Monica Alexander, Michael Y C Chong, Heather M Link, Marija Pejchinovska, Ursula Gazeley, Sahar M A Ahmed, Doris Chou, Ann-Beth Moller, Daniel Simpson, Leontine Alkema, Gemma Villanueva, Yanina Sguassero, Özge Tunçalp, Qian Long, Shaoming Xiao, Lale Say





Gyors hatású opioid, kiemelés előtt
Videolaryngoscop használata
Csökken AA – anyai hemodinamika javul
TIVA-volatilis anesztetikum?-PPH

Véletlen ébrenlét GA során:

s.c. 1:670 ⟷ általános 1:19600

EDC már in situ → top-up

Helyi „szokás”

Monitor

Vasoactiv gysz.

Pácienssel marad

EDC in situ

Anaesthesia 2020, 75, 674–682 doi:10.1111/anae.14966

Review Article

Choice of local anaesthetic for epidural caesarean section: a Bayesian network meta-analysis

M. M. Reschke,[1] D. T. Monks,[2] S. S. Varaday,[3] Y. Ginosar,[4] A. Palanisamy[3] and P. M. Singh[2]

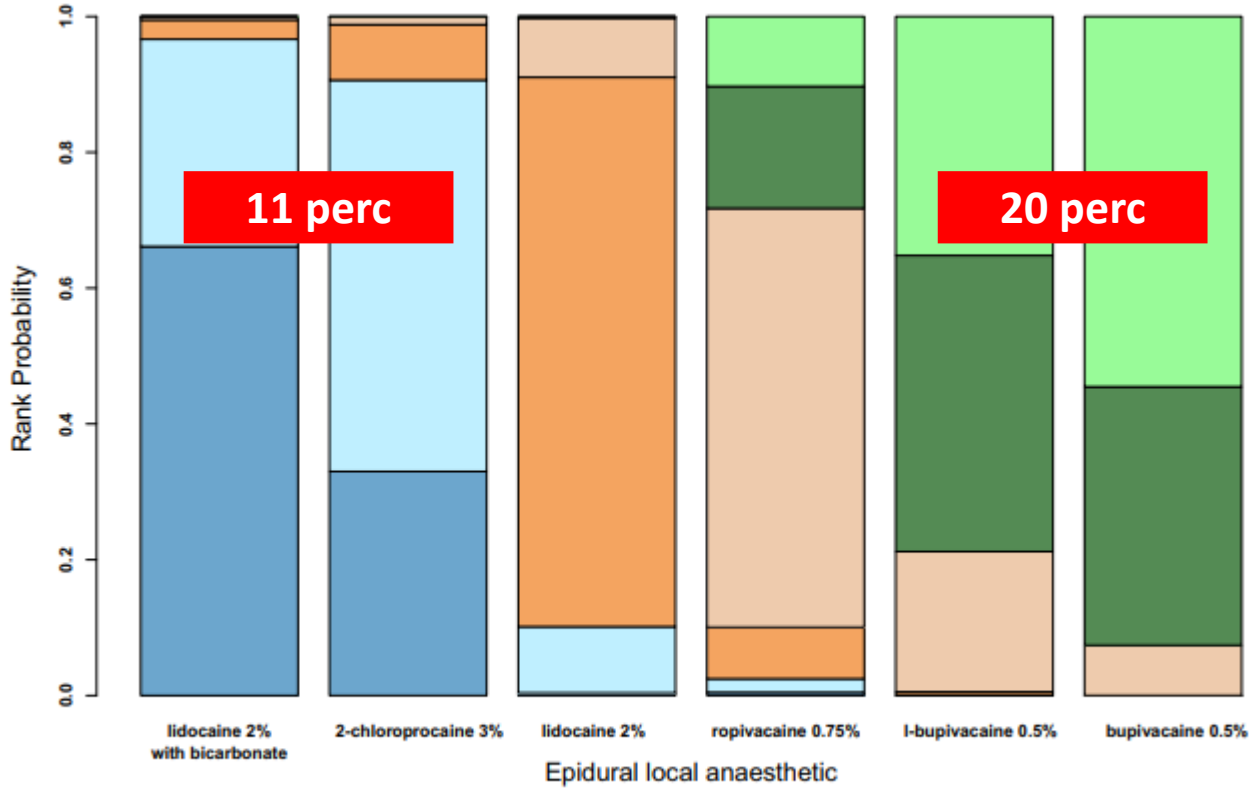


Figure 3 A rankogram of the probabilities that the speed of onset for six local anaesthetics was rank: first (■); second (□); third (■); fourth (□); fifth (■); and sixth (■).

Gyors ⟷ Lassú

EDC in situ

Extension of epidural blockade in labour for emergency Caesarean section using 2% lidocaine with epinephrine and fentanyl, with or without alkalinisation*

D. T. C. Lam,[1] W. D. Ngan Kee[2] and K. S. Khaw[2]

1 Medical Officer and 2 Associate Professor, Department of Anaesthesia and Intensive Care, The Chinese University of Hong Kong, Prince of Wales Hospital, Shatin, Hong Kong, China

Table 2 Details of epidural analgesia and anaesthesia in mothers receiving alkalinised (bicarbonate group) or non-alkalinised (saline group) epidural lidocaine 2% with epinephrine 1 : 200 000 for emergency Caesarean section. Values are mean (SD [range]) or median (interquartile range [range]).

	Bicarbonate group $n = 20$	Saline group $n = 20$	p-value
Duration of epidural infusion; h	5.3 (3.9)	7.5 (5.5)	0.1
Block level (pinprick) before top-up for Caesarean section	T_{11} (T_{10}-T_{12} [T_9-T_{12}])	T_{11} (T_{10}-T_{12} [T_9-T_{12}])	0.9
Maximum block level (pinprick)	T_4 (T_4-T_4 [T_4-T_6])	T_4 (T_4-T_6 [T_4-T_6])	0.3
Bromage score before top-up for Caesarean section*	1 (1–1 [1–2])	1 (1–1 [1–2])	0.2
Bromage score at end of surgery	4 (3–4 [3–4])	4 (3–4 (3–4])	0.8
Time from end of top-up to surgical anaesthesia†	5.2 (1.5 [2–8])	9.7 (1.6 [6–12])	< 0.001
Duration of surgery; min	45 (40–60 [30–115])	45 (35–45 [30–90])	0.6

*0 = no motor block; 1 = unable to raise the extended leg but able to move the knee and foot; 2 = unable to raise the extended leg and to move the knee, but able to move the foot; 3 = complete motor block of the lower limb. †Loss of discrimination to pinprick at the T_6 dermatome.

British Journal of Anaesthesia **107** (5): 668–78 (2011)
doi:10.1093/bja/aer300

BJA

Extending epidural analgesia for emergency Caesarean section: a meta-analysis

S. G. Hillyard[1,2*], T. E. Bate[2], T. B. Corcoran[1,3], M. J. Paech[3,4] and G. O'Sullivan[2]

[1] Department of Anaesthesia and Pain Medicine, Royal Perth Hospital, Wellington Street Campus, Box X2213 GPO, Perth, WA 6847, Australia
[2] Department of Anaesthesia, Guy's and St Thomas' NHS Foundation Trust, London SE1 7EH, UK
[3] School of Medicine and Pharmacology, University of Western Australia, Perth, WA, Australia
[4] Department of Anaesthesia and Pain Medicine, King Edward Memorial Hospital for Women, Perth, WA, Australia

* Corresponding author. E-mail: sghillyard@yahoo.co.uk

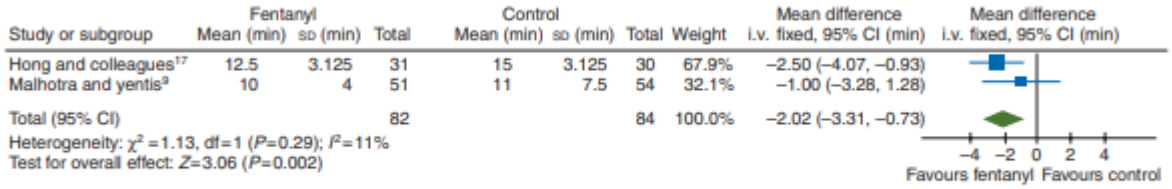


Fig 4 The effect of the addition of fentanyl to a top-up solution on the onset time of a block suitable to allow surgery.

Nem működő EDA

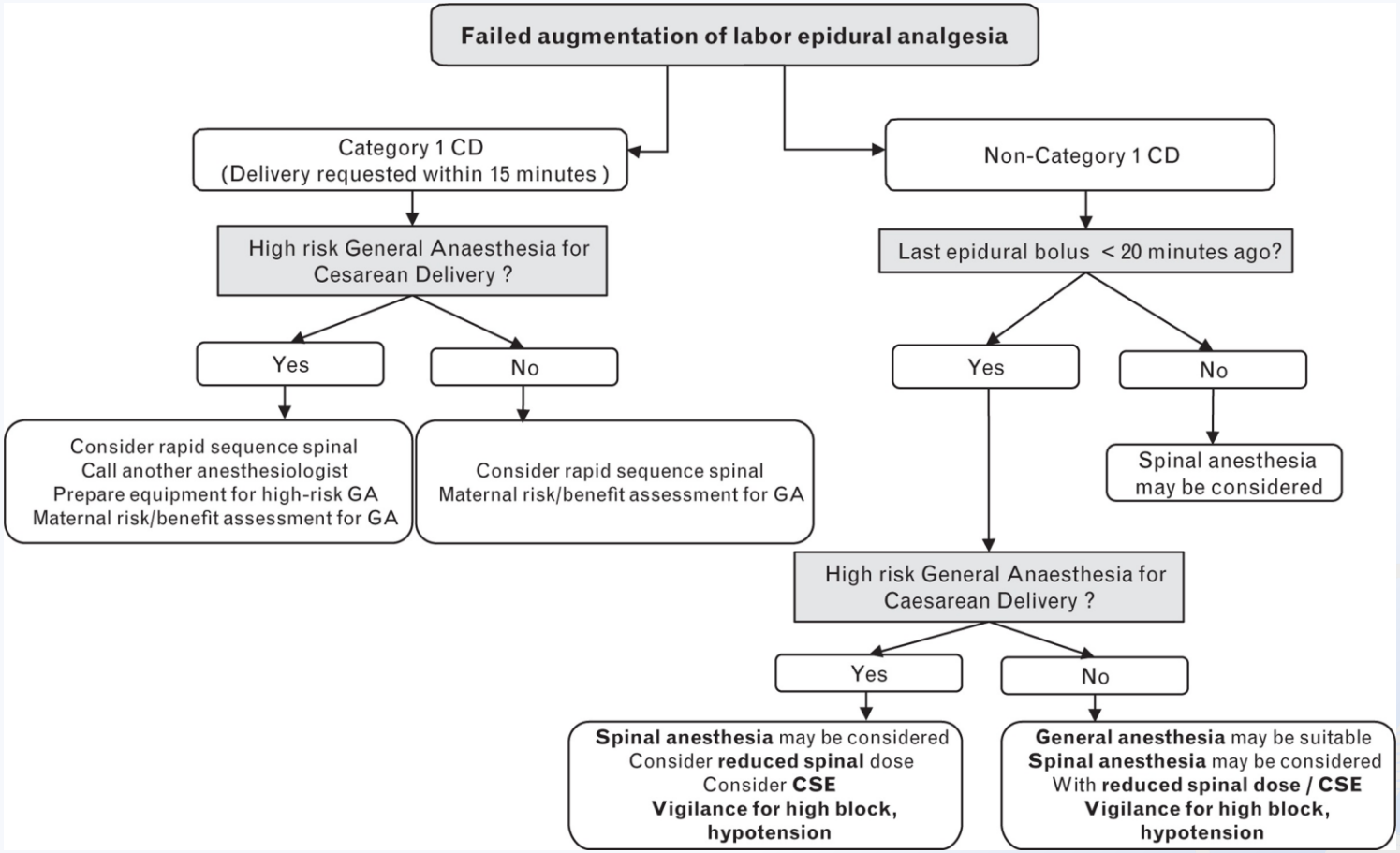
GUIDELINES

ESAIC focused guidelines for the management of the failing epidural during labour epidural analgesia

Brogly, Nicolas; Valbuena Gómez, Isabel; Afshari, Arash; Ekelund, Kim; Kranke, Peter; Weiniger, Carolyn F.; Lucas, Nuala; Dewandre, Pierre-Yves; Guasch Arevalo, Emilia; Ioscovich, Alexander; Kollmann, Andrea; Lindelof, Kim; Orbach-Zinger, Sharon; Reis, Stephanie; van den Bosch, Oscar; Van de Velde, Marc; Romero, Carolina S.

Author Information

European Journal of Anaesthesiology 42(2):p 96-112, February 2025. | **DOI:** 10.1097/EJA.0000000000002108



Összefoglalás

Team training, kommunikáció

In utero resuscitacio

Egyéni mérlegelés: Top-up, RSS, GA

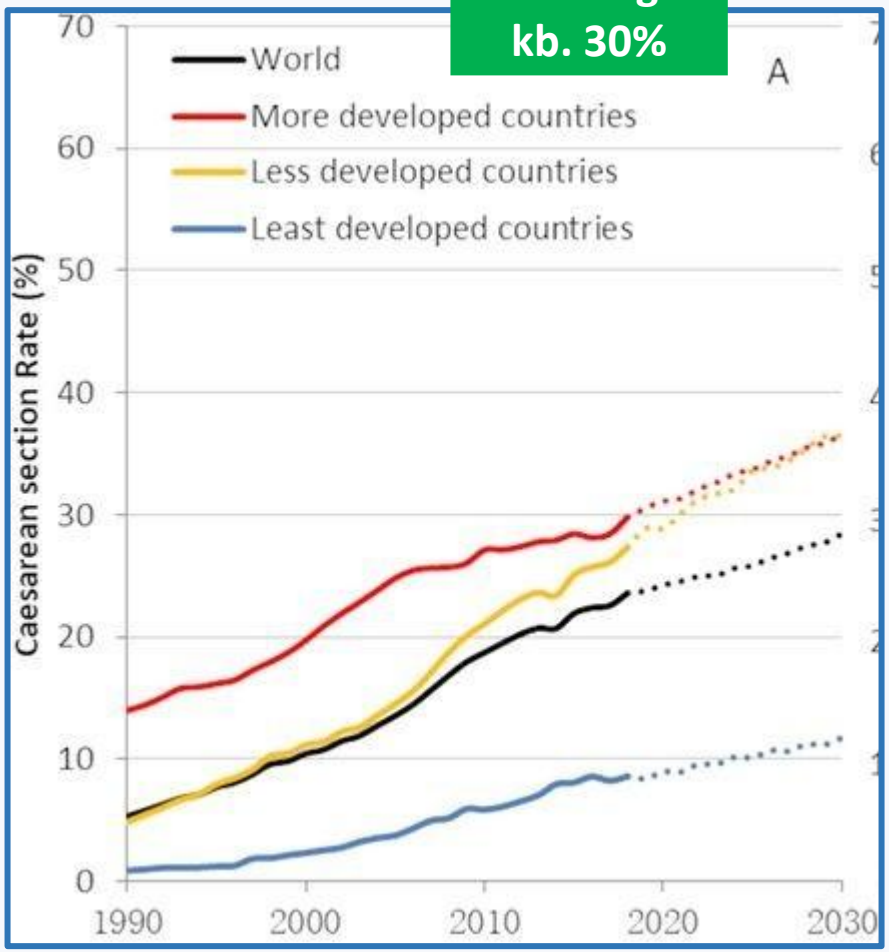
DAS guideline eszközös, személyi feltételei

Risk/benefit
Anya biztonsága!

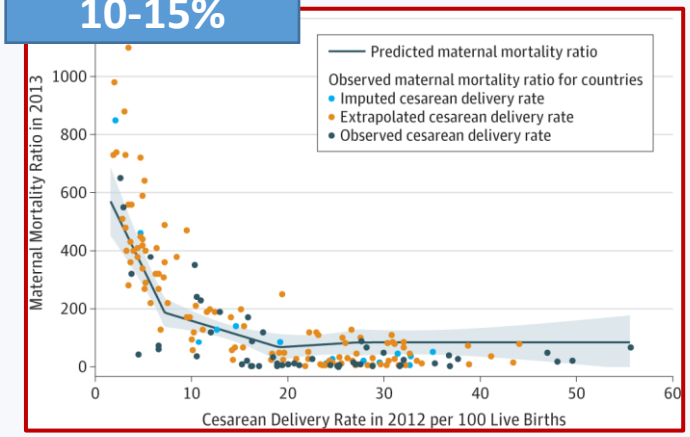
Köszönöm a figyelmet!

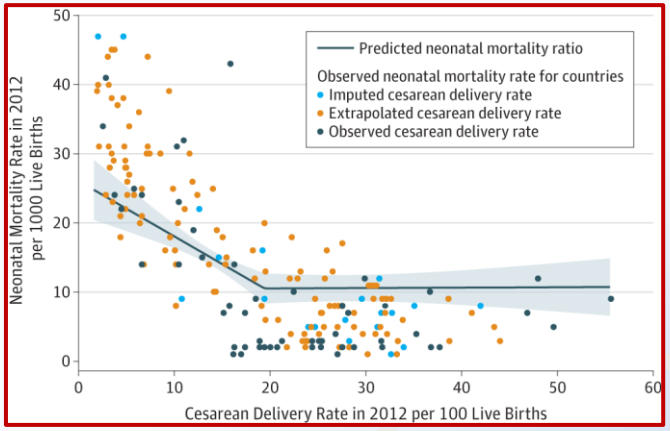
Császármetszés tendencia

Valóság: kb. 30%



WHO: 10-15%





BMJ Global Health

Trends and projections of caesarean section rates: global and regional estimates

Ana Pilar Betran ,[1] Jiangfeng Ye,[2] Ann-Beth Moller,[1] João Paulo Souza,[3] Jun Zhang[2]

JAMA

Original Investigation

Relationship Between Cesarean Delivery Rate and Maternal and Neonatal Mortality

George Molina, MD, MPH[1,2]; Thomas G. Weiser, MD, MPH[3]; Stuart R. Lipsitz, ScD[1,4]; et al

NICE/ ACOG ajánlás

Decision-to-birth interval for unplanned and emergency caesarean birth

Category 1 caesarean birth is when there is immediate threat to the life of the woman or fetus, and category 2 caesarean birth is when there is maternal or fetal compromise which is not immediately life-threatening.

1.4.3 Perform category 1 caesarean birth as soon as possible, and in most situations within 30 minutes of making the decision. **[2011, amended 2021]**

1.4.4 Perform category 2 caesarean birth as soon as possible, and in most situations within 75 minutes of making the decision. **[2011, amended 2021]**

1.4.5 Take into account the condition of the woman and the unborn baby when making decisions about rapid birth. Be aware that rapid birth can be harmful in certain circumstances. **[2011]**

Sürgős, szülészeti beavatkozást végző osztályokon adott kell legyen 30 percen belül történő császármetszés feltétele
Anyai, magzati kockázat/haszon mérlegelése mellett a DDI-t az adott helyzetre, helyre szabva.

"Historically, the consensus has been that hospitals need to have the capability of beginning a cesarean delivery within 30 minutes of the decision to operate. However, the scientific evidence to support this threshold is lacking. The decision-to-incision interval should be based on the timing that best incorporates maternal and fetal risks and benefits […] it is reasonable to tailor the time to delivery to local circumstances and logistics."[6]