Съезд Congress

5-7 сентября 2018 / Санкт-Петербург
September 5-7, 2018 / St. Petersburg

MARCEL VERCAUTEREN

CSE and SPINAL (…and continuous spinal ?) ANAESTHESIA FOR C-SECTION

Karl Koller 11.09.1884

August Bier 1898

1900 **Oskar Kreis (CH)**

Spinal for vaginal partus(n=6) : headache

General anaesthesia

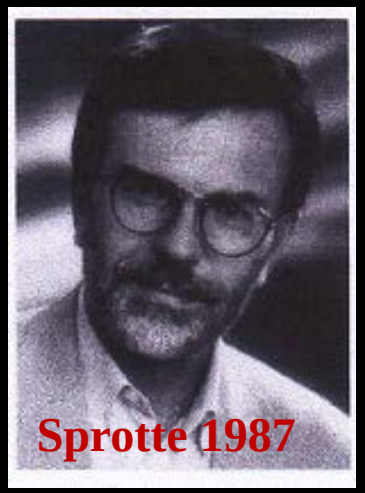
- Opium, papaveretum, morfine,…
- Suxamethonium 1906 (1st 1951)
- Pethidine 1932
- Thiopental 1934
- Cyclopropane 1929
- Trichloorethylene 1934
- Methoxyflurane 1940
- Tubocurarine 1935 (1st use 1942)
- Halothane 1956

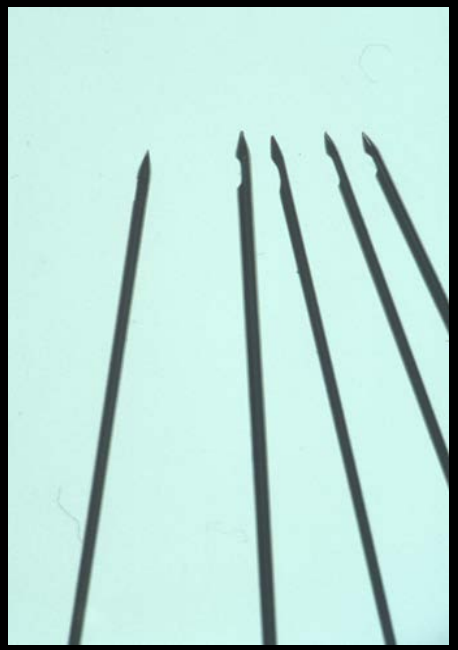
SA : why did it take so long ?

- **Caudal/lumbar epidural : LOR, continuous….**
- **1947 Woolley & Roe case (UK)**
  - ***Paralysis after spinal in 2 patients (phenol ?)***
- **Spinal needles (PDPH)**
- **Too abrupt (hypotension)**
- **Too unpredictable**
- **Adjuvants unknown**
- **Too simple ?**

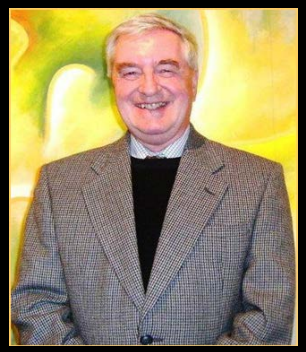
The late 80's & 90's

- **Spinal needles (size, design)**
  - *Whitacre 1951*
- **CSE**
- **Adjuvant substances**
- **Hypotension**
  - *Pre-load*
  - *Co-load*
  - *Phenylephrine*


Sprotte 1987



C-section ← CSE → labour



Brownridge

1981 : C-section

Rawal

1986 ASRA congress

Can Anaesth Soc J 1988

Camann,
Anesthesiology 11/1992

Camann,
Anesthesiology 5/1993

Collis et al,
Lancet 3/1993 (walking)

Stacey et al,
BJA 10/1993

Combined Spinal-Epidural Block (Modified Technique) for Cesarian Section in a Patient with Epilepsia and Severe Ischemic Cardiomyopathia

Marcel P. Vercauteren, Eric A. Boeckx, Luc Delbeke.
Departments of Anesthesiology and Obstetrics. University Hospital Antwerp, Belgium.

Case Study

A 27 year old parturient with known epilepsia was scheduled for elective cesarian section after 38 weeks of pregnancy. Two years before she had an anteroseptal myocardial infarction and pulmonary edema. Chronic medication: diphantoin, furosemide and diisosorbidedinitrate.

Anesthetic Management

1000 ml of Ringer's solution
Central venous line
Intra-arterial blood pressure monitoring
continuous 15° left lateral tilt and O_2 supply.
Combined spinal-extradural block (CSE).

Technique : Fig 1 - 5

Results

Intrathecal injection of 12.5 mg bupivacaine 0.5% (plain) induced an anesthetic level up to T10 (after 20 min). With 2 additional epidural gifts of lidocaine 2% (50 mg each) T5 was reached. A vigorous boy (2.200 gr) was born. Both anesthetic and surgical course were uneventful.

Advantages of CSE Block

Deep, symmetrical block of fast onset.
Muscle relaxation.
Adjustible. Low total dose.
Postoperative pain relief. Blood patch?

Advantages of **This** Technique

- Less manoeuvres in the epidural space (major tap avoided).
- No need for test strips to differentiate CSF from saline.
- Reduced risk of intrathecal catheter placement.

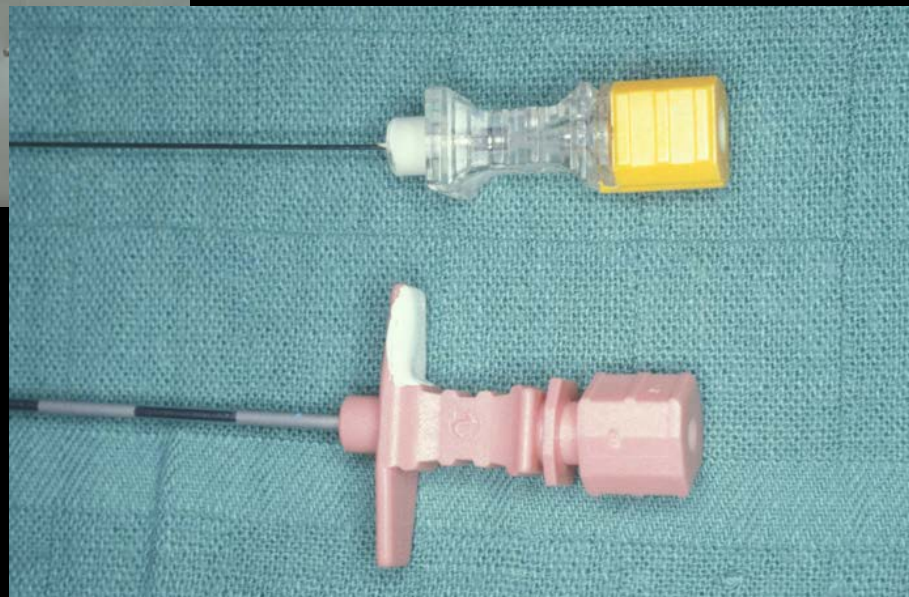
Indications

Profound anesthesia required.
Surgery may outlast the duration of spinal block.
Postoperative pain relief highly desirable.
Fear for toxicity.
Practically : obstetrics [1]
prostatectomy [2]
orthopedic surgery [3]

References

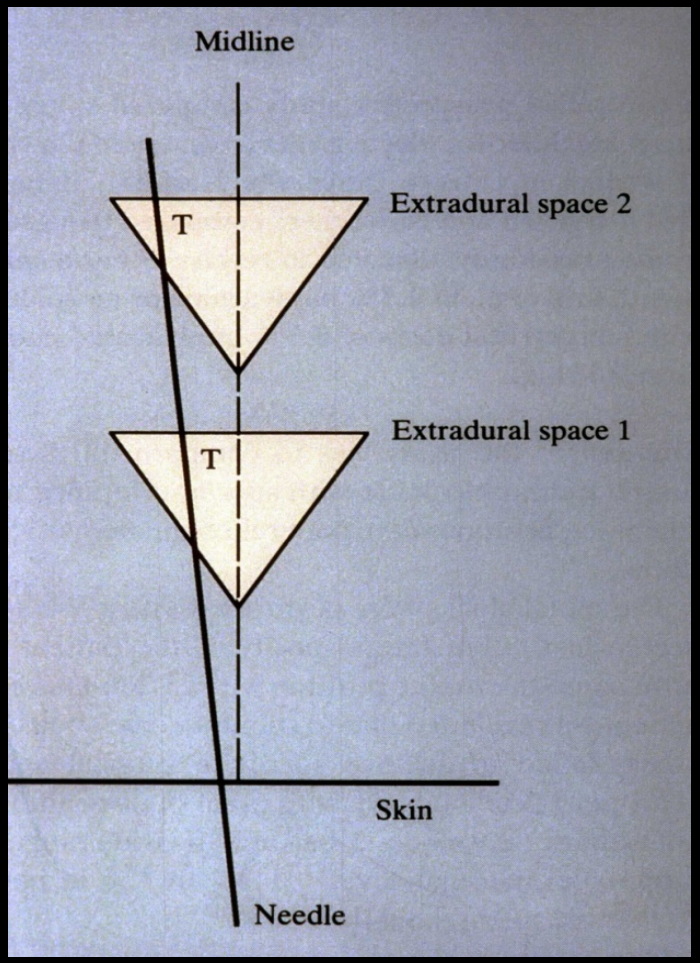
[1] RAWAL N., SCHOLLIN J. Epidural versus combined spinal-epidural block for cesarian section. Regional Anesth. 1986; 11 : 55 (abstract)
[2] ELDOR J., OLSHWANG D. Combined spinal-extradural block for prostatectomy. Br.J. Anaesth. 1988; 60 : 121-2 (letter).
[3] DESHA WR. A special needle for combined subarachnoid and epidural block. Anaesthesia 1985; 40: 308 (letter).

ASRA
San Francisco, March 1988

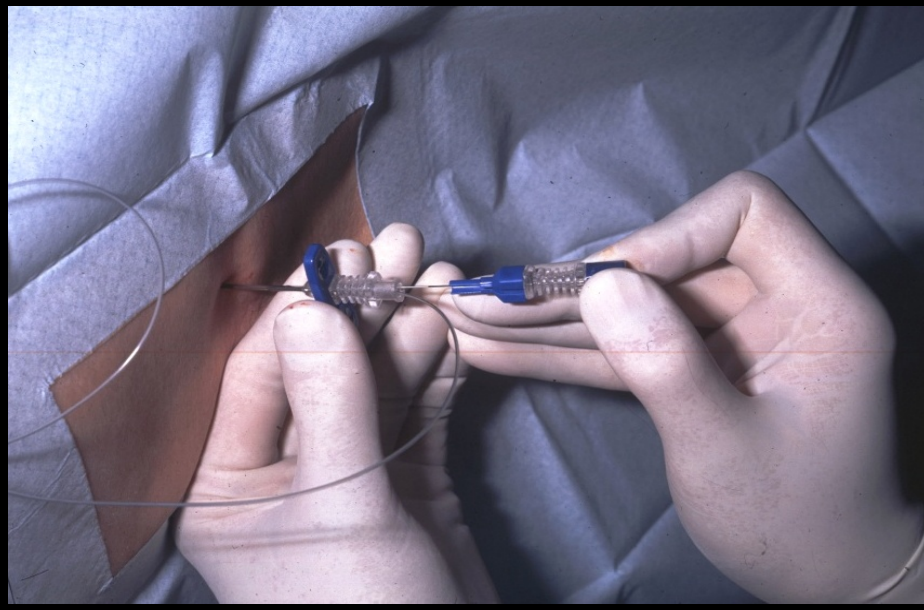


CSE : combines the advantages of spinal & epidural

- *fast onset*
- *lower dose possible*
- *symmetrical, deep block*
- ***intra-operative extension***
- ***postoperative analgesia***
- *catheter more central ?*



CSE : concerns



- **Material**
  - ***back-eye, lockable devices,..***
- **Time & cost**
- **The catheter !**
  - ***test-dose ? DLN ?***
- **More failures with single interspace**

  Puolakka et al RAPM 2001, Shadashivaiah et al, IJOA 2010
- **More conversion to GA ??**

  Kinsella, Anesthesia 2011
- **Higher blocks than single spinal ?**

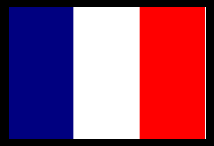
Does CSE cause higher blocks ?

- **Than a single dose spinal ?**
  - ***LOR : dura pushed forwards?***
  - ***Controversial studies***
    - **Lim et al, Anesth Analg 2006**
      - *No difference if C-section in labouring women*
    - **Ithnin et al, Anesth Analg 2006**
      - *Difference in elective CS (C8 vs T3 !)*
    - **Horstman et al, Anesth Analg 2009**
      - *No difference*

How popular is CSE for C-S ?

100% RR *C-section : 0%*

Weiniger et al, IJOA 2010

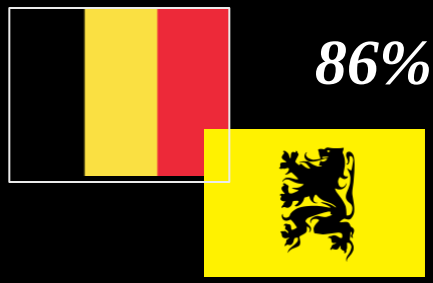


73% RR : *C-section : 2%*

Benhamou et al, EJA 2009

41.3% RR : *C-section : spinal 50% , CSE ??*

Stamer et al, EJA 2005 & Schmerz 2008



86% RR : *C-section 47%*

Versyck & Van Houwe , Acta Anaesthesiol Belg 2016

Low-dose CSE : the best?

Anesth Analg. 2000 Feb;90(2):241-2.

Wolters Kluwer

Small-dose neuraxial block: heading toward the new millennium.

Crowhurst JA, Birnbach DJ.

Comment on

Prevention of hypotension by a single 5-mg dose of ephedrine during small-dose spinal anesthesia in prehydrated cesarean delivery patients. [Anesth Analg. 2000]

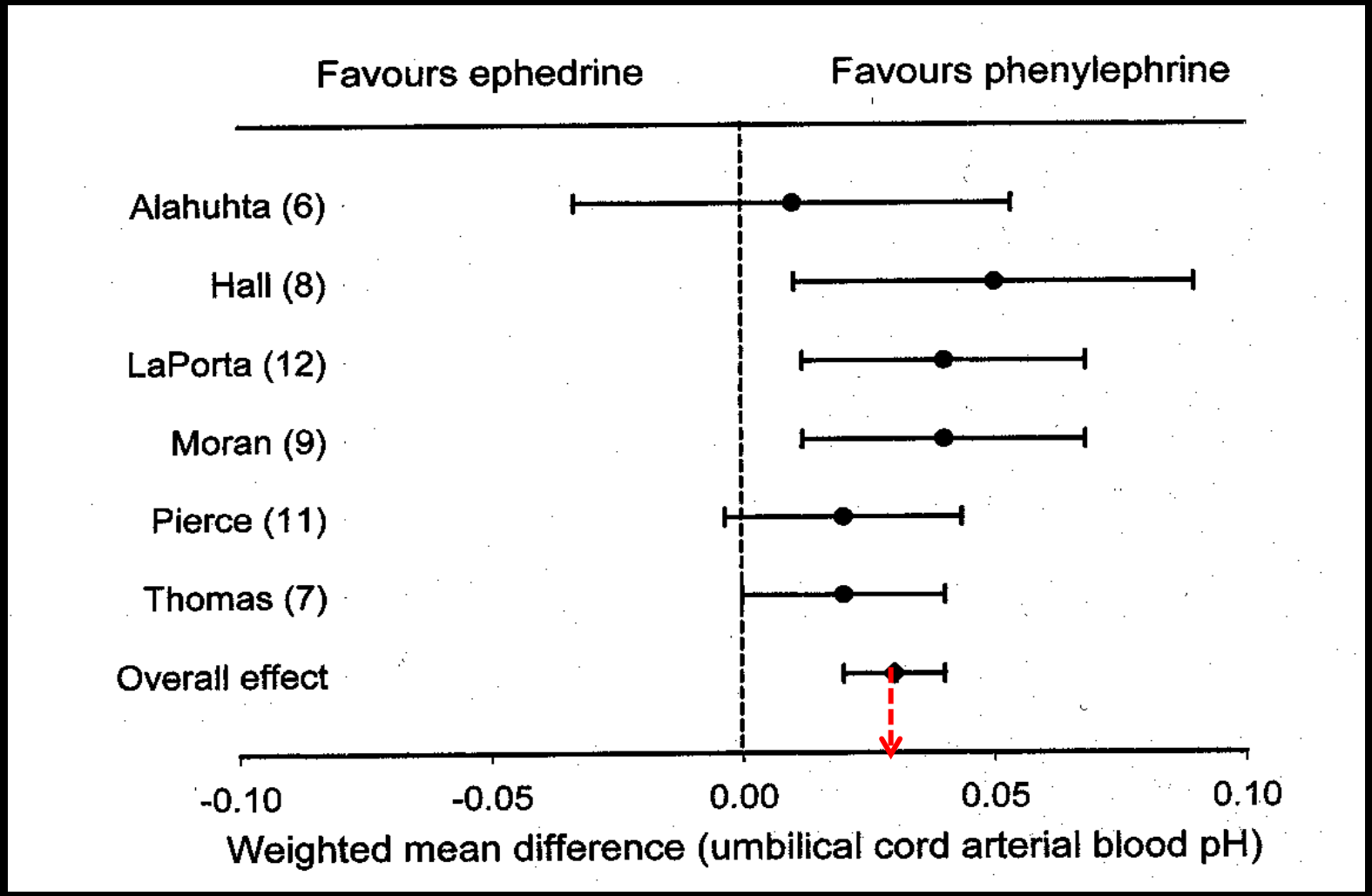
- **Definition ? > or < 8mg ?**

  Arzola et al, BJA 2011

  # position, baricity, opioid, uterine exterior ??

- **shorter motor block**
  - *PACU bypass, faster start of breast feeding (BFHI)*
- **less hypotension, N/V**
  - *Is hypotension still a problem ?*

Lee, Ngan Kee & Gin, Anesth Analg 2002; 94: 920-6 (n=7)
Lin et al, CNS Neurosci Ther 2012 (n=15)
Veeser et al, Acta Anaesthesiol Scand 2012 (n=20)



Phenylephrine ‘playing the baseline’ ?

Ngan et al, A&A 2004; 98: 815-21

- **100µg/min if SBP below base-line**

1260 ***(1010-1640)*** **µg**

Doherty et al, A&A 2012; 115: 1343-50

-120µg/min : 1740 ± 613 µg

Ngan Kee et al, Anaesthesia 2007

- **closed loop (38% SBP>120%)**

CONCERN : ED50 of LA >20% higher ?

Zhang & Wu 2017

Tyagi et al, Saudi J Anaesth 2017

Xiao et al, RAPM 2018

Spinal hypotension

- *Ephedrine*
- ***Phenylephrine***
  - *Phenylephrine + ephedrine*
  - *Metaraminol ?*
  - *Angiotensin*
  - *Norepinephrine ?*

    Ngan Kee, Anesthesiology sept 2017

    Ngan Kee, Anesth Analg july 2017

    Vallejo, IJOA febr 2017
  - *Dihydergotamine*
  - *Ondansetron*

    Heesen & Klimek, Anesth Analg 2016 (Meta-analysis ,9 OB studies)

How low should we go?

- **Bupi 3.75 - 5mg ? ↑ need for epid supplements**
  - **Pre-emptive epidural bolus after ‘x’ minutes ?**
  - **Reinforcement of the motor block**
  - ➢ **+ EVE ? Less or more hypotension ?**
    - ➢ **Cardiac disease ?**

      Hamlyn et al, IJOA 2005
    - ➢ **Overestimated ? # volume of EVE # baricity # position**

      Beale et al, BJA 2005

      Choi et al, RAPM 2000 (higher block but weaker)

      Kucukguclu et al, EJA 2008

      Tyagi et al, IJOA 2009

      Heesen & Klimek, 2017 (meta-analysis n=15)

PROSPECTIVE STUDY ON PAIN CHRONIFICATION AFTER C-SECTION.

Aerts S, Coppejans H, Vercauteren M
Dept of Anaesthesia, Antwerp University Hospital, Belgium

Objective & Methods :
A **prospective** study of **180** consecutive C-section patients for a 1-yr follow-up by phone and questionnaires.

Results:
At **2, 6 and 12 months** pain was still present in **30.4%, 17.3% and 7.4% resp**..
Logistic regression revealed that there was **NO correlation with anxiety, BMI, PONV, ethnicity, elective or urgent (59%!) C-section, pain during POD1 & 2**

There was a higher risk of pain at 6 months when moderate or severe pain were present at 2 or 8 weeks.

Conclusion:
The incidence of **moderate or severe** chronic pain **6 months** after C-section is still **10%** while further decreasing to **2.8% after 1 year**.
Acute postoperative pain does not seem to be related to chronic pain at 6 months whereas **intra-operative discomfort** may be at higher risk

	Pain during C-section	Pain 24h 48h	Pain 8 weeks	General vs. RA	Twins	First vs repeat CS	Pre-existing pain or pain 3 months after previous abdominal surgery
Pain at 6 months	p=0.055	p=0.29 p=0.18	p=0.015	p=0.43	p=0.4	p=0.66	p=0.22

Single dose spinal ?…

- **Our practice (and of others)**
  - **– BupiH 0.5%, 10mg (2mL) + Suf 5µg (1mL)**
  - **– CSE : 2mL (6.6mg / 3.3µg)**
  - **– SDS : 2.5mL (=8.3mg)**

Advantages of SDS

- **Fast**
- **Less positional issue**
- **No LOR (no posterior dura advancement)**

Danelli et al, Min Anestesiol 2001	ED95 BH	= 0,06mg/cm
Beale et al, BJA 2005	ED50 BH + F25	= 5,1-6,1mg
Tyagi et al, RAPM 2012	ED50 BH + F20	= 4,7mg
Xiao et al, 2015	ED50/95 BH + S 2.5	= 5.67 / 8.82mg
Onishi et al, IJOA 2017	ED50/95 BH +F15 + M75	= 6,0 / 12mg

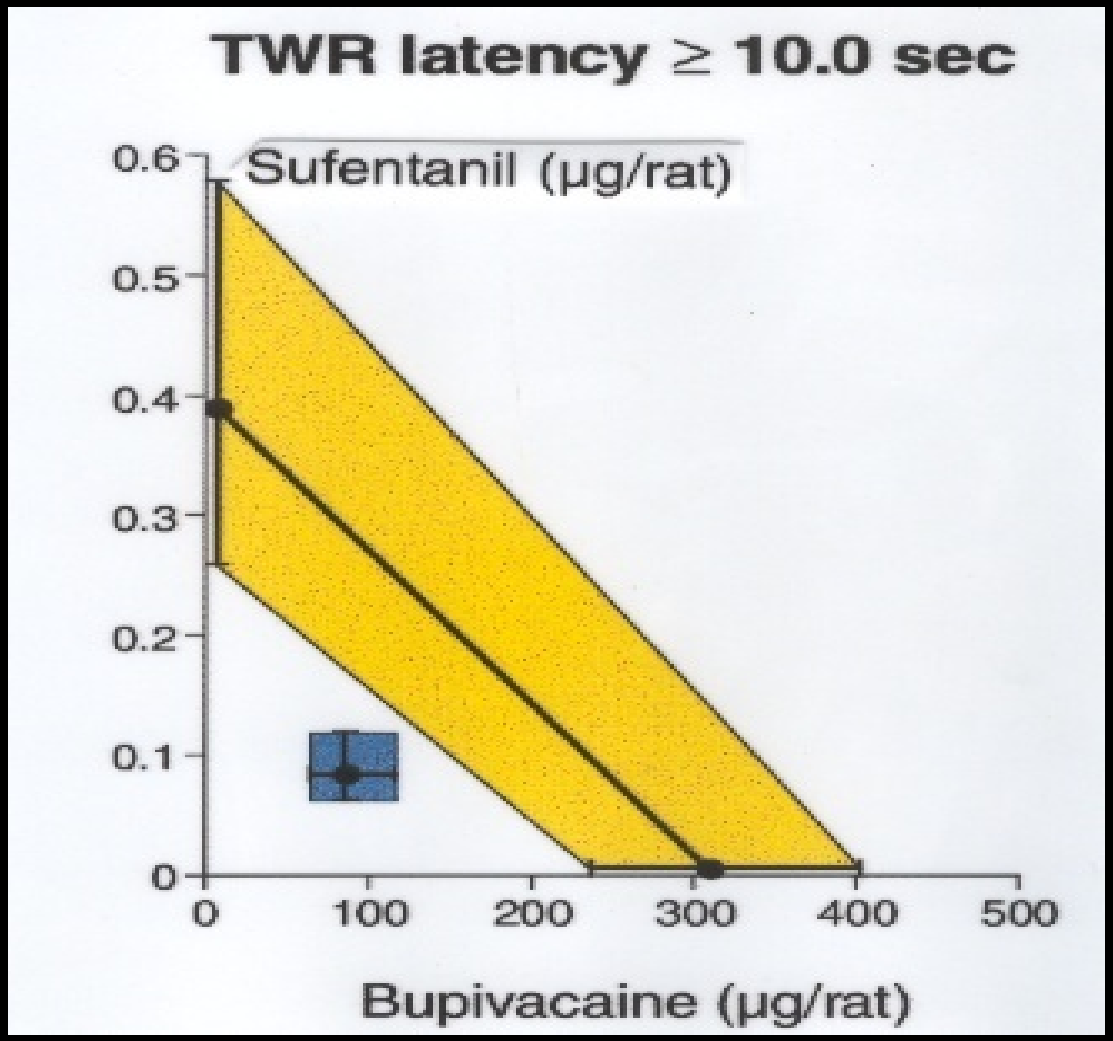
Lew E et al, A&A 2004	B 9 vs 5mg + F10 + EVE	Same VAS, block No failures mentioned
Choi, IJOA 2006	B 9mg + F20	No rescue
Van de Velde et al, A&A 2006	BH 6,5 vs 9,5mg + S 2,5	No rescue before birth
Coppejans et al, A&A 2006	BH 6,6mg + S 3,3	Rescue 1/30 (LLT)
Teoh et al, IJOA 2006	B 3,75mg + Fent + M + 3mL L 1,5%	1/22 failed
Roofhooft et al, Curr Op 2008	B 5-7mg + S	= sufficient for effective anaesthesia
Leo et al, A&A 2009 ***Tyagi et al, IJOA 2009***	B 7-8-9mg + M BH 9mg + F10	All fine, no rescue
Tang et al, EJA 2015	B 7,2mg + S 2	All fine (all baricities)
Alimian et al, Anesth Pain Med 2017	BH 8-9-10mg + S 2,5 (SDS)	All fine, so 8mg=best
Bidikar et al, 2017	LB 7.5mg + F 12.5 (SDS)	No failures
D'Ambrosio et al, BMC Anesth 2018	LB 6 vs 8mg + Fent 20	L8 : no failure

Adjuvants : C-section spinal

ROPIVACAINE	**ED*50***	**+ *S/F***	**ED*95***
Khaw 2001	**16.7**		**26.8**
Parpaglioni 2009 (+S)	**14.1**	**6.44**	
Chen 2010 (+S)	11.2	**8.1**	**15.4**
Geng 2011 *(T7 within 20 min)*	**9.45**		
Strompoulis 2015 (+F)		10.1	
Zheng 2015 (+S)		8.4	11.4
Xu & Zhang 2016	8.35		

LEVOBUPIVAINE		**+ *S/F***	
Parpaglioni 2009 (+S)	**10.6**	**4.73**	
Tyagi et al, 2017 (+F)		**4.2**	

- ***Opioids***



Vercauteren & Meert, Pharmacol Biochem Behav 1997; 58: 237-42

- *Opioids*
- *Adrenaline*
- ***Clonidine (Dexmedetomedine ?)***
  - **hypotension, sedation, FHR**
    - *Benhamou et al, A&A 1998 (C-section)*
    - *Pan et al, RAPM 1998 (C-section, also neostigmine)*
- *Neostigmine*
- *Magnesium*
- *Adenosine*
- *Midazolam*

CSA (Continuous Spinal)

- **What are/were the indications ?**
  - **Intended : ….or High-risk C-section**
  - **Accidental dural tap**
    - ***Cohn et al, IJOA 2016 (n=761 of whom 108 intended)***

      failure : 2.8% (6.1% after tap)

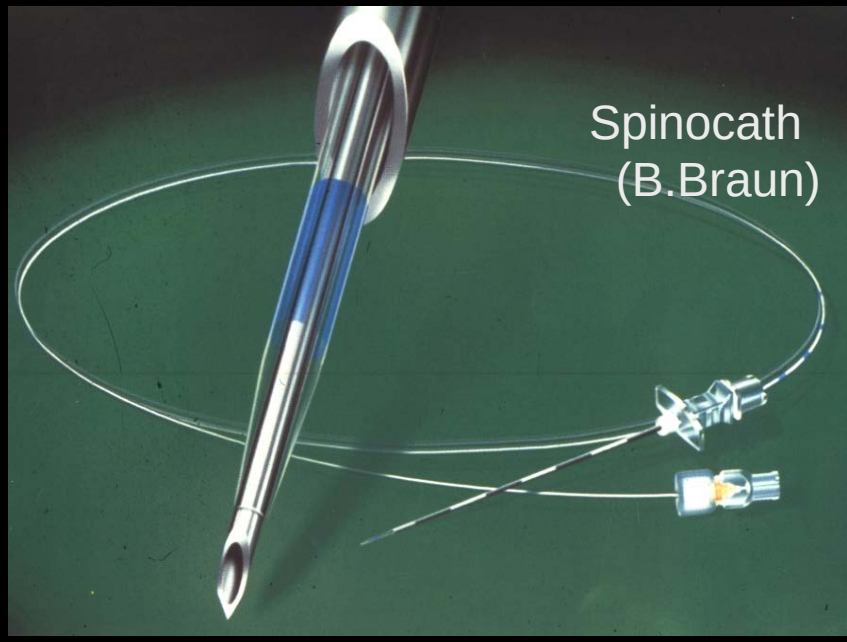
      PDPH 41%, EBP 31%
    - ***Alonso et al, IJOA 2009***

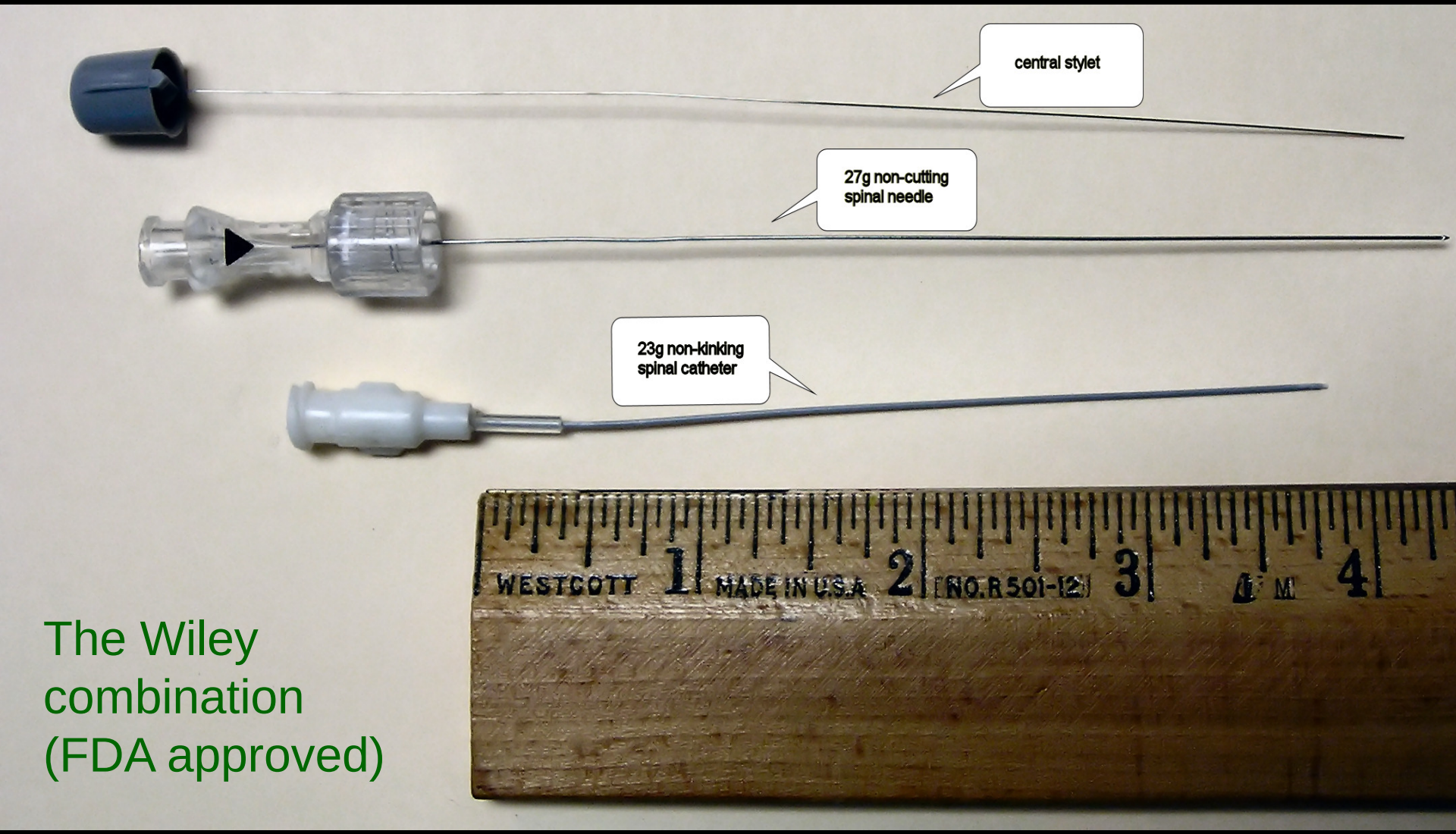
      20% failure, PDPH 29%

      EBP 18%
    - ***Smith et al, IJOA 2003 (scoliosis)***

      37% failure

      (3/19 techn, 4/16 anaesth)





The Wiley combination (FDA approved)

Tao et al, A&A 2015 : OB n=113, failed 11%, PDPH 2.6%

McKenzie et al, RAPM 2013 : PDPH 2/5, paresthesia 3/5

Additional questions

- Bupivacaine or …..?

  Toxicity is not an issue for spinals

  R but also LB cause less MB (& hypotension?)

  But is it clinically relevant enough ?

Less motor block

LevoB	Vercauteren, A&A 2001 Faccenda, RAPM 2003 Lim, A&A 2001 Coppejans , AAB 2006
LevoB & Ropi	Gautier, BJA 2003 Beilin, A&A 2007 Atienzar, IJOA 2008
Ropi (C-section)	Malhotra, IJOA 2016 (meta-analysis, -35,7min)

Less hypotension

LevoB	Bader, Anesthesiology 1999 Lew, Anaesth Intensive Care 2003 Coppejans, IJOA 2004 Guasch, Rev Esp An Rean 2010
Ropi	Whiteside, BJA 2003 Ogün, BJA 2003

Additional questions

- Bupivacaine or …..?

Randomised controlled trial of spinal anaesthesia with bupivacaine or 2-chloroprocaine during caesarean section

S. Maes[1], M. Laubach[2] and J. Poelaert[1]

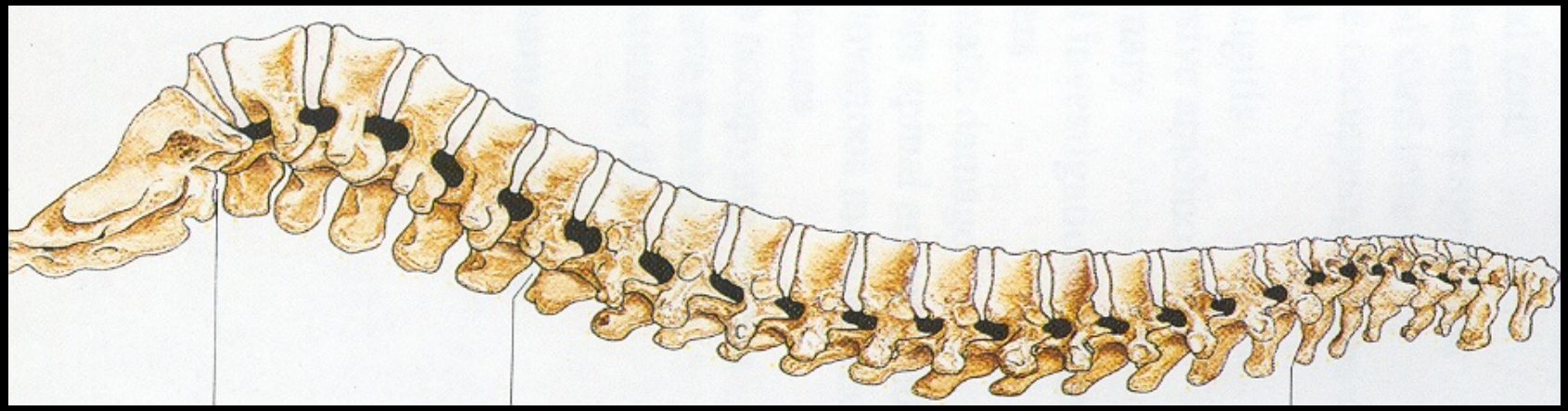
Acta Anaesthesiol Scand 2016; 60: 642-9

RCT (C-section)

Spinal Bupivacaine (7.5mg) or 2-Chloroprocain (40 mg)

2-CP : higher sensory level at min.

Conclusion: 2-Chloroprocaine can be used for low risk Caesarean section in healthy parturients. There is no difference in time to motor block resolution compared to bupivacaine.
Motor recovery seems more predictable for 2-chloroprocaine and may be beneficial for the breastfeeding initiation.



- Hyperbaric or plain ? HB faster & less GA?

Sia et al, Cochrane Database 2013

- Sitting or lateral ?

Sitting :

-slower

-less attempts

-lower block, less hypotension, less paraesthesia, …

Coppejans et al, A&A 2006

Tan & Gunaydin, 2014

Yun et al, A&A 1998 (more hypotension ?)

IV cannulation

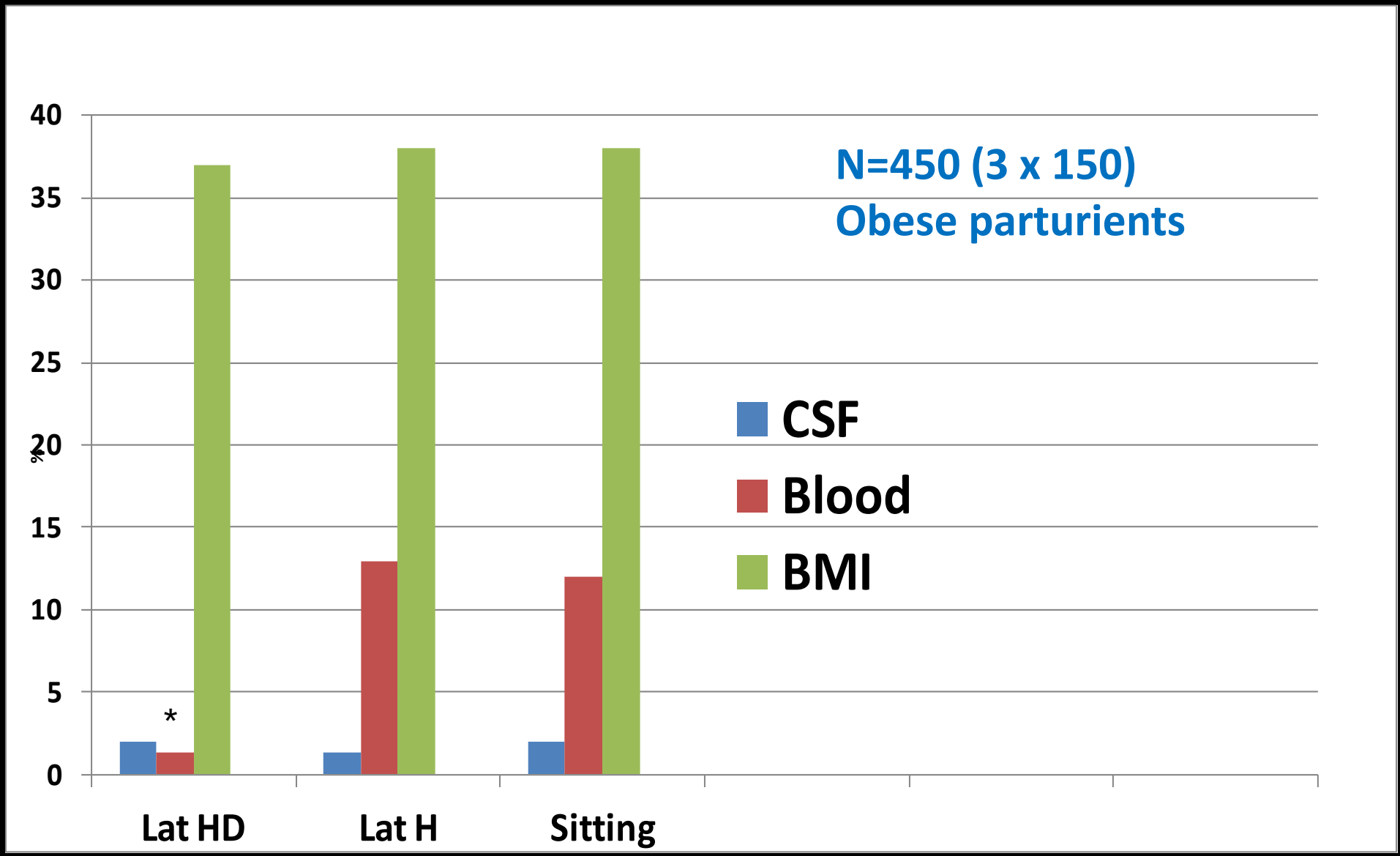
	N° of pts	Blood
Harney et al, 2005	**209**	**3.7 % lateral** **15.7 % sitting**

Mhyre et al, Anesth Analg 2009 (rev)
strategies that avoid IV cannulation

N=30 RCT , 12.738 parturients

- Saline before catheter placement
- Catheter type
- Insertion depth <6cm
- **Lateral (as opposed to sitting) position :**
  n=6, quality score 35%, OR 0.53

Bahar et al, Can J Anaesth 2004; 51: 577-80



Additional questions

- *Bupivacaine or …..?*
- *Hyperbaric or plain ?*
- *Sitting or lateral ?*
- *Colloid or crystalloid ?*

  Ripolles Melchor et al, Minerva Anestesiol 2015

  11 RCT, n=990

  Colloids less hypotension (RR 0,7)

- *Co-load or pre-load ?*

  Banerjee et al, Can J Anaesth 2010

  8 RCT, n=518 , both 60% hypotension

  Ni HF et al, 2017

  10 RCT, n=824 : co-load better than pre-load

Additional questions

- *Bupivacaine or …...?*
- *Hyperbaric or plain ?*
- *Sitting or lateral ?*
- *Coload or preload ? Colloid or crystalloid ?*
- Dose # ..duration of surgery, weight, height ?
- What if CSE or a SDS fails ?
- Spinal after (failing ?) labour epidural
  - **12 single reports of high/total spinal**

C-section : case

- CSE (L3-L4): no effect after 10 min.
- Epidural catheter
  - *10mL ropivacaine 0.75% : no effect after 15 min.*
- CSE (L3-L4)
  - *BupiH 7mg + Sufentanil 3.5µg*
  - *Within 1 min.*
    - Sensory and motor block
    - Numb fingers and cheeck
    - Respiratory distress
  - *Delivery (>10min.), improvement*
  - *End of surgery (35min.) : Bromage 0, sensory level at T7*

Spinal after failing labour epidural

- **Waters, 1994 : 1/17**
- **Adams, 1995 : 0/61**
- **Stoneham 1996 : 0/12**
- **Furst & Reisner 1995 : 2/27**
- **Dadarkar et al, IJOA 2004 : 0/115**
- **Einhorn & Habib, CJA 2016 : 8/263, *11% failure***

Recommendation after labour epidural

Allow the block to wear off at the lumbar level

No labour bolus during the last 30 minutes (mistake for CSF?)

Lower dose (20%?) than usual (CSE preferable ?)

PubMed visser and spinal and cesarean

Format: Abstract

Full text links

SpringerLink FULL-TEXT ARTICLE

Can J Anaesth. 2009 Aug;56(8):577-83. doi: 10.1007/s12630-009-9113-y. Epub 2009 Jun 5.

Spinal anesthesia for intrapartum Cesarean delivery following epidural labor analgesia: a retrospective cohort study.

Visser WA[1], Dijkstra A, Albayrak M, Gielen MJ, Boersma E, Vonsée HJ.

Author information

METHODS: Hemodynamic data, frequencies of either high or total **spinal** block, and maternal and neonatal outcome data were gathered from the anesthesia records of all parturients at the Amphia Hospital, undergoing intrapartum CD between January 1, 2001 and May 1, 2005.

RESULTS: Complete data were available for 693 patients (97.6%) of the 710 medical records that were identified. Of the 693 patients, 508 (73.3%) had no ELA and received SA, 128 patients (18.5%) received SA following epidural anesthesia for labor, 19 (2.7%) underwent conversion of ELA to ESA, and 38 (5.5%) received general anesthesia. When comparing both SA groups, no clinically relevant differences were observed regarding the incidence of total **spinal** block (0% in both groups) or high **spinal** block (0.2 vs 0.8%, P = 0.36). The number of hypotensive episodes, the total amount of ephedrine administered, and the Apgar scores recorded at 5 and 10 min were similar amongst groups.

Conclusions

- Spinal anaesthesia is the most popular
- CSE : variability among countries
- Bupivacaine (+F or S) still the LA of choice
- Hypotension : phenylephrine
- Don’t dose too low !
- Preload is not superior to co-load
  - *Colloids do somewhat better but not perfect*
- CSA : special indications but
  - *Equipment ? High failure rate and still PDPH*

Съезд
Congress

АССОЦИАЦИЯ АНЕСТЕЗИОЛОГОВ-РЕАНИМАТОЛОГОВ

5-7 сентября 2018 / Санкт-Петербург
September 5-7, 2018 / St. Petersburg

Thank you
Благодарю вас