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Evaluation of pain after vaginal delivery. L. ALLUIN, M.D., Ph.D., P. LAVAND'HOMME, M.D., Ph.D., F. ROELANTS, M.D., H. WATERLOOS, R.N. Anesthesiology Dept, St. Luc Hospital, Université Catholique de Louvain, Brussels, Belgium.

Background

The persistence of health problems after vaginal delivery (VD) is not rare since only 21% of women do not complain after 3 months (1). Among these problems, persistence of pain can interfere with maternal quality of life and mother-child relationship. Furthermore, presence of important pain might predispose to the development of chronic pain through central nervous system sensitization. The study evaluates pain level and incidence immediately (< 3 days) and 8 weeks after VD.

Materials and Methods

A prospective study was conducted that included, after Institutional Ethical Committee approval and patient's informed consent, 139 women who were delivered a live neonate vaginally under epidural analgesia. Paracetamol and NSAIDs were available for analgesia

after VD in all the patients. Age, parity and degree of perineal trauma (Intact Perineum group ; episiotomy, EPISIO group ; tears, TEARS group) were documented from delivery records. Within 3 days after VD, immediate pain (VAS 0-10 median and maximal, % patients with pain score > 3/10 and perineal location) was evaluated and another questionnaire was mailed 8 weeks later questioning early pain recall (VAS within 3 days post-VD) as well as pain duration (< 2 weeks, 2-4 weeks, 4-8 weeks, > 8 weeks). Statistical analysis used one way ANOVA and X² for multiple groups. P < 0.05 significant(*).

Results

Groups did not differ concerning age (30 ± 5 yrs) and parity (2 ± 0.7). 99 women completed the study at 8 weeks after VD. Perineal tears were only 1st and 2nd degree. Results are in the Table.

	Intact Perineum	EPISIO	TEARS
n	44 (31.6%)	55 (39.6%)	40 (28.8%)
Pain within 3 days			
Median/ Max VAS	4 ± 2.6 / 5±2.9	4 ± 2.1 / 5±2.7	3 ± 2.1 / 5±2.5
% patients with pain	56.8	76.4	65
% perineal pain	31.8	65.4	50
Pain recall at 8 weeks	3 ± 1.9*	4 ± 2.3 *	4 ± 2.5
% perineal pain	54.2	73.6	75
Pain duration < 2 weeks	58	60.3	75
2 – 4 weeks	8.3*	26.4 *	15
4 – 8 weeks	4.2	3.7	0
> 8 weeks (residual pain)	12.5	9.4	10

Discussion

Pain, especially perineal pain, represents a common problem for women after VD. Our results match those already published, i.e. between 22 – 51% within 8 weeks post-VD (1). We also found that episiotomy induces higher perineal pain complaints (around 71% (2)) than intact perineum (38% (2)) or tears of 1st and 2nd degrees (60% (2)). Concerning early rating scores, difference is better objectivated with pain recall, meaning that immediately after VD, positive feelings can obscure pain evaluation. Finally, the study demonstrates majority of pain

resolving within 2 weeks except after episiotomy (2-4 weeks needed for wound repair). Notwithstanding, presence of residual pain (> 8 weeks duration) is not rare and correlates with results of others (6-15% of the cases (1)).

References

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2. Macarthur *et al.*, AM. J. OBSTET. GYNECOL., **191**, 1199-204, 2004.

Breast reconstruction with pedicled Transverse Rectus Abdominis Muscle (TRAM) : perioperative management – a retrospective study. M. BEN AZIZ, I. ABBATOY, P. EWALENKO. Institut Jules Bordet - Cancer Centre of the Brussels Free University (ULB), Brussels, Belgium.

Background

Transposition of Transverse Rectus Abdominis Muscle for breast reconstruction after mastectomy is a long lasting procedure not devoid of complications such as prolonged pain, infection and flap necrosis. Careful screening of patients (pts) is mandatory. Anaesthesia and postoperative (PO) analgesia may play a role in the occurrence of these complications (1).

Methods

We performed a retrospective study on pts submitted to immediate or delayed TRAM reconstruction with the objectives to substantiate the complications and possible influence of anaesthetic and perioperative

management on patient outcome and length of hospital stay (LOS).

Eighty files were retrieved covering a period from 1993 to 2003. Thanks to the existence of a computerized medical file, a substantial amount of data could be analysed : medical history, anaesthetic charts, including fluids used, anaesthesia method and analgesia, as well as PO fluid and analgesia management, records of complications and LOS. For statistical analysis (Statview5, SAS), descriptive statistics were computed and after analysis of variance, comparative tests with t-tests or non parametric tests, chi-square or regression analysis were used where appropriate. $p \leq 0.05$ was considered significant (* in table).

LOS (days)	Hb D1 (mg%)	Flap problem	epidural	opioid	Total count
13.15 (5.47) *	< 9	partial necrosis	10/60	6/20 *	16/80
9.85 (4.51)	> 9 - < 10	haematoma	0/60	2/20	2/80
11.7 (4.68)	> 10				
P= 0.023				P= 0.011	

Results

Some pts had a positive medical history (diabetes 3, treated hypertension 13, moderate active smoking 9) which should normally have contraindicated TRAM reconstruction. Though no increase in complications was seen in these pts, their small number renders valid statistical analysis questionable regarding a possible influence on outcome in this surgical setting.

Anaesthesia method was equally distributed with volatile agents or propofol based TIVA. Sufentanil or remifentanil was used to provide analgesia. Combined intraoperative epidural analgesia was used in 1/2 cases. Patients were admitted to our postanaesthesia high care unit for 1 to 12 days, with a median stay of 3 days. Median PO LOS was of 11 days (range : 6-31)

PO epidural analgesia with local anaesthetics combined or not with opioids was provided in 60/80 cases, therefore raising caution for a statistical comparison between analgesia method.

The most frequent complications were *respiratory* (hypoventilation and or pleural effusion : 52 pts, leading to infection : 10 pts) and/or *surgical* (25 pts). 4 pts presented a pulmonary embolism, and 2 pts serious respiratory infection leading to controlled ventilation postoperatively. Pts BMI was a significant factor for

respiratory complications. Partial wound necrosis was observed in 16 pts, and treated surgically in 2. Partial flap necrosis was found more often when opioid analgesia was used ($p < 0.05$) but no effect of analgesia method neither on occurrence of respiratory problems nor on LOS was evidenced. LOS was prolonged with respiratory ($p = 0.0022$) and wound ($p < 0.0001$) problems and also in pts having a haemoglobin (HbD1) level below 9 g/dl on the 1st PO day ($p < 0.05$). Most relevant data are presented in table below (means(SD) or count).

Conclusion

Avoidance of postoperative anaemia and the use of epidural analgesia may reduce LOS and flap healing problems. These findings should be confirmed in large prospective studies using specific guidelines. The relatively low number of serious complications denotes an adequate preoperative screening and stresses the importance of adequate maintenance of parameters throughout the perioperative process.

Reference

1. Correll D. J., Viscusi E. R. *et al.*, REG. ANESTH. PAIN MED., **26**, 444-9, 2001.

Epidural continuous infusion of sufentanil and neostigmine for labor analgesia. V. CRISPIN, F. ROELANTS, N. RENIER, P. LAVAND'HOMME. Université Catholique de Louvain, Cliniques Universitaires Saint-luc, 1200 Brussels.

Background

During labor, motor impairment resulting from neuraxial local anesthetics leads to higher instrumentation delivery rate and lower parturients' satisfaction (1). Therefore other anesthetic regimen or combination are looked for. Of these, epidural neostigmine (N) 500 µg, a cholinesterase inhibitor, combined with sufentanil (S) seems to provide adequate labor analgesia without motor block or side effects (2). This study compares the efficacy in term of analgesia, ropivacaine (R) consumption, instrumentation, of a continuous epidural infusion combining sufentanil with either ropivacaine or neostigmine during labor.

Materials and Methods

After approval by the Clinical Research Practices Committee and informed consent, at the beginning of labor, a lumbar epidural catheter was inserted in healthy parturients. Our protocol started after epidural test dose administration and VAS value exceeding 30/100, with the epidural administration of five hundred µg of neostigmine and 10 µg of sufentanil given in a 12 mL volume. Then, they were randomly allocated to receive for the following 5 hours either epidural continuous infusion with sufentanil 2 µg/h and ropivacaine 10 mg/h (group SR ; n = 15) or sufentanil 2 µg/h and neostigmine 100 µg/h (group SN ; n = 15). After this time delay, ropivacaine 0.1% was used until delivery. During continuous infusion, rescue doses of epidural ropivacaine were given as needed. Pain scores, analgesia efficiency (= % parturients with VAS < 30/100), time before the 1st rescue dose (rescue 1), as well as number of rescues doses (n), labor duration, instrumentation rate and total ropivacaine consumption were noticed. Maternal and

fetal vital parameters and side effects were recorded. Statistical analysis used ANOVA ; p < 0.05 was considered significant (*).

Results

Parturients in both groups had similar demographics. Analgesia efficiency differed after 5 hours : SR 50% versus SN 17% (*) for similar cervical dilatation (6.75 vs 6 cm). Other results are expressed in the Table. Data are presented as mean ± SD and (95% CI). No particular side effects were observed.

	SR	SN
Rescue 1 (min)	155 ± 74	140 ± 75
n Rescues	1.1 ± 1	1.3 ± 1
L duration (min)	321 ± 164	299 ± 115
R use (mg/h)	13.2 (10-15)	6 (4.4-7.7)*
Instrumentation (%)	6.6	0

Discussion

Until cervical dilatation 6 cm, sufentanil-neostigmine infusion provides similar analgesia to classical sufentanil-ropivacaine combination and allows ropivacaine sparing effect. We could not demonstrate in this small size study an impact on the rate instrumentation delivery.

References

1. Wilson M. J. *et al.*, ANESTHESIOLOGY, **97**, 1567-75, 2002.
2. Roelants F. *et al.*, ANESTHESIOLOGY, **101**, 439-44, 2004.

Hyperbaric spinal levobupivacaine with sufentanil for cesarean delivery : a comparison with hyperbaric racemic bupivacaine. P. DE VOGHT, D. SCHOORENS, M. VAN DE VELDE*. Departments of Anesthesiology, Hasselt Salvator Hospital and UZ Leuven *

Introduction

Levobupivacaine is the pure S(-)enantiomer of racemic bupivacaine with less systemic toxicity. The purpose of this study was to evaluate the efficacy and safety of spinal anesthesia with 0.5% hyperbaric levobupivacaine, compared with 0.5% hyperbaric racemic bupivacaine for elective cesarean delivery.

Methods

Following ethical committee approval and patient informed consent, 24 parturients were enrolled to participate this randomised double blind trial. Single shot spinal anesthesia was performed at the L3-L4 interspace. The patients were randomly assigned to receive one of two hyperbaric intrathecal solutions : bupivacaine 6.6 mg (n = 12) or levobupivacaine 6.6 mg (n = 12) both combined with 3.3 µg sufentanil. Motor blockade (using a modified Bromage score), hemodynamic variables (blood pressure, heart rate), quality of anesthesia and neonatal outcome (Apgar score and umbilical artery pH (UA pH)) were recorded.

Statistic analysis consisted of repeated measures ANOVA and post hoc testing whenever appropriate. Parametric and non-parametric data were analysed using Chi square analysis and Fisher exact test. A $p < 0.05$ was considered statistically significant.

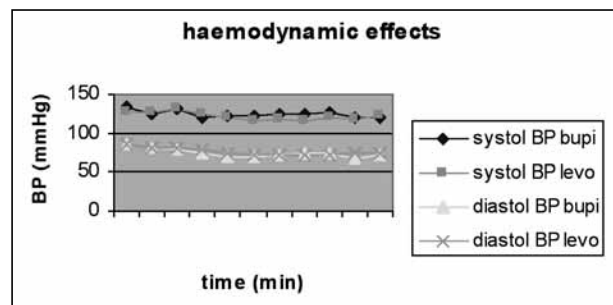
Results

Intergroup differences between levobupivacaine and bupivacaine were insignificant with regard to duration and extend of motor blockade, quality of analgesia, hemodynamics, maternal and neonatal outcome.

Discussion and conclusion

We conclude that racemic bupivacaine and levobupivacaine when used for spinal anesthesia during cesarean delivery produce equally effective and safe anesthesia.

	bupivacaine	levobupivacaine
UA pH < 7.2 (n)	1	1
Apgar < 7 (n)	0	0
UA pH	7.300 ± 0.060	7.290 ± 0.078
Duration Motor Block (min)	115 ± 21	115 ± 19



References

1. Glaser C., Marhofer P., et al., *Levobupivacaine versus racemic bupivacaine for spinal anesthesia*, ANESTH. ANALG., **94**, 194-198, 2002.
2. Vercauteren M. P., Hans G., et al., *Levobupivacaine combined with sufentanil and epinephrine for intrathecal labor analgesia : a comparison with racemic bupivacaine*, ANESTH. ANALG., **93**, 996-1000, 2001.
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Comparison of two Concentrations of Levobupivacaine in Patient Controlled Epidural Analgesia.

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Background

The relative effects of mass, volume and concentration of local anaesthetic used for postoperative epidural analgesia are still under debate. This randomised and blinded study evaluated the quality of analgesia and the incidence of side effects of two different concentrations of levobupivacaine (LB 0.15% and LB 0.5%) given via patient controlled epidural analgesia (PCEA) after lower abdominal surgery.

Materials and Methods

After Ethical Committee approve and informed consent, 56 patients undergoing lower abdominal surgery were included. An epidural catheter was inserted between Th 8-Th 12 before induction of general anaesthesia. At the end of surgery, patients were randomly assigned in two groups to receive : either LB 0.15% as a 3.3 ml bolus on demand, with a lockout of 30 min (n = 30), or LB 0.5% as a 1 ml bolus on demand, with an identical lockout interval (n = 26), both combined with a background infusion of 5mg/h this means 1 ml/h in the LB 0.5% and 3.3 ml/h in the LB 0.15%. The following variables were registered within 48 hours : upper and lower sensory block, pain scores (summarised as pain indicators) at rest and after coughing, motor blockade (Bromage), subcutaneous rescue morphine consumption, LB used per and postoperatively, haemodynamics, side-effects and patient satisfaction. General

Linear Model (GLM) statistics and Student's *t* test with Bonferroni correction were used. $P < 0.05$ was considered significant.

Results

The 2 groups were similar regarding morphine consumption, side-effects, patient satisfaction, quality of analgesia and demographic data, except for gender ratio ($P = 0.004$). There was no difference between the 2 groups for the mean upper sensory blockade. The inferior sensory level was significantly higher in the 1.5 mg/ml group ($P < 0.0001$). No difference for the level of epidural catheter insertion (Th 8-12). There was no difference in the amount of epidural LB given per and postoperatively. No motor blockade and hypotension occurred.

Discussion

Administering the same dose of LB in either a low or high concentration via PCEA mode provides an equal quality of postoperative analgesia at rest and during coughing for lower abdominal surgery without any difference in side effects.

References

1. Bromage, BR. J. ANAESTH., **47**, 199-211, 1975.
2. Denedde *et al.*, ANESTH ANALG., **96**, 796-801, 2003.

Table 1 : Pain indicators, postoperative analgesic consumption and patient satisfaction in the 2 groups

Variable	LB 0.15% (n=30)	LB 0.5% (n=26)	P-value
Gender (M/F)	14/16	3/23	0.0044
Age (yr)	55.5 ± 13.4	52.8 ± 9.56	0.41
BMI (kg/m ²)	26.2 ± 4.85	28.0 ± 6.64	0.24
<i>At rest</i>			
AUC (cm ²)	33.8 ± 31.5	33.9 ± 26.9	0.99
PVAS > 3 (h)	1.98 ± 4.38	2.64 ± 3.84	0.56
<i>At cough</i>			
AUC (cm ²)	63.5 ± 45.0	76.3 ± 50.3	0.32
PVAS > 3 (h)	8.42 ± 9.93	9.40 ± 10.4	0.72
LB 24 hr (mg)	184 ± 37	174 ± 53	0.43
LB 48hr (mg)	169 ± 41	152 ± 46	0.15
Morphine 24hr (mg)	3.4 ± 5.3	2.0 ± 3.5	0.25
Morphine 48hr (mg)	0.6 ± 2.2	0.3 ± 1.6	0.64
NSAIDs (n)	28 (93.3%)	24(92.3%)	0.88
Paracetamol (g)	16 ± 0	16 ± 0	-
Satisfied/very satisfied	10 (33%)/20 (67%)	12 (46%)/14 (54%)	0.28

AUC : area under the visual analogue scale (VAS) time curve ; PVAS > 3 : persistence of VAS over 3 cm. BMI = body mass index, NSAID's = non-steroidal anti-inflammatory drugs, LB = levobupivacaine

Comparison of Ephedrine-Phenylephrine vs Ephedrine to treat hypotension during elective cesarean section after spinal anesthesia. L. GAVAGE, V. MERCIER, R. ROELANTS, P. LAVANDIOMME. Université Catholique de Louvain, Cliniques Universitaires Saint-Luc, 1200 Brussels.

Background and Goal

Recent studies suggest that preventive administration of phenylephrine (P) combined with ephedrine (E) halved the incidence of hypotension during cesarean section under spinal anesthesia¹. This study assesses the effectiveness of curative administration of ephedrine-phenylephrine mixture by comparison with ephedrine alone to treat hypotension during spinal anesthesia for cesarean section.

Materials and Methods

After approval by the Clinical Research Practices Committee and informed consent, 40 healthy parturients scheduled for elective cesarean section received a crystalloid preload of 15 ml/kg. Spinal anesthesia (8 mg hyperbaric bupivacaine, 2µ sufentanil) was performed in the sitting position. Hypotension (SBP < 100 mmHg or decrease C 80% baseline) was treated with 1 mL incremental bolus doses of vasopressor solutions. Parturients were randomly allocated into 2 groups and receive either E-P mixture containing ephedrine 3 mg/mL with phenylephrine 15 µg/mL (group E-P; n = 20) or ephedrine with a concentration of 3 mg/mL (group B; n = 20) Maternal blood pressure and heart rate at different time points after spinal injection as well as vasopressor administration needed to avoid hypotension were recorded. Data are expressed as mean ± SD. Statistical analysis used ANOVA ; p < 005 was considered significant.

Results

Patients did not differ concerning demographic data, sensory level, time before baby delivery and Apgar scores. % patients needing vasopressors at different time (T in min post spinal anesthesia) and total vasopressors (V) consumption are given in theTable- No atropine was required.

	E	E-P	p
T 3 (%)	25	15	n.s.
T 5 (%)	45	35	n.s.
T 7 (%)	55	15	0.008
T 10 (%)	15	20	n.s.
T 20 (%)	15	20	n.s.
T 30 (%)	10	5	n.s.
Total V (mL)	6.85 ± 4.8	4±23	0.006

Discussion

Epheclrine-Phenylephrine combination reduces total amount of vasopressors needed and has shown to be more effective in the treatment of hypotension after spinal anesthesia for cesarean section.

Reference

1. Mercier F. J., Riley E. T., Frederickson W. L., *et al.*, ANESTHESIOLOGY, **95**, 668-74, 2001.

Pre-emptive cox-II inhibitor is associated with reduced pain after remifentanyl-based anaesthesia for thyroidectomy. Ph. GOFFARD, I. ABBATOY, J. MASSAUT, G. ANDRY, P. EWALENKO. Institut Jules Bordet - Cancer Centre of the Brussels Free University (ULB), Brussels, Belgium.

Background

The traditional approach to post-operative pain management, i.e. administration of an analgesic after the onset of pain, is not very effective when remifentanyl is used intraoperatively (1). The aim of this study was to investigate the effect of pre-incision oral cox-II inhibitor rofecoxib on postoperative (PO) morphine requirement and pain score on patients undergoing thyroidectomy after remifentanyl-propofol anaesthesia in a randomised double blind clinical trial.

Methods

After protocol acceptance by the Ethics committee and written informed consent, 37 patients were included in the study. Induction and maintenance of anaesthesia were with remifentanyl and propofol. The patients were randomly assigned into two groups before incision. Rofecoxib group (group R) (n = 19) received rofecoxib 50 mg orally one hour before incision and control group (group P) (n = 18) received a placebo. Both groups received paracetamol (Perfusalgan®) 1 g IV at the incision time and a bolus of morphine 0.1 mg/kg IV twenty minutes after the start of surgery.

After surgery, patients were transferred to the ICU where a patient-controlled analgesia (PCA) (2 mg morphine bolus with 8 minute intervals and no limit doses on 4 hours) device was started. We assessed pain score - following the verbal analogue scale (VAS 0-10) -, sedation, shivering and nausea levels at 15 minutes intervals the first hour then every hour for 24 hours and recorded the total morphine consumption during the 24 PO hours in the intensive care unit (ICU).

STATA 8 statistical software for Windows was used to perform statistical analysis. Due to the non-normality of distribution, scores were analysed using the Kruskal-Wallis test. Difference at $P < 0.05$ were considered significant. The values were expressed as means with standard deviation.

Results

The mean VAS score (2.14 ± 1.20 , 3.45 ± 1.53 , in group R versus P, $P = 0.0128$), the maximal VAS score (3.95 ± 1.99 , 5.59 ± 1.87 , R vs P, $P = 0.0143$) and the minimal VAS score (0.26 ± 0.56 , 0.94 ± 1.20 , R vs P, $P = 0.0210$) were significantly lower in the rofecoxib

group than in the control group during the ICU stay of the patients. Yet, the mean total morphine consumption was identical in the two groups (8.37 ± 8.64 , 12.42 ± 9.63 , $P = 0.1165$). Sedation scores, shivering and nausea did not significantly differ in both groups. Patients of either group were comparable regarding sex, ASA score, BMI, age, weight, height, duration of anaesthesia and surgery, and consumption of propofol and remifentanyl.

Discussion

The results of the study show that the combination of preemptive rofecoxib with PCA morphine produces better pain score and pain relief than morphine alone after remifentanyl-based anaesthesia. The role of long-acting COX-2 inhibitors in preoperative and preemptive pain management has been studied in several models. Meanwhile, in this study, the morphine requirements for both groups do not differ significantly. Apart the reduced power of the study from the small number of patients, different reasons could explain that : incomplete effect in preemptive group, partial preemptive effect in control group, surgery with low intensity noxious stimuli and tolerance that can develop rapidly from acute opioids exposure (2).

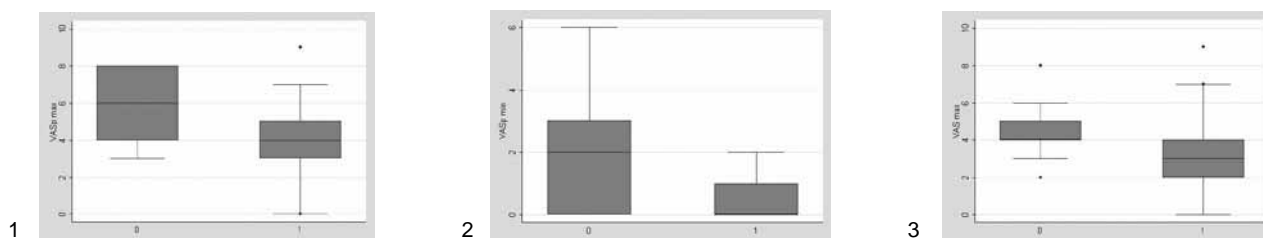
Conclusion

Pre-emptive cox-II inhibitor rofecoxib given orally one hour before incision reduce significantly pain intensity but not morphine requirements of patients anaesthetised with remifentanyl for thyroidectomy. These findings should be confirmed in larger prospective studies. The results confirm the importance of adequate pre-operative analgesia.

Reference

- Albrecht S., Schutler J., Yarmush J., *Postoperative pain management after intraoperative remifentanyl*, ANESTH. ANALG., **89**, 40-45, 1999.
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Figures : VAS scores : max (1), min (2) and mean (3) in group P (0) and R (1) – $p < 0.05$ (cfr text)



Box plots showing median and ranges.

Effects of low-dose naloxone infusion on tramadol-mediated analgesia and its side effects. G. HICK¹, J. BONTEMPS¹, M. LAMY², J. JORIS². Anaesthesia and I.C.M., Clinique Sainte-Elisabeth Namur¹ and CHU Liège,² Belgium.

Introduction

Tramadol is a central-acting analgesic with assumed efficacy after visceral surgery. Its analgesic effect is mediated by the opioid and monoaminergic systems. Low-dose naloxone infusion has been shown to improve opioid-induced analgesia [1-2] and to reduce opioid side effects [2-3]. We therefore investigated whether a postoperative continuous infusion of low dose of naloxone would also affect the effects of tramadol.

Methods

After approval of our Ethic Committee, 61 patients scheduled for hysterectomy and retropubic prostatectomy gave their consent to be included in this double blind study. Anaesthesia was standardized in all patients (induction : propofol, sufentanil and atracurium ; maintenance : desflurane in 50% O₂:N₂O). All patients were given tramadol iv 2 mg/kg 30 min before the end of surgery followed by a continuous infusion of tramadol

3 mg/kg/24 h. Patients were then randomly allocated to two groups : naloxone 0.25 µg/kg/h or saline. Rescue analgesia was provided by iv titration of piritramide in the recovery room followed by piritramide PCA on the ward for 48 h. Pain scores (100 mm VAS) at rest and during mobilisation were assessed during the two first postoperative days. Piritramide consumption was recorded every 4 h. Incidence and severity of opioid-induced side effects were also noted. Data (mean±sem) were analyzed using Students' *t* test, ANOVA or chi square when appropriate.

Results

Demographic and intraoperative data were similar in the two groups. Pain scores at rest and during mobilisation and the profile of side effects (Fig.1) did not differ significantly between both groups. Piritramide consumption was similar in the two groups (Fig. 2)

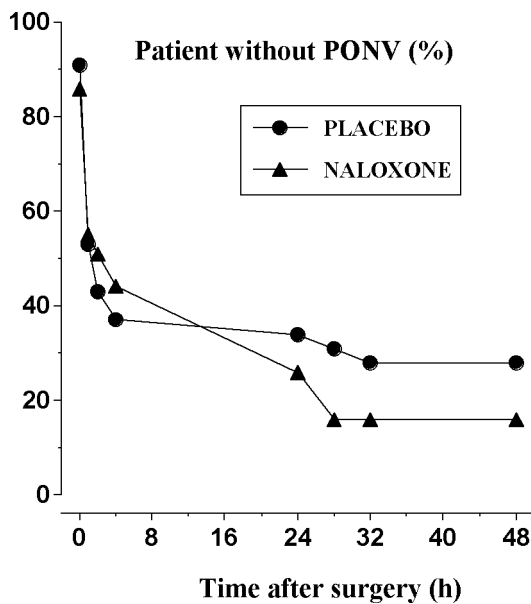


Fig. 1

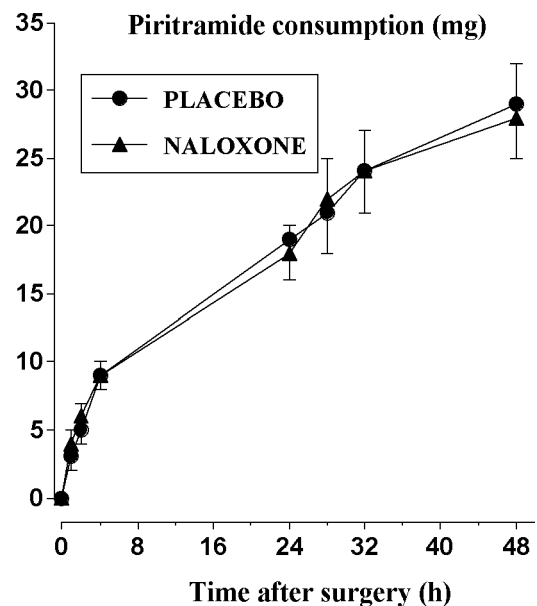


Fig. 2

Conclusions

This study suggests that low-dose naloxone infusion does not improve tramadol-mediated analgesia and does not reduce the incidence of tramadol-induced side effects.

References

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2. Gan *et al.*, ANESTHESIOLOGY, **87**, 1075-81, 1997.
3. Maxwell *et al.*, ANESTH. ANALG., **100**, 953-8, 2005.

Effects of intrathecal morphine in the management of post operative pain and side effects following coronary artery bypass grafting surgery (CABGS). JEANPIERRE L, ROEDIGER L, LARBUISSON R, LAMY M. Referral center for cardiothoracic surgery at a university hospital CHU of Liege - Departement of Anesthesiology - University of Liège, Domaine Universitaire du Sart-Tilman B35, 4000 Liège, Belgium.

Introduction

This study was designed to assess the benefits and complications associated with the use of intrathecal morphine (ITM) in patients undergoing CABGS. Excellent post operative analgesia was expected (1).

Methods

After approval by the Ethics Committee and informed consent, 30 patients undergoing first time elective CABGS were allocated randomly in two groups in a prospective, double blinded study to receive : group 1 (n 15/control group) IV patient controlled analgesia(PCA) with morphine (bolus 1.5mg/lock out interval 8 min) combined with a post extubation IV morphine bolus of 0.15mg/kg and group 2 (n 15/ ITM group) PCA morphine combined with a 0.5mg intrathecal morphine injection performed before the induction of general anesthesia (GA). Anesthesia was standardized and maintained with continuous IV target controlled infusion of remifentanyl and propofol combined with BIS index. Standard extubation criteria were applied. Pain was measured during 7 days after surgery using a visual analogue scale (VAS) at rest and exertion associated with verbal simple scale (VSS) and pain area cartography. We studied post operative analgesia, extubation time, duration of intensive care stay and the

incidence of side effects during the 48 h post extubation period. We recorded IV PCA morphine consumption during 96 h post extubation (PE). Statistical Analysis was performed with Fischer's exact test, Anova test and Unpaired T-test as appropriate at significance of $p < 0.05$.

Results (see table)

The two groups were similar for their demographic data, preoperative and intraoperative characteristics. The comparison between the 2 groups of VAS-VSS at rest and exertion showed only significant lower values in the ITM group at H + 6 and H + 9 post extubation but we noted a lower mean VAS value at rest during the first 24 h PE in the ITM group. The comparison between the 2 groups of extubation time was considered not significant and the incidence of side effects (pruritus, nausea, vomiting.) or adverse events (respiratory distress, myocardial ischemia, epidural hematoma.) was also NS. The PCA consumption was significantly lower in the ITM group from H + 1 until H + 24 PE. The global PCA consumption during the first 96 h PE was higher in the control group (mean global PCA at H + 96 was 89 ± 34 mg in control group and 52 ± 42 mg in ITM group / $P = 0.018$).

	VAS rest H + 6	VAS rest H + 9	VAS exertion H + 6	VAS exertion H + 9	VSS rest H + 6	VSS rest H + 9	VAS rest Mean from H + 1 to H + 24	PCA mg con- sumption from H + 1 to H + 24
ITM Group	15 + -14	14 + -13	31 + -19	32 + -21	0.4 + -0.63	0.6 + -0.5	20.6 + -6.6	17.8 + -18.3
Control Group	36 + -21	36 + -25	50 + -22	49 + -25	1.15+ -0.68	1.23 + -0.83	33 + -5.8	33.9 + -16.6
P value	0.0038	0.0079	0.023	0.056(QS)	0.0056	0.0	0.0007	0.036

(TABLE) Mean +- SD

Conclusion

Implementation of the ITM technique provides an effective analgesia during the first 24 h post extubation and demonstrates an IV opioid sparing effect. We didn't observe earlier tracheal extubation but it was not the goal of this study. No delayed respiratory distress and delayed extubation were observed in the ITM group (2)(3).

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Peripheral venous oxygen tension changes during the induction of anaesthesia may predict the presence of cardio-pulmonary illness. KALINOV O.*, HIMPE D.*, CAMU F.**. *Department of Anaesthesia, ZNA Middelheim General Hospital, Lindendreef, 1, B-2020 Antwerp, Belgium and **Professor of Anaesthesia, Free University of Brussels, Belgium.

Introduction

It has been shown earlier that peripheral venous oxygen tensions may increase, i.e. 'arterialize', in patients under controlled mechanical ventilation and oxygen therapy (1). The present study tests the hypothesis that the magnitude of these changes may predict or exclude the presence of cardio-pulmonary illness.

Method

A cohort of 170 consecutive and consenting patients was selected. During the IV line insertion a pre-induction peripheral venous blood-gas sample was taken. Keeping the FiO₂ at 50% a second blood-gas sample was collected 10 minutes after induction. Subsequently, the difference (Δ) in peripheral venous oxygen tensions between both samples was calculated.

Evidence of pre-existing cardio-pulmonary disease was obtained from the medical files and used to separate dichotomously cardio-pulmonary cases from controls. Sensitivity and specificity was calculated for multiple cut-off values and a Receiver Operating Characteristics (ROC) curve was constructed to validate the predictive value of this index : the Δ -peripheral-venous-pO₂.

Results

A summary of the data on the predictive value of differences between pre- and post-induction venous oxygen tensions is displayed in figure 1. An optimal cut-off value was found at a pO₂ difference around 77 mm Hg resulting in a sensitivity of 83.7 and a specificity of 59.5.

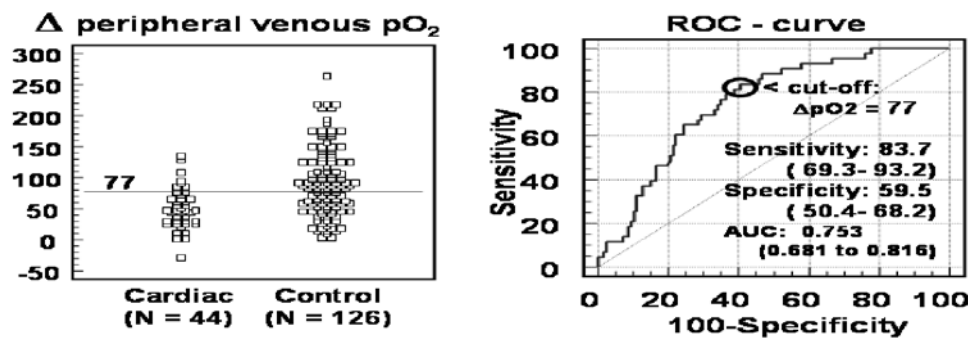


Figure 1 : On the left the pO₂ differences (mm Hg) observed in both patient groups are shown. On the right the ROC curve is displayed plus the usual predictive parameters such as sensitivity and specificity and their respective 95% confidence intervals. As an indicator of predictive power the area under the curve (AUC) of the ROC curve is also shown.

Conclusion

The Δ -peripheral-venous-pO₂ seems a fair predictor of the existence/absence of cardio-pulmonary illness in a particular patient. It might be of value in all cases when a patient's medical (cardiac or/and pulmonary) condition is unclear or unknown. Additionally, this easy indicator may help whenever the clinical usefulness for extended

or more invasive cardio-dynamic monitoring is under consideration.

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Introduction of tranexamic acid in a blood conservation strategy developed for cardiac surgery : economic impact. KENMEGNI FOGANG L., DAPER A., TRENCHANT A., VAN DER LINDEN P. Department of Anesthesia, CHU Brugmann-HUDERF, Brussels and CHU Charleroi, Belgium.

Introduction

Development of a standardized multidisciplinary transfusion strategy reduced the exposure of cardiac surgery patients to allogeneic red blood cell (RBC) transfusion (1). In this strategy, aprotinin (AP) was used as the first line antifibrinolytic agent. Tranexamic acid (TA) presents few side effects and is less expensive than AP. Therefore, introduction of TA as a first line antifibrinolytic agent might improve the cost-effectiveness of our multimodal blood conservation approach.

Patients and methods

Our institutional Ethics Committee approved this prospective non randomised observational study. All patients undergoing non-emergent coronary artery bypass graft or single valve surgery from April 2000 to

March 2002, who gave their informed consent were included. The developed strategy involved a standardized blood conservation program and a multidisciplinary allogeneic blood transfusion policy based mainly on clinical judgment, not only on a specific hemoglobin concentration. During the first year (April 2000 to March 2001), AP (full Hammersmith regiment) was used as the only antifibrinolytic agent (Control group). During the 2nd year (April 01 to March 2002) TA (10 mg/kg + 1mg/kg/h) was use as the first line antifibrinolytic agent, while AP was reserved for very specifics indications (Study group). Net RBC loss was calculated from estimated blood volume and pre- and post-operative hematocrit (2). Costs for the different blood sparing techniques and allogeneic blood products were carefully recorded. Data in both groups were compared using unpaired Student's t test or X² test where applicable.

Results

	Control group (N=247)	Study group (N=190)	P
Age (years)	65 ± 10	65 ± 11	NS
Sex (M / F) (%)	77 / 23	75 / 25	NS
Tuman score	1,53 ± 1,72	1,59 ± 1,88	NS
Surgical time (min)	233 ± 46	232 ± 47	NS
Aortic clamping time (min)	87 ± 20	86 ± 19	NS
Tranexamic acid (%)	0	41	0,000
Aprotinin (%)	41,3	17,4	0,000
Calculated RBC loss (ml)	496 ± 366	532 ± 409	NS
Allogeneic blood exposure (%)	13,4	17,9	NS
Costs for blood sparing techniques (€)	279 ± 310	71 ± 209	0,000
Costs for allogeneic blood products (€)	51 ± 215	56 ± 201	NS
Total costs for blood strategy (€)	330 ± 409	227 ± 293	0,004

Discussion

Calculated blood loss, allogeneic blood exposure and number of units transfused were not different between groups. Introduction of TA resulted in a significantly reduction in the use of AP. Total costs for blood strategy were significantly lower in the study group and this was essentially related to the lower costs associated with the blood sparing techniques.

Conclusion

In the conditions of our study, introduction of TA in our blood conservation strategy was cost-effective.

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General anesthesia for Cesarean delivery in an obstetric referral center : incidence, reasons and complications. A LAUWERS, A, TEUNKENS, E. VANDERMEERSCH, M. VAN DE VELDE. Department of Anesthesiology, UZ Gasthuisberg, Leuven.

Introduction

General anesthesia (GA) for Caesarean section (CS) is associated with an increased risk for potentially lethal respiratory complications, as compared to GA in the non pregnant population. In many institutions efforts have therefore focused on reducing the incidence of GA for CS. Following the initiation of practice guidelines related to the prevention of GA for CS at our institution, we prospectively evaluated, over a five year period, the incidence of, the reasons for and the complications of GA in an obstetric population in a Belgian national obstetrical referral center.

Methodology

We report on all patients who underwent obstetric GA between January 2000 and September 2004. Prospectively gathered evaluation forms and patient charts were systematically reviewed. Demographic data were recorded and the relevant medical and obstetric history was noted. The type of anesthesia performed as well as the complications that occurred were noted. If complications occurred, there follow up was reviewed. Charts were also evaluated to assess whether GA could have been avoided. The number of GA was also recorded in the years 1997, 1998 and 1999, before the introduction of measures to prevent GA in elective and non-planned CS.

Results

In 1997, 431 CS were performed, of which 105 were GA (24.4%). Between 1997 and 1999, protocols were initiated to reduce the incidence of GA : early epidural catheter placement in severe preeclampsia, anesthetist present during delivery of high risk deliveries such as twin or breech deliveries, guidelines related to maternal coagulopathy, early anesthetist consultation, etc... During the study period (2000-Sept 2004), 2236 CS were performed, representing 21.9% of deliveries. GA was carried out in 132 patients (5.9%).

Reasons for GA were impaired fetal well being in 88 patients (67%), maternal coagulopathy in 21 patients (16%), failed regional anesthesia in 12 patients (9%), maternal medical disease in 6 patients (4%) and previous back surgery in 5 patients (4%). Forty eight GA could have been avoided (36% of all GA) provided the

newly introduced practice guidelines would have been followed. Over the study years the number and incidence of GA decreased from 24.4% in 1997, to 8.6% in 2000 and 3.1% in 2004 (figure 1), indicating an increased awareness and application of these guidelines by all health care providers. In 2004, GA could be only avoided in 3 patients (27%).

In three patients (2.2%) a potentially life threatening complication occurred (1 failed intubation and 2 patients with Mendelsohn syndrome) and in 2 patients intubation was assessed as extremely difficult but eventually was successful. No permanent injury occurred as a result of anesthesia and its complications.

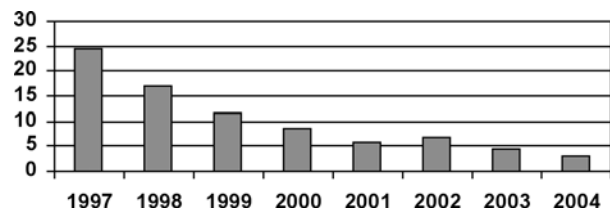


Figure 1 : Incidence of CS under GA (% of all CS)

Conclusion

Management protocols can successfully reduce the incidence of GA for CS and thus limit the risks of anesthesia. However further improvements remain possible especially with respect to anesthetist – obstetrician communication.

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Transforaminal Cervical Infiltrations : an outcome study. MOONEN J., KUMAR A., WILLEKENS I., VAN WAMBEKE P., MORLION B. UZ Gasthuisberg, Herestraat 49, 3000 Leuven, Belgium.

Introduction

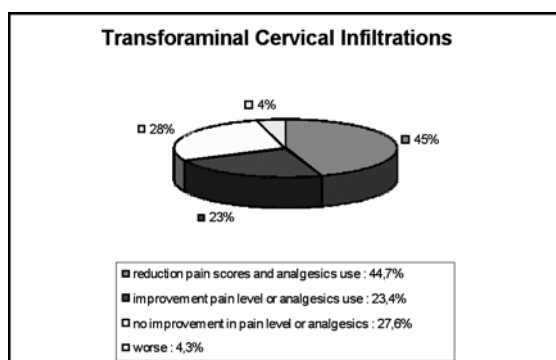
Cervical radiculopathy is a common problem which can lead to patient disability, seriously interfering with work and social life. Transforaminal epidural injection of steroids may be an alternative to surgery if more conservative therapy fails. The objective of this study was to assess the efficacy and safety of fluoroscopically guided cervical transforaminal epidural infiltrations with a local anaesthetic and a steroid.

Methods

A retrospective study was carried out to evaluate the pain level and use of analgesics. A random selection was made of 12 female and 35 male patients suffering from disabling cervical radicular pain not responding to conservative therapy. VAS scores and use of analgesics were recorded at the initial visit and from the patients' follow up files 2 to 4 months later. EMG and radiological (CT and MRI scans) evidence of radiculopathy were examined. Patients needing conversion to surgery due to failure of the infiltrations were recorded. All procedures were performed in a University Hospital in the period 2003-2004.

Results

All patients underwent a transforaminal cervical infiltration with a local anaesthetic (lidocaine 1%) and a steroid (betamethason, Diprophos®). The mean number of infiltrations performed per patient was 1.91. Mean age was 44,0 years (range 31 – 62 yrs). In 21 (44,7%) of the patients EMG evidence of radiculopathy was found. In 36 (76,6%) of the patients a radiculopathy could be demonstrated by means of a CT or MRI scan. The mean VAS-scores at the initial visit were 71,25/100. The mean VAS-scores 2 to 4 months after the infiltration were 38,30. After the procedure 21 (44,7%) of the patients had a reduction in both pain scores and use of analgesics, 11 (23,4%) had an improvement of either pain level or use of analgesics. 13 (27,6%) of the patients experienced no improvement, whereas 2 (4,3%) patients had actually more pain. Overall 32 (68,1%) of the 47 patients examined had an improvement after the procedure. 10 (21,3%) patients required surgery after failure



or insufficient pain relief by infiltrations. No cases of infection, new motor or sensory deficits, haematoma or other serious adverse effects were recorded in this study.

Discussion

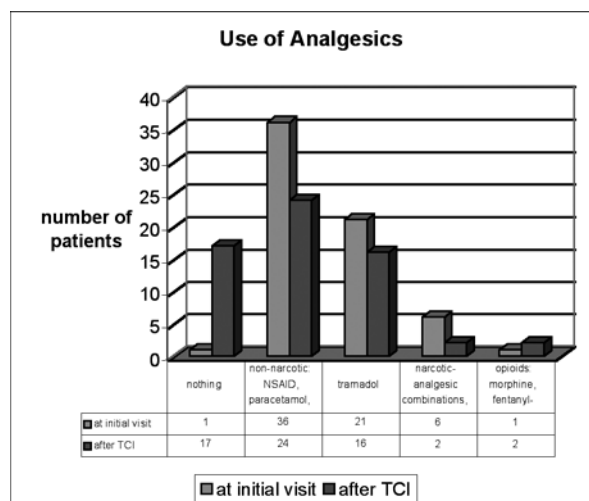
A literature review by Ellenberg *et al* showed that when patients with a proven cervical radiculopathy are treated nonsurgically, favourable outcomes may be expected in up to 80-90%. Surgery may therefore be reserved for patients who have either no improvement or increasing symptoms after TF infiltrations. The major drawback however is the fear of serious complications. These include spinal cord injury, intra-arterial injection, the risk of puncturing vital structures, infection, new motor or sensory deficits and unexpected spinal anaesthesia, due to longitudinal spread of intraneuronally injection. In view of these possible complications the procedure should always be performed under fluoroscopic guidance with the use of a contrast medium. Careful attention should be paid to the patient's anatomy.

Conclusion

Transforaminal epidural injections of steroids proved to be efficient in 68,1% of the patients examined in this study. No adverse effects were recorded in our patient population. Fluoroscopically guided transforaminal epidural injections of steroids is therefore an efficient and safe treatment option for cervical radicular pain. This technique should be considered before referring for surgical intervention.

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Effect of the sympathectomy on microcirculatory blood flow exposed to noradrenaline infusion.

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Introduction

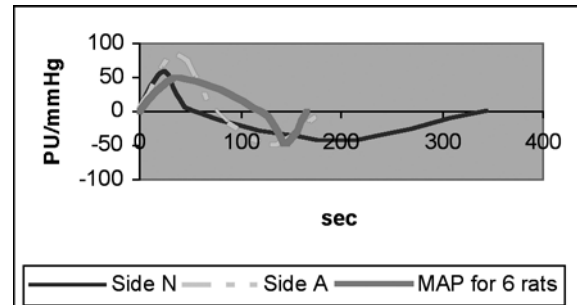
Nowadays, sympathectomy is often realised by locoregional anesthesia or by surgical adventicectomy, especially in surgery involving blood vessel transfer. This sympathectomy induces vasodilatation which improves microcirculation¹. We assessed the response of the cutaneous microcirculation to adrenergic agents in area where blood vessels were adventicectomised. We hereby observed whether recent denervation could counter the effects of adrenergic agents on microcirculation.

Materials and methods

According to Ethic Animal Committee approval, 'wistar' rats (280-350 gr) were preanaesthetized by ether breathing and induced by intraperitoneal sodium pentobarbitone (60 mgr/kg). Two flaps of an area 4cm*3cm vascularized by inferior epigastric blood vessels were prelevated. A microsopic adventicectomy of the nutrient pedicle was realised on the right side (side A) and not on the left (side N). In six rats, a 24g-catheter was also inserted in the external carotid to monitor mean blood pressure (MAP). Two fiberoptic light guide (Probe 407-4, Perimed®), connected to a Laser Doppler Flowmetry (LDF) were applied on each flap, approximately 1.5 cm away from the nutrient pedicles. LDF is expressed by unit of perfusion (PU). PU values during five minute of steady state defined the 'zero' value. 10 µg/kg of norepinephrine (NE) were injected in the external jugular vein. PU values were analysed by Perisoft Software® for Windows (amplitude, defined by maximum or minimum value of PU, duration between two zero points and area under the curve(AUC)). Durations in variation of MAP were noted. Data (mean±SD) were analysed by Wilcoxon test. p<0.05 was considered as significant.

Results

Twenty-three rats were enrolled in this study. NE administration firstly result in an increase in PU before returning to zero. Concerning this first PU variation, differences in duration, amplitude and AUC between side N and A were not statistically significant. Secondly, we



observed a PU decrease with significant difference in duration (292 ± 207 sec - side N vs 110 ± 150 sec - side A) and AUC (-8600 ± 1730 - side N vs -2106 ± 939 - side A), but not for the amplitude (-44 ± 26 PU - side N vs -49 ± 56 PU - side A) between the both sides. No PU decrease was observed in the adventicectomised side (side A) in 6 rats.

Comparison between the duration of the first positive PU variation and positive MAP variation was not significant. Nevertheless, the duration of PU decrease (387 ± 251 sec) was significantly different of the MAP decrease duration (100 ± 112 sec) in the side N, contrarily to side A.

Discussion and conclusions

In a denervated area (surgical adventicectomy), cutaneous microcirculation seems to be less affected by peripheral vasoconstriction induced by NE than in a normal one. Comparison between duration of MAP and PU variation (in this experiment with 6 rats) demonstrated a direct relationship between pulse pressure and LDF in case of sympathectomy. At first hand, recent denervation seems to be advantageous for the microcirculation exposed to stress hormones. Locoregional anesthesia, with its associated sympathectomy, could be closed to this experimental model and could offer the same advantage for the microcirculation (wound healing, burns treatment, ...)

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The effect of negative emotional context on neural and behavioural responses to electrical stimulation: a positron emission tomography analysis. L. ROMMES¹, A.C. THOMAS², D. HENNART¹, P. VOORDECKER³, L. BARVAIS¹, S. GOLDMAN². Departments of ¹Anaesthesiology and Reanimation and of ³Neurology, and ²PET/ Biomedical Cyclotron Unit, Hôpital Erasme, Free University of Brussels.

Introduction

Neuroimaging studies have delineated a human pain network (1). The "pain matrix" comprises the anterior cingulate cortex (ACC), primary (SI) and secondary somato-sensory cortices, insula, thalamus and cerebellum. Each region plays a different role within this system (2). There is increasing experimental evidence for an interaction between emotional context, cognition and sensory processing (3). Auditory stimuli represent a major source of emotional interactions in painful situations. We aimed at determining the effect of emotional auditory stimuli on the activity of the cerebral pain network in normal subjects.

Methods

Using positron emission tomography (PET), we examined neural responses to electrical stimulations (sensitive threshold and noxious stimulation) applied on the two hands in ten healthy right-handed volunteers (5M/5F; age: 23-43 y), in either a positive or negative emotional context produced by the audition of two different soundtracks. After each stimulus delivered, we measured its noxious intensity and unpleasantness. PET data were analysed using SPM99, looking for differential activation by means of contrasts. All volunteers gave their informed consent, and this study was approved by the Ethics Committee of the institution.

Results

During noxious stimulation, activation within SI ($P < 0.002$) and cerebellum ($P < 0.009$) was significant and, when combined with audition of unpleasant soundtrack, activation within the ACC ($P < 0.001$) was significant. In the negative emotional context with noxious stimulation, activation within the insula ($P < 0.0001$) was significant. The unpleasantness rating increased reliably with the noxious stimulation in the negative emotional context, but no pain intensity ratings differed significantly.

Conclusions

Being activated by pain in any emotional context, SI and cerebellum are thought to be involved in the sensory-discriminative aspect of pain processing. ACC and insula activations are influenced by a negative emotional context and probably participate in an affective and attentional modulation of pain sensation.

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Incidence and risk factors to develop residual pain after vaginal delivery. R. SERAMONDI, M.D., L. ALLUIN, M.D., F. ROELANTS, M.D., P. LAVAND'HOMME, M.D., Ph.D. Anesthesiology Dept, St Luc Hospital, Université Catholique de Louvain, Brussels, Belgium.

Background

Labor and childbirth represent a model of acute pain. The persistence of health problems after vaginal delivery (VD) is not rare(1). Among these problems, chronic pain, defined as persistent pain after 2 months post-VD, does exist and can interfere with maternal quality of life and mother-child relationship. The study evaluates both incidence, character and risk factors to develop residual pain after childbirth in healthy women.

Materials and Methods

After Hospital Ethical Committee approval and patient's informed consent, a prospective study was conducted that included 150 women who delivered vaginally a living neonate under epidural analgesia. After VD, Paracetamol and NSAIDs were available for analgesia as needed in all the patients. Age, parity and degree of perineal trauma (intact perineum ; episiotomy ; tears) were documented from delivery records. Early pain scores (VAS 0-10 median and maximal pain within 3 days after VD), % patients with pain score > 3/10 were questioned. Medical history of pain (headaches, back-aches...) as well as dysmenorrhea (scale 0 = no pain to 3 = important pain needing analgesic intake) and post-VD complications (infections, bleedings...) were assessed. A second record was mailed 8 weeks later questioning pain persistence and location. The group of patients presenting Residual Pain was compared to those

who were pain free. Statistical analysis used one way ANOVA and X². P< 0.05 was considered significant (*).

Results

101 patients completed the study, whom 82 (81%) were pain free and 19 (19%) reported pain (n = 11) or discomfort (n = 8) with abdominal (n = 7) and/or perineal (n = 13) location at 2 months post-VD. Age (32 ± 5) and parity (2 ± 1) did not differ between the two groups.

Conclusion

The presence of residual pain (> 8 weeks duration) is not rare after VD and our results for perineal pain (12.9%) match those already published (6-15% (1) and 4-13% (2)). Among the risk factors, history of severe dysmenorrhea and higher pain report early after VD seem to be involved. Both the early presence of important pain, already involved into the development of chronic pain after surgery (3), and dysmenorrhea represent conditions susceptible to sensitize the central nervous system.

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	Residual Pain	No Pain	P value
Intact perineum	31.5%	22%	0.26
Episiotomy / tears of degree 1-2	58% / 10%	66% / 22%	0.51 / 0.26
Post-delivery complications	21.1%	15.8%	0.58
Post-delivery VAS score			
Median pain / maximal pain	5 ± 2.9 / 6 ± 3.1	3 ± 2.1 / 5 ± 1.9	0.02 * / 0.06
% patients with median VAS > 3	55.6%	40.2%	0.23
History of pain	42.1%	35.4%	0.58
Severe dysmenorrhea (score 3)	21.1%	4.8%	0.01 *

Effect of remifentanyl on oxidative stress in an ex vivo perfused rat liver. G. TALLA, M.D., V. NUYENS, B.Sc., M. Stadler, M.D. M.Sc., J. Boogaerts, M.D., Ph.D. Department of Anaesthesiology, University Hospital Centre, Charleroi, Belgium.

Introduction

Ischaemia-reperfusion is a major cause of morbidity and mortality in liver surgery and transplantation (1). Recently, Zhang et al (2) showed that Remifentanyl® (RF), a potent ultra-short-acting opioid, confers protection against injury induced by ischemia in the rat heart. The goal of this study was to investigate whether RF could also protect the rat liver against normothermic ischaemia-reperfusion injury, using clinical biological markers.

Methods

After Animal Care Committee approval, female Wistar rats (150-200g) were fasted for \pm 16 hours but were allowed to tap water *ad libidum*. They were anaesthetised with Nembutal® i.p., the portal vein was cannulated, the liver removed and immediately perfused at a flow rate of 5 ml/min (pressure \pm 12 cm H₂O) at 37°C in a closed *ex vivo* system with HBSS supplemented with insulin, HEPES and O₂ (3). The experiment con-

sisted of three phases : perfusion for 15 min, warm ischaemia for 60 min, and reperfusion during 60 min. Animals were divided into 3 groups (n = 5 in each group) : control group, RF 1 μ g/ml and RF 10 μ g/ml administered in the perfusate before ischaemia. Enzymes ALT, AST, LDH (IU/l), potassium, Reactive Oxygen Species (ROS), i.e. dienes and trienes (spectrophotometry ; % Oxidative Index : O.I.) were analyzed in perfusate samples (0, 10, 15, 75, 90, 105, 120, 135 min after the start of the perfusion). Mean \pm SD. General linear mixed models (GLMM) and Student *t* with Bonferroni corrections. *P* < 0.05 was considered significant.

Results

The pattern of release of hepatocellular enzymes, potassium and ROS was similar in the three groups. GLMM did not demonstrated any difference between the groups at the different time-points. Mean values at 135 min are displayed in Table 1.

Table 1. Biological variables measured at 135 min in the perfusate. (ns for all values)

Variable	Control	RF 1 μ g/ml	RF 10 μ g/ml
AST (I.U./l)	716 \pm 104	719 \pm 515	828 \pm 489
ALT (I.U./l)	570 \pm 69	642 \pm 380	880 \pm 711
LDH (I.U./l)	12273 \pm 1432	8960 \pm 6725	11295 \pm 6261
Potassium (mEq/l)	9.5 \pm 0.4	9.3 \pm 0.8	9.6 \pm 0.6
Dienes (% O.I.)	0.43 \pm 0.03	0.41 \pm 0.08	0.43 \pm 0.04
Trienes (% O.I.)	0.20 \pm 0.02	0.22 \pm 0.02	0.21 \pm 0.02

Discussion

Under the present experimental conditions RF does not protect the rat liver against oxidative stress induced by ischaemia-reperfusion. On the heart, the protective effect of RF seems mediated via cardiac δ - and κ -opioid receptors (2). To the best of our knowledge, these receptors are absent in liver tissue. This might explain our results.

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Risk factors for chronic pain after elective cesarean section in healthy women. B. VANDERBECK, M.D., P. LAVAND'HOMME, M.D., Ph.D., F. ROELANTS, M.D., H. WATERLOOS, R.N. Anesthesiology Dept., St Luc Hospital, Université Catholique de Louvain, Brussels, Belgium.

Background

Chronic pain remains one potential adverse outcome of surgery (1). Although cesarean section (CS) represents common procedure in young healthy women, incidence and risk factors to develop chronic pain are still under-evaluated (2).

Materials and Methods

After informed consent, 100 healthy parturients undergoing elective CS were studied. Surgery was performed under spinal anesthesia, with Pfannenstiel incision and peritoneal layers closure in all patients. Patient Controlled Analgesia delivering morphine was available with NSAIDs for postoperative analgesia. Residual pain after 6 months was questioned by mail. Medical history and analysis of 48h postoperative data (VAS 0-100, morphine use, mapping area of wound hyperalgesia) were recorded. Statistical analysis used one way ANOVA and X².

Results

Six months after CS, 14.8% patients reported residual pain and discomfort located around the scar, associated to visceral component for 2% and to regular analgesics intake in 4%. Respectively in pain and control group : age 35 ± 5 vs 32 ± 5 yrs, average pregnancies number

$2.4 (1-7)$ vs $2.6 (1-8)$, nulliparas % (50 vs 32.8%) were similar. Medical history did not differ respectively in pain patients and control group for previous : CS (31% vs 41%), abdominal surgery (25% vs 34%), endometriosis (6.2% vs 2.8%) or obstetric procedures (37.5% vs 21.4%). More women with pain reported previous genitourinary infections (56% vs 17% ; $p = 0.003$). Chronic pain group displayed higher 24h VAS pain scores at rest (30 ± 21 vs 17 ± 16 ; $p = 0.04$) and movement (72 ± 18 vs 46 ± 22 ; $p = 0.003$) but no difference for morphine consumption (25 ± 12 vs 24 ± 18 mg). Wound hyperalgesia area was similar while 69% and 56% chronic pain patients presented hyperalgesia at 24h and 48h for only 24% ($p = 0.002$) and 14% ($p = 0.001$) in control group.

Conclusion

Chronic pain after elective CS should not be ignored. Our results match those already published (12.3% at 10 months(2)). Previous infectious conditions of genitourinary tract seem to represent striking risk factor as well as higher postoperative pain and presence of wound hyperalgesia.

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Comparison of Volume and Pressure Controlled Ventilation in Laparoscopic Gastric Banding.

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Background

Obesity has become a worldwide endemic problem. More and more bariatric surgery is performed, on more and more compromised patients. There are several surgical techniques, but the laparoscopic method has gained in frequency. Management of such patients faces the anaesthesiologist with complex ventilatory problems. The purpose of the present study was to evaluate two ventilatory techniques (pressure (PCV) vs. volume controlled (VCV)) during laparoscopic bariatric surgery.

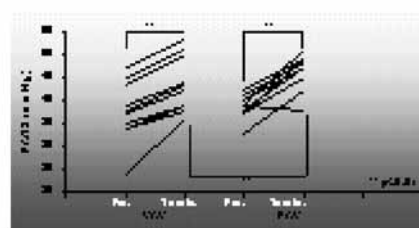
Materials and Methods

After institutional Review Board approval, 20 adult consenting patients, scheduled for elective gastric banding operation were studied. Anaesthesia was standardized: induction with remifentanyl, propofol and rocuronium, and maintenance with TCI remifentanyl and sevoflurane. Rocuronium was added if necessary. After and initial period of VCV with a tidal volume (VT) of 10 ml/kg (Ideal Body Weight IBW) and at a respiratory rate (RR) of 12 breaths/minute and surgical insufflation, the patients were allocated randomly to two groups: Group VCV (n = 10) received a VT of 10 ml/kg IBW in VCV, and Group PCV (n = 10) with the airway pressure set to provide a VT of 10 ml/kg IBW. RR was adjusted to maintain an ETCO_2 35-40 mmHg. Ventilatory variables were kept constant. Electrocardiogram, invasive radial arterial pressure, expired end-tidal carbon dioxide tension, airway pressures and arterial oxygen saturation were continuously monitored. The parameters were recorded with the Rugloop® software. Data were analyzed with the Turkey-Kramer test. Data are mean (\pm SD).

Results

No differences were found in the demographic characteristics of the two groups, nor in the values obtained before insufflation. The hemodynamic characteristics remained stable in the two groups. The P_{aO_2} didn't change significantly. The pH decreased and the arterial partial pressure of carbon dioxide increased in both groups after surgical insufflation, but in the Group PCV this increase was higher as compared to the Group VCV (46.4 (3.72) vs. 43.5 (5.95) mmHg, $p < 0.01$).

Arterial partial pressure of CO_2



Conclusions

Giving the difficulty of coping with CO_2 elimination during laparoscopic bariatric surgery, we conclude that volume controlled ventilation is better in these cases than pressure controlled ventilation.

References.

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Hypoglycemia due to Siphoning of an Insulin Infusion : a Laboratory Setup to Determine the different Forces at Work. P. J. VANELDEREN*, MD, F. M. SOETENS*, M.D., M. A. SOETENS*, M.D., H. J. JANSSEN**, Ph.D., A. M. DE WOLF***, M.D. *Department of Anesthesiology, Sint-Elisabeth Hospital, Turnhout, Belgium. **Limburgs Universitair Centrum, Department of Physics, Diepenbeek, Belgium. ***Department of Anesthesiology, The Feinberg School of Medicine, Northwestern University, Chicago, Illinois.

Introduction

We present a case where a syringe filled with insulin (50 U / 50 mL) was removed from the syringe pump and temporarily placed above the patient (55 cm above the right atrium), followed by passive emptying (siphoning) of the syringe into the patient (1,2). We reconstructed the clinical setting in a laboratory setup to determine the different forces at work.

Materials and methods

Eight new 50 mL syringes (Perfusor®-Syringe, B. Braun, Melsungen, Germany) and eight new 20 mL syringes (BD Plastipak, BD, Drogheda, Ireland) were filled with saline and connected to a triple-lumen central venous catheter by an extension tubing (internal diameter 1 mm). The height (h) of the syringes above the distal orifice of the triple-lumen catheter was increased gradually until flow was generated. Consequently, the height was lowered until flow stopped. To measure flow, a pressure transducer was placed between the syringe and the extension tubing (Fig. 1). The measured pressure (P) is given by :

$$P = -\rho \cdot g \cdot h + Q \cdot Z \quad \text{Equation 1}$$

where $-\rho \cdot g \cdot h$ is the pressure exerted by the fluid column [ρ is the density of the fluid ($\text{kg} \cdot \text{m}^{-3}$), g is the gravitational acceleration ($9.81 \text{ m} \cdot \text{s}^{-2}$) and h is the height of the syringe above the distal orifice of the triple-lumen catheter (m)] and $Q \cdot Z$ is the pressure gradient described by the Poiseuille equation [Q is flow ($\text{m}^3 \cdot \text{s}^{-1}$) and Z is the viscous resistance of the extension tubing]. Z is defined by :

$$Z = 8 \cdot \eta \cdot L / \pi \cdot r^4$$

where η is the viscosity of the fluid ($\text{Pa} \cdot \text{s}$), L is the length of the extension tubing (m) and r is the radius of the extension tubing (m).

According to Equation 1, when there is no flow, P is equal in magnitude to the hydrostatic pressure exerted by the fluid column ; when flow is present, P becomes less negative. The subsequent flow (Q) can be calculated by rearranging Equation 1 :

$$Q = [(Q \cdot g \cdot h) + P] / Z$$

Results

The first 50 mL syringe could be elevated 86 cm above the distal orifice of the triple-lumen catheter before flow was generated. The calculated flow was 348 mL / h. The Reynolds number (Re) corresponding with this flow rate is 123, which is much smaller than the critical value of 2300 at which the flow becomes turbulent and the Poiseuille equation is inappropriate. The flow stopped again when the syringe was 40 cm above the distal orifice of the triple lumen catheter. The heights needed for initiation of flow in the eight 50 mL syringes ranged from 60 cm

to 90 cm (mean 76 cm). In some syringes the initiation of the flow was rather slow, other syringes showed a much faster initiation. Also, flow in a syringe varied without altering its height. In none of the 20 mL syringes flow could be generated even with heights up to 3 m.

Discussion

In our patient a pressure difference of only 55 cm H_2O was required to move the plunger of the syringe. Two contributing factors are possible explanations. First, the negative intrathoracic pressure ($-10 \text{ cm H}_2\text{O}$) generated during spontaneous inspiration increases the pressure difference. Second, we found a large variability in the height and time required to generate flow in apparently identical syringes from the same manufacturer probably due to minuscule differences in the diameter of the barrel and the plunger of different syringes. After initiation of flow, the flow continued even when the height of the syringe was lowered. This is because the static resistive forces do no longer exist once the plunger is in motion and only the dynamic resistive forces remain present.

No flow could be generated with the 20 mL syringes even by increasing the height to 3 m.

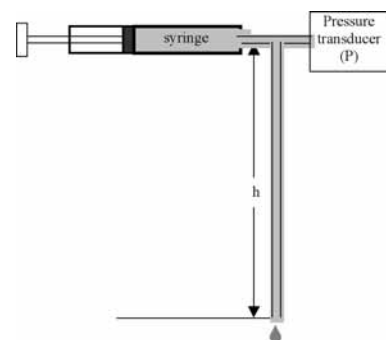
Conclusion

Siphoning occurs when a syringe is not or improperly placed in a syringe pump. There is a large variability in apparently identical syringes. Smaller syringe are safer to avoid siphoning.

References

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Figure 1 : Experimental set-up.



P is the pressure measured by the transducer. h is the height of the syringe above the distal orifice of the extension tubing.