

# Anesthesia and Research Meeting

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*Effects of intramuscular Midazolam premedication on humeral block for hand surgery.* L. BAES, M.D., J. PENEAU M.D., A. ROMAN M.D., M. SOSNOWSKI, M.D., Ph.D. Department of Anaesthesiology, Hospital Centre, Calais, France. Department of Anaesthesiology, CHU St Pierre, Brussels, Belgium.

## Introduction

The purpose of this study is to evaluate the efficacy of intramuscular midazolam premedication before humeral block for hand surgery.

We compared the anxiolytic effect, the patient's satisfaction score for humeral block, and the cardio-respiratory effects of IM Midazolam to IM Placebo (1).

## Methods

40 ASA I-II patients undergoing hand surgery under humeral block were selected in a double-blind randomized setting. 20 patients received IM Midazolam (0,1 mg/kg) 30 minutes before humeral block (2) and 20 others received placebo IM (2 ml of normal saline). Blood pressure, heart rate, respiratory rate, oxygen saturation

were measured on arrival (T1), and at T2 (30 mn after treatment). We evaluated anxiety by an Anxiety Visual Analog Test (AVAT) at T1, T2 and T3 (end of surgery), pain during the block at T2 + 5 mn by Visual Analogue Scale (VAS), and the locoregional satisfaction at T3 (scale between 0 and 10). Oxygen therapy was given through a nasal cannula if the measured oxygen saturation was inferior to 97%.

The statistic tests used are : Student, Mann-Whitney and Dunn's test. We considered that the test was significant if p value was less than 0,05.

## Results

Mean age was  $34 \pm 8$  in group M, and  $35 \pm 8$  in group P. Higher relief of anxiety was observed in group M at T2 ( $p < 0,001$ ) and at T3 ( $p < 0,001$ ).

	T1		T2		T3	
	M	P	M	P	M	P
Visual anxiety scale (median $\pm$ interquartile range)	$6 \pm 1$	$6 \pm 1$	$1 \pm 1$	$5 \pm 3$	$0 \pm 1$	$1 \pm 1$

Humeral block was less painful in group M (median  $\pm$  interquartile range :  $1 \pm 1$  ; group P : mean  $\pm$  SD :  $3 \pm 1$  ;  $p < 0,05$ ). LRA satisfaction was higher in group M (median  $\pm$  interquartile range :  $10 \pm 1,5$  ; group P :  $6 \pm 1$ ) ( $p < 0,001$ ). Mean arterial pressure was lower in group M at T2 ( $p < 0,001$ ) but the maximal difference is

less than 25%, and no inotrope was given. Respiratory rate was lower at T2 in group M ( $12 \pm 3$  ; group P :  $14,5 \pm 1,7$ ) ( $p < 0,01$ ).

4 patients in the group M needed nasal oxygenotherapy at T2 (SpO<sub>2</sub> = 96 for 3 patients, and 95 % for 1 patient).

	T1		T2	
	M	P	M	P
Mean arterial pressure (mean $\pm$ SD)	$97 \pm 14$	$99 \pm 6^*$	$86 \pm 16^*$	$97 \pm 17^*$
Heart rate (mean $\pm$ SD)	$79 \pm 12$	$81 \pm 12$	$74 \pm 11$	$78 \pm 11$
Respiratory rate (mean $\pm$ SD)	$14,0 \pm 1,7$	$14,5 \pm 1,9$	$12 \pm 3^*$	$14,5 \pm 1,7$

\* = this values are expressed by median  $\pm$  interquartile range.

## Conclusion

Performing a humeral block under midazolam premedication (0,1 mg/kg IM) lead to a better agreement of the technique and a better analgesia during block, moreover anxiety is lesser than under placebo treatment.

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*Peroperative aprotinin administration reduces perioperative cardiac troponin I (cTn) release : indication for a non-immunomodulatory mechanism.* F. DE BUCK\*, P. WOUTERS\*, P. SERGEANT\*\*, J. VAN HEMELRIJCK\*, J. CEUPPENS, E. VANDERMEERSCH\*, C. BERT\*. Departments of Anesthesiology\*, Cardiac Surgery\*\* and Immunology, University Hospital Gasthuisberg, Herestraat 49, 3000 Leuven, Belgium.

It has previously been demonstrated that aprotinin reduces both blood loss and inflammation in cardiac surgical patients. Wippermann (1), Pruefer (2) and Hendrikx (3) demonstrated a possible cardioprotective effect of aprotinin. We explored, in a prospective randomized trial, whether aprotinin has any protective myocardial effect in patients undergoing off-pump coronary artery bypass (OPCAB) grafting and whether this putative effect could be mediated through a reduction in the inflammatory reaction.

### Methods

After ethics committee approval and written informed consent, fifty patients scheduled for elective OPCAB were included. Patients were randomized to either control group (25) or aprotinin group (25). All patients received the same standard anesthetic care including lidoflazine (1 mg/kg iv). Aprotinin was given as a loading dose ( $2 \times 10^6$  KIU) before sternotomy and was followed by a continuous infusion at  $5 \times 10^5$  KIU/h. Blood samples for II-6, II-10 and cTn were taken at the following timepoints : induction of anesthesia, comple-

tion of revascularization (but before heparin neutralization), 6 h, 12 h and 24 h after revascularization.

### Results

Demographics, operating time, number of distal anastomoses (arterial and venous), frequency of intramural dissection (5 in each group) and number of perioperative ischemic events were not statistically different between both groups (data not shown). The difference in blood loss was highly significant ( $p = 0.00002$ ), 2131 ml in the control group versus 901 ml for treated patients.

There was a trend towards lower II-6 and II-10 plasma levels in the aprotinin group compared to the control group, but this difference was not significant (Fig. 1 and 2).

The cTn plasma levels did not differ significantly between both groups at time of induction but became significantly different thereafter at the time of revascularization ( $p = 0.03$ ) and 6 h ( $p = 0.004$ ) and 24 h ( $p = 0.03$ ) later. The difference in plasma levels between both groups was not significant 12 h after revascularization ( $p = 0.06$ ) (Fig. 3).

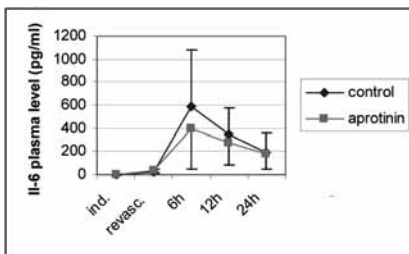


Fig. 1

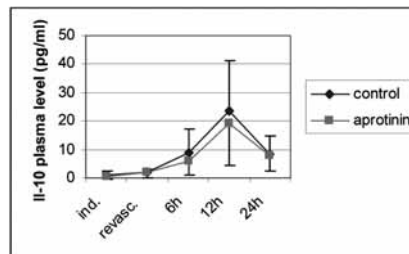


Fig. 2

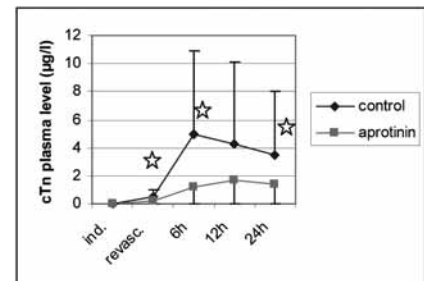


Fig. 3

### Discussion

Although aprotinin reduced the cTn release it did not significantly reduce the pro-inflammatory cytokine II-6 plasma levels nor did it augment the plasma levels of the anti-inflammatory cytokine II-10. We therefore propose that the aprotinin induced reduction in cTn release is not mediated through its anti-inflammatory action. In addition we confirmed the blood saving effect of aprotinin in OPCAB surgery.

### Conclusion

From this study it can be concluded that aprotinin reduces perioperative cTn release, indicating that aprotinin has a cardioprotective effect.

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*Efficacy of parecoxib sodium for the acute pain relief after hip surgery in comparison with propacetamol.* R. DELVAUX, M. CLAEYS, C. VANLERSBERGHE, F. CAMU. Departement of Anesthesiology, Flemish Free University of Brussels (VUB), Brussels, Belgium.

### Introduction

Opioid analgesics, although highly effective in managing acute postoperative pain, are associated with a number of adverse effects, which limit pain control and delay recovery. To deal with these problems a multimodal analgesia treatment combining NSAIDs and opioids is proposed. Conventional NSAIDs have a opioid sparing effect, however their use is associated with an altered platelet function and gastric ulceration through COX-1 enzyme inhibition. Parecoxib, a prodrug of valdecoxib and a potent inhibitor of COX-2, has a significant anti-inflammatory and analgesic action and is as efficacious as ketolorac (1). Furthermore, its use, when compared with non-selective COX inhibitors, is associated with less side effects.

The aim of this study is to assess parecoxib sodium vs propacetamol and the combination of parecoxib and propacetamol (2) for the relief of pain after hip arthroplasty.

### Methods

After ethical committee approval and written informed consent 48 ASA I-II patients, scheduled for elective total hip arthroplasty, were included in a double blind, randomised, placebo controlled study. Patients were randomly allocated to one of the following treatment groups: group 1: placebo/placebo, group 2: placebo/propacetamol 2 g IV QID, group 3: parecoxib/placebo 40 mg IV BID and group 4: the combination of parecoxib 40 mg IV BID and propacetamol 2 g IV QID. Anesthesia was performed by intraspinal administration of 10-20 mg bupivacaine 0,5%. The first dose of medication was given immediately after skin closure and subsequent dose was administered at 6 h intervals after the first dose. All patients benefited from patient controlled iv morphine (PCA), bolus dose 1 mg, lockout 6 min. Analgesic efficacy (VAS), cumulative morphine consumption and vital parameters were assessed at 2, 4,

6, 8, 10, 12, 18, 24, 30, 36, 42 and 48 h postoperatively. Data were analyzed using analysis of variance (ANOVA) and Fisher exact test where appropriate.

### Results

Patients receiving parecoxib or propacetamol or the combination of both consumed less morphine than patients receiving placebo. This morphine sparing effect was significant for patients receiving the combination of parecoxib and propacetamol. Mean cumulative amounts of morphine consumption over 48 h were  $61.91 \pm 41.22$  mg in the placebo group vs  $44.15 \pm 29.5$  mg in the propacetamol group,  $37.42 \pm 21.59$  mg in the parecoxib group and  $25.42 \pm 16.87$  mg in the parecoxib+propacetamol group respectively. Pain intensity was higher in the propacetamol group than in the other groups and this difference was significant between 24 h and 30 h postoperatively.

### Conclusion

After hip surgery parecoxib sodium and propacetamol or a combination of both produces an opioid sparing effect. Moreover administration of parecoxib 40 mg BID or the combination of propacetamol 2 g QID and parecoxib 40 mg BID resulted in an improved morphine analgesia when compared with 2 g propacetamol alone.

### References

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## Prediction of fluid responsiveness using pulse contour analysis during open chest conditions.

T. FRET, E. VANDERMEERSCH, P. WOUTERS. University Hospitals Leuven, Leuven.

### Introduction

Indices capable of predicting fluid responsiveness are essential for optimizing preload and as such haemodynamic stability. Besides static pressure indices, like central venous pressure (CVP) and pulmonary capillary wedge pressure (PCWP), a dynamic parameter is recently introduced in clinical practice. A new monitor device displays stroke volume variations (SVV) on-line using pulse contour analysis (1, 3). These variations result from the influence of positive pressure ventilation on cardiovascular loading. However, the significance and usefulness of SVV is not yet fully elucidated in open chest conditions. This study aims to evaluate SVV during open chest conditions.

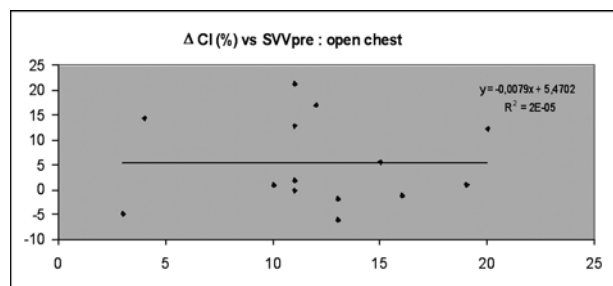
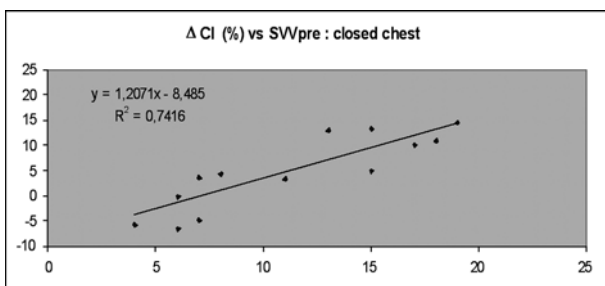
### Methods

The study was approved by the Institutional Ethical Committee and informed consent was obtained. We prospectively studied fifteen patients during off-pump coronary artery bypass (OPCAB) surgery. All patients were ventilated in a volume-controlled mode (8 ml/kg tidal volume). A pulmonary artery catheter was used for assessment of cardiac index (CI) with the thermodilution

technique. CVP, PCWP and CI were recorded. In addition, SVV was derived from pulse contour analysis (PulseCo system, UK). Baseline measurements were obtained in closed chest conditions before and after a legs-up manoeuvre (45 degrees) simulating a fluid load. The change in CI (DCI) resulting from the legs-up manoeuvre was a measure for fluid responsiveness. The hemodynamic data set was repeated after sternotomy and a sternal spread of 10 cm. The relation between the preload indices before the legs-up manoeuvre ( $CVP_{pre}$ ,  $PCWP_{pre}$ ,  $SVV_{pre}$ ) and the resulting DCI was evaluated with the Pearson correlation test as measure of predictability during closed and open chest conditions.

### Results

One patient was excluded because of new-onset supraventricular extra-beats. In closed chest conditions there was a strong correlation between  $SVV_{pre}$  and DCI ( $R^2 = 0.74$ ;  $p < 0.0001$ ). No correlation was found between  $CVP_{pre}$  nor  $PCWP_{pre}$  and DCI. In open chest conditions there was no correlation between  $SVV_{pre}$  nor  $PCWP_{pre}$  and DCI. Only  $CVP_{pre}$  correlated with DCI ( $R^2 = 0.31$ ;  $p = 0.0456$ ).



### Discussion

The influence of positive pressure ventilation on cardiac loading conditions can be used to derive a sensitive predictor (SVV) of fluid responsiveness. The findings of our study in closed chest conditions are consistent with previous studies. However, in contrast to the study of Reuter *et al.* (2), we found that in open chest conditions this index is of no value. Due to altered mechanics after sternotomy and sternal spread, the heart-lung interactions change. Consequently, the technology using these complex interactions is influenced, making SVV measurement unreliable during open chest conditions. In these conditions, CVP correlated with fluid responsiveness suggesting an important role for the right ventricle.

### Conclusion

In open chest conditions the new dynamic preload index SVV is no reliable predictor of fluid responsiveness.

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*Effect of intravenous lidocaine on EEG spectral entropy and haemodynamic responses to laryngoscopy and tracheal intubation: preliminary results.* D. GONZALEZ ALONSO, V. BONHOMME, P. HANS, P.-Y. DEWANDRE, J. F. BRICHANT. University Dpt of Anaesthesia & Intensive Care Medicine, CHR Citadelle, Liège University Hospital, Liège, Belgium.

### Background & Goal of Study

EEG spectral entropy can be used to monitor the depth of anaesthesia (1, 2, 3). We investigated the effect of IV lidocaine on entropy and on haemodynamic responses to laryngoscopy (L).

### Materials & Methods

After IEC approval, 20 ASA I or II consenting patients undergoing routine surgery were studied. They were randomly allocated to receive either 1 mg kg<sup>-1</sup> lidocaine (n = 10) or the same volume of saline (n = 10) before L. The event sequence was the following, each event occurring at the beginning of the 1 min non-invasive blood pressure (NIBP) measurement cycle: 0.15 µg kg<sup>-1</sup> sufentanil (L-5 min), 2 mg kg<sup>-1</sup> propofol (L-4), 0.15 mg kg<sup>-1</sup> cisatracurium (L-3), lidocaine or saline (L-2), 1 min before L (L-1), 20 sec duration L (L-0) and every min for 5 min after L (L+1 to L+5). Mean blood pressure (MBP), heart rate (HR), response (RE) and state (SE) entropy (Datex-Ohmeda™ M-Entropy™) were recorded. Data were analyzed using two-way mixed-design ANOVA's for 'Group' and 'Time' (from L-3 to L+5), and Tuckey's HSD tests. P < 0.05 was considered significant.

### Results

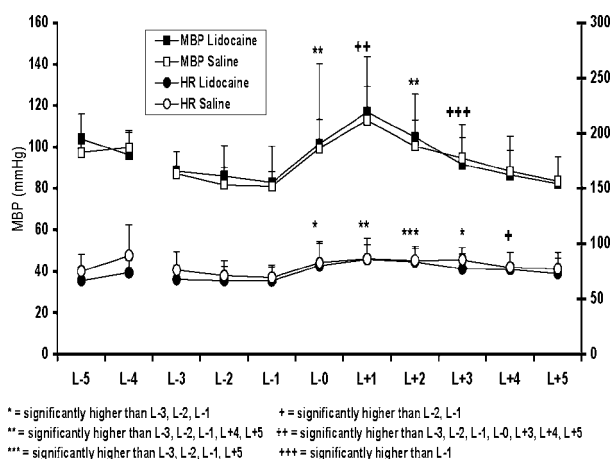
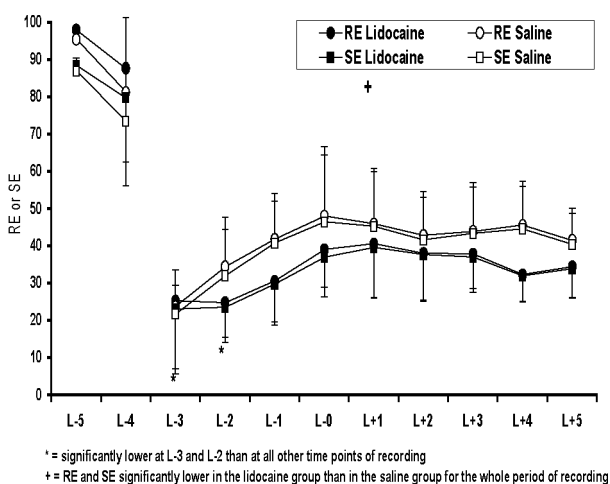
MBP, HR, RE and SE were comparable in both groups before induction. There was a significant difference between groups after induction for RE and SE but not for haemodynamics.

### Discussion

We observed a significant main effect of 'Group' and 'Time' for RE and SE without interaction between the two, and a significant main effect of 'Time' for haemodynamics. Hence, from L-3 to L+5, RE and SE were significantly lower in patients who received lidocaine. L was associated to an increase in MBP and HR, but not in RE and SE. There was no difference between groups. The study power for detecting an interaction between 'Group' and 'Time' was low.

### Conclusion

This preliminary study demonstrated that IV lidocaine administration after induction of anaesthesia lowered entropy during the laryngoscopy period. Additional patients must be recruited to evidence or reject a lidocaine-related differential haemodynamic or entropy response to laryngoscopy.



### References

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*Effects of acute isovolemic hemodilution on left ventricular function in cardiac surgery patients.*

L. H. JACOBS, S. CROMHEECKE, P. W. TEN BROECKE, S. G. DE HERT. University Hospital Antwerp, Edegem, Belgium.

*Introduction*

Increasing awareness of allogeneic transfusion-related complications has prompted physicians to search for save alternatives. Among these, acute isovolemic hemodilution (ANH) has been suggested as an inexpensive and effective means of reducing allogeneic blood exposure especially in cardiac surgery patients (1). However, the precise effects of ANH during total intravenous anesthesia on left ventricular function have not yet been determined in cardiac patients.

*Methods*

Ten elective coronary surgery patients received a midazolam based anesthesia. The study was approved by the Institutional Ethical Committee, and written informed consent was obtained. After aortic cannulation a pressure micromanometer was inserted in the left ventricle (LV). The measurements consisted of recordings of electrocardiographic and LV pressure tracings during an increase in systolic and diastolic pressure, obtained by leg elevation (2). Measurements were obtained before and after ANH. Arterial and mixed venous blood gases were taken before and after ANH. Data were compared using a paired t-test. All data (mean  $\pm$  SD) were considered significant if  $p < 0.01$ .

*Results*

ANH resulted in a decrease in hematocrit (hct) from  $40 \pm 4$  to  $29 \pm 2\%$ . After ANH, cardiac output (CO) increased significantly from  $5.6 \pm 1.1$  to  $6.7 \pm 1.3$  l/min. This was associated with a significant decrease in systemic vascular resistance from  $908 \pm 166$  to  $760 \pm 160$  dyne.sec.cm<sup>-5</sup>.

With ANH, oxygen delivery significantly decreased from  $987 \pm 191$  to  $830 \pm 141$  ml/dl. Oxygen consumption was similar before and after ANH, hence oxygen extraction ratio increased significantly from  $16 \pm 1$  to  $20 \pm 1\%$ . Compared to before ANH, the increase in  $dP/dt_{max}$  with leg elevation was significantly lower after ANH ( $60 \pm 40$  before ANH versus  $23 \pm 33$  mmHg after ANH). The rate of isovolemic relaxation ( $\tau$ ) significantly increased from  $60 \pm 7$  to  $64 \pm 6$  ms with ANH. The change in  $\tau$  with leg elevation was also significantly different before and after ANH ( $-1 \pm 1$  versus  $2 \pm 1$  ms).

*Conclusion*

Preservation of tissue oxygenation during acute isovolemic hemodilution depends on an increase in cardiac output and an increase in blood oxygen extraction. After ANH, we observed a compensatory CO increase and a depressed myocardial function as evident from a slower myocardial relaxation and a decreased response in  $dP/dt_{max}$  with an increase in cardiac load.

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*Haemolysis and plasma-activation of left venting blood during cardiopulmonary bypass.*  
G. JONCKHEERE, P. VERRELST, G. VAN MAELE, E. SCHELSTRAETE, J. P. MULIER, P. VANLANCKER. AZ Sint Jan Brugge, Brugge, Belgium.

*Patients*, ANESTHESIOLOGY, **90**, 748-57, 1999.

*Introduction*

During cardiopulmonary bypass the collection of the patient's blood from the operating field permits haemodynamic stability and avoidance of homologous blood transfusion. Several studies reported an activation of blood collected from the pericardial and pleural cavities after suctioning, eventually impairing postoperative haemostasis (1, 2). Free plasma haemoglobin (FPH) is an important marker of haemolysis and plasma-activation. The purpose of our study was to examine the extent of haemolysis and plasma-activation of the left venting blood coming from the canula inserted in the aortic root which is redirected into the venous reservoir.

Left venting blood FPH was then compared to cardiotomy and arterial blood FPH.

*Methodology*

Study population: after approval of the ethical committee and patient written informed consent we determined FPH in 10 patients undergoing elective

CABG procedure under CPB (3 to 6 coronary bypass grafts). We excluded urgent CABG, valve surgery and patients with blood disease, haemoglobin less than 8.5 g/dl, severe liver disease and kidney failure. Patients served as their own control.

Demographic data of the patients: gender ratio was 2F/ 8M, average age was 64.5 +/- 7.3 yrs, with average weight 75.5 +/- 12.9 kg and average height 169 +/- 6.1 cm.

Sampling times: four samples were taken: baseline Hct five minutes after heparinisation (T<sub>0</sub>), ten minutes after clamping the aorta (T<sub>1</sub>), five minutes before declamping (T<sub>2</sub>) and five minutes after protamine administration (T<sub>3</sub>).

The blood from the field was directed to a separate reservoir for washing after weaning from CPB.

Clinical data relating to the FPH were corrected for haemodilution according to FPH corrected = FPH x Hct baseline / Hct at time T.

*Results*

Time	Arterial	p-value	L-Venting	p-value	Pericard
T <sub>0</sub>	36.4		-		-
T <sub>1</sub>	40.4	N.S.	44.6	< 0.05	7,690.0
T <sub>2</sub>	95.2	< 0.05	61.5	< 0.05	10,115.9
T <sub>3</sub>	490.8				

FPH (mg/l) average

FPH increases during the procedure. There is less increase of FPH in left venting blood. Arterial FPH after weaning from CPB at T<sub>3</sub> is considerably higher than before declamping. At T<sub>2</sub> arterial FPH is significantly higher than left venting FPH.

*Conclusion*

A significant FPH difference between arterial and left venting blood is observed before removal of the crossclamp at T<sub>2</sub>. Lower FPH values in left venting blood suggests less haemolysis than arterial blood. As

left venting blood can be longer tolerated in the left ventricle, it is in time less in contact with nonendothelial surfaces than arterial blood circulating through the bypass pump.

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*Prophylactic intravenous tropisetron does not reduce the incidence of intrathecal sufentanil-induced pruritus in patients undergoing cesarean delivery.* T. LOONES, PH. VAN LANCKER. Department of Anesthesiology, AZ St. Jan hospital Bruges, Belgium.

*bypass : update*, PERFUSION, 345-351, 2001.

#### Introduction

Itching is an observed side effect after administration of intrathecal opioids.

Some studies have reported that ondansetron is successful in preventing intrathecal opioid-induced pruritus (1, 2).

We questioned whether tropisetron, an other selective serotonin III receptor antagonist, would also be effective.

#### Methods

Forty non breastfeeding women, scheduled for elective caesarian delivery, were included in a randomised, double-blind way after informed consent was written. All patients received an intrathecal injection of 7-10 mg levobupivacaine and 5 µg of sufentanil for combined spinal and epidural anesthesia.

The patients were randomly assigned into two

groups. Group 1 received tropisetron 5 mg IV and group 2 received placebo immediately after the umbilical cord was clamped.

Severity and location of pruritus were assessed every 15 minutes for the first 2 hours, then every 2 hours for the next 10 hours and once the morning after. The degree of pruritus was classified as 0 = no pruritus, 1 = mild pruritus (no treatment needed) and 2 = severe pruritus (treatment needed).

Statistical analysis was performed with chi-square or Mann-Whitney tests as appropriate.

A P value of < 0, 05 was considered significant.

#### Results

The incidence of pruritus was not significantly different in the two groups. At arrival in the recovery the incidence was 47, 6 % in the tropisetron group vs 52, 6 % in the placebo group (see table). At 4 hours the incidence was 15% vs 17, 6% (P = 1). At 12 hours the incidence

was 4, 8% vs 5, 3% (P = 1).

#### Discussion

Serotonin type III receptors are abundant in the dorsal horn area of the spinal cord and in the spinal tract of the trigeminal nerve in the medulla. Morphine activates serotonin type III receptors by a mechanism independent of opioid receptors. Therefore, pruritus may be induced by a direct stimulation of serotonin type III receptors. Several studies investigated the effect of ondansetron in preventing or treating intrathecal opioid-induced pruritus with contradictory findings. We found no previous reports in the literature on the effectiveness of tropisetron in the prevention of intrathecal opioid-induced pruritus.

There is, however, still a lack of valid data on the efficacy of interventions for the treatment of established pruritus.

#### References

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Table  
At arrival in recovery

			group		total
			placebo	tropisetron	
pruritus	none	n	9	11	20
		%	47.4%	52.4%	50.0%
	mild	n	9	10	19
		%	47.4%	47.6%	47.5%
	serious	n	1	0	1
		%	5.2%	.0%	2.5%
total	n		19	21	40
	%		100.0%	100.0%	100.0%

Chi-square test : P = 0.561.

#### Conclusion

In this small study tropisetron has not been found to prevent sufentanil-induced pruritus in patients undergoing cesarean delivery. Probably other mechanisms, independent of the serotonin receptor, are also involved in the pathogenesis of opioid-induced pruritus. Numerous other drugs, such as naloxone, naltrexone, droperidol, propofol and antihistaminic drugs (diphenhydramine) have all been used with varying success.

*N-terminal pro B-type natriuretic peptide is an independent predictor for de novo atrial fibrillation after cardiac surgery.* L. MASAMUNA, D. LEDOUX, P. DAMAS. University Hospital of Liège – General Intensive Care Department, Domaine Universitaire du Sart Tilman Batiment B35.

*pruritus*, ANESTH. ANALG., **95**, 1763-6, 2002.

### Introduction

Although it has no significant impact on hospital outcome after cardiac surgery, atrial fibrillation (AF) is associated with significantly prolonged ICU and hospital stay (1). The development of tools that identifies patients at risk for developing de novo AF is therefore justified. This could help in clinical management as well as for risk stratification in research on AF prevention.

### Material and Methods

From March 2003 to September 2004, we prospectively collected preoperative characteristics and preoperative N-terminal proBNP level (2) (Elecsys® Roche) in all consecutive patients undergoing heart surgery (n = 619). Patients with prior history of AF were excluded from analysis (n = 100). Potential variables for risk prediction were preoperative risk factors for AF described

in the literature (3) : age, chronic obstructive pulmonary disease (COPD), diabetes, history of hypertension (HT), history of myocardial infarction (MI), left ventricular ejection fraction (LVEF), NYHA classification, history of angina, pulmonary hypertension, history of cardiac surgery, history of extra cardiac arterial disease, complex surgery (other than CABG), preoperative creatinine and BNP level. Univariate and multivariate analysis were made using a logistic regression method to assess statistic significance.

### Results

Patient demographic characteristics are presented in table 1. Among the preoperative risk factors for AF described in the literature, five were univariate predictors (table 2). The multivariate analysis kept two independent risk factors : age and N-terminal proBNP level. The odds ratio for age and N-terminal proBNP level are

Table 1

Baseline Characteristics of population (n = 519)

Age (yrs)	66.3 ± 11.9
Men	349 (67.2%)
Unstable preoperative status	63 (12.1%)
Prior cardiac surgery	31(6%)
Systemic hypertension	362 (69.7%)
Diabetes mellitus	117 (22.5%)
NYHA class (n = 511)	I 120 (23.1%)
	II 188 (36.2%)
	III 146 (28.1%)
	IV 57 (11.0%)
LVEF (n = 461)	Poor 14 (3%)
	Moderate 88 (19.1%)
	Normal 359 (77.9%)
N-ter proBNP (P25 – M - P75)	175 – 473.5 – 1351.5

presented in table 3.

### Discussion

The identification of patients at high risk for postoperative atrial fibrillation give the opportunity to adapt perioperative strategies in order to decrease associated morbidity, to shorten hospital stay and possibly to decrease health care costs.

### Conclusions

Age and N-terminal B-type natriuretic peptide are potent preoperative independent predictors for de novo atrial fibrillation after heart surgery.

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Table 2

Preoperative risk factor for atrial fibrillation

	Univariate	Multivariate
Age	p < 0.001	p < 0.001
Pulmonary hypertension	p = 0.015	NS
Extra cardiac vasc. disease	p = 0.020	NS
Complex surgery	p = 0.013	NS
N-ter proBNP	p < 0.001	p = 0.011
Creatinine (> 12 mg/l)	p = 0.012	NS
NYHA class IV	p = 0.055	NS

Table 3

Odd ratios

Age	50 – 59	3.62
	60 – 69	4.73
	70 – 79	9.05
	> 80	17.18
N-ter proBNP	1 <sup>st</sup> quartile	1
	2 <sup>nd</sup> quartile	1.67
	3 <sup>rd</sup> quartile	1.91
	4 <sup>th</sup> quartile	2.33

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*A comparison between bispectral index and three versions of the A-Line® Auditory Evoked Potential Index to predict a calculated propofol effect-site concentration during a transition from fully awake to maximal burst suppression.* S. A. R. PICAUVET, M.D., H. E. M. VEREECKE, M.D., O. THAS, Ph.D., E. P. MORTIER, M.D., D.Sc., M. M. R. F. STRUYS, M.D., Ph.D. Universitair Ziekenhuis Gent, Universiteit Gent.

### Introduction

The clinical introduction of multiple electroencephalographic (EEG) and/or mid-latency auditory evoked potentials (MLAEP) derived indices for measuring the hypnotic component of anesthesia, implies a need for objective methods to compare performance (1). We investigated four indices in their ability to predict a calculated propofol effect-site concentration (CePROP). We compared the bispectral index (BIS), the A-Line® Auditory Evoked Potential Index version 1.5 (AAI<sub>1.5</sub>), which is derived from solitary MLAEP, and the new A-Line® Auditory Evoked Potential Index version 1.6, which is the first monitor to combine EEG, MLAEP and burst suppression derived information in a single index. This new monitor is proposed with two scales, ranging from 0 to 100 (AAI<sub>1.6\_100</sub>) and 0 to 60 (AAI<sub>1.6\_60</sub>).

### Methods

After ethics committee approval and patients informed consent, we included 13 ASA I patients (10 female, 3 male), aged 18-65 years, scheduled for minor ambulatory surgery. BIS and AAI<sub>1.6\_100</sub> were fixed as prescribed

by the manufacturers. AAI<sub>1.5</sub> and AAI<sub>1.6\_60</sub> were extracted post hoc from the AAI<sub>1.6\_100</sub> raw data. Propofol 1% was administered at 300 ml/h via a computer-assisted continuous infusion device (RUGLOOP) until maximal burst suppression was reached. Simultaneously, RUGLOOP calculates the corresponding CePROP, using the pharmacological Schnider model (2). Patients remained breathing spontaneously throughout the study period. Baseline variability was calculated for every index by the coefficient of variation (CV) in the awake patient. Correlation between every index and CePROP was statistically analyzed using both prediction probability (P<sub>k</sub>) and the individualized Spearman Rank (ISR) correlation test. Statistical significance was assessed with the T-test with Bonferroni correction ( $p < 0.05$ ).

### Results

Results are shown in table below. Although no significant difference was found between P<sub>k</sub>'s, a better result was found for the ISR correlation coefficients of AAI<sub>1.6\_100</sub> versus AAI<sub>1.5</sub>, and for the AAI<sub>1.6\_60</sub> versus all other indices.

	BIS	AAI1.5	AAI1.6_100	AAI1.6_60
Mean	96.12	90.06	87.00	58.69
SD	2.40	21.16	20.60	8.58
Coef. Var.	0.02	0.23	0.24	0.15
P <sub>k</sub> , median (min-max)	0.91 (0.70-0.98)	0.90 (0.73-0.94)	0.92 (0.75-0.98)	0.89 (0.75-0.97)
ISR correlation mean ± SD (95% CI)	-0.686 ± 0.033 (-0.748 -0.618)	-0.661 ± 0.032 (-0.721, -0.597)	-0.753 ± 0.031 (-0.813, -0.691)	-0.959 ± 0.005 (-0.967, -0.949)

### Discussion

Baseline variability should be low for a better performance of hypnotic indices in a sedation setting (3). Most MLAEP derived indices are characterized by excessive baseline variability. The decreased scale of the AAI<sub>1.6\_60</sub> improves the CV for prediction of CePROP compared to AAI<sub>1.5</sub> and AAI<sub>1.6\_100</sub>. Because P<sub>k</sub> analysis is dependent on the characteristics of the raw data input, the ability to detect a difference in performance becomes questionable. As a non parametric alternative, the ISR correlation depicts the non linearity in the data set more accurately than P<sub>k</sub> analysis and is an acceptable alternative to compare indices with different units. The question remains if the better results of the AAI<sub>1.6\_60</sub> are reflecting a better performance for detecting the clinical endpoints of hypnotic drug effects.

### Conclusions

We found that BIS has the better baseline variability compared to MLAEP extracted indices. By combining information extracted from EEG, MLAEP and burst suppression, the ability of the AAI<sub>1.6\_100</sub> to predict a cal-

culated CePROP is significantly improved compared to AAI<sub>1.5</sub>. The reduction in upper scale limit to 60 improves results even more but should be validated by using clinical endpoints.

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## Do muscle relaxants prevent high intraabdominal pressures during laparoscopic bariatric surgery ?

P. VAN STEELANT, J. P. MULIER. AZ Sint-Jan, Ruddershove 10, 8000 Brugge.

### Introduction

The administration of muscle relaxants is supposed to prevent high intraabdominal pressures induced by pneumoperitoneum during laparoscopy, and to improve intraoperative surgical conditions(1), but on the other side their use coincides with postoperative morbidity. In addition, previous studies reported anesthetic management without the need for neuromuscular blocking drugs during pneumoperitoneum (2). In the present study, we evaluated whether the use of muscle relaxants prevented high intraabdominal pressures (> 15 mmHg). Furthermore we also looked with which concomitant circumstances eg. 1) external surgical manipulation 2) change in patient positioning 3) breathing against the machine, high intraabdominal pressures took place, if ever they occurred.

### Methods

After the ethical committee approval, 10 patients (ASA II, BMI > 30), scheduled for laparoscopic gastric surgery were incorporated in the study. Anesthesia was induced intravenously with 200 mg propofol, 20 µg sufentanil and cisatracurium (0,1 mg/kg). A 'balanced' anesthesia was further given with a sevoflurane and N<sub>2</sub>O/O<sub>2</sub> mixture at 1 MAC. Sufentanil boluses were given if requested during laparoscopy.

After intubation, the patient was mechanically ventilated through a controlled minute ventilation-modus (CMV). End tidal-CO<sub>2</sub> was kept between 35 and 45 mmHg. No PEEP was used. CO<sub>2</sub> was insufflated through a Verres needle placed through an abdominal midline incision until intraabdominal pressure reached 15mmHg. IAP was recorded continuously with the head in a 15° head-down position and was considered elevated when it exceeded 15 mmHg end-expiratory. Neuromuscular monitoring was performed through a train-of-four stimulation (TOF) of the ulnar nerve every 5 min-

utes and whenever the IAP exceeded 15 mmHg. When the TOF-stimulation produced 3 or more responses, 2 mg cisatracurium was injected. When IAP rose, any external surgical manipulation, change in patient positioning or breathing against the machine was taken into consideration and checked for.

### Results

During ten laparoscopies, 23 episodes of IAP rising occurred. TOF was 0 at 13 occasions, 1 at 6 occasions and 2 at 4 occasions. In 21 of the 23 rising episodes, there was a clear external surgical manipulation of the abdomen: insertion of trocars and placement of pathways into the abdomen or a direct manipulation of the abdomen by the surgeon. No clear correlation with external surgical manipulation, no change in patient positioning and no breathing against the machine was observed in two cases. The first case was observed at a TOF-stimulation with 0 responses and occurred 30' after the beginning of the laparoscopy (BMI 40 – IAP 17 mmHg). The second case was seen with a TOF-stimulation with 0 responses and occurred at the beginning of the laparoscopy (BMI 36,5 – IAP 19 mmHg).

### Discussion

These results reveal that high intraabdominal pressures during laparoscopic bariatric surgery can occur notwithstanding adequate surgical muscular relaxation. In all but two instances, these were visibly due to external surgical manipulation. Whether compliance of the abdomen in 23 episodes of IAP rising in 10 laparoscopies morbidly obese people is affected by neuromuscular block must therefore be further investigated through pressure – volume loops with and without muscle relaxants, on the same patient.

### Conclusion

This preliminary study shows that high intraabdominal pressures during laparoscopic bariatric surgery are not prevented by the use of muscle relaxants. These are associated with external surgical manipulation in the absence of breathing against the machine. No association with change in patient positioning was found.

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Table

23 episodes of IAP rising in 10 laparoscopies

	TOF 0	TOF 1	TOF 2
Patient 1	1	1	1
Patient 2	1		1
Patient 3	3	1	
Patient 4	3		
Patient 5	1		
Patient 6	2		
Patient 7	2		1
Patient 8		1	
Patient 9		2	
Patient 10		1	1

*Effect of sevoflurane or propofol general anesthesia on electrocorticography during multiple subpial transection.* S. WALCKIERS, M.D., M.-A. DOCQUIER, M.D., M. VAN BOVEN, M.D., G. VAN RIJCKEVORSEL, M.D., Ph.D., B. ABU SERIEH, M.D., C. RAFTOPOULOS, M.D., Ph.D. St.-Luc Hospital, University of Louvain, Av. Hippocrate 10, 1200 Brussels, Belgium.

### Introduction

Multiple subpial transection (MST) is a surgical procedure proposed to patients with focal epilepsy refractory to all medical treatments and not accessible to resective surgery because the epileptic focus is localized in a highly functional area. Intraoperative electrocorticography (ECoG) is extremely important to delimit the epileptogenic area and hence to guide MST. However, under general anesthesia, many anesthetic agents influence the ECoG by suppressing or propagating electrical brain activity (1). Sevoflurane (S) possesses counteracting effects. On one side it was reported to decrease epileptic discharge in patients with temporal lobe epilepsy under fentanyl-based anesthesia (1). On the other side S can induce epileptic activity corresponding to epileptogenic foci in patients with seizure disorders (2). Propofol (P) displays a dose-dependant effect ranging from excitatory (low dose) to burst suppression (high dose) (3). We report our early-stage experience of anesthesia in ten patients who benefited from MST.

### Material and methods

Five children and five adults (8 to 50 years, mean of 22,5 years) with refractory epilepsy were selected for MST. Premedication involved regular anticonvulsants with Prazepam if needed.

Anesthesia was induced either intravenously with sufentanil (0,3 mcg/kg), propofol (P) (2 mg/kg) and atracurium to facilitate tracheal intubation or by inhalation with sevoflurane (S) (up to 8 vol %). Anesthesia was then maintained with oxygen in air, sufentanil and either P (TCI 3 to 4 mcg/ml in adults or 10 to 15 mg/kg/h in children) or S (1 MAC) in order to ensure adequate

depth of anesthesia. Monitoring included ECG, SpO<sub>2</sub>, invasive blood pressure, central venous catheter, rectal temperature, bladder catheter. An ECoG and contralateral EEG were performed during the surgical procedure and analysed by an electrophysiologist present in the operating room. Mild hypocapnia (PaCO<sub>2</sub> : 30-34 mmHg) and normothermal conditions were respected.

### Results

Under both conditions of our anesthesia protocol (S or P), epileptic activity could be elicited on ECoG and hence guide the surgery. MST was performed in all patients and they benefited from good clinical evolution after more than one year.

### Conclusion

In this small series, the effect of sevoflurane or propofol general anesthesia on ECoG allowed adequate conditions for MST.

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