
Introduction

Coagulation is frequently deranged after on-pump cardiac surgery. Early goal-directed therapy in bleeding patients is thought to reduce overall exposure to blood products and to improve outcome. Thromboelastography (TEG) has the advantage of being readily available and to assess whole blood clotting. However its sensitivity for detecting a low platelet count and a low fibrinogen level might be low in the perioperative setting (1). We tested the hypothesis that taking into account the preoperative platelet count in addition to TEG parameters obtained after cardiopulmonary bypass (CPB) would improve the sensitivity to detect a low platelet count after CPB.

Materials and Methods

After IRB approval, data were retrospectively collected on 67 consecutive adult patients considered at risk of bleeding after cardiac surgery involving CPB. Preoperatively, a platelet count and usual clotting tests were available for all patients. Heparinase TEG (TEG® 5000, Haemoscope Corp®, IL, USA), platelet count and usual clotting tests were obtained after CPB, 10 minutes after protamine administration. TEG parameters associated with a postoperative platelet count < \(100 \times 10^3 \text{µl}^{-1}\) were identified in a stepwise backward multiple logistic regression model with a P value threshold of 0.05 for leaving the model. The nested model including TEG parameters only was then compared with a full model comprising both the preoperative platelet count and the TEG parameters using the likelihood ratio test.

Results

The maximal amplitude (MA) was the only TEG parameter significantly associated with a platelet count lower than \(100 \times 10^3 \text{µl}^{-1}\) after CPB (\(P < 0.001\)). In this TEG-based model, best sensitivity (88.6%) and specificity (81.2%) for detecting patients with platelets \(\leq 100 \times 10^3 \text{µl}^{-1}\) were obtained using MA < 60 mm as a threshold value. Adding the preoperative platelet count to the TEG-based model resulted in a significant improvement of the model (\(P = 0.018\)). Figure 1 shows how the preoperative platelet count affects the probability of having a platelet count < \(100 \times 10^3 \text{µl}^{-1}\) after CPB according to whether MA is superior to 60 mm or not.

Discussion

Taking into account the preoperative platelet count refines the TEG-based diagnostic probability of thrombocytopenia after CPB. The impact of the preoperative platelet count on the probability of thrombocytopenia after CPB seems particularly important when MA is above 60 mm. The impact of the fibrinogen level on the relationship between MA and platelet count deserves further investigations.

References

Influence of the frailty on the post-operative pain: a retrospective analysis. O. Clarinval, M.D., M. De Koeck, Ph.D., J.-L. Scholtes, Ph.D., P. Lavand’Homme, Ph.D. Department of Anaesthesiology, Université Catholique de Louvain, Bruxelles, Belgium.

Introduction

Frailty is defined as a state of vulnerability including dependency, falls, disability, need for long-term care and mortality. It is associated with impairment in multiple physiological systems, reduced functional reserve and ability to regain physiological homeostasis. Surgical trauma and post-operative pain which often remains unknown and under-treated may speed up decline. In our data analysis, we have crossed the scores of the post-operative pains (Numeric Rating Scale at rest, NRS at movement, painkillers consumption and duration of the treatment) with the score on the Edmonton frail scale (1) to demonstrate a link, if any, between post-operative pain and frailty.

Analysis and methods

The Department of Anaesthesia of the Saint-Luc University clinics offers a follow-up service for post-operative pain, the Post-Operative Pain Service. A retrospective analysis were performed with the post-operative data collected between the 12/01/2012 and the 10/31/2013 and analysed with the XLSTAT program Version 2014.2.04 Copyright Addinsoft 1995-2014. The results were not significant.

First of all, we analysed Old-group versus Young-group. As expected, differences in duration of treatment (1.97 D Vs 2.14 D, p = 0.017), NRS at rest at day 1 (2.32 Vs 2.92, p < 0.0001), NRS at movement at day 1 (4.52 Vs 5.09, p = 0.001) and consumption of local anaesthetic (115 ml Vs 128 ml, p = 0.011) and opioids (9 ml Vs 12.3 ml, p < 0.0001) were significant. Nevertheless results for O-group at day 2 or day 4 were lower than Y-group, differences did not reach statistical difference.

Then on the other hand we compared “not frail patients” (NFP-group) and Y-group and on the other we compared “frail patient” (FP-group) with Y-group. Results of the analysis between NFP-group and Y-group were the same as previously : lower duration of treatment (2.02 D Vs 2.31 D, p = 0.084), lower consumption of local anaesthetic (119 ml Vs 129, p = 0.091) and opioids (9 ml Vs 12.3 ml, p = 0.001), lower score with NRS at rest or movement, even if all difference weren’t significant. We found same results by comparing FP-group and Y-group except with NRS at rest and at movement for day two to day four which were higher in frail patients. The results were not significant.

Finally, we compared NFP-group and FP-group. Duration of treatment (2.02 D Vs 1.85 D, p = 0.404) and consumption of local anaesthetic (day 1 : 119 ml Vs 108 ml, p = 0.321 and day 3 160 ml Vs 124 ml p = 0.081) were higher in NFP-group than FP-group but not significant. Surprisingly, NRS at rest and movement were higher in FP-group than NFP-group (at rest : 2.37 Vs 1.73, at movement 4.45 Vs 3.85).

Discussion

Although old patients seem to be less painful in view of analgesics consumption, surprisingly, the frail tend to feel more pain. This must be confirmed by analysis of greater population in our prospective study. Cognitive defect or disability of frailty patient could be a reason of underuse of PCA or NRS and could explain this result. In any case, analgesic treatments have to be adapted to each patient and his painful. Physiologically, reasons (2) given are the modifications of the nervous and peripheral system linked to age (decrease of the β-endorphin and of the GABA and their receptors) and the decline of the functions of the C and Aδ fibres.

References

Operating room discharge is faster and more predictable after deep neuromuscular block reversal with sugammadex. A comparison with a shallow block reversed by neostigmine. G. Delnooz, O. Thomas, L. Putz, Chr. Dransart, J. Jamart, O. Donnez, Ph. Dubois. CHU Dinant Godinne 1, Avenue Therassé, 5530 Yvoir, Belgium.

Introduction

Inducing a deep neuromuscular block (NMB) demonstrated to improve the laparoscopic conditions (1). Sugammadex allows fast and predictable reversal of any degree of NMB induced by rocuronium (2). However the cost-effectiveness of the combination in daily clinical practice is still uncertain (3). We performed a study to compare a deep NMB reversed by sugammadex with a shallow NMB reversed by neostigmine/glycopyrrolate after gynecologic laparoscopic surgery. We assessed the time saved with the use of deep NMB and sugammadex to glimpse the economic opportunities that could be related.

Materials and Methods

After the agreement of the Institutional Ethics Committee and the written approval of informed subjects, 100 women ASA I-II between 18 and 80 years old were randomized by minimization in two groups before undergoing a laparoscopic hysterectomy under general anesthesia. Group A was induced in moderate NMB by rocuronium 0.45 mg.kg⁻¹ and recovered spontaneously except when unacceptable surgical conditions occurred (rescue 5mg bolus). Group B was induced in deep NMB by rocuronium 0.6 mg/kg⁻¹ and reinduced with 5 mg bolus at train-of-four (TOF) count 2. The neuromuscular level of blockade was evaluated every 15 seconds by thumb adductor electromyography. At the end of surgery (abdominal ports removal), NMB was reversed either with neostigmine/glycopyrrolate 50 µg.kg⁻¹ (Group A, TOF count > 3) or with sugammadex 4 mg.kg⁻¹ (Group B, Posttetanic count > 1). Their effects were monitored until TOF ratio reached 0.9, allowing to wake and extubate the patient. We recorded the duration of the surgery (T1), the duration of NMB reversal (from the reversal agent injection until TOF ratio 0.9, allowing to wake and extubate the patient) was compared between the end of surgery and the operating room’s discharge (T3) and the total time spent in the operating room (OR) (T4). These different timings were compared between the two groups by the Wilcoxon rank sum test and are presented in the table below. P-values < 0.05 are considered as statistically significant.

<table>
<thead>
<tr>
<th>Time (h:mm:ss) (mean ± SD)</th>
<th>Group A (n = 50)</th>
<th>Group B (n = 50)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 Surgery</td>
<td>1:14:03 ± 0:22:39</td>
<td>1:09:25 ± 0:22:19</td>
<td>0.278</td>
</tr>
<tr>
<td>T2 Reversal</td>
<td>0:09:56 ± 0:15:26</td>
<td>0:02:37 ± 0:01:09</td>
<td>0.001</td>
</tr>
<tr>
<td>T3 OR discharge</td>
<td>0:13:52 ± 0:11:26</td>
<td>0:09:09 ± 0:04:17</td>
<td>0.005</td>
</tr>
<tr>
<td>T4 OR time</td>
<td>2:01:08 ± 0:28:08</td>
<td>1:51:20 ± 0:24:58</td>
<td>0.103</td>
</tr>
</tbody>
</table>

The potential benefit in reducing the duration of surgery with deep NMB, nor the overall time spent in the OR did not reached statistical significance. On the other hand, the Wilcoxon rank sum test demonstrated a highly significant difference in the time for NMB reversal (T2) and in the time for OR’s discharge (T3). The maximal range of T3 (Group A 1:12:00 vs Group B 0:22:00) was clinically relevant as the inter-individual variability of reversal with neostigmine resulted in unpredictably delayed discharge from OR.

Discussion

Using sugammadex to reverse deep NMB is associated with time saving and more predictable OR’s discharge. The potential clinical benefit is a more efficient use of health-care resource (4). Better predictability and shorter times allow a better dynamism of the operating theater and improve the turn over. However the economic value of the time saved is still unclear and depends on the ability of the staff to perform other tasks.

References

A systematic review and meta-regression analysis of mivacurium for tracheal intubation. S. Gori1,2, L. VanlintHout1, N. Hens, B. Vanacker2, B. Geniets1, M. Van de Velde2. 1Department of Anesthesiology GZA-Campus Sint-Vincentius Antwerpen, 2Department of Anesthesiology KU Leuven, UZ Gasthuisberg, Leuven.

Mivacurium is still used by many anesthetists in large parts of the world (1). There appears to be great variation in intubation conditions after a given dose of mivacurium (2). Identification of factors that may alter intubation conditions may help improve the clinical care of individual patients.

A systematic search for randomised controlled trials related to the use of mivacurium to facilitate endotracheal intubation was performed. Potential sources of heterogeneity in the outcome variable, i.e. excellent intubation conditions, were explored using random effects meta-regression analysis.

Twenty eight eligible studies were identified comprising 1032 patients in 58 treatment groups. The meta-regression model proposed could explain 73% of the total variation in the proportion of excellent intubation conditions of which mivacurium dose, anaesthesia technique and other explanatory variables, i.e. time to onset and age, accounted for respectively 25, 29 and 19% of that variation. Gender, priming or study location could not explain any differences in intubation quality.

Although promising in preclinical evaluations, conditions for tracheal intubation created by mivacurium are often unsatisfactory (3). Even when larger doses are given and a delay of 2 minutes is allowed, considerable between trial differences in the proportions of excellent intubation conditions are found. From the current systematic overview and meta-regression analysis it could be concluded that the probability of excellent intubation conditions increases with the mivacurium dose administered, the addition of opioids during the induction sequence, and the greater time delay to intubation. Although onset of neuromuscular block may be slower, intubation conditions improved with increasing age. Gender, priming and location of study did not contribute to the variation in excellent intubation conditions created by mivacurium. Finally, lack of outcome assessor’s blinding to knowledge of the allocated intervention tended to exaggerate participant’s intubation score.

Even with larger mivacurium doses and greater time delay before intubation, conditions for tracheal intubation are often suboptimal. More profound anaesthesia, especially in ageing people after standard doses of induction agents, may explain better intubation conditions even before complete paralysis is obtained.

References


Introduction

Cardiac surgery requires anticoagulation with unfractionated heparin (UFH) to prevent thrombosis within the cardiopulmonary bypass (CPB) circuit. Effective anticoagulation—target Activated Clotting Time (ACT) > 400 seconds (1) – is usually achieved by administration of 300 units/kg UFH. Heparin resistance (HR) is defined as the failure of unusually high doses of heparin to achieve a target ACT (2). Resistance factors to UFH described in the literature are related to two mechanisms. The first one is related to antithrombin (AT) deficiency and the second one is unrelated to AT (nitroglycerin infusion, increased factor VIII activity,...). Biological inflammatory syndrome is reflected by C-reactive protein (CRP).

Materials and Methods

From 02/2010 to 11/2012, we recorded prospectively in the institutional database all cardiac surgical patients operated in the CHU Dinant Godinne UCL Namur. We noted for each subject: CRP, pre and post administration of UFH ACT (300 units/kg) and AT levels (%). Patients with incomplete data and AT level < 70% were excluded. For each patient, we calculated the Heparin Sensibility Index according to Finley et al. (2). A CRP level of 10 mg/dl was selected as the threshold value.

Results and Discussion

From a total of 1128 registered patients, 712 were eligible. Data are presented as median [95% CI].

<table>
<thead>
<tr>
<th>CRP level (mg/dl)</th>
<th>Sample Size</th>
<th>HNF sensitivity Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 10</td>
<td>702</td>
<td>1.1500 [1.1400-1.1700]</td>
</tr>
<tr>
<td>≥ 10</td>
<td>10</td>
<td>0.9250 [0.8356-1.6956]</td>
</tr>
</tbody>
</table>

Subjects with CRP level ≥ 10 mg/dl showed less sensitivity to HFN administration than subjects with CRP level < 10 mg/dl. This difference is statistically significant (p < 0.05). However, the number of patients with CRP ≥ 10 mg/dl is low compared to patients with CRP < 10 mg/dl and do not enable conclusive evidence. An increase of the database is needed to confirm our observation. The following hypothesis is advanced. Factor VIII is an acute phase reactant that increases with inflammation. Case reports are emerging involving increased factor VIII as a risk factor for HR (3). Its contribution to non-AT mediated HR in the cardiac surgical patients requires further investigation.

Conclusion

We observed in our center an increase in heparin administration to achieve ACT level in patients with a biological inflammatory syndrome reflected by CRP ≥ 10 mg/dl.

References

Background and Goal of Study

Morbid obesity results in respiratory and ventilatory pathophysiological changes and increases the risk of sleep apnoea obstructive syndrome (SAOS). Both theoretically lead to postoperative hypoxaemia. However whether morbid obesity (MO) per se increases the risk of postoperative hypoxaemia remains controversial (1-3). We tested the hypothesis that the STOP BANG risk score for SAOS rather than obesity is associated with postoperative hypoxaemia.

Materials and methods

After IRB approval and informed consent, 44 MO patients with a BMI > 35 kg/m2 and 25 patients with a BMI < 25 kg/m2 scheduled for laparoscopic upper-abdominal surgery under standardized general anaesthesia and intraoperative mechanical ventilation were included in this study. Postoperative oxygen saturation and obstructive apnoea (OA = apnoea hypopnoea index [AHI] > 20) were recorded on the first postoperative night using a Somnolter® (Nomics, Angleur, Belgium). Exact logistic regression was used to evaluate the association between MO, STOP BANG ≥ 4 and OA. Postoperative oxygenation (median [IQ25-75]) was compared between groups using Kruskal-Wallis. P < 0.05 = statistically significant.

Results and discussion

BMI were similar in the 2 MO groups: STOP BANG < 4: BMI = 42.5 ± 3.7, n = 27; STOP BANG ≥ 4: BMI = 41.2 ± 4.2, n = 17. STOP BANG ≥ 4 (P = 0.001) but not MO (P = 0.4) was significantly associated with postoperative OA. Obese patients with STOP BANG > 4 also have the lowest postoperative oxygen saturation (Table 1).

Conclusion(s)

Our results suggest that morbid obesity alone (in the range of BMI explored in this study [35 kg/m2 > BMI < 55 kg/m2]) is not a risk factor for postoperative hypoxaemia after laparoscopic upper-abdominal surgery. Rather this study confirms that STOP BANG is a better predictor of postoperative hypoxaemia and OA.

References

1. ANN. INTERN. MED., 144, 575-80, 2006.
2. ANESTHESIOLOGY, 81, 410-8, 1994.


Objective

Our goal was to compare two types of sedation during cataract surgery under topical anesthesia. We compare propofol and sufentanil in topical anesthesia with sedation and medical monitoring. The end point is surgeon satisfaction in percent. A high percentage of surgeon satisfaction is correlated with a safe surgery and ultimately with a greater patient satisfaction.

Background

Extra capsular cataract extraction is one of the most frequently performed ophthalmic surgical procedures. Over the years, the surgical technique has been made simpler and easier allowing to perform such surgeries under topical anesthesia or topical anesthesia with sedation. However, ophthalmologists report a high incidence of anesthesia related difficulties when performing cataract surgery under topical anesthesia only (1). Therefore sedation is frequently associated with difficult surgical conditions (2). We compared the surgeons satisfaction when sedation was performed using sufentanil or propofol sedation.

Patients and Methods

After Institutional Ethics Committee approval and patient’s informed consent obtained, 40 patients were included in a randomized, double-blind study. Exclusion criteria included breakable cover lens, photophobia, incomplete mydriasis and cognitive disease. The patients in the PROP group (n = 17) received propofol with a target plasma concentration of 1 µg/ml, the objective was a mean entropy between 70 and 90. The patients in the SUF group (n = 23) received a 0.05 µg/kg single dose of sufentanil with a supplementary dose if necessary. No preanaesthetic medication was used. The primary end point is the surgeon satisfaction. A high-quality of operating condition is correlated with a surgeon satisfaction above 70 per cent. The other outcomes were patient analgesia evaluated by the pain numeric rating scale (NRS) and the number of eye movements (NEM = number of eyes movements step by step of surgery).

Results

Surgeon’s satisfaction was significantly greater in the SUF group (p = 0.0137). The NRS and the NEM were significantly lower in the SUF group (p = 0.0115 and p = 0.0181 respectively) (Table 1, fig. 1) (3).

Table 1

<table>
<thead>
<tr>
<th></th>
<th>Sufentanyl</th>
<th>Propofol</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>23</td>
<td>17</td>
</tr>
<tr>
<td>Age (mean, years)</td>
<td>71</td>
<td>72</td>
</tr>
<tr>
<td>Male sex (%)</td>
<td>43.5</td>
<td>64.7</td>
</tr>
<tr>
<td>BMI</td>
<td>26.81</td>
<td>26.16</td>
</tr>
<tr>
<td>Surgeon satisf (%)</td>
<td>91.13 (sd 5.37)</td>
<td>76.47 (sd 24.35)</td>
</tr>
<tr>
<td>NRS (0-10)</td>
<td>0.13 (sd 0.46)</td>
<td>1.41 (sd 2.34)</td>
</tr>
<tr>
<td>Eye movements</td>
<td>1.30 (sd 1.36)</td>
<td>2.82 (sd 2.21)</td>
</tr>
<tr>
<td>High-quality operating condition (%)</td>
<td>95.65</td>
<td>64.71</td>
</tr>
</tbody>
</table>

Conclusions

At the doses used in the present study, sufentanil sedation seems more appropriate for cataract surgery than propofol sedation. At a scheduled intermediate analysis, it appears that poor surgical conditions were unacceptably frequent in the PROP group; this lead us to stop the study. An analgesic is more appropriate than a hypnosedative for patient cooperation, NEM and pain.

References

3. The statistic analyses was performed with Mann-Whitney test.

Special thank to P D. Ledoux for statistic analyses.
A retrospective review of suspected anaphylactic reactions during anaesthesia. I. LEUEN, M.D.¹, F. SOETENS, M.D.², K. VERMEYLEN, M.D.², I. MERTENS, M.D.², M. VAN HOOF, M.D.², M. VAN DE VELEDE, M.D., Ph.D.¹ Depts. of anaesthesia of the KU Leuven, Leuven, Belgium and ¹AZ Turnhout, Turnhout, Belgium.

Introduction
An anaphylactic reaction is an uncommon but severe complication during anaesthesia (1). Since 2008 it is possible for Belgian anaesthesiologists to report suspected anaphylactic reactions during anaesthesia online on the website of the SARB (2). We analyzed the database.

Material and Methods
We reviewed all files from January 2008 until May 2013. The following variables were recorded: age at the time of the reaction, gender, history of allergy, previous surgery and respiratory disease (COPD or asthma), type of hospital where the suspected anaphylactic reaction occurred (university vs. regional hospital), type of anaesthesia (general vs. regional), severity of the reaction using the Ring and Messmer classification (4 grades; grade 1: muco-cutaneous signs, grade 2: non-life-threatening multisensory signs, grade 3: life-threatening multisensory signs, grade 4: cardiac arrest; the difference between grade 2 and 3 was arbitrary made by the need for adrenaline), time of onset of the suspected anaphylactic reaction after induction of anaesthesia, first clinical sign, incidence of cardiovascular, respiratory and cutaneous signs, use and dose of adrenaline, admission to intensive care, cancellation of surgery, mortality, measurement of acute and basal mast cell tryptase (MCT) and investigation with skin tests.

Results
There were 97 files in the database. Two files were excluded because of insufficient information. Most suspected anaphylactic reactions occurred in patients in their fifth (19%), sixth (21%) and seventh (18%) decade of life. The youngest patient was 7 years old and the oldest was 82 years. 58% of the patients were female.

47% of the patients had a history of allergy (to pollen, penicillin, NSAIDs and contrast). 74% of the patients never had anaesthesia before. 44% of the files were reported from university hospitals. Almost all reactions (95%) occurred under general anaesthesia.

Grade 1, 2, 3 and 4 reactions occurred respectively in 9.5%, 25%, 54% and 11.5% of the cases. The incidence of severe reactions (grade 3 and 4) was higher in regional hospitals than in university hospitals (81% vs. 45%, Chi-square test: p < 0.05). The time between the induction of anaesthesia and the onset of the reaction was within 5 min in 54% of the cases. The first clinical sign of the suspected anaphylactic reaction is shown in table 1.

Table 1

<table>
<thead>
<tr>
<th>Signs</th>
<th>Number of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cardiovascular signs (hypotension and tachycardia)</td>
<td>27</td>
<td>28%</td>
</tr>
<tr>
<td>2. Respiratory signs (bronchospasm and desaturation)</td>
<td>15</td>
<td>16%</td>
</tr>
<tr>
<td>3. Cutaneous signs</td>
<td>19</td>
<td>20%</td>
</tr>
<tr>
<td>1 + 2</td>
<td>11</td>
<td>12%</td>
</tr>
<tr>
<td>1 + 3</td>
<td>13</td>
<td>14%</td>
</tr>
<tr>
<td>2 + 3</td>
<td>2</td>
<td>2%</td>
</tr>
<tr>
<td>1 + 2 + 3</td>
<td>6</td>
<td>6%</td>
</tr>
<tr>
<td>Unknown</td>
<td>2</td>
<td>2%</td>
</tr>
</tbody>
</table>

The incidence of cutaneous, cardiovascular and respiratory signs was 89%, 85% and 60% respectively. The incidence of respiratory signs as a first clinical sign and during the whole suspected anaphylactic reaction was higher in patients with a history of respiratory disease compared to patients without a history of respiratory disease (first clinical sign: 58% vs. 29%, Chi-square test: p < 0.05; during the suspected anaphylactic reaction: 89% vs. 52%, Chi-square test: p < 0.05). The incidence of cutaneous signs in grade 1 reactions tended to be higher than in grade 4 reactions (100% vs. 72%, Chi-square test: p = 0.09).

62% of the patients needed adrenaline. The mean dose of adrenaline was 1.6 mg. 47% of the patients needed admission to the intensive care unit and in 39% surgery was canceled. One patient (1%) died.

In 85% of the cases MCT was measured. 86% of these measurements were done in the right time frame (30-90 min after start of the suspected anaphylactic reaction): 70% was positive (MCT > 13.5 µg/L). A basal MCT was measured in 55% of the patients and was elevated in 6 patients, suggesting mastocytosis.

Skin testing was done in 64 patients (67%) and was positive in 49 of them (77%). The most frequently incriminated agents were muscle relaxants (34%) and antibiotics (9.5%). In the group of muscle relaxants rocuronium was responsible for 72% of the anaphylactic reactions. Cross-sensitivity between muscle relaxants occurred in 75%.

The correct investigation (determination of MCT 60-90 min after start of the reaction, determination of a basal MCT and skin testing if MCT was positive) was done in 39% of the reported files.

Discussion
These results are in line with other databases: muscle relaxants and antibiotics are the most frequently incriminated agents; cross-sensitivity between muscle relaxants is frequent; cutaneous signs tend to be less frequent with more severe reactions, making diagnosis of anaphylaxis more difficult (3). There is probably an underreporting of less severe reactions from regional hospitals. Correct investigation is completed in a minority of cases.

References
2. SARB website: www.bvar.be
Preoperative inflammatory bowel diseases but not diverticulitis increase the risk of chronicisation of postoperative pain after laparoscopic colorectal surgery. K. Medjahed, M.D., D. Ledoux, M.D., M. Georges, M.D., C. Ramquet, M.D., G. Damilot, M.D., J. F. Brichant, M.D., J. L. Joris, M.D. Anesthesiology and Intensive Care Medicine, CHU Liege, Liege, Belgium.

Introduction

Prior inflammatory challenge can increase pain intensity and duration as well as spinal sensitization induced by a subsequent stimulus (1). This could account for the increased need for postoperative opiate observed in patients with inflammatory bowel diseases (IBD) (2). Spinal hypersensitivity potentially leading to chronic post-surgical pain (CPSP) we tested the hypothesis that IBD increases the risk of CPSP after laparoscopic colorectal surgery.

Materials and Methods

After IRB approval, the questionnaire of Lavand’homme et al. (3) was mailed to all the patients who underwent laparoscopic colorectal surgery from April 2008 until December 2011 (n = 260). No epidural analgesia was used in these patients. Recall of postoperative pain intensity, duration of postoperative pain, presence of persistent pain directly related to the surgical procedure were questioned. In case of CPSP related to the procedure, characteristics of pain and impact on quality of life and sleep were assessed. Patients were divided in three groups pending on the indication of surgery: neoplasm, IBD, or diverticulitis. Data were compared using Kruskal-Wallis and multiple logistic regression. P < 0.05 = statistically significant.

Results

Data of 199 patients (57 ± 16 yo, M/F : 102/97) were analyzed (77% response). 33 patients (16.6%) reported chronic pain 40 ± 16 months after laparoscopic surgery. Numbers of patients with intense postoperative pain (VAS ≥ 7/10) were: neoplasm 25%, IBD 58%, diverticulitis 34% (P = 0.002). Incidences of chronic pain were: neoplasm 11/87 (12.6%), IBD 13/44 (29.6%) and diverticulitis 8/65 (12.3%) (P = 0.04). Chronic pain tended to be more intense in the IBD group (P = 0.083).

Discussion

After laparoscopic colorectal surgery, patients with IBD complained of more intense postoperative pain and had a greater risk of developing CPSP than patients who had bowel surgery for neoplasm or diverticulitis. This confirms preoperative inflammatory stress affects acute and chronic postoperative pain. However the type of inflammatory profile (IBD vs. diverticulitis) seems to be determinant.

References

Background

Our objective was to compare the impact of using balanced HES (130/0.4) or balanced crystalloid for pump prime and intraoperative fluid therapy in adult cardiac surgery patients on the risk of transfusion and postoperative bleeding.

Methods

The study was approved by our IRB (B707201420116). Data from 432 consecutive adult patients undergoing on-pump cardiac surgery were retrospectively reviewed. Patients were assigned to the colloid or the crystalloid groups according to whether balanced hydroxyethyl starch (HES) 130/0.4 or balanced crystalloids had been used for pump prime and intraoperative fluid therapy. The primary outcome was the proportion of patients who received any type of blood product. Secondary outcome were results from usual clotting tests and thromboelastography, chest drain output, occurrence of complications during the ICU stay, lengths of ICU and hospital stays and 30-day mortality. First, propensity scores were estimated using a multivariable logistic regression including previously reported risk factors for transfusion and abnormal postoperative bleeding. Each colloid patient was then matched with a crystalloids patient based on propensity scores. Final analyses were performed on the propensity-matched patients. Multivariable logistic regression, chi square test Student’s t-test and Mann-Whitney test were used as appropriate.

Results

79 patients were excluded because of missing data. Successful matches were obtained for 120 colloid patients. Analyses were performed on 240 propensity-matched patients. The primary outcome occurred in 48 patients (40%) of the colloid group and 28 patients (23.3%) of the crystalloid group, corresponding to and OR of 2.1 (95% CI, 1.2-3.8), which is statistically significant (P = 0.009). After separation from cardiopulmonary bypass, the hemoglobin level was higher in crystalloid patients 9.6 [2] g/dL than in colloid patients 8.4 [1.3] g/dL (P < 0.001). Cumulate chest drain output after 3 hours was higher in colloid patients 180 [210] mL than in crystalloid patients 140 [100] mL (P = 0.002). On the heparinase thromboelastogram performed after protamine administration the K time was significantly longer (P < 0.001) and the maximal amplitude was significantly lower (P = 0.007) in the colloid patients. There was no significant difference between the groups for the other secondary outcomes.

Conclusion

The use of balanced HES 130/0.4 for pump priming and intraoperative fluid therapy increases the risk of transfusion and the chest drain output in comparison with the use of a balanced crystalloid only regimen. A greater degree of hemodilution and HES-induced clotting disturbances are likely to account for these results.

**Introduction**

In intensive care units (ICU), heparins are widely used to prevent venous thromboembolism (VTE) in medical and surgical patients at risk. However they have side effects, such as thrombocytopenia that can be deleterious in this setting. Fondaparinux (F), a selective inhibitor of factor Xa, binds only to antithrombin; therefore immunological effects are unlikely to occur. Its safety and superior efficiency have been mainly shown in major orthopedic surgery, decreasing the overall risk of venous thromboembolism without increasing the risk of clinically relevant bleeding, when compared with enoxaparin (E). In the present study, we compared the preventive use of F and E in two consecutive populations of ICU patients. In priority, we assessed the safety of each protocol. The main goal was to determine the number of patients requiring red blood cell transfusions according to the use of F versus E in the prevention of thromboembolic disease in ICU. Secondary goals were to determine in each group the number of unit of red blood cells administered and the rates of hemorrhagic, VTE and heparin induced thrombocytopenia events.

**Materials and Methods**

A retrospective study has been undertaken after switching from E to F in our intensive care unit. Two successive cohorts of hospitalized patients in the four months before and after switching from E to F were compared.

**Results**

In the investigated time period, 124 patients treated by E and 106 patients treated by F were included. Admission diagnosis in our mixed medico surgical ICU was medical (32%), trauma (28%) and elective or urgent (mainly neurosurgery) non-cardiac surgery (40%). Chi² test was performed for statistical analysis of categorical variables. Despite the fact that F group data had higher SAPS II score (25 vs 19, p 0.006), more mechanical ventilation (48% vs 32%, p 0.02) and elective or urgent (mainly neurosurgery) non-cardiac surgery (40%), we did not observed any difference between both groups about major or secondary criteria. The rates of transfused patients (14% vs 19%; NS), active bleedings (2.8% vs 1.9%; NS), and VTE events (2.4% vs 2.8%; NS) were similar in the group receiving respectively E or F. Furthermore, the platelet counts did not differ between the two groups (NS) and any heparin induced thrombocytopenia have been shown during ICU stay.

**Discussion**

In our retrospective study, we observed safety of F. The implementation of a preventive anticoagulation by F instead of E did not result in a significant increase of blood transfusion, nor hemorrhagic or thrombotic events. To our knowledge it’s the first study comparing the routine use of F and E for the prevention of thrombosis in ICU patients. The use of F, instead of heparin, reduces the exposition to heparin and then cancels the risk of heparin-induced thrombocytopenia. However, data are needed regarding the safety of use of this drug in ICU patients. Within their limitations, the results of this study suggest a certain level of safety for using F instead of E in the thromboprophylactic current practices in ICU. Further prospective randomized studies are needed to confirm our findings.

**References**

An Empirical Equation to Predict Sevoflurane Vaporizer Settings during Early Wash-in in O₂/air with the ADU®. W. PAUWELS, J.F. HENDRICKX, T. DELOOF, M. VAN DE VELDE.

Introduction

The number of vaporizer (F₀) and fresh gas flow (FGF) combinations that can be used to obtain a certain desired end-expired (Fₐ) % of an inhaled agents is infinite (1). During the wash-in, different anesthesiologists use a wide range of FGF - F₀, but high FGFs should be minimized because they profoundly affect cumulative agent usage. We thus sought to derive an empirical model that could predict the F₀ - FGF combinations that would attain a target sevoflurane Fₐ (Fₐ₅₀) within a predefined time interval.

Methods

After IRB approval, 60 ASA I – II patients undergoing general surgery were enrolled. After IV induction and endotracheal intubation, ventilation was controlled mechanically with the ADU® anesthesia machine (General Electric, Helsinki, Finland) with a fixed tidal volume of 500 mL and respiratory rate of 10 min. Patients received sevoflurane in O₂/air with a random combination of a fixed FGF - F₀ setting, i.e. one out of 60 possible combinations of FGF (0.5; 0.6; 0.7; 0.8; 0.9; 1; 1.5; 2; 3; or 4 L/min) and F₀ (3, 4, 5, 6, 7, or 8%). The resulting Fₐ₅₀ course was registered for 5 min and modeled with Excel Solver, using patient age, height, and weight as covariates (naïve pooled data fit). Values for the first minute were excluded from analysis. Excluded from model derivation were (1) Fₐ₅₀ data from the first minute and (2) FGF-F₀ pairs that did not result in Fₐ₅₀ > 0.7% before 5 min (to avoid awareness) or that did result in Fₐ₅₀ > 3.5% before 5 min (to avoid hemodynamic instability). During initial model building, it was assumed that Fₐ₅₀ increases linearly with F₀ (for the same FGF) and that uptake decreases exponentially. The effect of rebreathing was modeled purely empirically (with an Emax 4 parameter sigmoidal fit). With trial and error, the model was refined, guided by the minimum objective function in Solver. The resulting equation was solved for F₀ using Mathematica (WolframResearch, Oxfordshire, UK).

Results

13 FGF-F₀ pairs were excluded. The best naïve pooled fit was

\[
Fₐ₅₀ = (-0.0737 + F₀*16.8 \times (1-e^{-0.50} \times (1.98 + 5.90 \times (FGF^{0.5} / (1.98^{0.5} + FGF^{0.5}))))) / \text{height} + .1 \]

with F₀ in %, FGF in L/min, and height in cm. Other covariates did not improve the model. If solved for F₀, F₀ = (Fₐ₅₀*0.0743)/16.74*(1-e (-time/2.366) )*(1.80+5.75*(FGFs^2.35/(FGFs^2.35+FGFs^2.35)))1/(Ht+0.1)

which allows the anesthesiologist to select a target sevoflurane Fₐ₅₀ (Fₐ₅₀₉₀) to be reached within a predefined time interval (time) with a fixed FGF (FGFs) for a patient with height = Ht (in cm).

Discussion

We empirically derived a formula that describes the F₀-FGF combinations that can be used to attain a target Fₐ₅₀₉₀ in O₂/air after a predefined time interval with the ADU® anesthesia machine. If this model proves to perform well during prospective testing, it could be used to develop F₀-FGF administration schedules or help steer the automated delivery of inhaled agents.

References

Impact of the choice of colloid for cardiac-pulmonary bypass on postoperative renal function in cardiac surgery. S. Remacle¹, S. Lessire¹, F. Mullier², A.-S. DinQ³, N. Caron³, J. Mitchell¹, L. Jadin¹, M.-A. Nisolle¹, S. Voisin³, L. Verstraeten³, T. Busin³, A. Gruslin¹, I. Michaux⁴, M. Gourdin¹. ¹Department of Anesthesiology, ²Department clinical Biology Laboratory, ³Perfusionist, ⁴Department of Intensive Care, CHU Dinant-Godinne, UCL Namur, ⁵Unité de recherche en physiologie moléculaire (URPhyM), Université de Namur.

Introduction

Acute renal failure (ARF) is a frequent postoperative complication in cardiac surgery under cardiopulmonary bypass (CBP). Postoperative ARF is an independent predictive factor of mortality and morbidity in cardiac surgery.¹,² Colloids have repercussion on the postoperative ARF. However, the influence of the choice of colloids for CBP priming on the post-operative ARF remains controversial. A recent warning from European Medicines Agency (EMA) on the use of Hydroxyl Ethyl Starch (HES) currently limits their use. However, EMA recognizes that more studies are needed to evaluate the impact of colloids used during perioperative period. This study investigates the impact of three different colloids, Volulyte 6%, Gelofusine 4% and Albumin 4%, in the priming of CBP on postoperative renal function in patients undergoing cardiac surgery.

Materials and Methods

After local committee approval (CE 108-2010), 148 patients undergoing cardiac surgery with CBP were enrolled between July 2011 and July 2012 in this single-center prospective randomized study. For each patient, the choice of colloid is randomized by minimization (age, sex, type of cardiac surgery, preoperative GFR, presence of diabetes, ejection fraction of the left ventricle, EuroSCORE). The colloid used during anesthesia was the same as that used for the CBP. If the maximum dose is reached, the filling continues with Lactate-Ringer. Anaesthesia was induced with propofol, sufentanil and cisatracurium and maintained with sevoflurane (1-1.2MAC) to obtain a bispectral between 40-60. The patients were ventilated with a FiO₂ of 0.5 in air, a tidal volume of 6 ml/kg and a respiratory rate of 12/min. The CBP devices were similar during the study. To assess renal function, serum creatinine, urinary creatinine and urine output are measured on blood and urine samples achieved in all patients before surgery, during the sternal closure, 24 and 48 hours postoperatively. Glomerular filtration rate (GFR) is calculated from the Cockcroft-Gault. The duration of CBP, aortic clamping and CPB are registered. Cardiac output and mean arterial pressure (MAP) were measured preoperatively, intraoperatively and after sternal closure. Variables are compared between the three groups by analysis of variance (ANOVA). If heterogeneity, groups were compared 2-2 by the method of least significant difference (LSD). A linear regression is used to evaluate the influence of colloids and parameters at time 0 on the final value of the parameter, p < 0.05 significant.

Results

Our results show that the choice of colloid does not influence the evolution of serum creatinine in the immediate postoperative period (p = 0.634) and 24h postoperatively (p = 0.526), but influences it to 48h post-procedure (p = 0.009). A more detailed analysis shows that serum creatinine levels are higher compared to Gelofusine in comparison with Albumin (p = 0.003) and Volulyte (p = 0.042). No statistically significant difference was observed between Volulyte and Albumin (p = 0.317). Glomerular filtration shows no statistically significant difference in immediately postoperative period (p = 0.711) and 24h postoperatively (p = 0.451) but to 48h postoperatively (p = 0.029) : the glomerular filtration in Albumin group is statistically different (p = 0.008).

Our results show that the choice of the colloid does not influence the urinary output in immediate post-operative (p = 0.110), at 24 h post-surgery (p = 0.167) and 48 hours post-operatively (p = 0.286).

Rates of dobutamine, hemoglobin concentration, cardiac output, the total amount of cristalloids, duration of CBP and aortic clamping were not statistically different in the 3 groups at different times of the intervention.

Discussion

In conclusion, the choice of gelofusine in CBP lead to a significant impairment of renal function compared to Volulyte and Albumin in cardiac surgery. Further studies are needed to assess the impact of HES on renal function during the early and immediate post-operative period.

References

Quality of the preoperative medication history for the patients scheduled for total hip replacement or total knee replacement at the CHU of Liège (QAMP-STUDY). C. STAQUET¹, A. BUSUMBIGABO², B. REMY¹, T. VAN HEES³, J.F. BRICHANT¹,². ¹Dpt. of Anesthesia and ICM, ²Dpt. of Clinical Pharmacy, CHU of Liège, University of Liège, Belgium.

Introduction

Up to 27% of all hospital prescribing errors are related to inaccurate medication history obtained upon admission. Medication reconciliation is an important part of medication safety and a subject of growing interest. Few data are available about medication reconciliation at the preoperative visit for total hip replacement (THR) or total knee replacement (TKR). The objective of this study was to identify major errors existing in the preoperative medication history with the aim to recommend a new standardized way to obtain a comprehensive medication history for surgical patients at the preoperative visit.

Materials and Methods

The CHU of Liège is a teaching hospital of 925 beds. About 225 THR and TKR are performed each year. All patients are seen preoperatively by an anaesthesiologist. During this visit, the anaesthesiologist carries out a medication history for surgical patients at the preoperative visit for total hip replacement (THR) or total knee replacement (TKR). The objective of this study was to identify major errors existing in the preoperative medication history with the aim to recommend a new standardized way to obtain a comprehensive medication history for surgical patients at the preoperative visit.

Results

With the approach of the local ethics commette and inform consent of the patient, 105 patients (60% of women, 57% of THR, with a mean age of 64 years) were enrolled in the study. The average number of drugs per patient reported by the patient to the pharmacist was 5.5 ± 3.8, increasing to 8.7 ± 4.5 by using specific questions or by contacting the patient’s community pharmacist. Information in the medical chart was incomplete for 486 drugs (53.5%). The discrepancies were: drug omission 61.9%, treatment schedule omission 13.8%, dose omission 10.3%, treatment schedule and dose omission 15.0%. Omitted drugs were mainly complementary and alternative medicine products, analgesics and osteoporosis treatments, drugs for obstructive airway diseases, drugs for acids-related disorders, and cardiovascular system drugs (Table 1).

Conclusion

There were several errors in the medication history recorded preoperatively. This confirms the importance of improving the procedure for obtaining medication history. Education of anaesthesiologists, use of dedicated forms, collection of information from community pharmacists, active participation of a clinical pharmacist in the preoperative consultations or patient empowerment are suggested identified as possible ways of improvement.

References

Quality of Basic Life Support and the strength- and physiological characteristics of the rescuer.
A. STURTEWAGEN, H. LUYCKX, L. ACHTEN, N. MPOTOS, L. HERREGODS. University Hospital Ghent and Ghent University, De Pintelaan 185, 9000 Ghent, Belgium.

Introduction

The annual European incidence of sudden out-of-hospital cardiac arrest amount to 38 calls per 100,000 inhabitants. Chances to survive increase when cardiac pulmonary resuscitation (CPR) and defibrillation are started within five minutes after the cardiac arrest in Belgium. After emergency calling, it takes five to ten minutes to cover the distance hospital – victim. Therefore it is well-known that the performance of CPR requires large efforts of the non-professional rescuer. Different studies describe opposite results about determining factors on the quality of CPR (1, 2, 3). This study investigates the relation between strength- and physiological characteristics of the rescuer and the quality of CPR performed, according to the European Resuscitation Council (ERC) 2010 guidelines.

Materials and Methods

After IRB approval, 70 employees of the University Hospital Ghent participated in the study and signed the informed consent. Before the CPR test, physiological parameters of each participant at rest were measured: systolic, diastolic and mean arterial blood pressure (BP), heart rate (HR), oxygen saturation, ventilation rate. All parameters were monitored by a Siemens SC 9000 XL device, except for the ventilation rate that was counted by a researcher. Then, the participants performed three power tests (pull-force, push-up, arm-force) and completed a questionnaire (age, gender, weight, height, medication use, sports practice and CPR experience). The CPR test was performed on a Laerdal® Resusci Anne manikin with Laerdal skillreporting© software. The participants were asked to perform only-compressions CPR for ten minutes, subdivided in five two-minutes CPR while electrodes and blood pressure cuff were attached. After each two-minutes CPR, the participant was asked to breath in and out twice instead of performing ventilations on the manikin. This time reflects the real-time duration of out-of-hospital resuscitation of the first rescuer. We analyzed total compressions, correct compressions, compression depth, compression frequency. Compressions were considered as incorrect: compression depth < 5 cm, wrong hand position, inadequate compression frequency (< 90 per minute (pm)) and > 132 pm). Quality of CPR (chest compressions) was defined by the compression rate: the correct compressions / the total compressions (%). This compression rate was studied over ten minutes and related to strength- and physiological parameters of the rescusitor. SPSS 22.0 was used for statistical analysis and α statistical significance was set at 0.05.

Results

Ten participants dropped out for statistical analysis: two performed the CPR test for less than four minutes and eight performed a compression frequency of more than 132 pm.

Demographics (mean ± SD) were: gender m:n11, f:n 49; age 34 yr ± 12; height 169 cm ± 8.8; weight 66 kg ± 11; BMI 23 kg/m² ± 4. Sports practice: n18 no sport, n16 recreational, n26 active. CPR experience: 32 no experience, 28 experience. Significant differences are shown in table 1.

<table>
<thead>
<tr>
<th></th>
<th>BP vs time</th>
<th>HR vs time</th>
<th>Compression rate vs time</th>
<th>Compression frequency vs time</th>
<th>Age</th>
<th>Height</th>
<th>Weight</th>
<th>BMI</th>
<th>Pull-force</th>
<th>Push-up</th>
<th>Arm-force</th>
<th>Sport</th>
<th>CPR experience</th>
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<tr>
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</tr>
<tr>
<td>Male (n = 11)</td>
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</table>

(p < 0.05).

Discussion

A significant difference between male and female was found in compression rate. Man, who had a higher height, weight and arm force had a better compression rate that resulted in a higher CPR quality performance. These results should be considered carefully as there are many other factors that determine the performance of CPR e.g. regular training courses, stress handling experience, motivation. It should be interesting to include more variables in a future experiment. To conclude, we can state that rescuers with a high height, weight and arm force are physically more favoured to perform a good quality CPR, reflected in a higher compression rate.

References


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Compared to neostigmine, sugammadex’s reversal doesn’t improve the Aldrete score in PACU.

O. Thomas, G. Delnooz, L. Putz, Chr. Dransart, J. Jamart, O. Donnez, Ph. Dubois. CHU Dinant Godinne 1, Avenue Therasse, 5530 Yvoir, Belgium.

Introduction

Sugammadex allows fast and predictable reversal of any degree of neuromuscular block (NMB) induced by rocuronium. (1) The existence of arousal effect is controversial. (2, 3) The goal of this study was to determine if sugammadex’s reversal, compared to neostigmine, improves the quality of the patient’s recovery from anaesthesia and/or allows a reduction of the time spent in post-anaesthesia care unit (PACU).

Materials and Methods

After Institutional Ethics Committee agreement and written informed consent, 100 women ASA I-II between 18 and 80 years old were randomised by minimisation in two groups before undergoing a laparoscopic hysterectomy under desflurane MAC 1-1.2 general anaesthesia. All patients were given the same dose.kg\(^{-1}\) multimodal analgesia including sufentanil, ketamine, ketorolac, paracetamol and tramadol. PONV were prevented by dexamethasone, DHB and alizapride. Group A was induced in moderate NMB by rocuronium 0.45 mg.kg\(^{-1}\) and recovered spontaneously except when unacceptable surgical conditions occurred (rescue 5 mg bolus). Group B was induced and maintained in deep NMB by rocuronium 0.6 mg/kg\(^{-1}\) and additional 5 mg boluses. At the end of surgery (abdominal ports removal), NMB was reversed either with neostigmine/glycopyrrolate 50 µg.kg\(^{-1}\) (Group A, TOF count > 3) or with sugammadex 4 mg. kg\(^{-1}\) (Group B, Posttetanic count > 1). Their effects were monitored by electromyography until TOF ratio reached 0.9, allowing to wake and extubate the patient.

In PACU, nurses – blinded to the study group – evaluated on arrival and every 15 minutes the patients’ recovery using a modified Aldrete score (7 items – breathing, SpO\(_2\), blood pressure, consciousness, motor activity, nausea-vomiting, pain – 14 points). If needed, morphine 1 mg/5 minutes and ondansetron were added. After 30 minutes minimum, the patients were stated ready for discharge if Aldrete score was > 12 and every item under control.

In each patient, we recorded the initial Aldrete score, the best Aldrete score, and the discharge readiness time. Data were compared between the two groups by the Wilcoxon rank sum test. P-values < 0.05 are considered as statistically significant.

Results

The investigated population was 51 ± 10 years old and had a BMI of 26 ± 5 kg/m\(^2\). 3 patients were excluded from the analysis because incomplete assessments. Results are expressed as mean ± SD.

<table>
<thead>
<tr>
<th></th>
<th>Group A n = 48</th>
<th>Group B n = 49</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial modified Aldrete score</td>
<td>12.29 ± 1.25</td>
<td>12.04 ± 1.47</td>
<td>0.41</td>
</tr>
<tr>
<td>Best modified Aldrete score</td>
<td>13.73 ± 0.45</td>
<td>13.84 ± 0.37</td>
<td>0.201</td>
</tr>
<tr>
<td>Time PACU discharge (h:mm:ss)</td>
<td>0:53:26 ± 0:40:34</td>
<td>0:47:45 ± 0:31:46</td>
<td>0.543</td>
</tr>
</tbody>
</table>

The Wilcoxon rank sum test showed no statistically significant difference between groups.

Discussion

Our study demonstrates no significant benefit from sugammadex reversal in term of quality or speed of recovery after general anaesthesia. Previous studies showed that residual NMB on arrival in PACU was associated with delayed discharge (4). Our protocol imposed to recover TOF ratio > 0.9 before awakening and extubating the patients, ruling out the residual block issue and its possible impact on PACU duration of stay.

In these circumstances, sugammadex’s reversal did not favor faster and better modified Aldrete scores compared to neostigmine/glycopyrrolate.

References

The use of sugammadex in a Belgian regional hospital. D. van Beersel\textsuperscript{1,3}, G. Cammu\textsuperscript{1}, K. van Hecke\textsuperscript{2}, L. Foubert\textsuperscript{1}, M. van de Velde\textsuperscript{1}. \textsuperscript{1}Anesthesiology and Critical Care Medicine, \textsuperscript{2}Hospital Pharmacy, Onze-Lieve-Vrouw Ziekenhuis, Aalst, \textsuperscript{3}Anesthesiology and Algology, KU Leuven, Belgium.

Introduction

Sugammadex was developed by Schering-Plough/ Organon Laboratories and is specifically designed to rapidly reverse both moderate and deep muscle relaxation induced by rocuronium or vecuronium, likely within 2-3 min. The recommended doses of sugammadex are in the range of 2-16 mg/kg, depending on the intensity of the block. Sugammadex works by encapsulating the muscle relaxant molecule and rendering it inactive (1). This important innovation has been recognized by numerous studies and publications. In Belgium, the use of sugammadex is reimbursed under certain conditions and requires recording of the train-of-four (TOF) measurement results in the patient’s file (2). However, the use over the years of sugammadex in routine care has never been studied in our institution. Therefore, a retrospective review was conducted by the hospital pharmacy and the anesthesia department to include all patients receiving sugammadex between June 2009 and January 2013, in order to evaluate the use, efficacy and adverse effects of sugammadex in our institution.

Materials and Methods

This study was approved by the Ethical Committee (Chair: Dr. A. Leloup). Patient demographics, sugammadex dosing regimens, types of surgery where sugammadex was used, and adverse events were collected from the pharmacy order entry system, the physician reimbursement attestation, and the electronic patient anesthesia record.

Results

Of a total of 37,704 patients who received a general anesthetic with administration of a muscle relaxant in the given period, and who were admitted to the recovery room, 1188 patients (3%) received sugammadex. In 2010, the first full year that sugammadex was available in our hospital, 5.4% of patients had sugammadex administered; while in 2011, this was 3.5%, and 2.1% in 2012. Figure 1 shows the age distribution of the patients who received sugammadex; Figure 2 the different types of surgery for which sugammadex was administered. Table 1 shows the number of patients as per different sugammadex dosing regimen (2 mg/kg for moderate block reversal; 4 mg/kg for deep block reversal; 16 mg/kg for immediate reversal). In total, 1520 vials of sugammadex 2 mL were used, corresponding to a total cost of 125.704€. Of the 1188 patients, eight (0.7%) did not fulfill the reimbursement criteria: 7 because of doses administered different from the recommended ones, and one because of use of a regular dose for a non-reimbursed indication.

Review of records of patients who had sugammadex did not reveal symptoms of muscle weakness in the recovery room. No patient who had sugammadex was reintubated. There were no sugammadex-related adverse events reported, and there were no reports of neuromuscular block reocurrence.

Table 1

<table>
<thead>
<tr>
<th>Dose</th>
<th>Number (n)</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 mg/kg</td>
<td>871</td>
<td>73.3</td>
</tr>
<tr>
<td>4 mg/kg</td>
<td>306</td>
<td>25.8</td>
</tr>
<tr>
<td>16 mg/kg</td>
<td>4</td>
<td>0.3</td>
</tr>
<tr>
<td>Other</td>
<td>7</td>
<td>0.6</td>
</tr>
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</table>

Discussion

This drug utilization study demonstrated that sugammadex was used in all age ranges, with a peak between 60-69 yrs. The majority of the patients treated with sugammadex had abdominal, vascular or neurosurgery. The use of sugammadex decreased over the years (from 5.4 to 2.1%). About three quarters of patients who received sugammadex, had a 2 mg/kg dose administered. This is in line with previous findings in our institution (3). While the results support published evidence of the efficacy and minimal side effects of sugammadex (1), they also highlight that the drug is being used outwith its reimbursed indications and outwith its standard dosing (0.7%) (4). As far as the National Health Security remuneration attestations (2) were filled out faithfully by the attending anesthetists, however, the indication selection of the drug seems to be generally quite correct, as well as the dose used. The total medicine cost was high.

References