

The Effect Of Maintaining Normal Mean Arterial Blood Pressure On The Incidence Of Intraoperative Emetic Episodes During Spinal Anaesthesia

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الخلاصة : بالرغم من الفوائد الجمة للتخدير الموضعي عن طريق حقن أدوية التخدير الموضعية في منطقة السائل الشوكي تحت الأم الجافية الأ أنه يترافق مع أعراض جانبية من أهمها هو الغثيان و التقيؤ خلال و بعد العملية مما يسبب ازعاجا شديدا للمريض و أرباكا لعمل الجراح خلال العملية .أهتم العلماء بهذا الموضوع و وضعوا عدة دراسات و أساليب علاجية للحد منه .الهدف من هذه الدراسة هو لمعرفة نسبة حدوث أعراض الغثيان و التقيؤ و الحاجة الفعلية لأستخدام العقارات المضادة للتقيؤ في حالة المحافظة على معدل ضغط دم شرياني طبيعي . هذه الدراسة اجريت على ستين مريضا ذكرا هم تحت تصنيف الدرجة الاولى من تصنيف الرابطة الامريكية لاطباء التخدير و أعمارهم بين 20 – 45 سنة لأجراء عمليات جراحة كسور الساقين . تم تقسيم المرضى الى مجموعتين ،المجموعة الأولى تتكون من 30 مريضا تم حقنهم وريديا بعقار الأيفيدرين 15 ملغ مباشرة بعد الأنتهاء من حقن علاج التخدير الموضعي (2 مل من 0.5% بوبيفاكاين) في منطقة السائل الشوكي . بينما أعطوا مرضى المجموعة الثانية 3مل من محلول النورمال سلاين وريديا مباشرة بعد الأنتهاء من حقن علاج التخدير الموضعي المذكور . تم أخذ الملاحظات التالية: تغييرات ضغط الدم الشرياني و نبض القلب و نسبة تشبع الدم بالأوكسجين بصورة متكررة خلال العملية ، كما تم أحتساب عدد المرات التي أصيب بها المريض بأعراض الغثيان و التقيؤ و عدد الحالات الشديدة التي أستوجبت إعطاء مضادات التقيؤ لهم . أظهرت هذه الدراسة عدم وجود فرق واضح بعدد الحالات الشديدة التي أستوجبت إعطاء مضادات التقيؤ في كلتا المجموعتين بالرغم من أن مجمل عدد الحالات العامة لأعراض الغثيان و التقيؤ كانت أقل في المجموعة الأولى مقارنة بالمجموعة الثانية .توصي هذه الدراسة بالأستمرار في إعطاء مضادات التقيؤ بصورة روتينية قبل هذا النوع من العمليات مع الحاجة الى مزيد من الدراسات في هذا المجال .

Abstract:

Objective : To evaluate the effect of maintaining normal mean arterial blood pressure on the incidence of intraoperative emetic episodes in patient undergoing lower limbs orthopaedic surgeries under spinal anaesthesia .

Method : 60 Patients were randomly divided into two groups each composed of 30 patients . Group(A) received ephedrine 15 mg intravenously immediately after spinal anaesthesia with 2ml Bupivacaine 0.5% while group (B) received normal saline instead of ephedrine immediately after spinal anaesthesia with the same local anaesthetic . Baseline and frequent subsequent reading of mean arterial blood pressure , pulse rate , oxygen saturation , number and severity of intraoperative emetic episodes were noted .

Results : No significant difference between the two groups regarding the incidence of emetic episodes that need a treatment with an anti-emetics . However the total number of cases associated with an intraoperative emetic episodes is obviously less in group (A) than group (B) .

Conclusion : the anti-emetic drug(s) as a prophylactic for intraoperative emetic episodes is necessary even when the mean arterial blood pressure is maintained during spinal anaesthesia .Further studies in this aspect is needed .

Introduction

Intra-operative emetic symptoms during abdominal surgery under spinal anesthesia have a multi-factorial origin and factors such as psychological

changes (anxiety), arterial hypotension which is occur due to the sympathetic block following an intrathecal injection of local anaesthetics, hypoperfusion of the central nervous system, abrupt

visceral movements, and concomitant opiate administration may have an influence on them (1,2). Also the emetic symptoms are high during the pregnancy because of an anatomical and physiological changes during pregnancy. Increased concentration of serum progesterone decreases gastrointestinal motility and reduces lower oesophageal pressure (3).

During the orthopaedic surgeries of the lower limbs under spinal anaesthesia in the non pregnant patients, the intraoperative emetic symptoms are mainly due to the arterial hypotension as there are no visceral movements during such operations providing no concomitant opiate administration.

Hypotension caused by a reduction in systemic vascular resistance is normally compensated by an increase in cardiac output. This is attenuated under spinal anaesthesia by an increase in venous capacitance because of venodilatation in the lower part of the body. Thus, instead of compensatory increase, cardiac output usually decreases (4). This combined effect of reduced cardiac output and decreased systemic vascular resistance accounts for hypotension after spinal anaesthesia. Hypotension may cause brain stem hypoperfusion, thus triggering emesis.

A number of treatments have been introduced in order to reduce an intra and post operative nausea and vomiting (PONV) (5), such as 5-HT₃ antagonists (ondansetron and granisetron) (6-7), dopamine receptor antagonists (metoclopramide), and antihistamine drugs. However, each of these treatments is associated with critical limiting factors, namely cost with 5-HT₃ antagonists, extrapyramidal symptoms with dopamine receptor antagonists, excessive sedation and tachycardia with antihistamine drugs (8-9).

Metoclopramide has central and peripheral antiemetic action. Centrally it blocks dopamine receptors and

peripherally it increases lower oesophageal tone. Its half life is approximately 3-4 hrs, but side effects of the agent are not desirable.

Ephedrine has mixed direct and indirect actions on α - and β -adrenergic receptors and is the vasopressor of choice for spinal hypotension (10-11). An intravenous administration of bolus dose of ephedrine 30 mg can prevent hypotension, but at the expense of increased incidence of reactive hypertension. In contrast, an intravenous administration of a bolus dose of ephedrine 15 mg decreases the incidence of hypotension without increasing the incidence of reactive hypertension.

Aim of the study :

As each of the anti-emetic drugs is associated with critical limiting factors and side effects and as hypotension is the main cause of the intraoperative emetic symptoms, so, in this study we try to answer a question: Is the administration of an intravenous metoclopramide prior to the spinal anaesthesia of the lower limbs surgery necessary if an intraoperative hypotension is prevented by the preemptive administration of a vasopressor agent (ephedrine 15 mg i.v.) and by the preloading with 500 ml normal saline solution?

Patients and methods :

60 adult male patients (20-45 years old, ASA1 classification) are the material of this study. All patients were scheduled for an orthopaedic surgeries in the lower limbs under spinal anaesthesia. Patients were randomly divided into two groups each composed of 30 patients. Exclusion criteria in this study included contraindications to spinal anaesthesia (12). After establishing an I.V. line, all patients received 500 ml of normal saline solution. Monitoring include lead 2 ECG, non invasive blood pressure monitor and pulse oximetry. Baseline

haemodynamic readings were taken including heart rate, blood pressure and oxygen saturation. Dural puncture was performed by a 22 gauge spinal needle which is introduced through mid line approach at the L3–L4 inter-space in lateral or sitting position. After the free flow of cerebrospinal fluid, 2 ml of 0.5% hyperbaric bupivacaine (10 mg) was injected intrathecally then the patients were placed in supine position immediately. Only the group (A) patients received an intravenous bolus dose of 15 mg Ephedrine and group (B) patient received an equal volume of normal saline intravenously. Haemodynamic reading were regularly monitored every one minute for the first five minutes and every three minutes for the following fifteen minutes then every five minutes for the remaining time of operation.

Hypotension is defined as a reduction of 20% or more in baseline reading of mean arterial blood pressure. Intraoperative hypotension is treated by 5mg of ephedrine i.v. with or without 500ml of normal saline solution. Atropine 0.6 mg i.v. is given if hypotension is associated with bradycardia. Oxygen should be delivered by mask at 5 L/min if SpO₂ < 95%.

Intraoperative emetic episodes (nausea, retching and vomiting) experienced by the patients were recorded by anaesthesiologists. Episodes were identified by direct questioning or by spontaneous complaint by the patients. Nausea was defined as a subjectively unpleasant sensation associated with awareness of the urge to vomit; retching was defined as the laboured, spasmodic, rhythmic contraction of the respiratory muscles without the expulsion of gastric contents; vomiting was defined as the forceful expulsion of gastric contents from the mouth (13). If two or more episodes of nausea-vomiting occurred (significant episodes), 10 mg of metoclopramide was provided

intravenously as rescue antiemetic treatment. Severity of these episodes is ranging from nausea to vomiting.

Data Collected :

- 1 – Age of the patient .
- 2 – Weight of the patient .
- 3 – Duration of surgery .
- 4 – Haemodynamic recording (heart rate , mean arterial blood pressure and oxygen saturation) as mentioned above .
- 5 – Number of intraoperative emetic episodes and its severity .

Results :

1 – No significant difference in the demographic data between both groups regarding the age, weight and surgery time (table 1) .

2 – Mean arterial blood pressure measurements during 5 minutes, 15 minutes, 30 minutes and 45 minutes after the intrathecal administration of local anaesthetic reveals a higher reading in group A patients than group B patients (table 2) (figure 1) .

3 – Maximum incidence of the significant hypotension occur in the period of 5 – 15 minutes after the intrathecal administration of local anaesthetic in both cases. Group B is associated with a higher incidence of a significant reduction in mean arterial blood pressure than group A patients. This reduction had been treated by the administration of 5 mg ephedrine i.v. with or without an intravenous infusion of 500 ml normal saline solution (table 2) (figure 2) . Noticeable side effects of ephedrine were not found in any studied subjects.

4 - No significant difference in the incidence of the intraoperative emetic episodes in both groups. All the episodes are limited between nausea and retching. No episodes of vomiting occur in both groups. The overall incidence of these episodes in group A is about 8.3% compared with 17.45% but the incidence

of the significant episodes that need treatment with 10 mg metoclopramide i.v. is approximately the same . (table 3) (figure 2) .

5 – Maximum incidence of intraoperative emetic episodes occur in the period of 15 – 30 minutes after the intrathecal

administration of local anaesthetic in both cases . Most of these are significant episodes treated by 10 mg metoclopramide i.v.(table 3) (figure 2) . Noticeable side effects of metoclopramide were not found in any studied subjects.

Variable	GROUP A		GROUP B	
	Mean	S.D	Mean	S.D
Age(yrs)	32.1	6.5	34.4	5.7
Weight(Kg)	74.5	8.3	77.3	6.6
Surgery time(min)	65	7.0	62.0	5.0

Table 1 :No significant difference in demographic data between both groups .

Mean arterial bl.pr (MAP) mmHg	Group	Mean	Std . deviation	Number of significant hypotension
Baseline	A	94.5	6.5	0
	B	89.1	8.5	0
5 minutes	A	77.0	7.8	7
	B	64.1	8.8	19
15 minutes	A	78.5	5.8	3
	B	73.0	6.9	8
30 minutes	A	84.1	5.5	0
	B	75.1	6.7	4
45 minutes	A	85.5	5.8	0
	B	77.0	6.1	0

Table 2 : Mean arterial blood pressure readings in both groups

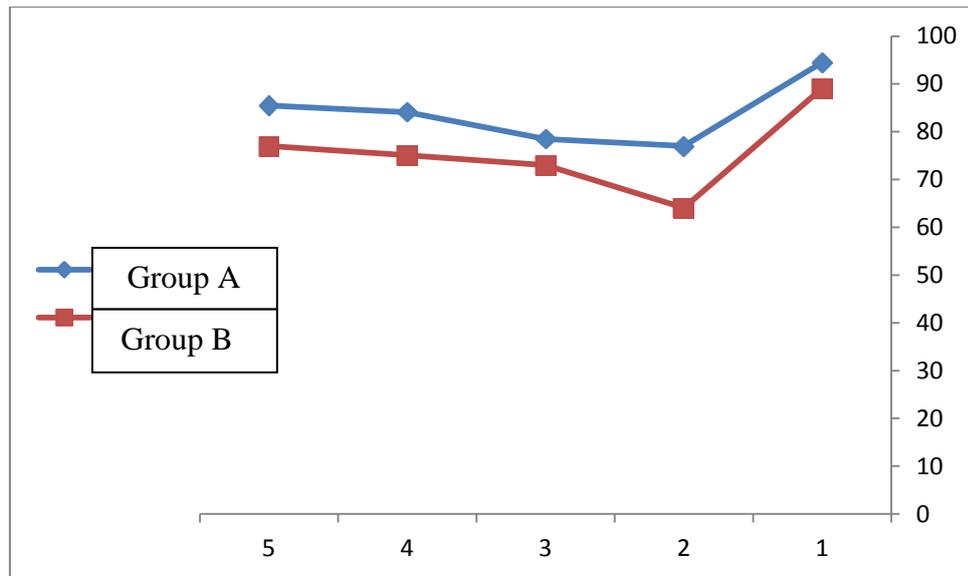


Figure (1) : Mean arterial blood pressure readings in both groups : maximum Incidence of significant hypotension occur during the first 5 – 15 minutes after the intrathecal administration of local anaesthetic .

Number of intraoperative emetic symptoms	Group	Nausea & retching (number & %)	Vomiting (number & %)	Significant emetic symptoms
Baseline	A	0 (0%)	0 (0%)	0 (0%)
	B	0 (0%)	0 (0%)	0 (0%)
5 minutes	A	2 (6.6%)	0 (0%)	0 (0%)
	B	5 (16.6%)	0 (0%)	0 (0%)
15 minutes	A	3 (10%)	0 (0%)	6 (20 %)
	B	8 (26.6%)	0 (0%)	6 (20 %)
30 minutes	A	2 (6.6%)	0 (0%)	2 (6.6%)
	B	4 (13.3%)	0 (0%)	3 (10%)
45 minutes	A	3 (10%)	0 (0%)	0 (0%)
	B	4 (13.3%)	0 (0%)	0 (0%)

Table (3) : : No *significant* difference in the incidence of the emetic symptoms episodes in both groups.

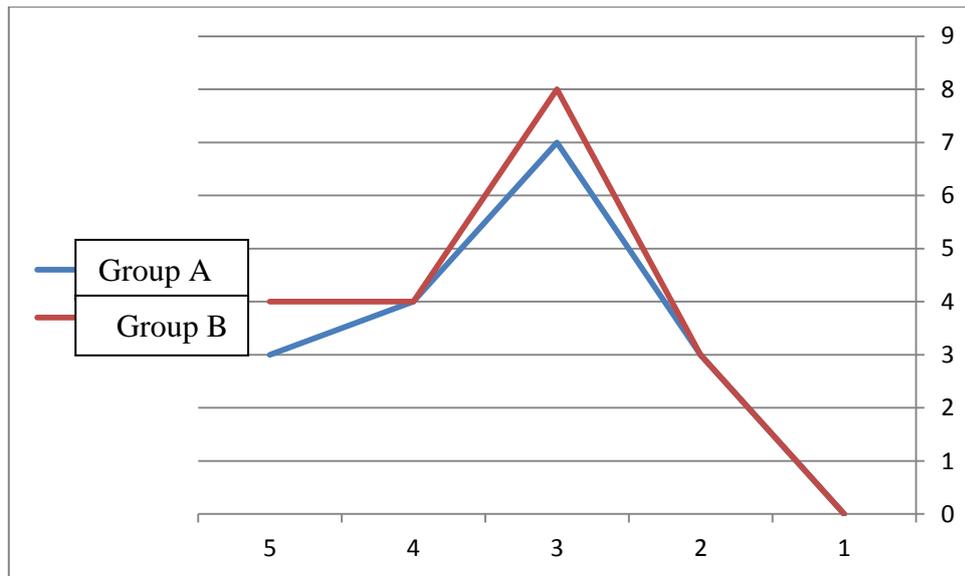


Figure (2) : No *significant* difference in the incidence of the emetic symptoms episodes in both groups .

Discussion :

Great care had been taken to design methodology such a way that made possible to compare findings with previous researches .

Present study found no obvious significant correlation between maintaining normal mean arterial blood pressure and the reduction in the incidence of significant intraoperative emetic episodes in the lower limbs orthopaedic surgeries . The total number of episodes or the overall incidence of these episodes in group A is about 8.3% compared with 17.45% in group B (i.e about 52.44% reduction) but the incidence of the significant episodes that need treatment with 10 mg metoclopramide i.v. is approximately the same .Our study is agreed by Cooper DW and his colleagues ; they reported that a significantly lower incidence of nausea and vomiting under spinal anaesthesia has been observed when using Phenylephrine when compared to Ephedrine and seems to be unrelated to the systolic blood pressure (14) , this arise the possibility of other aetiological factors involved in intraoperative nausea and vomiting during spinal anaesthesia .

The prospective work of Carpenter *et al.*(15) in a similar setting confirmed these findings. It appears that not one single mechanism is responsible for causing emetic episodes after spinal anaesthesia. Several mechanisms may be active simultaneously, and the importance of each in a particular case may remain speculative.

Our study is disagreed by Iclal Ozdemir Kol and his colleagues.They reported that there were a significant lower incidences of nausea and vomiting in the ephedrine group compared with the control group(about 66% reduction) (16) ; also

Carpenter *et al.* (17) reported that hypotension leads to a two-fold increase in the relative risk of intraoperative nausea and vomiting (ephedrine group reduces nausea and vomiting by 75% compared with control group) but he does not mention the incidence of significant episodes .

Recommendations :

The etiologic factors involved in intraoperative nausea and vomiting during spinal anaesthesia are so numerous, that larger prospective studies with larger patients samples seem to be needed in order to establish the most

important risk factors, the best prevention guidelines, and the effectiveness and safety of new antiemetic agents. Therefore, we recommend to use the anti-emetic drug(s)

as a prophylactic for intraoperative emetic episodes even when the mean arterial blood pressure is maintained during spinal anaesthesia.

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