A THESIS STUDY FOR FULFILMENT OF MASTER DEGREE IN ANESTHESIA

Title of the Study:

Comparison between Intrathecal Nalbuphine & Bupivacaine versus Fentanyl & Bupivacaine for Postoperative Analgesia after Lower Abdominal Surgeries

Postgraduate Student: **Muhammad Mustafa Hamisa**
Degree: **M.B.B.Ch.**

DIRECTOR: **Prof. Dr. Sherif Farouk Ibrahim**
Academic Position: **PROFESSOR of ANESTHESIA & ICU**

Co-DIRECTOR: **Dr. Fady Adib Abd Elmalek**
Academic Position: **LECTURER of ANESTHESIA & ICU**

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مقدمة من الطالب : محمد مصطفى هميسة

الدرجة : بكالريوس الطب و الجراحة / جامعة عين شمس

المشرف الأكاديمى : أ.د. شريف فاروق إبراهيم

الدرجة الأكاديمية : أستاذ التخدير و الرعاية المركزة

المشرف المساعد : د. فادى أديب عبدالملك

الدرجة الأكاديمية : مدرس التخدير و الرعاية المركزة

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Prof. of Anesthesia,Intensive care & Pain management
Faculty of medicine-Banha university

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Contents

Abbreviations

CSE : combined spinal epidural

CSF : cerebro-spinal fluid

CNS : central nervous system

CVS : cardio vascular system

DBP : diastolic blood pressure

GA : general anesthesia

IV : intravenous

LA : local anesthetic

LMWH: low molecular weight heparin

N&S : nausea and vomiting

SBP : systolic blood pressure

VAS : visual analogue scale

Vit : vitamin

CHAPTER

(1)

INTRODUCTION

Analgesia is one of the main demands of all patients post operatively. There has been a radical Improvement in the quality of pain relief specially with use of opioids systemically. There is still scope to make opioid use not only more effective but also less hazardous according to route of administration and type of additives.

(Santos SG and Azpiazu AU , 2012.)

It has been tested whether the intrathecal combinations of a reduced dose of bupivacaine with an opioid compared with a standard dose of the same LA alone guaranteed adequate intraoperative anesthesia and postoperative analgesia and decreased LA-related adverse effects and improve recovery from the spinal block.

(Elia N, Wenk M and Tramer MR. 2013)

Various opioids have been used along with bupivacaine to prolong its effect, to improve the quality of analgesia and minimize the requirement of postoperative analgesics. The lipophilic opioid such as fentanyl is the opioid most studied and widely used intradurally in the context of postoperative pain.

(Mugabure Bujedo B. 2012)

The use of Nalbuphine, a mixed opioid agonist antagonist, can prove to be a grace because when used singly or in combination with other agents it has the potential to maintain or even enhance opioid based analgesia while simultaneously mitigating the common mu-opioid side effects.

(Mark W. Gunion , Anna Maria Marchionn,2014)

AIM OF STUDY

To compare the post-operative analgesic effect of intrathecal nalbuphine as an adjuvant to bupivacaine versus intrathecal fentanyl as an adjuvant to bupivacaine after lower abdominal surgeries concerning hemodynamic stability, respiratory state & presence of side effects.

CHAPTER (2)

1) REVIEW

- **NEURAXIAL , GENERAL ANESTHESIA AND PAIN RELIEF**

There are three main regional anesthetic techniques which are spinal, epidural, and combined spinal epidural (CSE). Many practitioners prefer spinal & CSE techniques over epidural because they have a rapid onset and lower incidence of failed block. Their use for young adult patients was facilitated by the popularization of pencil-point needles, which dramatically reduced the incidence of post dural puncture headache. (***Rudra et al., 2004).***

The choice of regional or general anesthesia is influenced by a variety of other factors, such as the urgency of the procedure, patient hemodynamic status and patient preference***.*** For scheduled surgeries, the rapidity of anesthetic induction is less of a concern, so both anesthetic options (regional and general) are available. If the surgery must be performed urgently, an anesthetic technique that can be performed relatively quickly is preferred since anesthesia must be achieved expeditiously ***(Bano etal, 2006).***

- **Advantages of neuraxial blockade include**:

1) Adequate anesthesia plus postoperative relief of pain with reduced requirements for systemic opioids resulting in avoidance of sedation and respiratory depression. ***(Rodgers et al., 2005)***
2) More importantly, the inhibition of the neuro-endocrinal response to surgery, trauma induced nociceptive impulses and blunting of the autonomic and somatic responses to pain facilitate breathing, coughing, sighing and early ambulation. ***(Rodgers et al., 2005)***

3) The patient is awake and airway reflexes are maintained. Inhibition of upper airway reflexes and alterations of gastrointestinal function increase the risk of pulmonary aspiration. Airway reflexes are compromised by the loss of consciousness that occurs with induction of general anesthesia. ***(Bano et al., 2006).***

If **evaluation of the patient's airway anatomy** suggests that intubation may be difficult, then regional anesthesia may be a more desirable choice than general anesthesia. Other reasons a regional anesthetic may be preferable include history of sux apnea or delayed recovery from GA & some types of cardiac or respiratory disease, and for the prevention/treatment of autonomic hyper-reflexia. ***(Spiegel and Hess, 2007).***

Table (1): Contraindications to spinal anesthesia

Absolute:

- Infection at site of injection.
- Patient refusal.
- Coagulopathy or other bleeding diathesis.
- Severe hypovolemia.
- Increased intracranial pressure.
- Severe aortic stenosis.
- Severe mitral stenosis.

Relative:

- Sepsis.
- Uncooperative patient.
- Preexixting neurological deficits.
- Demyelinating lesions.
- Stenotic valvular heart lesions.
- Severe spinal deformity.

(Kleinman and Mikhail, 2006)

Patient medical factors also influence choice of optimum anesthetic. In general, acute hemorrhage and hemodynamic instability compromise against the use of regional anesthesia since the accompanying **sympathetic block** will produce vasodilatation, which will exacerbate **severe hypotension up to shock**. The presence of a **significant bleeding diathesis** (eg, severe thrombocytopenia) or cardiac patients on antiplatelet medication or any other cause of coagulopathy is another contraindication to regional anesthesia because of the increased risk of causing a **spinal/epidural hematoma** ***(Horlocker et al., 2003).***

For all patients in whom a bleeding tendency is suspected:

The most common indications for anticoagulation medications are as in cardiac patients including heart valve replacements &heart rhythm disorders , obesity , bed ridden , post lower limb orthopedic surgeries , diabetics or other congenital causes as hemophilia, certain clotting aspects deficiency or vitamin shortage as vit. k (**Benzon H et al., 2003)**

Neuraxial blocks should not be performed until at least 12 hours after the last dose of low dose (prophylactic) LMWH (eg, Enoxaparin 40 mg), and not until at least 24 hours after the last dose in patients receiving high-dose (therapeutic) LMWH (eg, Enoxaparin 1 to 1.5 mg/kg every 12 hours). In addition: If postoperative LMWH is to be used, the first dose should not be administered prior to 24 hours postoperatively if a high dosing regimen is planned, and not prior to six to eight hours postoperatively if a single-daily dosing regimen is planned. ***(Horlocker et al., 2003).***

To prevent regional anesthesia-induced hypotension (spinal sympathectomy):

include volume expansion using intravenous fluids, administration of vasopressors, and mechanical interventions(such as use of leg wrapping or compression boots) .

Intravenous fluid infusion of crystalloid as pre-loading or co-loading with 10-20ml/kg has been a standard prerequisite to regional anesthesia. However, crystalloid preload prior to anesthesia does not reliably prevent spinal hypotension, probably due to rapid redistribution of crystalloid into the extravascular compartment. So, recently co-load with lactated Ringer's is preferable as it seems to be more appropriate physiologically and safer but it still controversy in reducing, but not eliminating, the incidence of spinal-induced hypotension in patients. (***Klienman and Mickhail, 2006).***

Post–operative pain relief :

it is still an unresolved issue. One of the methods of providing postoperative analgesia is by prolonging the duration of intrathecal bupivacaine by additives such as opioids, clonidine, ketamine etc. However each drug has its limitations and a need for alternative methods ***(Tan et al., 2001).***

Intrathecal opioids are synergistic with local anesthetics and intensify the sensory block without increasing the sympathetic block. The combination makes it possible to achieve spinal anesthesia with lower doses of local anesthetic especially with opioids that offer hemodynamic stability. As intrathecal mu opioids injection is associated with higher incidence of side effects, however usage of fentanyl is combined with milder side effects ***(Tan et al., 2001).***

It was proved the utility of using neuraxially administered Nalbuphine in managing post-operative pain and has been used to antagonize the side effects of spinal opiates as opiates induced pruritis , nausea & vomiting **(Zatloukal J, et al.2009)**

PATHOPHYSIOLOGICAL CONSEQUENCES OF POSTOPERATIVE PAIN

1) Respiratory system:

Excursions of the diaphragm are markedly limited, particularly when ileus develops. Furthermore, in an attempt to attenuate pain, the patient refrains from deep breathing and coughing. Pulmonary status deteriorates. When narcotics are given in sufficient amount, respiratory depression could result. Apnea may occur in severe cases. Prolonged bed rest and immobility can produce similar changes in pulmonary function. ***(Bongard et al., 2008)***

2) Cardiovascular system:

Cardiovascular effects of pain are initiated by the release of catecholamines, aldesterone and cortisol as well as by activation of the renin angiotensin system. These hormones have direct effect on the myocardium and vasculature, and they augment salt and water retention ***(Brown, 2005).***

3) Gastro-intestinal:

Sympathetic activation, such as from uncontrolled pain, may delay return of postoperative gastrointestinal motility that may develop into paralytic ileus and delays return of gastro-intestinal function ***(Brown, 2005).***

4) General sense of well being:

The most common reaction to acute pain is anxiety. Sleep disturbances are also typical. When the duration of pain becomes prolonged, depression is not unusual. Some patients react with anger that is frequently directed to the medical staff ***(Brown, 2005).***

2)Anatomical Considerations of REGIONAL ANESTHESIA

The spinal canal inside the vertebral column contains the spinal cord with its coverings (the meninges), fatty tissue, and a venous plexus. The meninges are composed of three layers: the pia mater, the arachnoid mater, and the Dura mater; all are contiguous with their cranial counterparts. The pia mater is closely adherent to the spinal cord, whereas the arachnoid mater is usually closely adherent to the thicker and denser Dura mater. ***(Brown, 2005).***

Cerebrospinal fluid (CSF):

CSF is an isotonic, aqueous medium with a constitution similar to interstitial fluid. CSF is contained between the pia and arachnoid matters in the subarachnoid space

(Kleinman and Mikhail, 2006).

The Spinal cord:

The spinal cord normally extends from the foramen magnum to the level of L_1 in adults. The anterior and posterior nerve roots at each spinal level join one another and exit the intervertebral foramina forming spinal nerves from C_1 to S_5. Because the spinal cord normally ends at L_1, lower nerve roots course some distance before exiting the intervertebral foramina. These lower spinal nerves form the cauda equina ("horse tail"). Therefore, performing a lumbar (subarachnoid) puncture below L_1 in an adult avoids potential needle trauma to the cord; damage to the cauda equina is unlikely as these nerve roots float in the dural sac below L_1 and tend to be pushed away (rather than pierced) by an advancing needle ***(Brown, 2005)***