COMPARISON BETWEEN EPIDURAL ANESTHESIA (BUPIVACAINE & FENTANYL) MIXTURE AND CONTINUOUS INTRAVENOUS MORPHINE FOR PAIN CONTROL IN THE TREATMENT OF MAJOR ABDOMINAL VASCULAR SURGERY AT QUEEN ALIA HOSPITAL

Taiseer Nsour MD*, Mohamed Keilani MD*, Merhej Ahmad MD*, Ibraheem Khasawneh MD*, Kristy Janho MD**, Maha Hdaib RN^

ABSTRACT

Objective: To compare the use of continuous epidural analgesia (Bupivacaine & Fentanyl) mixture and continuous intravenous Morphine in regard to efficacy and side effects for the relief of postoperative pain in the treatment of abdominal vascular surgery (upper and lower abdominal surgery).

Methods: This study was conducted at Queen Alia Hospital between January 2003 and December 2005. Age range of the study participants was between 45-80 years, 85 were males and 21 were females. The patients signed a consent form for surgical and anesthesia intervention. A total of 106 patients who had coronary artery disease, diabetes mellitus, chronic obstructive pulmonary disease, chronic renal failure or more than one of these diseases (American Society of Anesthesiologists III and IV class) were divided into two treatment modalities. Group A (60 patients) received continuous epidural analgesia (Bupivacain & Fentanyl) mixture while group B (46 patients) received continuous intravenous morphine for the relief of postoperative pain in the treatment of major abdominal vascular surgery. Pain was assessed postoperatively using pain relief score. The different side effects reported included nausea and vomiting, motor block, respiratory depression and sedation. Simple descriptive statistics and the Chi-Square test were used to analyze the data. P value of < 0.05 was considered statically significant.

Results: Pain relief was better among patients in group A than those in group B ($P<0.001$). Similarly, there was a lower statistically significant difference regarding side effects among patients in group A.

Conclusion: Patients who received continuous epidural Bupivacaine & Fentanyl experienced better pain relief and fewer complications than those in the Morphine group. Results indicate that the use of epidural anesthesia (Fentanyl & Bupivacaine) is a safe procedure and is more efficient than the continuous intravenous morphine for pain relief in the treatment of major abdominal vascular surgery.

Key words: Bupivacaine, Epidural, Fentanyl, Patients controlled analgesia

JRMS April 2009; 16(1): 34-37

From the Departments of
*Anesthesia, Queen Alia Military Hospital, (QAMH), Amman-Jordan
** Vascular Surgery Unit, (QAMH)
^ Nursing, (QAMH)
Correspondence should be addressed to Dr. T. Nsour, (QAMH), Amman-Jordan
Manuscript received April 26, 2006. Accepted September 21, 2006

Introduction

Review of the literature suggests that epidural anesthesia/analgesia have benefits that are important in terms of patient satisfaction, and is important in integrated perioperative care.[1] Opioids administered via patient controlled analgesia (IV-PCA) or intravenous (IV) infusion provides better analgesia and patient satisfaction than conventional delivery.[2] However, IV infusion has not been demonstrated to affect postoperative outcome significantly. Recent studies suggest that advances in anesthesia and postoperative analgesia can affect postoperative outcome. Epidural anesthesia can attenuate "stress response" to surgery and improve the quality of postoperative analgesia in comparison with systemic opioids.[3] Continuous epidural infusion (CEI) of highly concentrated local anesthetics (LA) can cause increasing motor weakness and higher risk of systemic toxicity.[4] There are several means to reduce these drawbacks, such as the insertion of epidural catheters at the center of the involved segments and the use of low concentrations of LA plus Opioids.[5,6] Several lines of evidence indicate that epidural opioids are safe, provide good pain relief, less pain during movement, fewer cardiopulmonary complications, lower incidence of thromboembolism and earlier discharge from hospital, while intravenous opiates lead to more side effects, including respiratory depression, nausea and vomiting.

For postoperative pain relief in patients undergoing major vascular surgery, we compared two methods of analgesia: epidural Bupivacaine & Fentanyl mixture (epidural group) which is commonly used for postoperative analgesia, and continuous intravenous Morphine (IV group).

Methods

This study was conducted at Queen Alia Hospital between January 2003 and December 2005. Age range of the study participant was between 45-80 years. All participants signed a consent form for surgical and anesthesia intervention.

A total of 106 patients (85 males and 21 females), who had coronary artery disease, diabetes mellitus, chronic obstructive pulmonary disease, chronic renal failure or more than one of these diseases (American society of anesthesiologist class III and IV) were divided into two treatment modalities. Group A (60 patients) received continuous epidural analgesia (Bupivacaine & Fentanyl) mixture while group B (46 patients) received continuous intravenous morphine for the relief of postoperative pain in the treatment of major abdominal vascular surgery. Monitoring of blood pressure, ECG and heart rate started at the time of placement of the epidural catheter (thoracic or lumbar), and at a level that would provide epidural block i.e. 1-2 spinal segments above the upper end of the patient's wound. Thoracic epidural anesthesia was preferred for these patients and T7-T8 or T8-T9 was usually used. The patient was placed in a sitting position, and the "intermittent loss of resistance technique" with saline to identify the epidural space was used; the catheter was inserted 4cm cephalically. A test dose of 3ml Bupivacaine 0.5% was injected, and the catheter was tapped along the midline of the back.

General anesthesia was induced using Fentanyl, Thiopental or Propofol, and non depolarizing muscle relaxant (Tracurium or Vecuronium bromide) for endotracheal intubations and maintenance. Anesthesia was maintained with Isoflurane (O_2:N_2O, 1:1). Lungs were mechanically ventilated, and another dose of 8-12ml of 0.25 Bupivacaine was administered during surgery. At the end of surgery, the patients were extubated directly.

During the next 48 postoperative hours, a mixture of Bupivacaine/Fentanyl (0.1%/1microgram per ml, 6-8ml/hour) was used in the epidural group, while in the intravenous group Morphine 1-2 mg/hour was administered. All patients were monitored in the recovery room and later in the intensive care unit (ICU) for blood pressure, heart rate, central venous pressure (CVP), respiratory complications, sedation, nausea and vomiting, and "motor block in the epidural group".

Respiratory depression was defined as when respiratory rate was less than 8 per minute and O_2 saturation dropped < 90% and was treated with O_2 mask. Patient pain relief and satisfaction were assessed using a Pain Relief Scale: (PRS) 1=not effective at all, 2=mildly effective, 3=very effective, 4=completely effective. Simple descriptive statistics and the Chi-Square test were used to analyze the data. A P value < 0.05 was considered statically significant.

Results

There were no differences in the distribution of the surgical procedures between the two groups. The patients' characteristics are summarized in Table I.

Table I. Demographic characteristics of the study groups

Group of the patients	Group A	Group B
Mean Age (year) ±SD	59±13	63±10
Mean Weight (Kg) ± SD	70±12	67±17
ASA III	42(70%)	33(72%)
ASA IV	18(30%)	13(28%)

Table II. Pain relief score among the study groups

Pain relief scale (PRS)	Group A		Group B		P value
	NO.	%	NO.	%	
PRS= 1	0	0	2	4	<0.05
PRS= 2	9	15	12	26	<0.05
PRS= 3	29	49	25	54	>0.05
PRS= 4	22	36	7	16	<0.01

Table III. Side effects among the study groups

Group	Group A		Group B		P value
	No.	%	No.	%	
Nausea and vomiting	4	7	9	20	<0.05
Respiratory depression	-	0	2	4	<0.05
Sedation	-	0	5	11	<0.001
Mild motor block	1	1.5	-	0	>0.05
Incomplete motor block	2	3	-	0	>0.005

No significant differences in age, gender or weight were observed between patients receiving the Bupivacaine & Fentanyl mixture and those receiving Morphine IV. Table II shows that 36% from group A who received epidural anesthesia (Fentanyl & Bupivacaine) had a PRS score=4 while only 16% of the patients from group B who received continuous IV morphine had a PRS score=4.

There was a statistically significant difference in pain relief between the two groups at PRS score=4 (<0.001). At PRS score=1 none of the patients among group A reported that epidural is not effective, however 4% of the patients in group B reported suffering severe pain. The difference between these two groups was statistically significant (<0.05). The side effects for both groups are shown in Table III.

Four patients (7%) in group A had nausea and vomiting while nine patients (20%) in group B had nausea and vomiting. Two patients (4%) in group B had respiratory depression but none in group A developed this side effect. None of the patients in group A had sedation, while five patients (11%) in group B had sedation. Three patients (5%) in group A had motor block but none in group B developed this symptom. The differences regarding the side effects in both groups were statistically significant and were lower with group A. Blood pressure and heart rate were stable in both groups.

Discussion

Despite improvements in the perioperative care, major surgical operations are still followed by sequelae such as pain, organ dysfunction and prolonged convalescence. It has been assumed that sufficient pain relief will improve the surgical outcome with reduced morbidity, need for hospitalization and convalescence, and there is a common consensus that optimal (dynamic) pain relief is a prerequisite for early postoperative recovery.[7] Epidural analgesia provides better analgesia than intravenous patient-controlled analgesia.[8] Lynch and colleagues found that epidural analgesia significantly decreased pain at rest and with movement as compared with parenteral opioids in abdominal aortic surgery.[9] It is also important to note that the equimolar ratio at which the opioid and the local anesthetic are administered may play a role in the analgesic efficacy of a local aneasthetic/opioid mixture.[10]

The combination of epidural opioids and local anesthetics provides the best balance of analgesia and causes fewer side effects after major abdominal surgery. Work performed in Denmark by the

research group of Kehlet and Holte has been directed at finding the most advantageous combination of local anesthetics and opioids for post-operative epidural infusion.[11] Yun-Hui found that 28% of the patients who received epidural Fentanyl & Bupivacaine were satisfied while only 17% from those receiving intravenous morphine were satisfied.[12] In our study 36% of the epidural group were satisfied compared to only 16% in the intravenous group. Yun-Hui found that 11% of patients in epidural group and 22% of patients in intravenous group had nausea and vomiting, while in our study 7% of patients in epidural group and 20% of patients in intravenous group had nausea and vomiting. Respiratory depression in Yun-Hui's study was none for both patients in the epidural group and patients in intravenous morphine group. In our study respiratory depression in epidural group was none but in the intravenous group it developed in 4% of the patients. Sedation in Yun-Hui's study was none for patients in epidural group and 1.5% for the patients in the intravenous group, while in our study it was none in the epidural group and 11% in the intravenous group. Motor block in patients with epidural block in the Yun-Hui study was 2.5% while for the patients in our study was 3% (incomplete motor block).

A multicentre Australian study (MASTER Anesthesia trial) found epidural analgesia/ anesthesia to be clinically superior on the basis of pain measured by visual analog scores in patients randomized to epidural and intravenous group.[13] Respiratory failure was less in the epidural group in comparison with the intravenous group.[13]

Conclusion

Patients who received epidural Bupivacaine & Fentanyl experienced better pain relief and fewer complications than those in the Morphine group. Therefore, the use of epidural anesthesia (Fentanyl with Bupivacaine) is a more efficient and a safer procedure than continuous intravenous morphine for the pain relief in the treatment of major abdominal vascular surgery.

References

1. **Ballantyne JC,** Does epidural analgesia improve surgical outcome? *British Journal of Anaesthesia* 2004; 92(1): 4-6.
2. **Moraca RJ, Sheldon DG, Thirlby RC.** The role of epidural anesthesia and analgesia in surgical practice. *Ann Surg* 2003; 238(5): 663-673.
3. **Smith G, Donal J, Buggy B.** Epidural anesthesia and analgesia: better outcome after major surgery? - Editorial - Statistical Data Included. *British Medical Journal* 1999.
4. **Standl T, Burmeister M, Ohnesorge H, *et al*,** Patient-controlled epidural analgesia reduces analgesic requirements compared to continuous epidural infusion after major abdominal surgery. *Can J Anesth* 2003; 50: 258-264.
5. **Cooper DW, Turner G.** Patient-controlled extradural analgesia to compare bupivacaine, fentanyl and bupivacaine with fentanyl in the treatment of postoperative pain. *Br J Anaesth* 1993; 70: 503-507.
6. **Kahn L, Baxter FJ, Dauphin A, *et al*.** A comparison of thoracic and lumbar epidural techniques for post - thoracoabdominal esophagectomy analgesia. *Can J Anesth* 1999; 46: 415-422.
7. **Kehlet H, Holte K.** Effect of postoperative analgesia on surgical outcome, *British Journal of Aneasthesia* 2001; 87(1) 62-72.
8. **Barnett RA, Ochroch A.** Review: epidural analgesia management and outcomes. *Annals of Long-Term Care* 2003; 11(11): 33-38.
9. **Lynch EP, Lazor MA, Gellis JE, *et al*.** Patient experience of pain after elective noncardiac surgery. *Anesth Analg* 1997; 85(1): 117-123.
10. **De Leon-Casasola OA, Lema MJ.** Postoperative epidural opioid analgesia: what are the choices? *Anesth Analg* 1996; 83: 867-875.
11. **Stevens R, Ghazi S, Stevens RA.** Post-operative Epidural Analgesia: what have we learned over the past ten years? Annual Meeting of the American Society of Regional Anesthesia, Seattle, WA, May 14-17, 1998.
12. **Yun-Hui Teng.** Post operative pain relief. *Chang Gung Med J* 2004; 27: (12): 28-37.
13. **Wedel DJ,** Perioperative Epidural Analgesia and outcome After Major Abdominal Surgery in High-Risk Patients. *Anesthesia Analgesia* 2003; 96: 53-62.