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# Evaluation of Epidural Anesthesia Using Fentanyl andBupivacainfor Lower Limb Post-Operative Pain Management

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***Abstract:***
***Background:****Evaluation of epidural anesthesia using bupivacain and fentanyl for lower limb post-operative pain management.*
***Materials and Methods:****Descriptive prospective design, analysis of over 30 patients with ASA 1-2, aged 18 – 60, no contraindication against epidural anesthesia, indication for planned below emergency lower limb surgery at the 7A Miliraty Hospital. Patients received no pre-anesthetic agent, firstly received epidural anesthesia, had a catheter inserted at epidural space, and then received spinal cord anesthesia for surgery. Post-operative pain (VAS ≥ 5) was relieved by bolus administration of 10ml anesthetic (bupivacain 1% + fentanyl 2µg/ml + adrenalin 1/200000) until VAS < 4, then administrated with 6-8ml/h anesthetic using electric syringe. VAS and hemodynamics were monitored at recording time.*
***Results:****Epidural anesthesia using bupivacain and fentanyl for lower limb post-operative pain management resulted in satisfactory outcomes. VAS value was always under 4 at investigated times. No pain (VAS = 0) was recorded during continuous anesthetic administration from hour 12 to hour 72.*
***Conclusion:****Epidural anesthesia with bupivacaine and fentanyl can be successfully applied for postoperative pain management for lower limb surgeries.*
***Key Word:****Spinal Cord Anesthesia, Epidural Anesthesia, Bupivacain, Fentanyl*

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## I. Introduction

Lower limb injuries were common in traffic, work and domestic accidents. Operative and post-operative pain management is always a high priority for surgeons, anesthetists, and intensive care specialists. Epidural anesthesia has been applied since the beginning of 19th century, however, due to high complication rates because of inadequate understanding of spinal physiology, limited technical level and facilities, this method was left in oblivion for long times. Later researches in epidural anesthesia worldwide finally enable this method to be one of the most popular ones in surgery and lower limb post-operative pain management.[1,2,3,4,5,6,7]. Epidural anesthesia utilizes various anesthetic agents, and the most common one is bupivacaine[8] (Singh 2012). However, due to its many side effects, such as hypotension, bradycardia, and cardio-muscular intoxication, anesthetists must strive for adjuvants to mitigate these side effects. Morphin-derived painkillers were used in combination with bupivacaine for side effect mitigation and elongation of post-operative analgesic effect.[2,5,9]. There are still few reports on epidural anesthesia using bupivacain and fentanyl for lower limb post-operative pain management in Vietnam, and especially in the 7A Miliraty Hospital, therefore this study was carried out to evaluate epidural anesthesia using bupivacain and fentanyl for lower limb post-operative pain management.

## II. Material And Methods

**Research targets**: patients with ASA 1-2, aged 15 – 60, no contraindication against epidural anesthesia, indication for lower limb surgery.
**Time and location**: December 2014 to August 2015 at the 7A Miliraty Hospital, Hochiminh City, Vietnam.
**Methods**
***Design***: Prospective description, analysis.
***Technical facilities***: Phillip monitor (heart rate, blood pressure, SpO2), Perifix epidural anesthesia kit, B-Braun, Germany; spinal needle, B-Braun; VAS measurement scale, measured value 0 to 10 Astra.

***Used drugs***: Bupivacain 0,5% (Astra), Fentanyl (TW2), Analeptic.

**Patient preparation:** Patients were laid flat on their backs. Installed heart rate, ECG, $SpO_2$ monitor, oxygen mask 3 to 5 minutes before anesthesia. Carried out pre-anesthesia transfusion. Explained carefully to the patients about epidural and spinal anesthesia and its application in surgery and post-operative pain management. Investigated patients were not administered sedative or pre-anesthetic agents to accurately examine the analgesic effect of the studied method. Anesthetists were properly sterilized, equipped for epidural and spinal anesthesia. The patients were then left to sit on the surgical stable and bent the back maximally towards the abdomen. Sterilized the injection site thrice with Povidone-iodine. Inserted the needle at positions L2-L3, L3-L4 for epidural anesthesia, when the needle reached epidural space, installed and fixed the catheter at D12-L1 positions in the epidural space. Spinal anesthesia was done by injection at epidural space one vertebra below epidural anesthesia. Monitored the patients, when spinal anesthesia effect worn off (VAS > 4), administered 8ml bolus anesthetic (bupivacain 0.1% + fentanyl 2µg/ml). Re-examined after five minutes, if VAS < 4 then continuously administered anesthetic using electric syringe (4-10ml/h) to maintain VAS below 4.

**Data collection**

Using pre-designed forms by the authors. Collected data including patient information (sex, age, height (m), weight (kg)), surgery type, ASA (1 or 2), hemodynamics (heart rate (l/ph), blood pressure (mmHg), $SpO_2$), anesthetic time, total used anesthetics, total turns of epidural anesthesia implementation.

***Investigated time***: T0 (bolus administration), T1 (5 minutes after bolus administration), T2 (10 minutes after bolus administration), T3 (15 minutes of continuous administration), T4 (1 hour of continuous administration), T5 (6 hours of continuous administration), T6 (12 hours of continuous administration), T7 (24 hours of continuous administration) T8 (36 hours of continuous administration), T9 (48 hours of continuous administration), T10 (72 hours of continuous administration).

**Data analysis**: Using SPSS 16.0 software. Statistical significant results at $p<0.05$.

## III. Result

**Patient information**

**Table no 1:** Patient sex ratio

| Sex | Number | Percentage |
|---|---|---|
| Male | 16 | 53,3 |
| Female | 14 | 46,7 |

Eighteen cases were thigh surgeries, took a higher portion (60%) than lower leg surgeries (12 cases, 40%).

**Table no 2:** Patient distribution by weight and ages

| Parameters | Average + SD | Min – Max |
|---|---|---|
| Ages (year) | 32.13 ± 7.59 | 20 – 46 |
| Weight (kg) | 51.60 ± 6.45 | 40 – 65 |

The average age in this study was 32.13 ± 7.59 years (min was 20, and max was 46). The average weight in this study was 51.60 ± 6.45 kg (min was 40, and max was 65).

**Table no 3:** Patient dispotion by surgical types

| Surgical types | Number | Percentage |
|---|---|---|
| Thigh | 18 | 60 |
| Lower leg | 12 | 40 |

Eighteen cases were thigh surgeries, took a higher portion (60%) than lower leg surgeries (12 cases, 40%).

**Table no 4:** Patient disposition by ASA

| Classification | Number | Percentage |
|---|---|---|
| ASA1 | 27 | 90 |
| ASA2 | 3 | 10 |

Most patients (90%) were healthy (ASA1). The remaining (10%, ASA2) contracted minor illnesses with negligible impacts on this study.

**Table no 5:** Operating time and spinal anesthesia effect duration

| Parameters | Average + Standard deviation (min) | Min – Max |
|---|---|---|
| Operation duration | 101.5± 22.01 | 80 - 150 |
| Spinal anesthesia effect duration | 140.00 ± 10.98 | 120 – 160 |

The average lower limb surgery time was 101.5 ± 22.01 minutes (max. 150 and min. 80). The average spinal anesthesia effect duration was 140.00 ± 10.98 minutes. As the average surgery time was 101.5 ± 22.01, anesthesia duration was enough to carry out the operation.

**Effect of epidural anesthesia**

**Table no 6:** Number of epidural anesthesia needle insertions

| Insertion time | Number | Percentage |
|---|---|---|
| Once | 18 | 60 |
| Twice | 8 | 26.67 |
| Thrice | 4 | 13.33 |
| Failure | 0 | 0 |

**Table no 7:** Anesthesia performance time

| Parameters | Average | Max – Min |
|---|---|---|
| Anesthesia performance time (minutes) | 11.24 ± 1.94 | 8 – 15 |

The average lower limb surgery time was 101.5 ± 22.01 minutes (max. 150 and min. 80). The average spinal anesthesia effect duration was 140.00 ± 10.98 minutes. As the average surgery time was 101.5 ± 22.01, anesthesia duration was enough to carry out the operation.

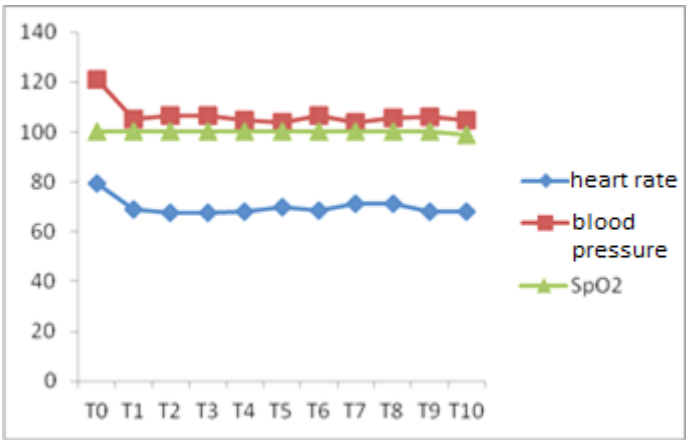


**Figure no 1:** Effects on heart rate, systolic blood pressure, and $SpO_2$

Heart rate and systolic blood pressure both decreased at T1 (5 minutes after bolus administration), which is reasonable since epidural anesthesia suppressed sympathetic nervous system lead to vascular relaxation, although within an acceptable level. Rate and pressure did not change remarkably at other investigated times, which means patients felt no pain.

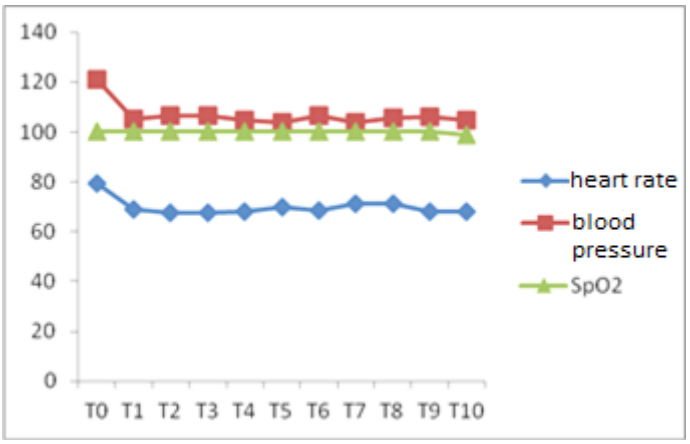


**Figure no 2:** VAS value at investigated times

When spinal anesthesia faded away (T0), the pain level was assessed using VAS scale. Most patients had VAS value at five, which means pain relief required. After anesthetic bolus administration, VAS value significantly ($p<0.05$) decreased at T1 (5 minutes after bolus). It kept dwindling at T2, T3, T4, T5 and reach zero at T6 – T10 (12 and 72 hours of continuous anesthetic administration).

**Side effects**

**Table no 8:** Side effects

| | Nausea | Urinary retention |
|---|---|---|
| Number | 2 | 3 |

Two patients (6.67%) got nausea during operation and were treated with Priperam intravenous injection. Three patients felt urinary retention and heat therapy was used.

## IV. Discussion

**Patient information**

Sex ratio was roughly equal amongst 30 studied patients. Ages, weights, and ASA classification (Table 1, 2, 4) show good health, stable mentality, and cooperative behavior with anesthetists. Thigh surgeries accounted for 60% and lower leg surgeries for 40% of the operations (Table 3).

The most prolonged lower limb surgery took 150 minutes and the quickest ones took 80 minutes, with an average time of 101.5± 22.01 minutes. The average spinal anesthesia time was 140.00 ± 10.98 minutes. As the average operating time was 101.5± 22.01 minutes, the anesthesia effect was long enough to carry out the surgery.

**Effect of epidural anesthesia**

***Number of insertions***: In 40% of the cases insertion had to be done twice or thrice since the technique was difficult and was done at the 7A MiliratyHospitalfor the first time. However, the success rate was high. Sixty percent of the cases only required one insertion. Average performance time was, 13.65 ± 6.23 minutes, comparable with studies of Nguyễn Thu Chung (2014)[10]. It is concluded that epidural anesthesia in this study did not end in failure.

***VAS value***: VAS value significantly decreased from T0 to T1 ($p<0.05$) but changes from T1 to T6 were not significant. No pain recorded from T6 to T10. The result was similar to studies of LêVăn Chung and NguyễnVănChừng (2008)[11] and NguyễnThịPhương Dung and NguyễnVănChừng (2010)[12].

***Effect of epidural anesthesia on respiration and hemodynamics***: Heart rate and blood pressure decreased significantly ($p<0.05$) from T0 to T1, then stabilized throughout post-operative pain management. This result was compatible with studies ofNguyễn Thu Chung(2014)[10]. Hence, pain raised heart rate, blood pressure, and respiration rate. These parameters remarkably decreased and stabilized when the pain was relieved.

***Side effects***: Side effects occurred at low rate, usually nausea and urinary retention and the patients were stabilized after treatment. Other complications did not occur in the study.

## V. Conclusion

This study investigated the application ofepidural anesthesia using bupivacain and fentanyl for lower limb post-operative pain management resulted on 30 patients in the 7A MiliratyHospital, and the result was satisfactory. Insertions were performed well and the indications of pain such as VAS value, heart rate, blood pressure were successfully stabilized with few side effects. Hence it is worthy to consider further research for practical applications of this method in the conditions of Viet Nam.

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