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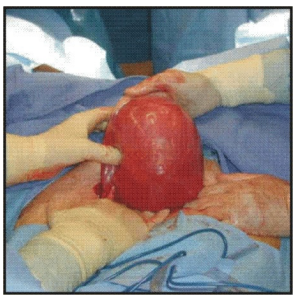


POST-OPERATIVE PAIN RELIEF FOR LOWER ABDOMINAL SURGERY;
COMPARISON BETWEEN EXTRADURAL BUPRENORPHINE AND PARENTERAL BUPRENORPHINE

DR. ROBINA FIRDOUS, FCPS
Assistant Professor of Anaesthesia,
Punjab Medical College, Faisalabad

ABSTRACT ... robinafirdous@hotmail.com The severity of post-operative pain and the lack of efforts in relieving it have led to the involvement of Anaesthesiologists in the management of post-operative and acute pain. Parenteral opiates have been utilized for post-operative pain management. The identification of the opioid receptors on substantia gelatinosa[1] has provided an alternate route i.e the epidural route - for administering opiates. **Objectives:** To evaluate and compare the efficacy and side effects of parenteral Buprenorphine with those of Extradural Buprenorphine. **Setting:** Department of Anaesthesia, District Headquarter Hospital, Faisalabad. **Period:** The data was collected during the last three and a half years. **Materials and Methods:** Sixty adult patients of either sex and ages ranging from 35-45 years, who underwent lower abdominal surgery, were randomly selected for the study. They were equally divided into two groups. Group I patients were administered Buprenorphine 0.3 mg through the epidural catheter in extradural space. Group II patients were given Buprenorphine 0.3 mg intramuscularly. **Results:** Buprenorphine through the epidural route gives better analgesia with fewer side effects as compared with the parenteral route.

Key Words: Opioids, Buprenorphine, Extradural, Parenteral

INTRODUCTION

Pain is a major concern in post-operative period. It was, however, sadly ignored in the past and members of public as well as eminent members of medical profession commented on severity of pain after surgery and the lack of efforts to relieve it. Post-operative pain relief is imperative and is a hallmark for the assessment of good anaesthetic care as well as surgical management.

Anaesthesiologists are being increasingly consulted in the management of acute and post-operative pain. Parenteral opiates are commonly used for relieving post-operative pain by prescribing a fixed dose at small intervals. However, parenteral opiates provide a relatively brief duration of analgesia with painful intervals and can lead to numerous side effects.

The discovery of opioid receptors in the spinal cord has led to extradural administration of narcotics. This technique produces prolonged segmental analgesia without somatic, sensory, or sympathetic blockade[2]. The success of this technique in achieving post-operative pain relief has been most rewarding and has wide spread applications. However, intra-spinal administration of narcotics demand a thorough knowledge of the technique and analgesic agents involved with their

benefits and risks. All aspects of epidural technique should be considered including possible side effects[3].

Epidural administration of opiates for managing acute and post-operative pain has gained widespread popularity. However, the side effects have been reported, the most serious of them being the respiratory depression that may occur several hours after the injection[4,5].

OBJECTIVES

1. To assess the efficacy of opioid (Buprenorphine) used epidurally and intramuscularly for relief of pain after lower abdominal surgery.
2. To compare the quality and duration of analgesia produced by the drug by the two routes.
3. To ascertain the nature and incidents of side effects of this drug when used through these routes.

MATERIALS AND METHODS

Sixty adult patients undergoing lower abdominal surgery were included in the study. The whole procedure was explained to them and their informed consent was obtained. The average age of the patients was ranges between 40-45 years. The relative demographic details are listed in Table I. The operations they underwent are listed in Table II. The patients were randomly allocated to one of the two groups each comprising of thirty patients.

Group I received epidural Buprenorphine.
Group II received parenteral Buprenorphine.

Both groups were organized keeping in mind the age, weight & sex. All patients underwent surgery under general anaesthesia. They were ASA physical status I to III and were premedicated orally with Diazepam (5-10 mg).

Table-I. Demographic Data

Description	Group I	Group II
Number	30	30
Age (y)	40±5	41±5.5
Weight (kg)	60±9.4	62±10.7
Sex (M/F)	15/15	15/15

Table-II. Operations Performed

Operation Performed	Group I	Group II
Appendicectomy	5	6
C & S	5	4
Hysterectomy	7	8
Vesicolithotomy	4	4
Colporrhaphy	3	3
Herniorrhaphy	6	5
Total	30	30

Prior to induction, epidural catheter was passed through the touhy needle in the lateral position (using loss of resistance to air technique) at L_{1-2} or L_{2-3} intra-vertebral space. A 2 ml test dose of 0.25% Bupivacain was injected. At the time of closure of the abdominal cavity:

Group I;
Patients were given 0.3 mg Buprenorphine in 9 ml of normal saline into epidural catheter.

Group II;
Patients received 0.3 mg Buprenorphine intramuscularly.

Patients were monitored postoperatively for 24 hours in their respective wards at the District Headquarter Hospital, Faisalabad and were instructed to ask for analgesia as soon as pain at rest returned.

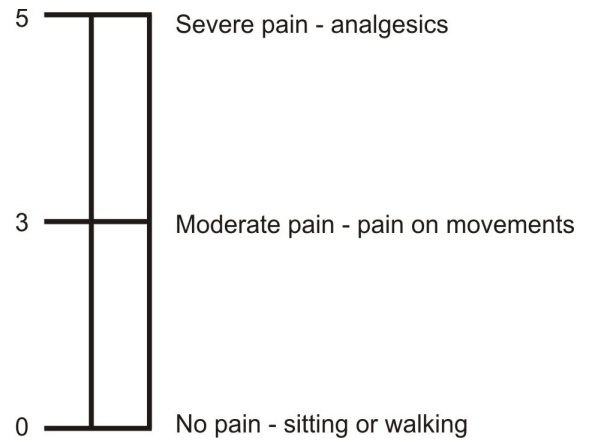
Post-operative follow up included the recording of vital signs, evaluation of pain (onset of analgesia and duration of analgesia), recording of the side effects and conscious level.

Pulse rate, arterial B.P. and ECG were consciously

displayed using Bioscope. O_2 saturation was monitored with pulse oximeter. Pain was assessed on a vertical scale[6] as shown in Figure 1. The bottom of the scale scored zero, representing no pain (the patient could sit up in bed and walk around without difficulty; and the top scored 5 representing unbearable pain (patient frequently asked for analgesia). A score of 3 was assigned to moderate pain (the patient had pain on movement but was reluctant to get out of bed).

A score of zero was assigned when the patient was found to be asleep. Intensity of pain was assessed immediately before the administration of drug. Time of onset of analgesia was noted after epidural injection and then assessment of pain-score was made 4 hourly. The duration of analgesia (the time between administration of drug and request for additional pain medication) was recorded for each dose.

Figure 1: Visual Analogue Scale



Objective Pain Assessment: Score 5 - Frequent need for analgesic, 3 - Pain on movement and reluctant to get out of bed; 0 – sits in bed, walks around easily, found to be asleep.

The presence of adverse side effects was also noted including pruritis, nausea and vomiting. An attempt was made to assess the degree of sedation as below.

Score	Conscious level
0	Awake and alert
1	Awake but drowsy
2	Drowsy but arouse-able
3	Un-arouse-able

The need for catheterization of urinary bladder was noted in patients without a retained catheter. Motor blockade on lower limb was assessed by the modified Bromage Score as below[7].

Score	Range of Movement
0	Full movement
1	Loss of knee extension against gravity
2	Loss of knee flexion and extension
3	Total Paralysis

All the results were expressed as mean SD. Results were analysed using student test and analysis of variance. A probability less than 0.05 was considered statistically significant.

RESULTS

Table-III. Onset, Duration of Analgesia

Description	Group I No.= 30	Group II No. = 30
Time and onset (minutes)	12.05	21.01
Duration of analgesia		
First dose	480	360
Second dose	1020	916
Mean	750	639
Drug used in 24 hours (mg)	0.58	0.645
No. of doses in 24 hours (mean)	1.93	2.15

DURATION AND QUALITY OF ANALGESIA

Onset and duration of analgesia was significantly different in the two groups. Overall mean duration in the two groups is respectively shown in Table III.

Table IV Mean Pain Score (0-5) after each drug up to 24 hours

Time (hours)	Group I No.= 30	Group II No. = 30
0	4.25 ± 0.57	4.3 ± 0.64
1	1.8 ± 0.52	1.9 ± 0.3
4	0.5 ± 0.61	1.5 ± 1.06
8	0.53 ± 0.78	2.1 ± 0.1
12	0.5 ± 0.78	1.3 ± 0.9
16	1.0 ± 0.72	1.4 ± 0.9
20	1.5 ± 0.53	1.5 ± 0.7
24	0.75 ± 0.51	1.2 ± 0.3

Over the 48 hours under study, the epidural Buprenorphine required for adequate analgesia was 0.6 mg whereas Buprenorphine required for the parenteral (Group II) was 0.9 mg.

EFFECTS ON HEART RATE AND BLOOD PRESSURE

The effects of drug through both routes on heart rates and blood pressure are shown in Table V Heart rate was not changed significantly by Buprenorphine through any of the routes.

Administration of Buprenorphine through parenteral route resulted in the fall of arterial pressure. Decrease in systolic pressure was statistically significant.

EFFECT ON RESPIRATORY FUNCTIONS

Respiratory rate decreased in Group II. Three out of thirty patients were below 10/m while Buprenorphine through epidural route did not depress respiration.

ADVERSE EFFECTS

Incidences of side effects are listed in Table VI. Drowsiness was observed in 1 patient in Group 1 but twenty patients in group II. Two patients in group I and 10 patients in group II had nausea and vomiting.

Table V The Effects of Epidural and Parenteral Buprenorphine on heart rate, respiratory rate and arterial pressure before and one hour after injection

Drugs	HR (Beats/min)	Respiratory rate/min	S. P. (mm Hg)	D. P. (mm Hg)
Buprenorphine Epidural				
Before	88.8 ± 7.7	25.9 ± 2.1	133.8 ± 13.1	83.9 ± 7.2
After	87.2 ± 5.52	17.4 ± 3.7	129.4 ± 1.3	82.4 ± 6.1
Buprenorphine Parenteral				
Before	89.9 ± 9.1	24.9 ± 2.4	130.3 ± 7.6	84.0 ± 7.82
After	85. 8 ± 8.1	16.9 ± 2.1	105.5 ± 5.6	70.7 ± 7.8

Two patients in each group complained of pruritis when asked but they did not require any treatment. None of the patients in both groups complained of weakness of lower limbs and none of them needed catheterization of urinary bladder.

DISCUSSION

Management of post-operative pain has been improved during the recent past. The discovery of the opioid receptors on substantia gelatinosa has introduced the new concept in pain management. Most investigators have concluded that Buprenorphine when given via the

epidural route provides safe and effective postoperative analgesia. Being highly lipophilic, it gains rapid access to the neuraxis. But because of its closed receptor kinetics, the rates of association and dissociation with the receptors are likely to be rate limiting for the onset and decline of the effect. These factors tend to offset each other, and both the onset and the duration of the effect, therefore, seems to be comparable to those of morphine when injected epidurally[8].

Table VI Frequency of side effects in two groups

Side Effects	Group I	Group II
Respiratory depression Respiratory rate < 10	0	3
Hypotension > 30% decrease in systolic B.P.	0	2
Nausea/Vomiting	2	10
Pruritis	2	2
Retention of urea passed unaided catheterization	0	0
Drowsiness	1	20
Weakness of lower limbs	0	0

In the literature epidural doses of Buprenorphine vary between 0.06 to 0.3 mg. There have been few comparisons between different dosages in the same study. But one group of investigators found marked intensifying postoperative analgesia as the dosage is increased from 0.15 to 0.3 mg.

I have used 0.3 mg Buprenorphine epidurally to have standard analgesic effect. Buprenorphine has high affinity for mu and delta receptor subtypes and somewhat lower affinity for kappa subtype[9].

Even the smallest dose applied can be supposed to render a very high concentration of drug at spinal receptors close to the level of the injection. This may bring about actions on kappa receptors, being antagonistic to mu receptor effect[10].

This results in lowering the analgesic effect on spinal level.

Following the initial use in patients with chronic pain, extradural opioids have been used increasingly for relieving post-operative pain.

The quality of analgesia was better in group I (epidural Buprenorphine).

On the first post-operative day, majority of the patients in group I, was satisfied with analgesia; only two patients had moderate pain whereas in group II, five patients had moderate pain. There was no effect of clinical importance on heart rate but arterial blood pressure decreases significantly after parenteral Buprenorphine.

Epidural opioids have been found to have minimal effect on cardiovascular function[11].

There have been a number of reports on respiratory depression following the use of extradural opioid.

In all the patients, there was a decrease in respiratory rate due to better pain control.

The risk associated with epidural opioid is that the onset of respiratory depression may be delayed and may occur as late as twelve hours or more after lipid insoluble agent like morphine[12]. The lipophilic drugs like pethidine and Buprenorphine have less potential for this effect. Other side effects such as pruritis, nausea, vomiting and urinary retention have been reported after the use of epidural opioid. Incidents of these side effects are shown in Table VI.

In this study the relative frequency of these side effects was low. This may be due to the use of lipid soluble drug (Buprenorphine) which is less prone to cause such an adverse effect. Drowsiness was immediately obvious in almost all our patients in Group II. But in group I, only five patients were drowsy but arouse-able. Pruritis was reported only on direct questioning and no treatment was demanded by any patient. Incidence of nausea and vomiting was comparatively low in Group I. Only two patients in group I felt sick, whereas in Group II, ten

patients complained of nausea and vomiting.

Weakness and numbness of lower limbs was not seen in any of the patients of both groups.

CONCLUSION

It is concluded from this study, that Buprenorphine used through epidural route as well as parenterally provides adequate analgesia. But epidural route provides uniform, high quality and prolonged analgesia as compared to the parenteral route.

Buprenorphine through epidural route does not affect the B.P. whereas parenterally there is a fall in B.P.

Buprenorphine has no respiratory depression if used epidurally as compared to the parenteral route.

The frequency of nausea, vomiting is much higher if Buprenorphine is given parenterally. The patient remains mentally alert if epidural route is used compared to parenteral route.

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