A Comparative Study of Sensory and Motor Block among Patients Undergoing Surgery of Lower Abdomen

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ABSTRACT

Introduction: In spite of marvelous advances in medical science, many patients are concerned about having operative procedures because of their fear of ensuing postoperative pain. Unrelieved postoperative pain results in patient's discomfort, long hospital stay, poor patient outcome and greater use of health care resources. Objective of the research was to study anesthetic profile of patients undergoing surgery of lower abdomen

Material and Methods: The present study "Randomized Double Blind Control Study of Intrathecal Ropivacaine + Fentanyl vs. Ropivacaine + Clonidine for motor and sensory blockade in lower abdominal surgeries".

Results: The patients were divided into two groups and they were compared for various parameters. It was found the both the groups were comparable with respect to age, sex, height, weight and motor and sensory blockade time.

Conclusion: There was no significant difference in both groups with respect to maximum level of block achieved with Intrathecal Ropivacaine + Fentanyl vs. Ropivacaine + Clonidine for motor and sensory blockade in lower abdominal surgeries.

Keywords: Anesthetic profile, sensory blockade, motor blockage

INTRODUCTION

In spite of marvelous advances in medical science, many patients are concerned about having operative procedures because of their fear of ensuing postoperative pain. Unrelieved postoperative pain results in patient's discomfort, long hospital stay, poor patient outcome and greater use of health care resources.

Man has been trying to overcome this monster of pain since ages. One of the important landmarks in this fight was development of field of Anesthesia. To render a patient pain free while undergoing surgical procedures was an achievement in itself.

A major event in field of took place in 1885 when first spinal analgesia was administered by Leonard Corning[1] (1855–1923), a neurologist in New York. He was experimenting with cocaine on the spinal nerves of a dog when he accidentally pierced the dura mater.

Quincke[2] in 1891 demonstrated a safe, predictable means of performing lumbar puncture. Using his technique first planned spinal anaesthesia for surgery in man was administered by August Bier[3] (1861–1949) on 16 August 1898, in Kiel, when he injected 3 ml of 0.5% cocaine solution into a 34-year-old labourer. After using it on 6 patients, he and his assistant each injected cocaine into the other's spine. The first phase in the history of spinal anaesthesia, from 1899 to 1905, was characterized by the use of only cocaine for spinal anaesthesia but later it went out of vogue due to the toxicity of cocaine.

In 1905, Heinrich Braun[4], a German surgeon, reported the use of procaine for operative spinal anaesthesia. Means for controlling levels of Anaesthesia by making procaine solutions hyperbaric by adding glucose, was first reported by Barker[5] in 1907or hypobaric, initially by adding alcohol. Synthesis of Tetracaine in 1931 and its introduction into clinical practice by Sise[6] in 1935, synthesis of Dibucaine and its introduction into clinical practice by Jones[7] in 1930 popularized spinal Anaesthesia. Continuous spinal Anaesthesia was demonstrated by Lemmon[8] in 1940 and Tuohy[9] in1945. In 1945, Prickett[5] and associates published their report on the neurologic safety of Intrathecal epinephrine to prolong the duration of spinal Anaesthesia.

MATERIAL AND METHODS

The present study "Randomized Double Blind Control Study of Intrathecal Ropivacaine + Fentanyl vs. Ropivacaine + Clonidine for motor and sensory blockade in lower abdominal surgeries" was carried out at Yashoda Hospital in the department of Anesthesiology during the period from April 2012 to April 2013.

The study was carried out to evaluate the characteristics of Block and Post-Operative Analgesia of Fentanyl and Clonidine as an adjuvant to Intrathecal 0.75% Ropivacaine for lower abdominal surgeries. The results of above technique were compared in different groups.

Institutional Ethical Committee approval was obtained. It was prospective, randomized and double blinded study. The study included total 80 patients belonging to ASA grade I and II of either sex with age between 20-60 years posted for various lower abdominal surgeries.

Details of present study process including potential side effects were explained to all patients and relatives.

Thorough clinical examination and History was taken.

Investigations: CBP, ECG and X ray Chest of patients, Blood sugar, Blood urea and serum creatinine, Serum electrolytes, Blood group, 2D-ECHO if required were done. Physician and cardiologist opinion if required were taken.

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How to cite this article: Pradeep P, Mohammed N. Ali. A comparative study of sensory and motor block among patients undergoing surgery of lower abdomen. International Journal of Contemporary Medical Research 2016;3(3):822-825.

Patients were kept NBM for 6 hours and no premedication of oral sedatives was given. Well informed written consent was obtained.

All the parameters were recorded as per the proforma and subjected to statistical analysis.

RESULTS

Our study was conducted on 80 patients who were randomly allocated into group I and group II consisting of 40 patients each. Minimum age recorded in our study was 21 years and maximum age was 60 years. The mean age of patient in group I was 41.775±11.088 years while the mean age of patient in group II was 41.450±11.509 years. The P value was 0.898 which signifies that the two groups were comparable with regards to Age.

Mean weight of patients in group I was 63.500 ±7.132 kgs and mean weight of patients in group II was 64.475 ± 7.275. The P value was 0.547 which is not significant showing that the groups are comparable with regards to Weight.

Mean height of patients in group I was 159.825± 7.480cms while mean height of patients in group II was 162.550± 6.547cms. The P value was 0.693 which was again insignificant and group I and II are comparable with regards to height.

Thus the patients in our study group were comparable with respect to Age, Weight and Height eliminating bias (if any) which can occur due to these factors.

In our study Sex distribution in both groups was equivalent with group I having 45% males and 55% females and group II having 52.50 % males and 47.50% females. Thus both groups were comparable for sex distribution.

In present study, the minimum time of onset of sensory block was 15 seconds and maximum time was 90 seconds. Mean time of sensory onset with Group I38.750 ± 12.076 sec., with Group II was41.300± 20.284 sec. (p=0.497).

Minimum time of onset of motor block was 60 seconds and maximum time was 240 seconds. Mean time of Motor onset with Group I was 144.625±17.074 sec., with Group II was 152.000± 55.525 sec. (p=0.424)

Minimum time to reach the maximum level of sensory block was 04 min. and maximum time was 16 min. Mean time required to reach the maximum level of sensory block in Group I was 5.100 ± 1.020mins, in Group II was 8.475 ± 2.935mins. (p= 0.000)

In the present study the time to reach sensory block up to T10 level in group I was 4.425 ± 0.829 min and in group II was 7.425 ± 2.763 min (P=0.000) with minimum time of 3 minutes and maximum time of 14 minutes in the groups.

The difference between Group I and Group II was insignificant in terms of time for onset of sensory block, motor block but it was significant for time to reach the maximum level of sensory block and time to reach sensory level of T10 with group II requiring more time as compared to group I.

In group I maximum level of T6 was achieved in 12.5 %

Parameters	Group I	Group II	P Value
	Mean ± SD	Mean ± SD	
Age in years	41.775±11.088	41.450±11.509	0.898
Weight in kgs	63.500 ±7.132	64.475 ± 7.275	0.547
Height in CMS	159.825± 7.480	162.550± 6.547	0.693
ANOVA is applied. P value <0.05 is significant			

Table-1a: Demographic profile of patients

Range	Group I		Group II	
	Min	Max	Min	Max
Age	21	60	21	59
Height	144	174	149	175
Weight	46	78	52	82

Table-1b: Demographic profile of patients

Groups	Sex		Total	P value
	Male	Female		
Group I (n=40)	18	22	40	0.508
	45%	55%	100%	
GroupII (n=40)	21	19	40	
	52.50%	47.50%	100%	
	39	41	80	
T- Test is applied. P value is significant if <0.05.				

Table-2: Comparison of Sex in two Groups

Parameters	Group I	Group II	P Value
	Mean ± SD	Mean ± SD	
Onset Sensory (In Sec)	38.750 ± 12.076	41.300± 20.284	0.497
Onset Motor (In Sec)	144.625±17.074	152.000± 55.525	0.424
Max Level (In Min)	5.100 ± 1.020	8.475± 2.935	0.000
T10 Sensory level (In Min)	4.425 ± 0.829	7.425 ± 2.763	0.000
T- Test is applied. P value is significant if <0.05.			

Table-3a: Comparison of Onset parameters in two groups

Range	Group I		Group II	
	Min	Max	Min	Max
Onset Sensory (In Sec)	20	65	15	90
Onset Motor (In Sec)	110	190	60	240
Max Level (In Min)	3	8.5	4	16
T10 Sensory level (In Min)	3	6	4	14

Table-3b: Comparison of Onset parameters in two groups

Max level of sensory block	Group I		Group II	
	N	%	N	%
T6	5	12.5	8	20
T8	8	20	7	17.5
T10	27	67.5	25	62.5
Total	40	100	40	100
T- Test is applied. P value is significant if <0.05.				

Table-4: Comparison of maximum level of block achieved in two groups

subjects while 20 % subjects had a maximum level of T8 and remaining 67.5% of subjects achieved a maximum level of T10. In group II the subjects achieving T6 level were20%, while those with T8 level were 17.5% and the remaining 62.5% had a maximum level of T10. (P value = 0.112)
Thus in our study there was no significant difference in both groups with respect to maximum level of block achieved.

DISCUSSION

Acute pain has emerged an important issue because of humanitarian aspect, associated morbidity and mortality and important financial consequences.
Relief of Intra operative and postoperative pain is professionally rewarding and is a subject that has gained attention in past few years.
Pain during surgery or in the postoperative period increases morbidity by causing -

- Sympathetic stimulation increased heart rate, blood pressure, altered regional blood flow, increased oxygen consumption.
- Stress response due to hormonal surge and depressed immune functions.
- Delayed urinary functions.

Benefits of pain prevention and control is moral and ethical, decreases fear – anxiety, decreases morbidity, early ambulation and discharge, early return of visceral functions and oral intake.
Postoperative pain treatment must be included in the anesthetic planning even before induction of anesthesia, adopting the idea of managing pain before it occurs.
Adjuvant drugs are pharmacological agents possessing little pharmacological effect by themselves, but enhance or potentiate the action of other drugs when given at the same time.
Neuraxial analgesia is achieved in the peri operative period with local anesthetic (LA) drugs. Adjuvant drugs modify LA effects and reduce side effects. Peri operatively these drugs affect:

- Latency i.e. time of onset of LA block
- Duration of analgesia i.e. duration of sensory and motor block
- Quality of analgesia i.e. complete, incomplete (partial or patchy analgesia requiring supplemental drugs)
- Postoperatively adjuvant drugs affect:
- Analgesic gap i.e. time interval between subsequent doses administered
- Quality of analgesia i.e. patient satisfaction, care providers' impression of pain relief
- Side effects i.e. reduction of untoward effects of LA drugs

Knowledge and use of adjuvant drug therapy has rendered Neuraxial analgesia more effective in the management of both acute and chronic pain conditions.
Since the 1980s, Neuraxial use of drugs for the treatment of acute and chronic painful conditions has been widely accepted. Lowered dosage requirements, fewer side effects and less toxicity coupled with high efficacy make this alternative route of therapy a practical choice. There are several reasons to believe that the co-delivery of agents with different mechanisms of action will be therapeutically advantageous. It can be assumed that an agent who may modulate one component may not be able to act on a different state. There are several agents which do not display cross tolerance and can help in minimizing concurrent development of tolerance. These agents often act on different elements of the pain pathway and result in a nonlinear therapeutic result i.e. potentiating or positive synergism. Resultant effects are more than would be expected when used in combination.[10]
Administration of local anesthetics with opioids has become a well-accepted practice in the management of spinal anesthesia for surgical procedures. In the literature, several combinations of local anesthetics such as Lidocaine, Bupivacaine or Ropivacaine, and opioids, such as Fentanyl, have been reported for a variety of surgical procedures. In these reports, the addition of small-dose Intrathecal Fentanyl (10 - 25 µg) to local anesthetics during spinal anesthesia has been shown to enhance and increase the duration of sensory analgesia without intensifying the motor block or prolonging the recovery.[11]
Addition of Fentanyl to Ropivacaine prolongs the duration of block and also improves the quality of analgesia; this finding was corroborated in study done by A. Yegin et al[12] in 2005. In this study Fentanyl 25µg was added to18mg of 6mg / ml hyperbaric Ropivacaine for subarachnoid block and postoperative pain relief in patients undergoing TURP surgery. They found no significant difference between the groups in achieving the highest level of sensory block, and in the time taken to reach the peak level. Regression to L1 was significantly prolonged in the Fentanyl group compared with the saline group (P¼0.004). Time to the first feeling of pain and the first analgesic requirement was significantly prolonged in the Fentanyl group compared with the saline group (P¼0.011 and P¼0.016, respectively). The frequency of pruritus was significantly higher in the Fentanyl group compared with the saline group (P¼0.022). In Conclusion they found that addition of Fentanyl 25mg to hyperbaric Ropivacaine 18mg for spinal anesthesia in patients undergoing TURP may significantly improve the quality and prolong the duration of analgesia, without causing a substantial increase in the frequency of major side-effects.

CONCLUSION

There was no significant difference in both groups with respect to maximum level of block achieved with Intrathecal Ropivacaine + Fentanyl vs. Ropivacaine + Clonidine for motor and sensory blockade in lower abdominal surgeries.

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Source of Support: Nil; **Conflict of Interest:** None

Submitted: 28-01-2016; **Published online**: 19-02-2016