Research Paper Medical Science

A Comparative Study of 0.5% Bupivacaine (Heavy) and 0.5% Bupivacaine (Heavy) With Dexmedetomidine for Spinal Anaesthesia in Lower Abdominal Surgeries

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KEYWORDS : Dexmedetomidine, Bupivacaine, spinal anaesthesia

PATIENTS AND METHODS

Present clinical study was conducted at Great Eastern Medical School and Kamineni Institute of Medical Sciences, during the period July 2014 to September 2015. Study was approved by Institutional ethics committee

Present study was undertaken to compare the efficacy of dexmedetomidine as an adjuvant to 0.5% bupivacaine (heavy) for subarachnoid block in lower abdominal surgeries. It was prospective controlled study done on 60 patients undergoing elective lower abdominal surgeries.

Inclusion criteria

- Age between 20-60 years of either gender.
- American Society of Anaesthesiologist (ASA) grade I and II.

Exclusion criteria

- Patient with neurological disorders.
- Patients with allergy to study drug.
- Patients with coagulation disorders.
- Patients with local infections at site of injection.
- Patients with spine deformities.
- American Society of Anaesthesiologist (ASA) grade III and above.
- Pregnancy

METHOD

After a thorough clinical examination and relevant laboratory investigations of all patients, an informed, written consent was obtained both for conduct of study as well as administration of spinal anaesthesia.

All patients were kept nil by mouth from midnight before surgery and tablet alprazolam (0.01 mg/kg) was administered at bed time the day before surgery.

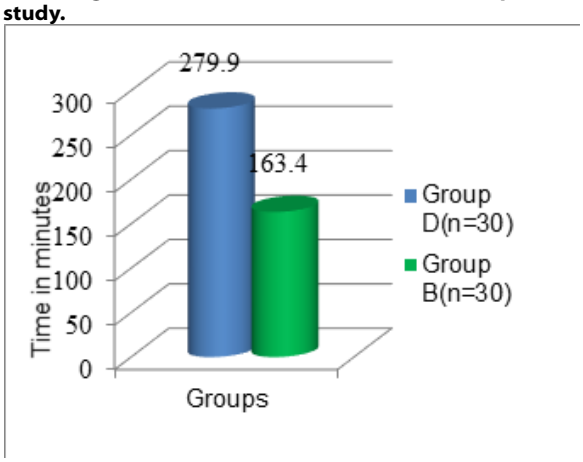
All the patients were re-examined, assessed and weighed pre-operatively on the day of surgery. Intravenous access was established with an 18G intravenous access and preloading was done with 15 ml/kg lactated ringer's solution 30 minutes before procedure. Anaesthesia machine and accessory anaesthetic equipments were checked and drugs including emergency drugs were kept ready. A multi parameter monitor for monitoring heart rate (HR), non-invasive blood pressure (NIBP), electro cardiogram (ECG) and peripheral capillary oxygen saturation (SpO2) were attached to each patient on arrival to the operating room and baseline parameters were recorded.

All the patients were allocated into two groups of 30 each.

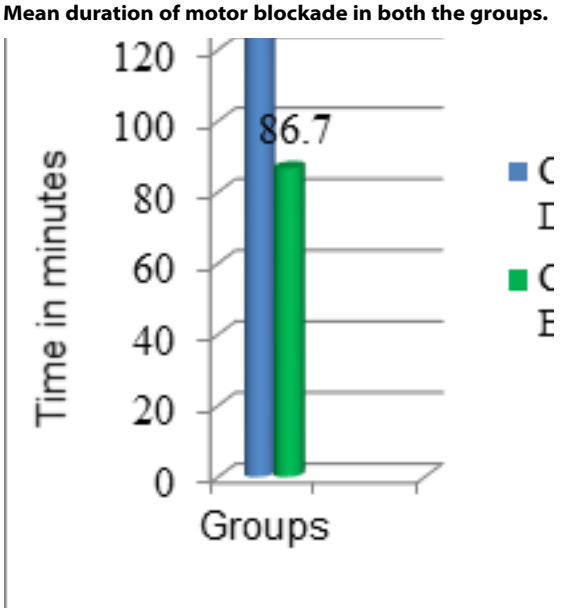
- Group D (dexmedetomidine): bupivacaine and dexmedetomidine group.
- Group B (Control): bupivacaine and saline group.
- Under strict aseptic conditions, with the patient in the left lateral position, a lumbar puncture was performed at L3-L4 intervertebral space through midline approach using a 25-gauge Quincke spinal needle. After ensuring free flow of CSF, group D patients received 0.5% heavy bupivacaine 3 ml with dexmedetomidine (5 µgm) 0.5 ml and group B patients received 0.5% heavy bupivacaine 3 ml with 0.9% saline 0.5 ml. After the intrathecal injection patients were returned to supine position. Haemodynamic parameters such as heart rate, systolic blood pressure, diastolic blood pressure, mean arterial blood pressure and SpO2 of the patients were recorded.

OBSERVATIONS AND RESULTS

Following were the observations and results of present study.



Mean duration of motor blockade in both the groups.



Mean time of two segment regression in both the groups.

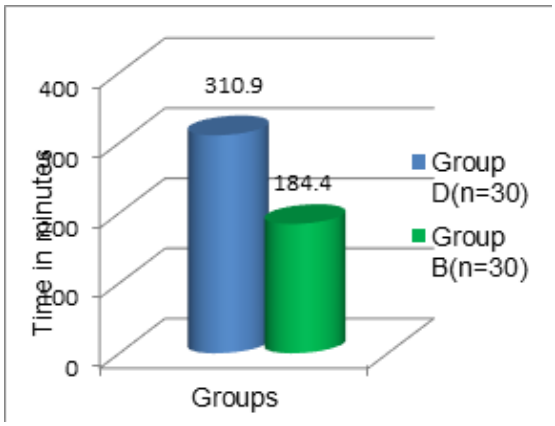
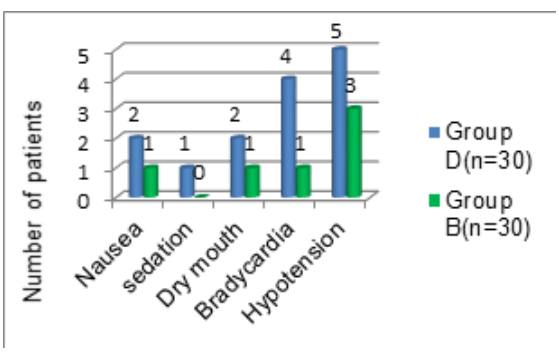
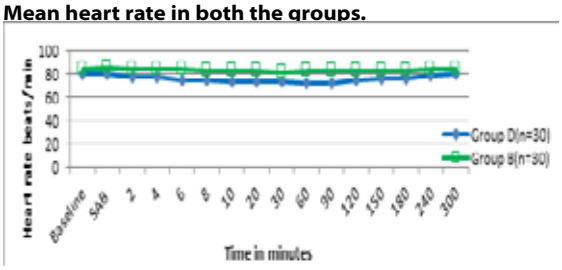


Figure 24: Mean duration of analgesia in both the groups

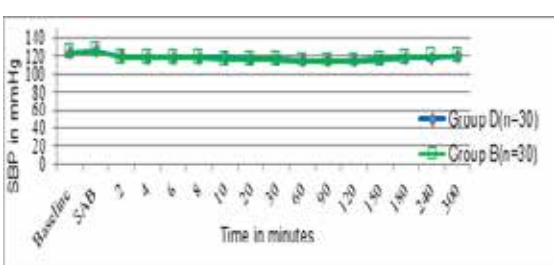


Occurrence of side effects in both the groups.

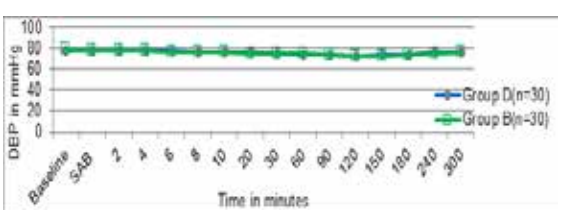
Mean heart rate in both the groups.



Mean systolic blood pressure in both the groups.



Mean diastolic blood pressures in both the groups.



Mean of mean arterial pressure in both the groups

DISCUSSIONS

Different drugs like magnesium sulphate, neostigmine, midazolam, fentanyl, clonidine etc. have been used via intrathecal route as adjuvant to local anesthesia in order to prolong the duration of spinal analgesia. Among them clonidine an α2 agonist, is widely used by oral, intrathecal and intravenous routes as an adjuvant to prolong the duration of spinal anaesthesia.

Dexmedetomidine is a new α2 agonist, approved by FDA in 1999 for use as an analgesic and sedative in the intensive care units. α-adrenoreceptor agonists have different α1:α2 selectivity. Clonidine, the first developed and the most known α2 agonist is considered as a partial α2 agonist, since its α1:α2 selectivity is 200, while α1:α2selectivity of dexmedetomidine is 1620 and hence has 8 times more affinity for α2 receptors than that of clonidine. Dexmedetomidine differs from clonidine as it possessess most selective α2 adrenoreceptor agonist activity especially for the 2A subtype of this receptor, which makes it a more sedative and analgesic agent than clonidine.Systemic and intrathecal injection of dexmedetomidine produces analgesia by acting at spinal level, laminae VII and VIII of the ventral horns of the spinal cord.Due to this greater selectivity, dexmedetomidine is more suitable adjuvant to spinal anaesthesia compared to clonidine.

So in this context, dexmedetomidine may be a very useful drug along with the local anaesthetic bupivacaine 0.5% heavy for spinal anaesthesia. Hence the present study was undertaken to evaluate the effectiveness of dexmedetomidine as an adjuvant in spinal anaesthesia with 0.5% bupivacaine (heavy) for prolonging duration of analgesia.

MAXIMUM HEIGHT OF SENSORY BLOCKADE:

COMPARISON OF MAXIMUM HEIGHT OF SENSORY BLOCKADE

The maximum height of sensory blockade in dexmedetomidine group was (T6-T8)compared to (T6-T8) level in control group. Mean of maximum height of sensory blockade is comparable between both the groups.

TWO SEGMENT REGRESSION:

COMPARISON OF MEAN DURATION OF TWO SEGMENT REGRESSION

In present study, mean duration of two segment regression in dexmedetomidine and control groups was 126.7±7.25 and 86.7±9.5 minutes respectively. It is prolonged in dexmedetomidine group which is statistically significant (P<0.05).Thus it is seen that duration of two segment regression is prolonged in dexmedetomidine compared to control group.

DURATION OF MOTOR BLOCKADE:

COMPARISON OF MEAN DURATION OF MOTOR BLOCKADE

Mean duration of motor blockade in dexmedetomidine and control groups was 279.9±19.6 and 163.4±14.4minutes respectively and it is prolonged in dexmedetomidine group which is statistically significant (P<0.05).

Thus it is seen that mean duration of motor blockade is prolonged in dexmedetomidine group as compared to control group.

DURATION OF ANALGESIA:

COMPARISON OF MEAN DURATION OF ANALGESIA

Mean duration of analgesia in dexmedetomidine and control groups was 310.9±20.0 and 184.4±13.6 minutes respectively. Mean duration of analgesia is significantly more in dexmedetomidine group as compared to control group (P<0.05).

Thus it is seen that mean duration of analgesia is prolonged in dexmedetomidine group as compared to control group.

COMPARISON OF HAEMODYNAMIC PARAMETERS:

The changes in mean values of heart rate in both the groups after administration of study drug were not statistically significant at various intervals of time.

MEAN HAEMODYNAMIC PARAMETERS

Even though four patients had one episode of bradycardia and five patients had one episode of hypotension, all the patients remained

haemodynamically stable throughout the procedure.Bradycardia and hypotension did not produce any haemodynamic instability in both the groups.

MEAN ARTERIAL PRESSURE

The changes in mean values of mean arterial pressure in both the groups, after administration of study drug are statistically not significant (p>0.05) at various intervals of time.

ECG monitoring showed sinus bradycardia in 4(13.33%) patients in group D(dexmedetomidine) and 1(3.33%) patients in group B (control). There were no ST-T changes or dysrhythmias in ECG in any of the patients of either group throughout the study period.

COMPLICATIONS:

Occurance of complications like nausea was two(6.66%) cases in dexmedetomidine group and one (3.33%) case in control group, sedation was one (3.33%) case in dexmedetomidine group, bradycardia was four (13.33%) cases in dexmedetomidine group and in one (3.33%) case incontrol group and hypotension was five (16.66%) cases in dexmedetomidine group and three (9.99%) cases in control group.

Present study findings are one patient of dexmedetomidine group and one patient of control group developed nausea, two patients of dexmedetomidine group and one patient of control group developed sedation and one patient of dexmedetomidine group developed bradycardia and three patients of dexmedetomidine group and three patients of control group developed hypotension.

SUMMARY

Sixty patients of ASA grade I and II of 20 to 60 years age, undergoing lower abdominal surgeries under spinal anaesthesia were divided into two groups of 30 each.

GROUP D (study group) - Bupivacaine and dexmedetomidine group

GROUP B (control group) - Bupivacaine and saline group

Under strict aseptic conditions, with the patient in the left lateral position, a lumbar puncture was performed at L3-L4 intervertebral space. After ensuring free flow of CSF, group D patients received 0.5% heavy bupivacaine 3ml with dexmedetomidine (5 µgm) 0.5ml and Group B patients received 0.5% heavy bupivacaine 3 ml with 0.9% saline 0.5 ml.

Observations were tabulated and analysed using 'students unpaired t-test'.

- Haemodynamic parameters (heart rate, systolic, diastolic blood pressure and mean arterial pressure) were comparable in both the groups.
- The mean duration of two segment regression in dexmedetomidine group was126.7±7.25 minutes and in control group was 86.7±9.5 minutes. The prolongation in two segment regression in dexmedetomidine group was statistically significant (p<0.05).
- The mean duration of motor blockade in dexmedetomidine group was279.9±19.6 minutes and in control group was 163.4±14.4 minutes. The prolongation in duration of motor blockade in dexmedetomidine group was statistically significant (p<0.05).
- The mean duration of analgesia in dexmedetomidine group was310.9±20.0 minutes and in control group was 184.4±13.6 minutes. The prolongation in duration of analgesia in dexmedetomidine group was statistically significant (p<0.05).
- Two (6.66%) patients had nausea, one (3.33%) patients had sedation, two (6.66%) patients had dry mouth, four (13.33%) patients had bradycardia and five (16.66%) patients had hypotension in dexmedetomidine group. Whereas in control group one (3.33%) patient had nausea, one (3.33%) patient had dry mouth, one (3.33%) patient had bradycardia and three (10%) patients had hypotension.
- Even though four patients had one episode of bradycardia and five patients had one episode of hypotension, all the patients remained haemodynamically stable throughout procedure. Bradycardia and hypotension did not produce any haemodynamic instability in both the groups.
- There were no ST-T changes or dysrythmias in ECG in any of the patients of either group throughout the study period.
- SpO2 was maintained 98% and above in all the patients throughout the study period.

From the present study, it is concluded that addition of 5µg of dexmedetomidine to 3ml of 0.5% bupivacaine (heavy) intrathecally for spinal anaesthesia for lower abdominal surgeries has the following advantages.

- Onset of sensory and motor blockade is faster.
- It prolongs the duration of analgesia.
- It prolongs the duration of motor blockade.
- It is haemodynamically stable with insignificant side effects like one episode of bradycardia and hypotension at the initial 6-10 minutes of study.
- It was not associated with side effects like respiratory depression.
- It is an attractive alternative to opioids for prolonging spinal anesthesia.