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Comparative Evaluation of Bupivacaine Plain Versus Bupivacaine with Dexmedetomidine in Spinal Anaesthesia for Vaginal Hysterectomy Cases

KEYWORDS: Dexmedetomidine, Hyperbaric Bupivacaine, vaginal hysterectomy.

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ABSTRACT *We conducted a randomized double blind study on 100 patients of ASA grade I and II undergoing vaginal hysterectomy, patients were divided in two groups Group B (control group): received 12.5mg of 0.5% hyperbaric bupivacaine with 0.5ml normal saline,Group B+D (dexmedetomidine group):received 12.5mg of 0.5% hyperbaric bupivacaine with 5µg(0.5 ml) dexmedetomidine. The characteristics of sensory and motor block, duration of post operative analgesia, sedation score and visual analogue score were obtained in both groups and values were compared with 'paired t-test'. Onset of sensory and motor block was significantly faster, sedation score was significantly higher in group B+D intraoperatively(p < 0.001). Postoperative pain scores and demand for rescue analgesic was significantly less in group B+D (p<0.001). To conclude, dexmedetomidine seems to be attractive alternative as adjuvant to intrathecal bupivacaine with stable haemodynamics, minimal side effects and excellent quality of analgesia.*

INTRODUCTION

"Divine is the task to relieve pain - Hippocrates ." Relief of pain during operation is one of the mainstays of balanced anesthesia. Perkins and co-workers provided an insight into the reality that poorly managed acute pain like postoperative pain can lead to the occurrence of chronic pain[1].

Spinal anaesthesia is safe and simple tecŠique for gynaecological surgeries that provides intra- and postoperative pain relief with full preservation of mental status. New trends in subaracŠoid block are use of adjuvant which reduce nature of complications as well as improve anesthetic effect.

Various adjuvants that are added to local anaesthetic agents are adrenaline, phenylephrine, opioids, α2 agonists, neostigmine, ketamine, midazolam, tramadol & magnesium sulphate.

Because of serious side effects associated with opioids recently α-2 adrenoreceptor agonists have emerged as adjuvants of choice to local anaesthetic agents because of their sedative, analgesic and haemodynamic stabilizing effect. They have been found to prolong the duration of spinal block following intrathecal administration[2].

Clonidine has been shown to result in prolongation of the sensory and motor blockade and reduction in the amount or concentration of local anesthetic agent required to produce post operative analgesia[3]. Dexmedetomidine a highly selective α-2 agonist is pharmacologically related to clonidine. Its unique properties render it suitable for sedation and analgesia during the whole of perioperative period.

As there are only few studies available for intrathecal dexmedetomidine. Hence, we have undertaken this study to evaluate and compare the effects of adding dexmedetomidine with hyperbaric bupivacaine versus intrathecal hyperbaric bupivacaine alone in patients scheduled for elective gynaecological surgeries.

METHODOLOGY

This randomized controlled study was undertaken after obtaining ethical committee clearance and informed consent from all patients. 100 female patients between 35-70 years age, of ASA Grade-I and Grade-II posted for elective vaginal hysterectomy surgeries were grouped randomly into two groups (**n=50**). Patients were allocated into two groups by computer generated random number sequence in 50 patients each.

Group B (control group): Received 12.5mg of 0.5% hyperbaric bupivacaine with 0.5ml normal saline.

Group B+D (dexmedetomidine group): Received 12.5mg of 0.5% hyperbaric bupivacaine with 5µg(0.5 ml) dexmedetomidine.

After preoperative assessment and preparation, intrathecal injection of study drug was given in L3-L4 intrathecal space using 23G Quincke spinal needle under all aseptic precautions.

Test drug was prepared by the anaesthesiologist who was not involved in study. Dexmedetomidine 0.5 ml is diluted to 5 ml with normal saline and 0.5 ml of this is added to 2.5 ml of 0.5% hyperbaric bupivacaine. Observer and the patient were blinded for study drug.

Time taken for onset of sensory and motor blockade, intraoperative sedation, duration of analgesia, number of rescue analgesics required in 24 hours and adverse effects

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were obsevered.

Onset of sensory blockade: was defined as time taken from intrathecal injection of study drug till the patient did not feel the pin prick at T10 level.

Onset and quality of motor blockade: is defined as time taken from intrathecal injection of study drug till patient developed modified Bromage-3 score.

Duration of analgesia was defined as time taken from intrathecal injection of the study drug to the patient's demand for rescue analgesic in the post operative period. Intra venous diclofenac sodium 75mg was given as rescue analgesic if VAS(visual analogue scale)[4] pain score was 4 or more. Same dose was repeated whenever patient complaint pain afterwards and number of doses counted for 24 hours.

Level of sedation was assessed by ramsay sedation score[5].

Statistical analysis was done using the Microsoft excel software, using paired "t" Test as well as comparing mean and standard deviation.

A "p" value <0.05 was taken as significant and "p" value <0.001 was taken as highly significant.

OBESERVATION AND RESULTS

Table 1: Onset of Sensory Blockade:-

Onset of sensory Blockade	Group B	Group B+D	P value	Significant
Mean Time (minutes)	4.3±0.84	2.5±0.58	<0.001	Significant

Onset of sensory blockade was 4.3±0.84 minutes in Group B and 2.5±0.58 minutes in Group B+D. In our study, there was less time for onset of sensory blockade in group B+D compared to group B which was statistically significant. Confidence interval of 95% cases of Group B is 4.07 to 4.53 minutes while in Group B+D it is 2.34 to 2.66 minutes.

Table 2: Onset of grade 3 motor blockade:-

Onset of grade 3 motor blockade	Group B	Group B+D	P value	Significance
Mean Time (Minutes)	6.54±0.81	5.06±0.82	<0.001	Significant

The mean time from intrathecal injection to onset of grade 3 motor block was 6.54±0.81 minutes in Group B and 5.06±0.82 minutes in Group B+D. Thus, the onset of motor block in Group B+D was faster as compared to Group B. Confidence interval of 95% cases of Group B is 6.32 to 6.76 minutes while in Group B+D it is 4.83 to 5.29 minutes.

Table 3: Sedation Score:-

Sedation Score	Group B	Group B+D	P value	Significance
Mean Sedation Score	1.76±0.43	2.22±0.55	<0.001	Significant

Sedation Score in group B is 1.76±0.43 and in group B+D is 2.22±0.55. In our study, there was more sedation score in group B+D compared to group B which was statistically significant .Confidence interval of 95% cases of Group B is 1.64 to 1.88 while in Group B+D it is 1.67 to 2.37.

Table 4: Mean duration of analgesia:-

Mean duration of analgesia	Group B	Group B+D	P Value	Significance
Mean Time (minutes)	177±15.45	381.3±17.43	<0.001	Significant

Mean duration of analgesia in group B is 177±15.45 minutes and in group B+D is 381.3±17.43 minutes. In our study, there was more mean duration of analgesia time in group B+D compared to group B which was statistically significant .Confidence interval of 95% cases of Group B is 172.72 to 181.28 minutes while in Group B+D it is 376.47 to 386.13 minutes.

Table 5: No. of Rescue analgesia:-

No. of 24 hrs rescue analgesia	Group B	Group B+D	P Value	Significance
Average dose	2.86±0.35	1.92±0.44	<0.001	Significant

No. of 24 hrs rescue analgesia in group B is 2.86±0.35 doses and in group B+D is 1.92±0.44 doses. In our study, there was less doses of rescue analgesia in 24 hours given in group B+D compared to group B which was statistically significant .Confidence interval of 95% cases of Group B is 2.76 to 2.96 doses while in Group B+D it is 1.8 to 2.4 Doses.

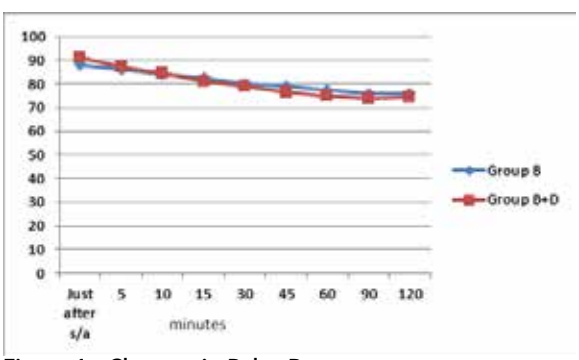

Figure 1-: Changes in Pulse Rate-

Mean pulse rate were less in group D as compared to group B, but the difference between the two groups was not statistically significant (p > 0.05).

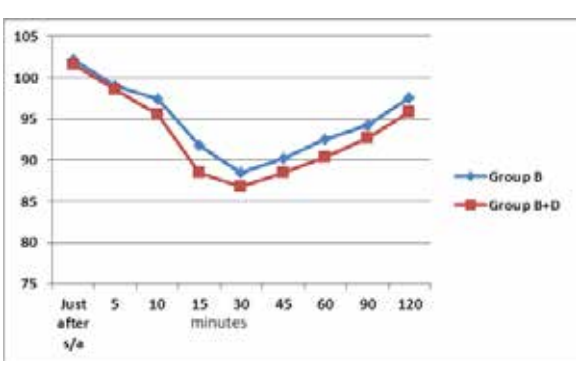

Figure 2-: Changes in Mean Blood Pressure-

Mean blood pressure were less in group B+ D as compared to group B, but the difference between the two

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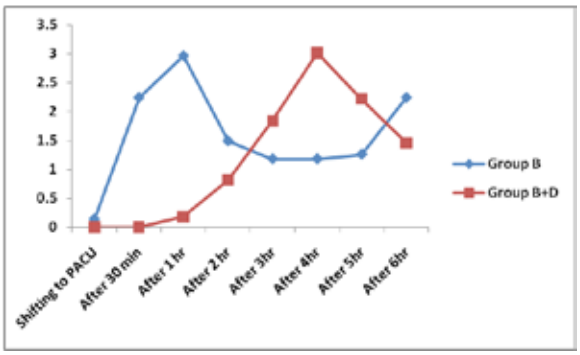
groups was not statistically significant (p > 0.05).

Figure 3-VAS Score



First appearance of pain of VAS 4 level in group B is at 1st hour while in Group B+D it is at 4th hour postoperatively.

DISCUSSION

An intrathecal additive to local anaesthetics forms reliable method of prolonging duration of anaesthesia and post operative analgesia.

Dexmedetomidine an α-2adrenergic agonist is pharmacologically related to clonidine and is the most recent agent in this group approved by FDA in 1999 for the use in humans as a short term medication (<24 hrs) for analgesia and sedation in intense care unit[6].

As studied by Zhang H, Fang Zhou et al.[7] in male cunming mice ,in vivo intrathecal dexmedetomidine has no significant pathological impacts on the spinal cord .Sanders RD, Sun P et al.[8] also showed that dexmedetomidine provides cortical neuroprotection in the rat.

As there are only few human studies available for dexmedetomidine as a spinal adjuvant to bupivacaine , we decided to perform the study.

The mean time from intrathecal injection to onset of sensory block at T10 level was 4.3±0.84 minutes in Group B and 2.5±0.58 minutes in Group B+D,which was statistically significant. These results are similar to Al-Mustafa MM et al[9]. Kanazi GE et al[10] observed the onset of sensory blockade to be 9.7±4.2 minutes in control group,and 8.76± 3.7 minutes in dexmedetomidine group with no significant difference, which could be due to the less doses of dexmedetomidine (3 mcg).

The mean time for onset of grade 3 motor block was 6.54±0.81 minutes in Group B and 5.06±0.82 minutes in Group B+D. Faster onset of motor block observed in dexmedetomidine group which was in concordance with results of various studies[9,10].

Mean pulse rate and Mean blood pressure were less in group B+D as compared to group B,but the difference was not statistically significant (p > 0.05). These findings are in agreement with findings of G. E. Kanazi et al[10]., Shukla D et al.[11], and Al-Mustafa MM et al[9].

Higher sedation Score was found in dexmedetomidine group (P value <0.001) The dose of dexmedetomidine selected in this study did not produce excessive sedation, as no patient developed respiratory depression or fall in SpO_2. In fact, the sedation produced by dexmedetomidine was found to be desirable as all the patients remained calm and quite in intraoperative and postoperative period. These results are similar to those observed by Al Ghanem et al[12]. But in study conducted by Al Mustafa et al[9] found no statistically significant difference between two groups which may be due to low dose of dexmedetomidine used in study.

Mean duration of analgesia in control group was 177±15.45 minutes and in dexmedetomidine group was 381.3±17.43 minutes, which was statistically significant. In study conducted by Gupta R et. Al[13] authors found statistically significant results which compares our study.

Time to first rescue analgesic was at 1st hour postoperatively in control group as compared to 4th hour in dexmedetomidine group. Higher duration of analgesia found in our study was similar to previously reported results of various studies[13,14].

No. of 24 hrs rescue analgesia in group B was 2.86±0.35 doses and in group B+D is 1.92±0.44 doses, which was statistically significant. In study conducted by Gupta R et. al[13] found statistically significant results which compares our study.

We did not observe any major complication except few showing mild bradycardia and hypotension which was not drug resistant. In study conducted by Rajni Gupta et al.[13] authors also found that dexmedetomidine when added to intrathical bupivacaine has excellent quality of post operative analgesia with minimal side effects.

CONCLUSION

Intrathecal supplementation of dexmedetomidine to bupivacaine produces prolonged sensory and motor block, duration of analgesia and lesser number of rescue analgesics required in post-op 24 hours compared to bupivacaine alone.

In conclusion, 5 µg dexmedetomidine seems to be an attractive adjuvant to intrathecal bupivacaine in surgical procedures especially in those that need quite long time with minimal side effects and excellent quality of postoperative analgesia.

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