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Comparative Study of the Effect of Adding Dexmedetomidine versus Fentanyl to Intrathecal Bupivacaine on Spinal Block Characteristics in Endo-Urological Procedures

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Abstract

Background and Aim: Various studies have been done on addition of various adjuncts to spinal local anaesthetics to improve as well as to increase the time of spinal anesthesia and analgesia, so that the total dose of local anaesthetics could be decreased. Present study was done with an aim to evaluate the relative efficacy of dexmedetomidine and fentanyl with 0.5% hyperbaric bupivacaine intrathecally in Endo-urological procedures. *Material and Methods:* Total 80 patients of ASA grade I and II, between 18 to 70 years were scheduled for different Endo-urological surgeries including Turp, Turbt, End To End Urethroplasy,Suprapubic Cystolithotrity/Suprapubic Cystolithotomy And Urs (Lower ureteric stone) and RIRS were included in the study. Patients were allocated into 2 groups, each of 40 patients, each received a total volume of 3.5ml which contained dose of 15mg (i.e. 3ml) 0.5% hyperbaric bupivacaine combined either Dexmedetomidinne or Fentanyl. After noting baseline parameters the patients were monitored using continuous electrocardiography (lead II), heart rate, non-invasive blood pressure, and continuous pulse oximetry. *Results:* The changes in mean heart rate between two groups were significant statistically after 60 minutes of spinal anaesthesia, which showed more fall in heart rate in patients of group-D than group-F. The changes in mean arterial pressure were also statistically significant between the two groups after 75 minutes of spinal anaesthesia, which showed more fall in patients of group-D. Intra–operative hypotension requiring treatment was also observed more in group-D patients (12.5%) compared to group-F (2.5%). *Conclusion:* Dexmedetomidine is a good option to fentanyl in spinal anesthesia as it significantly prolongs duration of sensory and motor block and increase the duration of analgesia, it causes hypotension and bradycardia which are easily reversible and without any untoward adverse events.

Key words: Bradycardia, Dexmedetomidine, Fentanyl, Hypotension

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Introduction

Neuraxial blockade with spinal anaesthesia is the preferred technique in most of the urological procedures as it creates excellent operating conditions (muscle relaxation), causes least hemodynamic changes as the amount of drug required is less and absence of manipulation of airway and last but the most important, it provides excellent intra and postoperative analgesia to the

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patient. Though it has above advantages various studies have been done to improve the quality of analgesia in procedures that cause visceral pain for which higher dose may be requiredto increase the level of sensory blockade which may lead to hemodynamic changes that may have unfavourable effects on patients with hypertension and diabetes.

Various studies have been done on addition of various adjuncts to spinal local anaesthetics to improve as well as to increase the time of spinal anesthesia and analgesia, so that the total dose of local anaesthetics could be decreased. Many of them have successfully concluded that adjuncts do decrease the dose of spinal local anesthetics, improve the quality of analgesia and duration as well and lastly also increase duration of motor block. So with adjuncts procedures more than 2-3 hours, even complex one could be done easily without additional requirement of different modality of anesthesia.

Various urological procedures such as Transurethral resection of prostate (TURP), Transurethtral resection of bladder tumour, End To End Urethroplasty, ureteroscopic retrieval of stone (URS) for lower ureteric stone and Suprapubic cystolithotrity (SPCL) are frequently done under regional anaesthesia. A dose of fentanyl 20-30 microgram (µg) as adjunct to spinal anesthesia produces faster block onset time, improved intraoperative analgesia and decrease incidence of intraoperative nausea and vomiting in obstetric patients.[1]

Dexmedetomidine is a relatively selective alpha-2 agonist with sympatholytic, sedative, analgesic and amnestic properties. It is indicated for the short-term sedation of patients needing mechanical ventilation in intensive care unit.[2] Recent reports have been published describing dexmedetomidine as a useful adjunct in both regional and general anaesthesia. A few case studies have demonstrated successful use of dexmedetomidine as a replacement of opioids, in whom airway compromise was a concern. A thorough understanding of the drug will help anaesthesia provider to use dexmedetomidine as a sole drug or as an adjuvant.[2,3,4]

The following study of comparing 2 drugs (fentanyl and dexmedetomidine) as adjuncts to local anaesthetic bupivacaine in spinal anaesthesia for above mentioned Endo-urological procedures which is least studied till now, will find differences in hemodynamic variables and also in analgesia duration and any complications or side effect.

Present study was done with an aim to evaluate the relative efficacy of dexmedetomidine and fentanyl with 0.5% hyperbaric bupivacaine intrathecally in Endo-urological procedures.

Material and Methods

Total 80 patients of ASA grade I and II, between 18 to 70 years were scheduled for different Endo-urological surgeries including Turp, Turbt, End To End Urethroplasy,Suprapubic Cystolithotrity/ Suprapubic Cystolithotomy And Urs (Lower ureteric stone) and RIRS were included in the study.

Exclusion criteria

Patients with coagulation abnormalities, severe cardiac or renal disease, mental disturbances, neurological diseases, deformities of spine or local anaesthetic allergies were excluded from the study.

Sample size were calculated for the paired statistical analysis with student t-test using power and sample size program PS version 3.0.7, with level of confidence = 95% and Power = 0.87, n' came out to be 40 for each group. Sampling technique was done as Probability sampling, with randomization by envelope method, 80 patients were randomly divided into two groups of 40 each.

Patients were allocated into 2 groups, each of 40 patients, each received a total volume of 3.5ml which contained dose of 15mg (i.e. 3ml) 0.5% hyperbaric bupivacaine combined either Dexmedetomidinne or Fentanyl, as follows:

Group D: (3ml of 0.5% hyperbaric bupivacaine + 0.5ml of 10 µg dexmedetomidine)

Group F: (3ml of 0.5% hyperbaric bupivacaine +0.5ml of 25 µg fentanyl)

After noting baseline parameters the patients were monitored using continuous electrocardiography (lead II), heart rate, non-invasive blood pressure, and continuous pulse oximetry. 18 gauge IV cannula was inserted at the forearm level; NS was administered as bolus of 10 ml/kg for 15 min before subarachnoid block to all patients. Drug filled syringe was given to the performing anaesthetist,who along with the person collecting data was blinded. Spinal anaesthesia was performed at L3-L4 interspace (L2-L3 space in case of failure) with the patient in sitting position by using a 25 gauge quincke needle. Free flow of cerebrospinal fluid was verified before injection of anaesthetic solution, which was administered without aspiration.

Criteria of Block

Onset of sensory block: sensory block was assessed

every 60 seconds by pinprick method. At the T10 level failure to perceive pain on prick wastaken as the onset of sensory block

Onset of motor block: Motor block was assessed by using the modified bromage scale.

Bromage Scales

Grade-0: No block – full flexion of knee and feet

Grade-I: Partial block-just able to flex knee but full flexion of feet.

Grade-II: Almost complete block – unable to flex knee but complete

Flexion of feet possible

Grade-III: Complete block: unable to flex knee and feet.

The duration of spinal anaesthesia was calculated from the time of spinal injection to the time taken for two level sensory regressions from the peak block height. Time of sensory regression to S1 level and time to complete motor resolution was recorded from the time of spinal injection. The intensity of pain was also recorded every 30 minutes in the postoperative period using a VAS, explained to the patient preoperatively, and graded on a scale of 0 to 10 and when the VAS score was > 4 rescue analgesia was given in the form of intravenous tramadol 1.5 mg/kg slowly over 2 minutes and further dose if required will be 1mg/kg.

Adverse effects of intrathecal opioids, if any were recorded. The presence of urinary retention could not be assessed, as most of the patients had an indwelling catheter. Nausea and vomiting, if present, were treated with ondansetron 4mg intravenous while post-operative pruritus was controlled with 4mg of oral chlorpheniramine maleate.

The recorded data was compiled and entered in a spreadsheet computer program (Microsoft Excel 2007) and then exported to data editor page of SPSS version 15 (SPSS Inc., Chicago, Illinois, USA).

Descriptive statistics included computation of percentages, means and standard deviations. For all tests, confidence level and level of significance were set at 95% and 5% respectively.

Results

This study "Comparison of effect of adding dexmedetomidine versus fentanyl to intrathecal bupivacaine on spinal block characteristics in urological procedures" was carried out in patients admitted at Muljibhaipatel Urological Hospital, Nadiad.

Observations made in 80 patients undergoing various urological procedures routinely done under spinal anaesthesia. This was a double blind case control study. The study population was divided in two groups of 40 each. Group D was the group of patients receiving 10µg of dexmedetomidine with 15mg of hyperbaric bupivacaine(0.5%) and another group F received 25µg of fentanyl with 0.5% 15mg of hyperbaric bupivacaine.

There was no significant difference between the two groups with respect to age, Ht. and Wt. (Table 1).

Table 1: Age (Years), Ht. (cm) and Wt (Kg) of study participants

	Group D	Group F	*p* value
Age (Mean ± SD)	51.97 ± 13.77	55.17 ± 12.75	0.2507
Wt (Mean ± SD)	70.07 ± 10.27	67.45 ± 11.53	0.2859
Ht (Mean ± SD)	168.47 ± 6.12	167.52 ± 7.12	0.5245

Table 2: Comparison of sex ratio between group D and group F

Sex	Group-D	Group-F	Total
Male	38	40	78
Female	2	0	2
Total	40	40	80

Table 3: Sensory Blockade among both groups

Sensory Blockade	Group D	Group F	*p* value
Time of onset of sensory block at T10 level (MIN) Mean + SD	8.775 ± 0.2920	8.850 ± 0.2943	0.8569
Mode of peak sensory height (mean)	T7 (7.075 ± 0.12)	T7 (7.050 ± 0.11)	0.8829
Time to reach peak sensory level (min) Mean + SD	15.025 + 2.281	14.625 + 2.192	0.4263

No significant difference was found between both gender ($p > 0.05$) (Table 2).

The table 3 shows that the mean time of onset of sensory block at T10 level in both Group-D (8.77min) and Group-F (8.85min) were almost similar and hence there was no significant difference between both groups. The difference in duration of anaesthesia (as indicated from time for 2 segment sensory regression below the peak sensory level) was more in Group-D (126min) as compared to Group-F (117min) which was statistically significant (Table 3).

Table 4: Motor Blockade among both groups

Motor Blockade	Group-D	Group-F	*p* value
Time of onset of motor block (bromage 1) (min.) Mean + SD	2.625 + 0.8378	2.325 + 0.5256	0.0587
Time to reach grade 3 motor blockade(min) Mean + SD	9.1 + 2.687	9.6 + 1.446	0.3043

Table 5: Recovery of motor Blockade

Recovery of Blockade	Group-D	Group-F	*p* value
Time to complete motor regression (min) Mean + SD	289.75 + 35.76	250.75 + 23.68	< 0.0001

Table 6: Duration of analgesia (i.e Time for rescue analgesia after spinal block) and dose required in 1st 24 hours

Parameters	Group-D	Group-F	*p* value
Time of rescue analgesia(MIN)	573.6 ± 64.16	454.4 ± 27.90	0.085
Total dose required(mg)	125.0 ± 8.287	132.8 ± 8.139	0.5081

Table 7: Heart rate comparison of Group-D and Group-F(1st 180 min)

Time	Group-D (mean + SD)	Group-F (mean + SD)	*p* value
Pre-operative	94.525 + 13.125	93.625 + 13.638	0.7644
5 min	92.625 + 12.790	93.475 + 13.860	0.7764
10 min	90.65 + 13.05	91.55 + 14.178	0.7685
15 min	87.375 + 13.028	89.425 + 14.274	0.5043
20 min	84.375 + 12.862	86.975 + 14.323	0.3778
30 min	81.175 + 12.596	83.80 + 14.396	0.3882
45 min	77.75 + 12.661	82.025 + 14.790	0.1689
60 min	75.55 + 12.772	82.175 + 14.392	0.0325
75 min	75.125 + 12.035	81.05 + 13.642	0.0428
90 min	73.85 + 11.705	80.95 + 13.939	0.0133
105 min	72.575 + 10.592	80.35 + 13.37	0.0052
120 min	72.525 + 10.884	79.65 + 12.823	0.0091
150 min	72.825 + 10.595	79.60 + 12.105	0.0094
180 min	72.15 + 9.317	79.9 + 11.22	0.0021

The onset of motor block in Group-D was though prolonged then Group-F, but the difference was not quite significant statistically (Table 4).

There was a statistically significant difference between the two groups, in the time taken to completely recover from motor blockade, being longer in group-D then Group-F (Table 5).

In the present number of patients required in Group- D and Group-F was 14 and 16 respectively (out of 40 patients in each group). Comparing their mean showed that time of rescue analgesia was longer in Group–D (573 min) than Group-F (454min), though they are not statistically significant (Table 6).

The changes in mean heart rate between two groups were significant statistically after 60 minutes of spinal anaesthesia, which showed more fall in heart rate in patients of Group-D than Group-F. Mean fall in heart rate in Group-D and Group-F was 22 and 14 respectively. Hence fall in heart rate was seen more with Group-D patients, which was ≥ 20% and in Group-F was ≤ 15% of baseline heart rate (Table 7).

Table 8: Mean Arterial Blood Pressure comparison of Group-D and Group-F of 1st 180minutes

Time	Group-D (mean + SD)	Group-F (mean + SD)	*p* value
Pre-operative	110.47 + 12.63	108.57 + 12.17	0.4952
5 min	106.025 + 11.75	104 + 11.28	0.6359
10 min	102 + 11.578	101.675 + 10.376	0.8949
15 min	98.95 + 12.12	98.87 + 10.21	0.9762
20 min	96.15 + 12.19	95.47 + 10.39	0.7906
30 min	94.075 + 11.865	93.175 + 10.706	0.7227
45 min	92.875 + 11.765	91.975 + 9.068	0.7026
60 min	90.475 + 11.989	92.85 + 8.254	0.3057
75 min	89.725 + 10.837	94.50 + 9.416	0.0387
90 min	89.525 + 11.207	94.95 + 9.538	0.0224
105 min	88.925 + 10.709	95.925 + 9.88	0.0003
120 min	88.425 ± 9.83	96.75 ± 9.97	0.0003
150 min	87.575 + 8.878	98.8 + 9.368	0.0001
180 min	85.825 + 9.055	98.125 + 8.913	<0.0001

Table 9: Respiratory rate comparison of Group-D and Group-F

Time	Group-D (mean + SD)	Group-F (mean + SD)	*p* value
Pre-operative	13.6 ± 0.16	13.2 ± 0.16	0.9999
5 min	13.8 ± 0.11	13.33 ± 0.15	0.0170
10 min	13.3 ± 0.07	13.13 ± 0.17	0.3701
15 min	12.9 ± 0.15	12.9 ± 0.17	0.9999
20 min	12.85 ± 0.15	12.8 ± 0.17	0.8314
30 min	13.0 ± 0.07	12.73 ± 0.17	0.1506
45 min	13.2 ± 0.09	13.23 ± 0.17	0.9000
60 min	13.1 ± 0.13	13.33 ± 0.16	0.2858
75 min	13.5 ± 0.17	13.3 ± 0.14	0.3925
90 min	13.5 ± 0.14	13.3 ± 0.14	0.50
105 min	13.9 ± 0.11	13.23 ± 0.18	0.03
120 min	13.3 ± 0.10	12.9 ± 0.15	0.02
150 min	13.05 ± 0.12	12.7 ± 0.15	0.088
180 min	13.88 ± 0.11	13.7 ± 0.13	0.3254

The changes in mean arterial pressure were also statistically significant between the two groups after 75 minutes of spinal anaesthesia, which showed more fall in patients of Group-D (Table 8).

Respiratory depression was not observed in either group and comparison between both was not significant statistically either (Table 9).

Table 10: (a and b): Intra-operative bradycardia and hypotension that required treatment with atropine and ephedrine respectively their total doses required

Atropine dose (mg)	Bradycardia (total number of patients requiring treatment)		*p* value
	Group-D	Group-F	
0.3	5 (12.5%)	2(5%)	0.006
0.6	2(5%)	0(0%)	
Total	7(17.5%)	2(5%)	

Ephedrine dose (mg)	Hypotension (total number of patients requiring treatment)		*p* value
	Group-D	**Group-F**	
6	1(2.5%)	0(0%)	0.01
12	4(10%)	1(2.5%)	
Total	5(12.5%)	1(2.5%)	

Intra-operative bradycardia requiring treatment was observed more in group-D patients. 7 patients in Group-D and 2 patients in Group-F required atropine and p-value of 0.006 was obtained on applying chi-square test for comparing the percentage of patients having bradycardia in both groups, hence statistically significant and requirement of dose in both group were similar (0.3mg) and were not significant statistically (p = 0.4589) (Table 10a).

Intra–operative hypotension requiring treatment was also observed more in Group-D patients (12.5%) compared to Group-F (2.5%), hence applying chi-square test, we got p-value of 0.01 which was statistically significant. But requirement of mean dose cannot be compared between the groups as only 1 patient required dose of 6mg of ephedrine in Group-F (Table 10b).

Side effects observed in both groups were only shivering and that too in 0.5% and 0.25% population in Group-D and Group-F respectively.

Discussion

Neuraxial blockade with spinal anaesthesia is the preferred technique in most of the urological procedures as it creates excellent operating conditions, causes least hemodynamic changes as the amount of drug required is less and absence of manipulation of airway and last but the most important, it provides excellent intra and postoperative analgesia to the patient. Though it has above advantages various studies have been done to improve the quality of analgesia in procedures that cause visceral pain for which higher dose may require increasing the level of sensory blockade which may lead to hemodynamic changes that may have unfavorable effects on patients with hypertension and diabetes.[5-8]

Various studies have been done on addition various adjuncts to spinal local anesthetics to increase the duration of spinal anesthesia and analgesia, so that the total dose of local anesthetics could be decreased. Many of them have successfully concluded that adjuncts do decrease the dose of spinal local anesthetics, improve the quality of analgesia and duration as well and lastly also increase duration motor block.[8,9] So with adjuncts procedures more than 2-3 hours, even complex one could be done easily with additional requirment of different modality of anesthesia.

In our study we have compared the relative efficacy of 2 different adjuncts(dexmedetomidine and fentanyl), at different doses (i.e 10µg and 25µg respectively) with regard to duration and quality of sensory block, duration of motor block, hemodynamic changes and also we observed the side effects/adverse effects to see if they are easily treatable or not. Though we have also observed and recorded the time of onset of sensory and motor block as well, but we are more concerned with the parameters mentioned in start of this paragraph.

The type of our study design is randomized, prospective and double blind case controlled. Study includes total of 80 patients of ASA grade I and II, with 40 patients in either group.

The demographic parameters with respect to age, sex, weight, height and ASA grade are comparable in either group. Type and duration of surgeries included were also comparable in either group. In a study by, Subhi m. Al-ghanem et al.[10] observed in their study comparing 5µg dexmedetomidine versus 25µg fentanyl in gynaecological procedures that time to reach sensory level T10 was 7.5 ± 7.4 min and 7.4 ± 3.3 min respectively (p = 0.95) and in our study it was 8.77 ± 0.29 min and 8.85 ± 0.29 min respectively (p = 0.85). So above study supports our conclusion that there was significant difference in mean time to reach sensory level T10. In another study by Al-mustafa et al.[8], comparing different doses of dexmedetomidine (5 and 10 µg) with 10 mg isobaric bupivacaine, it was 6.3 ± 2.7 min and 4.7 ± 2.0 min respectively comparing with their third group which received normal saline which was 9.5 ± 3.0 min. In another study Deepika Shukla et al.[11], observed the onset time of block, both sensory up to T10 dermatome, was rapid in the

dexmedetomidine group (2.27 ± 1.09) and delayed in the magnesium group (6.46 ± 1.33) in comparison with the normal saline group was (4.14 ± 1.06).

In our study the peak sensory level was comparable in both groups, which was T7. Subhi m. Al-ghanem et al.[10] didn't observed any difference in peak level achieved in their study comparing 5µg dexmedetomidine versus 25µg fentanyl (with 10mg isobaric bupivacaine) in gynaecological procedures which was T6 in either group. While in a recent study by Rajnigupta et al.[12] in which they compared the effects of dexmedetomidine (5µg) versus fentanyl (25µg) with 12.5 mg 0.5% hyperbaric bupivacaine intrathecally in lower abdominal surgeries, they observed that there was no difference between peak sensory level achieved in both groups which were T5 and T6 respectively. Eid et al.[13] observed that the peak sensory level were T5 and T7 in groups receiving 10µg and 15µg of dexmedetomidine respectively.

In our study time to reach peak sensory level was 15.02 ± 2.2min and 14.62 ± 2.1min (p=0.426) respectively in dexmedetomidine and fentanyl group. Al-ghanem et al.[10] observed that it was 19.34 ± 2.8min and 18.39 ± 2.4min respectively (p=0.126).

In our study, the time to 2 segment regression was 126 ± 19min and 117 ± 12min (p=0.0149) in groups receiving 10µg of dexmedetomidine and 25µg fentanyl respectively. In another study by Eid et al.[11], time to 2 segment regression in group receiving dexmedetomidinne 10µg and 15µg were 103 ± 28min and 200 ± 30min respectively (statistically significant).

In our study, the time to sensory regression to S1 level observed was 366 ± 44min and 327 ± 37 min in dexmedetomidine and fentanyl group respectively ($p < 0.001$). While in study by Rajnigupta et al[12] it was 476 ± 23 min and 187 ± 12 min, hence it was also statistically significant as in our study, which supported our results. Al- ghanem et al.[10] observed in their study, that it was 274 ± 73 min and 179 ± 47min respectively. Study by Eid et al.[13] comparing different doses of dexmedetomidine observed that the time to sensory regression to S1 was 320 ± 65min and 408 ± 68 min in the respective groups while in their 3rd group which received normal saline it was 238 ± 57 min. Another similar study comparing different doses of dexmedetomidine by Al-mustafa et al.[8] observed that it was 277 ± 23 min and 338 ± 44 min compared to their third group receiving normal saline in which it was 165 ± 32 min.

In our study time to reach motor bromage 3 score were 9.1 ± 2.6 min and 9.6 ± 1.4 min in dexmedetomidine and fentanyl group respectively. Rajnigupta et al.[12] observed that it was 11.6 ± 1.8 min and 11.2 ± 1.3 respectively. Hence above 2 studies didn't showed significant difference between the either groups in their studies, though there are differences between the 2 studies. Al-ghanem et al.[10] observed that it was 14.4 ± 6.7 min and 14.3 ± 5.7 min ($p = 0.93$) respectively, not significant in this study as well. Al-mustafa et al.[8] observed that it was 13.0 ± 3.4min and 10.4 ± 3.4 min in dexmedetomidine groups receiving 5 µg and 10 µg respectively in comparison with their 3rd group receiving normal saline which was 18.0 ± 3.3 min. . In another study deepikashukla et al.[13], the onset time to motor Bromage 3 scale, was rapid in the dexmedetomidine group and delayed in the magnesium group in comparison with the normal saline group was (4.81 ± 1.03).

In our study time to reach motor bromage 0, was 289 ± 35 min and 250 ± 23 min ($p < 0.001$) respectively in dexmedetomidine and fentanyl group. Rajnigupta et al.[12] observed that 421 ± 21min and 149 ± 18 min ($p < 0.001$) respectively. Al- ghanem et al.[10] observed that it was 240 ± 64 min and 155 ± 46 min ($p < 0.001$) respectively. Eid et al.[13] observed that it was 280 ± 46 min and 336 ± 58 min respectively in groups receiving 10 and 15µg of dexmedetomidine in comparison with their 3rd group receiving normal saline 202 ± 41.8 min. Al-mustafa et al.[8] observed that it was 246.4 ± 25.7 min 302.9 ± 36.7 min in dexmedetomidine groups receiving 5µg and 10µg respectively compared with their third group receiving normal saline was 140.1 ± 32.3 min.

In relation to duration of analgesia, Eid et al has observed that dexmedetomidine reduces rest pain and dynamic pain VAS score significantly in 1st 24 hours and also reduce the rescue analgesic consumption by 45% in orthopaedic surgeries of lower limbs. In another study Rajni Gupta et al[12] observed that in lower abdominal surgeries also dexmedetomidine reduces VAS pain score in 1st24 hours by 35% and also reduce analgesic consumption by 64%, but we observed that only 14 patients in group-D and 16 patients in group-F required rescue analgesia, comparing means of these patients we observed that time of rescue analgesia from spinal block was 573min and 456min respectively ($p = 0.006$). But this difference might me because of the type of surgeries included in our study as nearly 50% of patients in either group didn't required analgesia at all in 1st 24 hours and mean analgesic requirement in these patients was 125 mg and 132 mg (p=0.50) in group D and group

F respectively was not statistically significant.

In our study the changes in mean heart rate observed were statistically significant after 60 minutes of spinal block and fall in mean heart rate of Group-D and Group-F was 22 and 14 respectively at the end of 180 min ($p < 0.001$). Hence fall in heart rate was seen more with Group D patients, which was >20% and in Group-F was <15% of baseline heart rate. But meta-analysis of various studies done by F.w. abdallah et al[14] has not shown that incidences of bradycardia are more with dexmedetomidine and statistically not significant as well ($p = 0.98$).

Meta-analysis by F.W. abdallah[15] has observed no significant incidences of hypotension with dexmedetomidine as compared with other adjutants intrathecally with $p = 0.64$, but in our study we observed that fall in mean arterial pressure was found to be statistically significant after 75 min of spinal block, which was consistently falling till 180min of spinal block and the mean fall in MAP was >20% in dexmedetomidine and ≤ 10% in fentanyl group ($p < 0.001$).

In the meta-analysis by Abdallah et al[14] in April 2013, they concluded that dexmedetomidine produces reversible bradycardia in 7% of brachial plexus block patients, similarly in our study bradycardia though observed in 7 patients of dexmedetomidine and only 2 patients in fentanyl group, it was easily reversible with a mean dose of 0.3mg of atropine in both groups ($p = 0.4569$).

In study by Rajnigupta et al., observed that intra-operative ephedrine requirement was more in dexmedetomidine group compare with fentanyl group which was (10 ± 4 mg) and (6 ± 3 mg) respectively, but in our study 5 patients in dexmedetomidine group and only 1 patient in fentanyl group required ephedrine, on applying chi-square test p-value obtained was 0.001 hence dexmedetomidine caused hypotension in significant number of patients as compared to fentanyl. The mean dose of ephedrine required to treat in dexmedetomidine group was 10 in our study but it cannot be calculated in fentanyl group as only 1 patient required ephedrine, hence p- value also cannot be calculated. In our study, none of the patients had respiratory depression and this was comparable with the results of meta-analysis by FW abdallah.

None of the studies observed any side effects which were statistically significant in our study also we observed only shivering as a side effect in 2 patients in Group D and 1 patient in Group F.

Conclusion

Dexmedetomidine is a good option to fentanyl in spinal anesthesia as it significantly prolongs duration of sensory and motor block and increase the duration of analgesia, it causes hypotension and bradycardia which are easily reversible and without any untoward adverse events.

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