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A COMPARATIVE STUDY OF CLONIDINE AND DEXMEDETOMIDINE AS ADJUVANT IN NEURAXIAL BLOCK – A CASE SERIES

Anaesthesiology

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ABSTRACT

BACKGROUND-Most of the lower abdominal surgeries are performed under spinal anaesthesia which is a popular technique using hyperbaric local anaesthetic solutions such as 0.5% Bupivacaine. The advantages are simplicity of technique, rapid onset of action and reliability in producing uniform sensory and motor blockade. Main disadvantage of using plain local anaesthetic agent arelimited duration of action and lack of longer postoperative analgesia.To overcome this problem, administration of different adjuvant in local anaesthetic is an excellent technique.
AIMS-To compare the effect of adding Clonidine and Dexmedetomidine to Bupivacaine for neuraxial block.
METHODS-This study was be conducted after the approval of institutional ethical committee. It is a prospective study in which 75 selected patients who were posted for lower abdominal surgeries were randomly allotted into three groups.Group B -Inj.0.5% Heavy Bupivacaine 3.2cc(16 mg) + Inj. Normal saline Group C -Inj.0.5% Heavy Bupivacaine 3.2cc(16 mg) + Inj.Clonidine 30 mcgGroup D -Inj.0.5% Heavy Bupivacaine 3.2cc(16 mg) + Inj.Dexmedetomidine 3 mcg, Total volume injected in all group was 3.5 ml.The end of drug injection was taken as zero time. Onset, duration of sensory blockade, duration of motor blockade was noted.
RESULTS –prolonged sensory and motor blockage and superior post-operative analgesia was observed in group D.
CONCLUSION- Addition of Dexmeditomidine 3 mcg is significantly more effective than plain 0.5% Bupivacaine or when Clonidine 30mcg was used as adjuvant, for prolongation of sensory and motor blockage and post-operative analgesia.

KEYWORDS

Dexmediotomidine, Clonidine, Intrathecal.

INTRODUCTION:

Most of the lower abdominal surgeries are performed under spinal anaesthesia which is a popular technique using hyperbaric local anaesthetic solutions such as 0.5% Bupivacaine. The advantages are simplicity of technique, rapid onset of action and reliability in producing uniform sensory and motor blockade. Main disadvantage of using plain local anaesthetic agent are limited duration of action and lack of longer postoperative analgesia. To overcome this problem, administration of different adjuvant in local anaesthetic is an excellent technique.Advantages of adjuvents areincreased quality of sensory and motor blockade, increased duration of block and decreased postoperative pain.It acts as synergistic to local anaesthetics which lower local anaesthetic requirement, decreases side effects. Various drugs like opioids, neostigmine, midazolam, preservative free ketamine,clonidine,dexmedetomidine etc. are used as adjuvants intrathecally in clinical practice. Dexmedetomidine and clonidine are selective α2 adrenergic agonist. Small doses of selective α2 adrenergic agonist used in combination with bupivacaine in neuroaxial block produce a prolongation in the duration of motor and sensory block with nonsignificant hemodynamic changes.

AIMS AND OBJECTIVES:

This study was done to compare the effect of adding Clonidine and Dexmedetomidine to Bupivacaine for neuraxial blockade and compare the onset and duration of sensory and motor block, analgesiaand side effects.

MATERIALS AND METHODS:

Institutional ethical approval was obtained.Total 75 patients undergoing lower abdominal surgeries were selected.Adult patientsup to 55 yearsboth genders,ASA status I and II, body Weight 40 to 70 kgs and height 150 to 170 cmwith normal coagulation profile were included in the study. Patients with ASA status III, IV, V, paediatric and geriatric patients, patients with spine abnormalities or psychiatric disorder, patients on anti-hypertensive and anticoagulant medications and those with history of aallergy or coagulopathy were excluded from the study. This was a prospective study in which 75 selected patients who were posted for lower abdominal surgeries are randomly allotted into three groups according to inclusion criteria.

- Group B -Inj.0.5% Heavy Bupivacaine 3.2cc(16 mg) + Inj. Normal saline
- Group C -Inj.0.5% Heavy Bupivacaine 3.2cc(16 mg) + Inj.Clonidine 30 mcg
- Group D -Inj.0.5% Heavy Bupivacaine 3.2cc(16 mg) + Inj.Dexmedetomidine 3 mcg

By adding 0.9% normal saline to local anaethesticagent's total volume injected in all group is 3.5 ml.Study drug was injected after bevel directed upward and checking for free flow of CSF over 10-15 seconds.After that patients were immediately changed to the supine position. The end of drug injection was taken as zero time.Onset time for sensory and motor blockage was noted.A sensory level of T6 was considered adequate to allow surgery to proceed.The duration of sensory blockade (time to regression of sensory T6 to S1) was recorded.The duration of motor blockade (time to achieve Modified Bromage scale 3 to 0)was noted.Intraoperative Complication like hypotension, bradycardia, nausea, vomiting, sedation, respiratory depression can occur and treated accordingly. Intra-op blood loss is replaced as indicated. No additional sedative medications are given during the surgery.

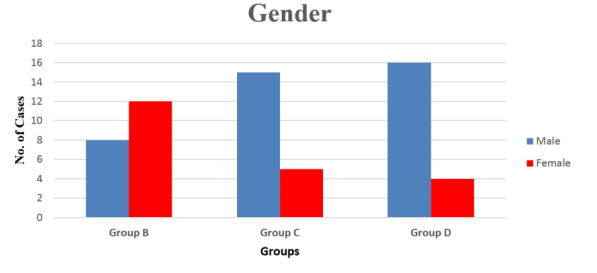
OBSERVATIONS:

DEMOGRAPHIC DATA:

There was no statistical difference between the three groups.

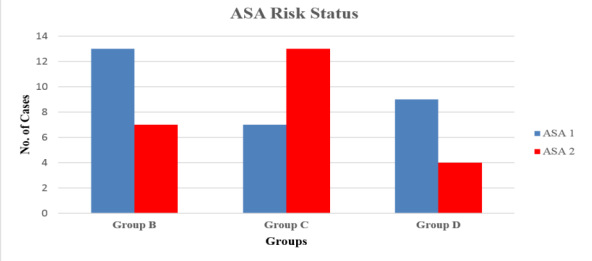
Demographic data

		Group B	Group C	Group D
Age(years)		35.90±8.49	39.80±8.44	33.95±12.62
Weight(kg)		57.30±8.18	56.85±9.64	55.90±8.06
Height(cm)		157.20±4.91	159.95±5.62	159.15±6.70
Gender	Male	8	15	16
	Female	12	5	4



ASA risk status

	Group B	Group C	Group D
ASA risk I	13	7	9
ASA risk II	7	13	11

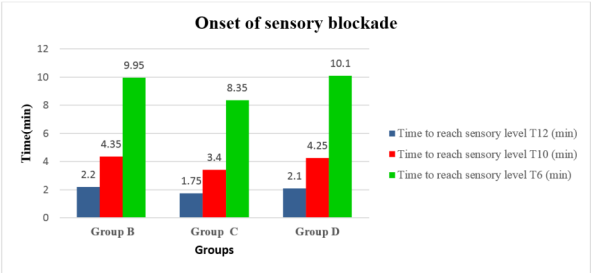


Total duration of surgery

	Group B	Group C	Group D
Duration of surgery (min)	78.25 ± 36.32	96.55 ± 36.52	83.85 ± 28.98

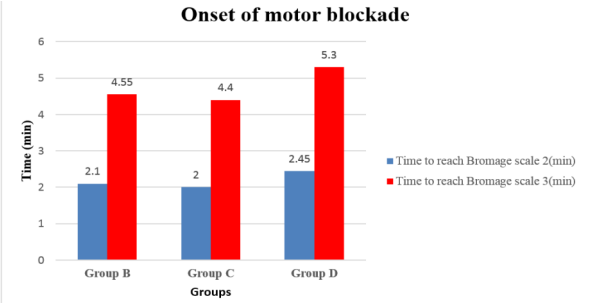
Time of onset of Sensory blockade

	Group B	Group C	Group D
Time to reach sensory level T12 (min)	2.20 ± 0.89	1.75 ± o.72	2.10 ± 0.64
Time to reach sensory level T10 (min)	4.35 ± 0,75	3.40 ± 1.05	4.25 ± 1.77
Time to reach sensory level T6 (min)	9.95 ± 3.63	8.35 ± 2.72	10.10 ± 3.96



Duration of sensory block
(Time of regression of sensory S1 from T6 level)

	Group B	Group C	Group D
Duration of sensory block (min)	314.00±24.96	504.505±42.91	576.35±95.00



Duration of Motor Block
(Time to achieve Modified Bromage scale 0 to 3)

	Group B	Group C	Group D
Duration of motor block (min)	237.40±21.12	426.50±40.33	495.45±93.20

Two segment regression time
(Time for regression of two segments from T6 level)

	Group B	Group C	Group D
Time of two segment regression (min)	60.50 ±7.42	107.50 ±28.47	114.90±41.97

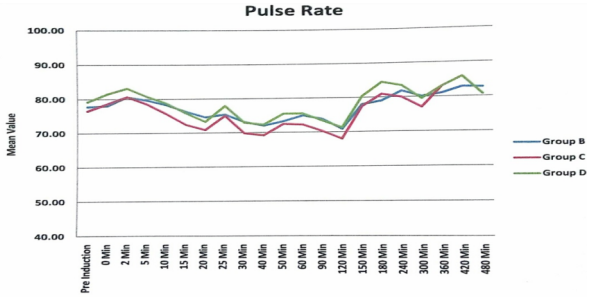
Duration of effective Analgesia
(Time of giving spinal anaesthesia till [VAS]visual analogue scale > 3)

	Group B	Group C	Group D
Duration of effective analgesia(min)	202.80±21.30	366.85±48.76	359.65±62.51

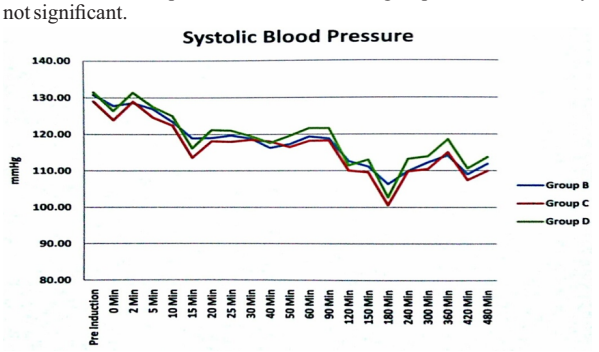
COMPARISON OF DURATION OF SENSORY AND MOTORBLOCKADE:

	GROUP B	GROUP C	GROUP D
Time to reach sensory T10(min)	4.35±0.75	3.40±1.05	4.25±1.77
Time to reach sensory T6(min)	9.95±3.63	8.35±2.72	10.10±3.96
Time to reach M Bromage 2(min)	2.10±0.91	2.00±0.79	2.45±1.15
Time to reach M Bromage 3(min)	4.55±1.76	4.40±1.57	5.30±2.68
Duration of motor block(min)	237.40±21.12	426.50±40.33	495.45±93.20
Duration of effective analgesia(min)	202.80±21.30	366.85±48.76	359.65±62.51

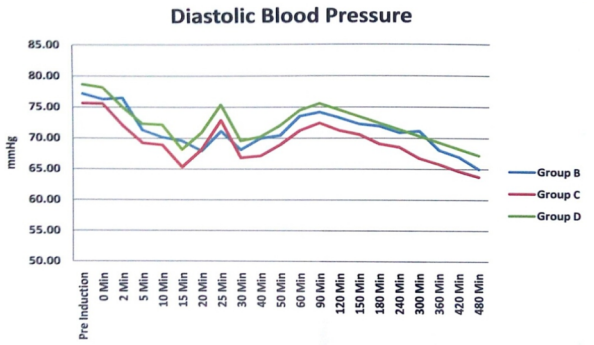
PERI-OPERATIVE PULSE RATE: The difference in mean pulse rate between three groups were statistically not significant.



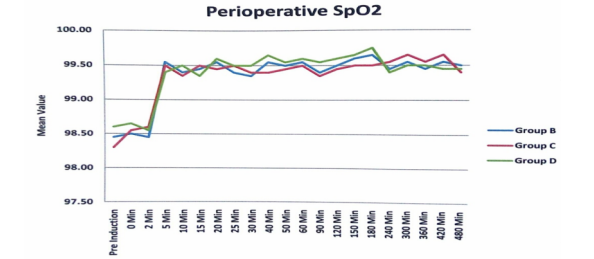
PERIOPERATIVE SYSTOLIC BLOOD PRESSURE: The difference in mean pulse rate between three groups were statistically not significant.



PERIOPERATIVE DIASTOLIC BP: The difference in mean pulse rate between three groups were statistically not significant.

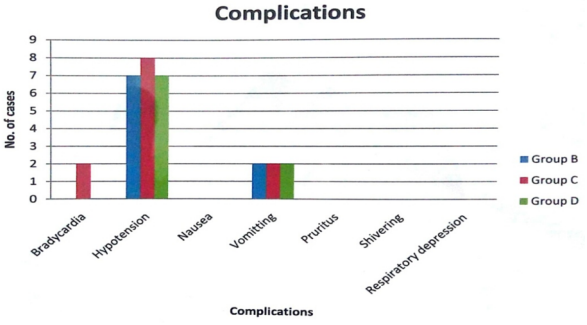


PERIOPERATIVE SPO2: The difference in mean BP between three groups were statistically not significant.



PERIOPERATIVE COMPLICATIONS:

Complications	Group B	Group C	Group D
Bradycardia	0	2	0
Hypotension	7	8	7
Nausea	0	0	0
Vomiting	2	2	2
Pruritus	0	0	0
Shivering	0	0	0
Respiratory Depression	0	0	0



DISCUSSION:

1.TIME OF ONSET OF SENSORY BLOCK

According to V Mahendru et al, P Shethi et al study Time for onset of sensory levelT6 was shorter in bupivacaine plus clonidine group as compared to bupivacaine plus dexmeditimidine and bupivacaine only group. According to T Suryashree et al timefor onset of sensory level T6 wa observed to be shorter in bupivacaine plus dexmeditimidine group as compared to bupivacaine plus clonidine.In our study time for onset of sensory levelT6 was observed to be shorter in bupivacaine plus clonidine group as compare to bupivacaine plus dexmeditimidine and bupivacaine only group.

Time between the end of injection of test drug to achieve 16 sensory level

No.	Author	Year	Bupivacaine	Adjuvant		Mean time of Onset of T6 Sensory block
				Drug	Dose	
1.	V.Mahendru	2013	12.5 mg			10.1±3.5
				Clonidine	30 mcg	9.5±3
				cDexmedetomidine	5 mcg	10.3±3.3
2.	P. Shethi	2015	12.5 mg			16±3.85
				Clonidine	30 mcg	14±4.11
				cDexmedetomidine	3 mcg	17±4.51
3.	Suryasree	2015	15 mg	Clonidine	30 mcg	4.3±1.12
				cDexmedetomidine	5 mcg	4.03±1.0
4.	Our study	2017	16mg			9.95±3.63
				Clonidine	30 mcg	8.35±2.72
				cDexmedetomidine	3 mcg	10.10±3.96

TIME OF ONSET OF MOTOR BLOCK

According to G E Kanazi et al, V Mahendru et al, P Shethi et al. the time for onset of motor block was shorter in bupivacaine plus clonidine group and bupivacaine plus dexmeditimidine group as compared to bupivacaine only group.According to T Suryashree et. al. time for onset of motor block was found to be shorter in bupivacaine plus dexmeditimidine group as compare to bupivacaine plus clonidine.In our study time for onset of motor block was observed to be shorter in bupivacaine plus clonidine group as as compared to bupivacaine plus dexmeditimidine group and bupivacaine only group.

Onset of motor block:Time from the end of injection of test drug to achieve Modified Bromage scale 3

No.	Author	Year	Bupivacaine	Adjuvant		Mean time of onset of motor block
				Drug	Dose	
1.	G.E.Kanazi	2006	12 mg			20.7 ±10.3
				Clonidine	30 mcg	11.7 ±5.9
				Dexmedetomidine	3 mcg	13.2 ±5.6
2.	V. Mahendr	2013	12.5			9.2 ±2.9
				Clonidine	30 mcg	9.8 ±3.6
				Dexmedetomidine	5 mcg	9.7 ±3.2
3.	P. Shethi	2015	12.5			15.0 ±3.4
				Clonidine	30 mcg	9.0 ±1.8
				Dexmedetomidine	3 mcg	10.0 ±1.7
4.	T. Suryasree	2015	15	Clonidine	30 mcg	6.57 ±1.48
				Dexmedetomidine	5 mcg	5.27 ±1.25
5.	Our Study	2017	2017			4.55 ±1.76
				Clonidine	30 mcg	4.40 ±1.57
				Dexmedetomidine	3 mcg	5.30 ±2.68

1) DURATION OF MOTOR BLOCKADE

According to G E Kanazi et al, P Shethi et al, V Mahendru et.al. the time of Duration of motor blockage was significantly prolonged in in bupivacaine plus clonidine group and bupivacaine plus dexmeditimidine group as compared to bupivacaine only group. According to T Suryashree et. al. the time of duration of motor block was observed to be significantly prolonged in bupivacaine plus dexmeditimidine group as compared to bupivacaine plus clonidine.In our study the time of duration of motor blockade was prolonged in bupivacaine plus dexmeditimidine group as compared to bupivacaine plus clonidine.

Duration of Motor Block

No.	Author	Year	Bupivacaine	Adjuvant		Mean duration of motor block
				Drug	Dose	
1.	G.E.Kanazi	2006	12 mg			163±47
				Clonidine	30 mcg	216±35
				Dexmedetomidine	3 mcg	250±76
2.	V. Mahendr	2013	12.5			161.5±19.8
				Clonidine	30 mcg	198.7±26.4
				Dexmedetomidine	5 mcg	273.3±24.6
3.	P. Shethi	2015	12.5			175±28.8
				Clonidine	30 mcg	229±42.57
				Dexmedetomidine	3 mcg	253±38.4
4.	T. Suryasree	2015	15	Clonidine	30 mcg	223.03±45.35
				Dexmedetomidine	5 mcg	269.6±45.05
5.	Our Study	2017	2017			237.40±21.12
				Clonidine	30 mcg	426.50±40.33
				Dexmedetomidine	3 mcg	495.45±93.2

2) DURATION OF SENSORY BLOCKADE

According to G E Kanazi et al, P Shethi et al. time of duration of sensory block was significantly prolonged in in bupivacaine plus clonidine group and bupivacaine plus dexmeditimidine group than bupivacaine only group.According to T Suryashree et al. time of duration of sensory block was significantly prolonged in in bupivacaine plus dexmeditimidine group as compare to bupivacaine plus clonidine.In our study the time of duration of sensory block was prolonged in in bupivacaine plus clonidine group and bupivacaine plus dexmeditimidine group as compared to bupivacaine only group.

Duration of Sensory block: Time to regression of sensory S1 from T6 level

No.	Author	Year	Bupivacaine	Adjuvant		Mean duration of sensory block
				Drug	Dose	
1.	G.E. Kanazi	2006	12mg			190±48
				Clonidine	30mcg	272±38
				Dexmedetomidine	3mcg	303±75
2.	P. Shethi	2015	12.5			199.8±32.9
				Clonidine	30mcg	278.6±26.4
				cDexmedetomidine	3 mcg	306.6±51
3.	T. Suryasree	2015	12.5	Clonidine	30mcg	300.83±35.06
				Dexmedetomidine	5 mcg	345.93±45.9
4.	Our study	2017	16mg			314±24.96
				Clonidine	30mcg	504.50±42.91
				cDexmedetomidine	5mcg	576.35±95

3) DURATION OF EFFECTIVE ANALGESIA

According to V Mahendru et al, S L Solanki et al, P Shethi et al. time of duration of effective analgesia was longest in Bupivacaine plus Dexmeditomidine group but duration of effective analgesia was significantly prolonged in Bupivacaine plus Dexmeditomidine and Bupivacaine plus Clonidine group as compared to bupivacaine group.According to T Suryashree et al, M Prabhakar et al duration of effective analgesia is significantly prolonged in Bupivacaine plus Dexmeditomidine group as compared to Bupivacaine plus Clonidine group. In our study duration of effective analgesia was significantly prolonged in Bupivacaine plus Dexmeditomidine and Bupivacaine plus Clonidine group as compared to bupivacaine only group.

Doses of Dexmedefomidine and Cloridine

No.	Author	Year	Bupivacaine	Adjuvant	
				Drug	Dose
1	G.E.Kanazi	2006	12 mg	Clonidine	
				Dexmedetomidine	5 mcg
2	AI Mustafa	2009	12.5 mg	Dexmedetomidine	5 mcg
					10 mcg
3	R Gupta	2011	12.5 mg	Dexmedetomidine	5 mcg
4	Mohamad AA	2012	10 mg	Dexmedetomidine	5 mcg
5	HALA E A EID		15 mg	Dexmedetomidine	10 mcg
					15 mcg
6	V.Mahendru	2013	12.5 mg	Clonidine	30 mcg
				Dexmedetomidine	5 mcg
7	S.L.Solanki	2013	15 mg	Clonidine	50 mcg
				Dexmedetomidine	5 mcg
8	M.Gupta	2014	15 mg	Dexmedetomidine	5 mcg
9	D.Shukla		15 mg	Dexmedetomidine	10 mcg
10	V. Chastrath	2014	12.5 mg	Dexmedetomidine	10 mcg
11	Hem Anand Naragam	2014	8 mg	Dexmedetomidine	5 mcg
12	P.Shethi	2015	12.5	Clonidine	30 mcg
				Dexmedetomidine	3 mcg
13	T.Suryasree	2015	15 mg	Clonidine	30 mcg
				Dexmedetomidine	5 mcg
14	Ch.Srinivas Rao	2015	12.5 mg	Dexmedetomidine	5 mcg
15	Murali Prabhakar	2015	12.5 mg	Clonidine	50 mcg
				Dexmedetomidine	2 mcg
16	R.Tripathi	2015	15 mg	Dexmedetomidine	5mcg
17	Our study	2017	16 mg	Clonidine	30 mcg
				Dexmedetomidine	3 mcg

CONCLUSION:

Effects of Dexmeditomidine 3 mcg and Clonidine 30mcg is significantly more effective than 0.5% Bupivacaine only for prolongation of sensory and motor blockage and post-operative analgesia. Effect of Dexmeditomidine 3 mcg is superior to Clonidine 30mcg for prolongation of duration of sensory and motor block and post-operative analgesia.

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