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Comparision of Clonidine and Dexmedetomidine as an adjuvant in fasttrack neuroanaesthesia.

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Abstract
Background*: Concept of fast tracking in anesthesia is getting popular nowadays. α 2 agonists are first approved by FDA for only sedation in ICU. But at present they are explored in various surgeries and in various routes.*
Intoduction*: In present study we evaluate efficacy of Clonidine and Dexmedetomidine in neuroanaesthesia for various intracranial tumors and pituitary adenomas.*
Aim Of Study*: To evaluate efficacy of Clonidine and Dexmedetomidine in neuroanaesthesia for premedication, induction, haemodynamic stability, post operative smooth extubation, recovery profile.*
Material And Method*: Present study was randomized, retrograde observational study. It was done in 2012-2013 in V.S. general hospital, N.H.L. municipal medical college, neurosurgery department. 80 patients for elective or emergency surgery patients of ASA grade 1 or 2 enrolled in study and they are randomly allocated to 2 groups. In group C , patients were received Inj. Clonidine pre operatively 1 mcg/kg loading dose over 10 min by infusion pump followed by 0.5 mcg/kg/hr after intubation. In group D , patients were received Inj. Dexmeditomidine pre operatively 1 mcg/kg loading dose over 10 min by infusion pump followed by maintenance infusion 0.5 mcg/kg/hr after intubation. Patients are induced with Inj. Thiopentone sodium and Inj. Vecuronium bromide and intubated with appropriate size endotracheal tube and maintained with O_2, N_2O, sevoflurane (0.2-0.5 MAC) in close circuit and Inj. Vecuronium bromide on Drager Fabius GS Work Station. In both the group infusion of drug was continued till dura closure.*
Results*: In both the group patients are having stable haemodynamics and smooth post operative recovery and extubation. Rate of reintubation was very less in both the groups.*
Conclusion*: α 2 agonists are good adjuvants for fast track neuroanaesthesia. Dexmeditomidine is better than Clonidine in form of fast track neuroanaesthesia.*
Keywords*: Dexmedetomidine; Clonidine; Neuroanaesthesia; Fastracking.*

I. Introduction

Subject of fast tracking is nowadays popular both in surgeries and anaesthesia .It is done in cardiac, ambulatory and various neurosurgeries for better haemodynamics, early extubation, smooth recovery, short hospital stay.

Patients of intracranial tumours have signs and symptoms of raised ICP, hypertension and increased stress response with altered glassglow coma scale. Fasttracking in neuroanaesthesia is challenging as we have to decrese ICP with better haemodynamics, proper depth of anesthesia as well as early recovery and extubation.

α2 agonist like Dexmeditomidine and Clonidine were approved by FDA in 1999 for sedation in ICU. But they are now used in various anaesthetia techniques as an adjuvants. There are various studies suggesting advantageous role of Dexmeditimidine or Clonidine in neuroanaesthesia separately. Our aim of study was to compare both drugs in fasttracking in neuroanaesthesia.

II. Material And Method

After approval of institutional ethical committee and taking informed written consent of patient and relatives 80 patients of age group 18-50 yrs posted for elective or emergency neurosurgeries of ASA grade 1 and 2 were enrolled in study and randomly allocated in 2 groups, group C and group D.

All patients are preoperatively thoroughly accessed and investigated by routine investigation and specific investigations (CT scan, MRI). ABGA with electrolytes was done on the operative morning.

In operation theatre, all monitors like electrocardiogram, noninvasive blood pressure, SPO2, neuromuscular monitoring applied. 2 large bore venous cannulas were inserted.

Patients were premedicated with Inj. Glycoprrolate 0.02 mcg/kg, Inj. Ondensetron 4 mg and Inj. Fentanyl 1 mcg/kg and Inj. Dexamethasone 8 mg.

In group C , patients were received Inj. Clonidine pre operatively 1 mcg/kg loading dose over 10 min by infusion pump followed by 0.5 mcg/kg/hr after intubation.

In group D , patients were received Inj. Dexmeditomidine pre operatively 1 mcg/kg loading dose over 10 min by infusion pump followed by maintenance infusion 0.5 mcg/kg/hr after intubation.

Baseline and after premedication haemodynamic values are noted.patients were induced with Inj. Thiopentone sodium and Inj. Vecuronium bromide and intubated with appropriate size endotracheal tube and maintained with O2,N2O,sevoflurane (0.2- 0.5 MAC) and Inj. Vecuronium bromide on Drager Fabius GS Work Station. Incremental dose of Inj. Vecuronium bromide was given according to neuromuscular monitoring by double burst mode. After intubation EtCO2 was attached, as neurosurgeries were done in different position. ICP was monitored indirectly by close observation of operative site for brain swelling. As in neurosurgery we could not apply BIS electrodes directly to the forehead, awareness was monitored indirectly with increase in heart rate, blood pressure, sweating. Sevoflurane concentration was titrated accordingly to prevent awareness. Continuous monitoring of ECG,HR,SPO2,EtCO2 were done. NIBP and NM monitoring was done intermittently till end of surgery.

Bradycardia and hypotension were defined as 30% decreased in baseline values. Bradycardia was treated with inj. Atropine 0.6 mg iv state. And hypotension was treated by decrease in the dose of infusion of a2 agonist. Incremental dose of inj. Vecuronium bromide was given according to NMJ monitoring. Total requirement of sevoflurane was calculated during surgery.

Infusion of drug was stopped at the closure of dura. Reversal was given after regaining of spontaneous respiration and guided with NMJ monitoring. Patients were extubated after regaining of adequate muscle tone and power, spontaneous tidal volume, reflexes. time duration between reversal and extubation was noted. Patients were watched for alderte criterias and fasttracking criterias for recovery. Patients were shifted to post operative neuro ICU and monitored for 24 hours. Post operative analgesia was given in the form of inj paracetamol 10 mg/kg. and post operative analgesic requests in 24 hours were noted

Table : 1. Fast track criteria[10]

Level of coniousiousness	
-awake and orientedion	2
-arousable with minimum stimulation	1
-responsive only for tectile stimulation	0
Physical activity	
-able to move all extremities on command	2
-some weakness in movement of extremities	1
-unable to voluntarily move extremities	0
Haemodynamic stability	
-Blood pressure <15% of baseline MAP value	2
-Blood pressure 15%-30% of baseline MAP value	1
-Blood pressure >30% of baseline MAP value	0
Respiratory stability	
-Able to breath deeply	2
-Tachypnea with good cough	1
-Dyspneic with weak cough	0
Oxygen saturation	
-Maintain value >90% on room air	2
-Requires supplemental oxygen to maintain oxygen saturation >90%	1
-Saturation <90% with supplemental oxygen	0
Post operative pain assessment	
-None or mild discomfort	2
-Moderate to severe pain controlled with IV analgesics	1
-persistent severe pain	0
Post operative emetic symptoms	
-None/mild nausea with no active vomiting	2
-Transient vomiting controlled with IV antiemetics	1
-Persistent moderate to severe nausea and vomiting	0
Total score	14

Table : 2. Aldrete criteria[10]

Respiratory stability	
-Able to take deep breath and cough	2
-Dyspnea/shallow breathing	1
-Apnea	0
Oxygen saturation	
-Maintain value >92% on room air	2
-Needs o2 inhalation to maintain oxygen saturation >90%	1
-o2saturation <90% even with supplemental oxygen	0
Coniousiousness	
-Fully awake	2
-arousable on calling	1

-Not responding	0
Circulation	
-BP±20 mm Hg preop	2
-BP±20-50 mm Hg preop	1
-BP±50 mm Hg preop	0
Activity	
-Able to move 4 extremities	2
-Able to move 2 extremities	1
-Able to move 0 extremities	0
Total score	10

III. Results

Demographics including age, weight, ASA status, gender, duration of surgery and anaesthesia are shown in the table-3.

	Group D (n=40)	Group C (n=40)
Age (Years)	41.2±10.8	44.7±12.8
Gender (M:F)	24/16	22/18
Weight (Kg)	72.2±11.6	69.7±12.5
ASA status (1/2)	36/4	31/9
duration of surgery (min)	120.1±40.4	126.8±52.0
duration of anaesthesia (min)	133.8±39.9	138.7±50.9

Chart – 1 : haemodynamic changes

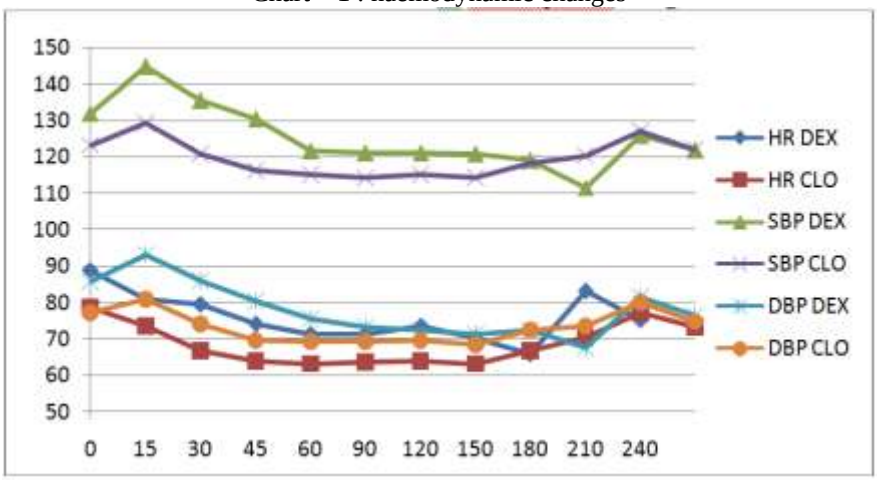

Chart 1 shows that there were stable haemodynamic changes in both the groups.

Table – 4

		Group D (n=40)	Group C (n=40)	P value
Extubation time	Min	7.6±1.14	12.6±1.51	<0.001
Post extubation 5 min	FTC	10.8±1.6	10.2±1.8	>0.05
	AC	7.1±1.7	6.5±1.5	>0.05
Post extubation 10 min	FTC	12.2±1.6	12.5±1.5	>0.05
	AC	8.7±1.1	8.4±1.5	>0.05
Post extubation 15 min	FTC	12.5±1.8	12.7±0.9	>0.05
	AC	9.7±0.2	8.9±1.1	>0.05
Post extubation 30 min	FTC	12.8±0.8	12.8±0.5	>0.05
	AC	9.8±0.1	9.1±0.6	>0.05

In primary outcome variables mean extubation time was shorter in group D than that of group C. otherwise FTC and AC were comparable in both the groups post extubation 5,10,15 and 30 mins. ABGA was done post operatively 30 min after extubation and compared with baseline ABGA. All patients were monitored in PACU for 24 hours. Oxygenation by ventimask was done. Post operative analgesic requests within 24 hours were more in group C (3.4±0.5) compared to group D (2.4±0.5). no patient had neurosurgical complication requiring early reoperation. No patient had any complication like shivering, vomiting, respiratory depression.

IV. Discussion

We compared the effect of two different α2 agonists dexmedetomidine and clonidine in neurosurgical patient in attempt to find clinically feasible combination of anaesthetics that would provide perioperative haemodynamic stability and fast recovery without respiratory depression. Addition of α2 agonists reduce requirement of volatile anaesthetic agent.

Fasttracking in surgery and anaesthesia for intracranial tumours balances the ICP, BP, CBF changes and early and satisfactory outcome in form of neurophysiological and neurocognitive function as well as it decreases the hospital stay of the patient.[2]

Aim of the study was to compare efficacy of two α2 agonists dexmedetomidine and clonidine in neuroanaesthesia added in form of premedication and pre operative infusion for stable haemodynamics, smooth recovery and fasttracking.

The antinociceptive , sympatholytic and anaesthesia sparing effects of α2 agonists are well documented.[1] This spectrum of properties would be consistent with the important goals during neurosurgical anesthesia of intraoperative haemodynamic stability and modulation of intraoperative sympathetic response to attenuate cerebrovascular and myocardial risks and avaid antracranial haemorrhage[2,3] , and to allow immediate neurological evaluation upon emergence[4].

Physiologically α2 receptors are located presynaptic, post synaptic and extrasynapticaly. Presynaptical receptors are responsible for more clinical impact as they regulate nor adrenaline and ATP release through negative feedback mechanism. α2 receptor are also present in periphery as in pletlets, liver, kidney, eye, etc. pharmacologically studies shows that Dexmedetomidine is 8 times more specific α2 adenoreceptor than Clonidine. α2: α1 activity 1620:1 for Dexmedetomidine and 220:1 for clonidine. Dexmedetomidine acts supraspinally on locus ceruleus α2 receptors directly in spinal cord, so inhibit the nociception. Substantia geletenosa of spinal cord of dorsal horn contains α2 receptors. When stimulated inhibit firing of nociceptive neurons stimulated by Aδ and c fibers and also inhibits substance-P[1], so it provides better haemodynamic control and intense analgesia. Clonidine also prevents increase in ICP by controlling haemodynamic changes.Gonul Keles&Ment ozer used dexmedetomidine infusion for fastracking for spine surgery[9] Our experience with both the drugs to control haemodynamics was good. But in Clonidine group extubation was late ($P<0.001$). it was 7.6+1.14 min in group D and 12.6+1.51 in group C. otherwise fasttracking and alderte criteria were fulfilled same in both groups ($P>0.05$). limitations of our study were there was no control group& nonavailability of BIS,SSEP,ICPmonitoring.No patient in both groups need reintubation.Overall outcome was good &fastracked in both groups in terms of surgical & anaesthesia outcome.[primary & secondary]

In nutshellboth dexmedetomidine &clonidine are good adjuvantsts in neuroanaesthesia for intracranial tumours;in terms of better haemodynamic stability;smooth emergence;better neurocognitive & neurophysiological status of patient.

V. Acknowledgement

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Abreviations: ICP-Intra Cranial Presure.;NMJ:-Neuromuscular Junction;CBF:-Cerebral Blood Flow;Etco2:-End tidal co2.

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