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Dexmedetomidine as an adjuvant for Hypotensive Anaesthesia during Functional Endoscopic Sinus Surgery (FESS)

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Abstract
Introduction:*FESS (Functional Endoscopic Sinus Surgery) is done via endoscope and the area is highly vascular thus it becomes important to minimize bleeding. Hence we require hypotensive anesthesia. Various drugs have been used for the purpose: nitroglycerine (NTG), sodium nitroprusside(SNP),propofol,beta blockers, calcium channel blockers, higher concentrations of inhalational anesthetics etc. Since all these drugs have certain limitations there was a search for safer and more effective drug .Dexmedetomidine, a newer alphaadrenoceptor agonist,fulfills this requirement since it is short acting, has no residual effects, produces sedation and analgesia and reduces mean arterial pressure thereby reducing intraoperative blood loss.*
Aims: *To study the efficacy of dexmedetomidine in providing hypotensive anaesthesia so as to minimize bleeding during endoscopic sinus surgery in a randomized double blind control study.*
Method:*40 patients of ASA grade I/II, aged18-55yrs,scheduled for endoscopic sinus surgery, were randomly allocated into two groups of twenty each by sealed envelope method. Group C: received Normal saline as loading dose of 1mcg/kg intravenously followed by maintenance infusion of 0.6mcg/kg intravenously, Group D: received dexmedetomidine in similar doses. The loading dose was given slowly over 15 minutes. The surgery was started after the loading dose was over. Both the anaesthetist conducting the study and the patient were blinded to the study drug. The amount of blood loss, doses of intravenous& inhalation agents and side effects were studied.*
Results:*The patient characteristics did not differ in bothcontrol(C) and study (D) groups (Table1). Blood losses were lower in group D as compared to group C (p = 0.03).Total dose of fentanyl (p< 0.001),propofol(p <0.001)and isoflurane (p =0.04)were lower in group D as compared to group C. The VAS scores in the immediate postoperative periods were also lower in the group D (p =0.03).The only side effect noted was bradycardia (2patients)which however reverted with discontinuation of the drug.Atropine was not required.*
Conclusions:*Dexmedetomidine is a safe &effective adjuvant for hypotensive anaesthesia to decrease bleeding and thus provide bloodless field during FESS surgery. It also decreases the dose requirements of propofol,fentanyl and isoflurane. It is also an effective analgesic agent.*
Keywords:*Hypotensive anesthesia, FESS, NTG, SNP, Dexmedetomidine*

I. Introduction

Dexmedetomidine, an alpha 2 adrenoceptor agonist, was primarily introduced for producing sedation and analgesia in critically ill patients but has gained popularity among anesthetists because of its spectrum of beneficial effects viz. analgesia, lowering of blood pressure,"conscious sedation" without respiratory depression etc[1,2,3].Thus it has been used for procedures performed under monitored anaesthesia care and also for administering hypotensive anaesthesia.

Functional Endoscopic Sinus Surgery(FESS) is done via endoscope and the area is richly supplied by blood vessels. Hence it is mandatory tominimize bleeding so as to provide clear endoscopic vision. Thus surgeons demand hypotensive anaesthesia for FESS[4].Various drugs have been used as hypotensive agents such asnitroglycerine(NTG), sodium nitroprusside(SNP), propofol,beta blockers, calcium channel blockers, high concentrations of inhalational anesthetics etc.[5,6,7].But there are many side effects such as tachycardia, rebound hypertension, delayed recovery etc.Since all these drugs have certain limitations, there has been a search for safer and more effective drug .Dexmedetomidinefulfills this requirement since it is short acting, has no residual effects ,produces sedation& analgesia without respiratory depressionand reduces mean arterial pressure[8].Thereby it reduces intra operative bleeding as well as increases patient safety and surgeon satisfaction

,provides better surgical field and thus reduces operative time. Thus it produces excellent operative conditions for FESS surgery.

Study Design
A prospective randomized double blind control study.

II. Methods

This study was conducted at Mahatma Gandhi Medical College and Hospital, Jaipur, after obtaining approval from ethical committee and informed consent from the patients. The patients were ASA grade I/II, aged 18-55yrs scheduled for FESS; randomly allocated into two groups of twenty each by sealed envelope method.

Group C received Normal saline as loading dose of 1mcg/kg intravenously followed by maintenance infusion of 0.6mcg/kg intravenously. Group D received dexmedetomidine in similar doses. The loading dose was given slowly over 15 minutes. Both the anaesthetist administering the drug and the patients were blinded to the study.

Patients having hypertension, coronary artery diseases, renal, hepatic or cerebral insufficiency, coagulation disorders or those receiving drugs influencing blood coagulation were excluded from the study.So also were those undergoing recurrent sinus surgeries.

Patients were premedicated with ranitidine 150 mg. and alprazolam0.25 mg orally a night before surgery .On the operating table, routine monitoring was applied and intravenous access obtained. Preloading was done with ringer lactate 500 ml intravenously. Thereafter the infusion of the study drug was started. The readings of mean blood pressure (MAP),pulse rate, arterial oxygen saturation (SpO_2) were monitored at regular intervals before and after starting the study drug and during surgery. E.C.G. was also continuously monitored. After completion of the loading doses, anaesthetic induction was commenced. Patients were oxygenated for five minutes and administered glycopyrrolate0.2mg, midazolam 1mg and fentanyl 50µg intravenously.Induction was done with propofol in the doses of 1-2 mg/kg intravenously so as to produce loss of eyelash reflex.Endotracheal intubation was facilitated with injrocuronium 1mg/kg.Anaesthesia was maintained with nitrous oxide: oxygen 66%:33% and isoflurane0.2-1%. Skeletal muscle relaxation was attained with vecuronium in the doses of 0.06-0.08 mg/ kg. Mean arterial pressure was kept between 55-65 mmHg.If mean blood pressure was >80 mm Hg then fentanyl 50 mcg and/or propofol 20 mg were administered intravenously and also Isoflurane concentration was titrated .Total requirement of fentanyl, propofol and isoflurane were estimated. The infusion of study drug was discontinued on completion of surgery. After adequate recovery from neuromuscular blockade, patients were administered neostigmine 0.05mg/kg and glycopyrrolate0.04mg/kg. There after endotracheal extubation was done.

Intra operative bleeding was assessed on a 4 point scale by the surgeon who was blinded to the study (0=no bleeding, excellent surgical conditions; 1=minimum bleeding, sporadic suction; 2=diffuse bleeding, repeated suction and 3=considerable troublesome bleeding, continuous suction) [9]. The incidence of side effects such as vomiting, bradycardia and hypotension were recorded, if any. In the postoperative period, oxygen inhalation was given and vitals monitored at an interval of 10 minutes. In the recovery room, pain scores were assessed using Visual Analogue Scale (VAS) scores. (0==no pain –---------10=severe pain).Surgeon satisfaction in terms of operating conditions,bleeding, clear visibility and predicted outcome was assessed on a 7 point Likert scale(0=extremely dissatisfied ----7=extremely satisfied) .[9]

The primary end point was the blood loss. Secondary end points were surgeon satisfaction, dose requirements of propofol, fentanyl and isoflurane. Statistical analysis was performed using SPSS trial version20 software (SPSS inc., Chicago, Illinos, USA).Continuous data were presented as Mean±SD and analyzed using student t test. Categorical data were presented as numbers and analyzed using chi square test. p value <0.05 was considered statistically significant.

III. Results

The patient characteristics did not differ in both the control and study groups(Table1). Blood losses were lower in group D as compared to group C (p= 0.03). In group D total requirements of fentanyl (p<0.001), propofol(p <0.001)and isoflurane(p =0.04)were lesser. The VAS scores in the immediate postoperative periods were also significantly lower in the group D (p =0.03).The only side effect noted was bradycardia in 2 patients in group D which however reverted with discontinuation of the drug. These two patients were not included in the study. Atropine was not required in any patient.

IV. Discussion

Bleeding is undesired during any surgical procedure since it is disturbing to the surgeon as well as more of it can be dangerous for the patient. Moreover during FESS surgery, it is very difficult for the surgeon to

proceed because the space is less and bleeding hinders the endoscopic visibility. Sometimes it is just impossible to visualize anything and the procedure has to be abandoned. Thus hypotensive anaesthesia is demanded by the surgeons.

Dexmedetomidine exerts analgesic, sedative and anxiolytic effects after intravenous administration. Though initially introduced as a sedative agent for mechanically ventilated patients in intensive care units, it has now been used in anaesthesia as an adjuvant to decrease the doses of analgesics specially opioids and anaesthetic agents[10.]

The effects of dexmedetomidine are sub-cortical and non-cortical and do not cause impairment of cognitive function. This is in contrast with propofol and the barbiturates which cause diffuse neuronal hyperpolarisation via opening of chloride channels. It produces analgesic effects by acting at alpha 2 receptors within the locus coeruleus and spinal cord. It has unique property of providing "conscious sedation."

Its hemodynamic effects (a decrease in the blood pressure and heart rate due to sympatholytic action) are predictable and dose dependent. There is however a biphasic response to the loading dose that is initial hypertension followed by hypotension[11].Thus we allowed the surgery to commence only after the loading dose was over.

Thus dexmedetomidine has beneficial effects of causing hypotension without tachycardia; with sedation and analgesia ultimately leading to minimal blood loss and excellent surgical field which is must in FESS. The safe and effective maintenance doses recommended are 0.2-0.7mcg/kg/hr hence we used these doses The kinetics of dexmedetomidine is linear over these dose ranges[11].After intravenous administration, the distribution half life of dexmedetomidine is approximately 6 minutes in adults. No pharmacokinetic differences have been described for the age range of 18-75 years. A volunteer study has reported that dexmedetomidine decreases isoflurane requirement in a dose dependent manner. However isoflurane did not appear to influence the pharmacokinetics of dexmedetomidine[12].In our study also the requirement of isoflurane was reduced in the dexmedetomidine group as compared to the control group.

Studies byDurmus M et al and Ayoglu H et al have advocated the use of dexmedetomidine for providing hypotensive anaesthesia during septoplasty and tympanoplasty[13,14].

The common side effects observed with the use of dexmedetomidine are bradycardia and precipitous fall in blood pressure. Bradycardia is usually seen with higher doses and is reversible on decreasing the dose or discontinuing the infusion. If it persists then pharmacological intervention is required. In our study 2patients in dexmedetomidine group had bradycardia (6.66%), atropine was however not needed. These patients were not included in the study. Rest of the patients tolerated the drug well, were haemodynamically stable, there was reduced bleeding and better surgeon satisfaction.Severe hypotension can be prevented by titrating the dose and by preloading the patient with crystalloids. Thus we preloaded the patients with ringer lactate 10 ml/kg before starting the loading dose. One patient in the control group had respiratory depression in the immediate post operative period. This may be due to larger doses of propofol and fentanyl required in this patient.

V. Conclusions

Thus we conclude that dexmedetomidine is an effective adjuvant for hypotensive anaesthesia to decrease bleeding and thus provide bloodless field during FESS .It also decreases the dose requirements of propofol and isoflurane. It is also an effective analgesic agent. Moreover it is safe drug, the only side effect being bradycardia which is usually reversible.

Conflict of interest: None

Limitations: We could have done monitoring of invasive blood pressure to be more accurate and cerebral perfusion pressure studies to establish patient safety. Our sample size could have been larger so as to reduce the bias.

References

[1]. Gertler R, Brown C, Mitchell D H, Silvius EN. Dexmedetomidine: a novel sedative-analgesicagent. BUMC Proceedings. 2001; 14:13-21.
[2]. Venn R M, Karol MD, Grounds RM.Pharmacokinetics of dexmedetomidineinfusionsforsedation of postoperativepatientsrequiringintensivecare. Br. J Anaes2002; 88:669-75
[3]. Paris A, Tonner PH: Dexmedetomidine in anaesthesia. CurrOpinAnaesthesiol 2005; 18:412-18.
[4]. Cincikas D, Ivaskevicius S. Application of controlled arterial hypotension in endoscopic rhino-surgery. Medicina (Kaunas) 2003; 39:852-9.
[5]. Boezaart AP, Merwe JV, Coetzee A. Comparison of sodium nitropruside and esmolol-induced controlled hypotension for functional endoscopic sinus surgery. Can J Anaesth 1995; 42:373-6.
[6]. Degoute CS. Controlled hypotension: Guide to drug choice. Drugs 2007;67:1053-76.
Venn R M and Grounds R M. Comparison between dexmedetomidine and propofol for sedation in intensive care unit: patient and clinician perceptions. Br J Anaesth.2001; 87:684-90.

[7]. BloorBC, Ward DS, Belleville JP. Effect of intravenousdexmedetomidine in humans. II. Hemodynamicchangs.Anesthesiology, 1992 Dec; 77:1134-42.
[8]. Peden CJ,Cloote AH, Stratford N, Prys-Roberts C. The effect of intravenous dexmedetomidine premedication on the dose of requirements of propofol to induce loss of consciousness in patients receiving alfentanil. Anaesthesia 2001;56:408-13. Scheinin B, Lindgren L, Randell T, Scheinin H, Scheinin M. Dexmedetomidineattenuatessympathoadrenalresponses totrachealintubation and reduces theneedforthiopentone and peroperativefentanyl. British Journal of Anaesthesia 1992; 68:126-31.
[9]. Indira kumari, UditaNathani, VikramBedi, Sapna Gupta, Rajesh Gupta, Bhuie. Comparison of clonidine vs midazolam in monitored anesthesia care during ENT surgery-A prospective, double blind, randomized clinical study. An international journal of anesthesiology, pain management, intensive care and resuscitation 206:690-99.
[10]. Scheinin H, Jaakola ML, Sjovall S, Ali-Melkkilä T, Kaukinen S, Turunen J, et al. Intramuscular dexmedetomidine as premedicationfor general anesthesia. A comparativemulticenterstudy. Anaesthesiology. 1993 ; 78:1065-75.
[11]. Hall JE, Uhrich TD, Barney JA, Arain SR, Ebert TJ.Sedative, amnestic and analgesic properties of small dose Dex infusions. AnaesthAnalg 2000; 90: 699-705
[12]. Khan Z P,Munday IT, Jones RM, Thornton C, Mant TG, Amin D.Effects of dexmedetomidineonisofluranerequirements in healthyvolunteers.Pharmacodynamic and pharmacokineticinteractions . BR J Anaesth.1999; 83:372
[13]. Durmus M, et al. Effect of dexmedetomidineonbleedingduringtympanoplastyorseptoplasty. E J Anaesthesiology.2007; 24:447-53
[14]. Ayoglu H, Yapakci O, Ugur MB, Uzun L, Altunkaya H, Ozer Y, et al.Effectiveness of dexmedetomidine in reducingbleedingduringseptoplasty and tympanoplastyoperations . JClinAnaesthesia. 2008;20:437-41.

Observations

Table No.1 Demography

Variable	Group D	Group C	P value
Age (Mean±SD)	31.03 ± 12.87	34.13 ± 13.03	> .05
Weight (Mean±SD)	50.53 ± 9.52	55.43 ± 9.16	> .05
Sex (M/F)	11/9	10/10	

Table No. 2 Total doses of drugs

Drug	Fentanyl(Mean±SD)	Propofol(Mean±SD)	Isoflurane(Mean±SD)
Group D	84.8±30.15	95.35±7.35	0.36±0.399
Group C	144.2±41.56	116±9.81	0.56±0.179
P value	0.0001	0.0001	0.04

Table No. 3 Intra operative bleeding scores

Bleeding score	No.of.pt. Group D	No.of.pt. Group C
0	1	0
1	13	5
2	4	9
3	2	6

Chi square= 8.479 p=0.03

Table No. 4VAS scores

VAS Scores	No.of.pt. Group D	No.of.pt. Group C
0-5	10	3
6-8	9	12
9-10	1	5

Chi square=6.864 p=0.03

Table No.5.Likert scores for surgeon satisfaction

Likert score		1	2	3	4	5	6	7
No. of patients	Group D	1	2	1	5	3	5	3
	Group C	5	6	4	2	1	1	1

Chi square= 12.41 p=0.05

Table No. 6 Side effects

Variable	Group D	Group C
Bradycardia	2	-
Hypertension	-	-
Severe hypotension	-	-
Resp.depression	-	1
Vomiting	-	-
Others	-	-