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ORIGINAL ARTICLE

Compare the Effects of Dexmedetomidine and Metoprolol in Reducing Blood Loss During Craniotomy

FAHEEM ASGHAR[1], UMAR IQBAL[2], MAMOONA SHAIKH[3]
[1]Assistant Professor Anesthesia and ICU, M. Islam Medical College, Gujranwala
[2]Associate Professor Anesthesia, Rashid Latif Medical College, Lahore
[3]Senior Instructor, Department of Anesthesia, Isra University Hospital, Hyderabad, Sindh
Correspondence to: Faheem Asghar, Email: doctorfaheem@gmail.com, Cell: +92 3006446633

ABSTRACT

Objective: The aim of current study is to compare the effects of dexmedetomidine and metoprolol in reducing blood loss during craniotomy.

Study Design: Randomized Double bind

Place and Duration: Conducted at M.Islam Medical College Gujranwala/Rashid Latif Medical College Lahore, during from Feb 2021 to September 2021.

Methods: There were seventy patients of both genders were included in this study. Craniotomy patients with severe head injuries were presented.Age, gender, and BMI were all collected after informed written agreement was obtained from all participants.Patients were divided into two groups. Group I had 35 patients and received metroprolol while group II had 35 patients and received dexmedetomidine during craniotomy. Outcomes among both were assessed and compared in terms of blood loss, heart rate and blood pressure during the surgery. The full dataset was analyzed using SPSS 24.0.

Results: There were 20 (57.1%) males and 15 (42.9%) females in group I while in group II 22 (62.9%) males and 13 (37.1%) females. In group I mean age was 49.4±4.13 years with mean BMI 24.9±5.23 kg/m^2 and in group II mean age was 50.7±5.42 years with mean BMI 24.8±6.32 kg/m^2. Mean blood loss after 2 hours of surgery in group II was lower 411.4±6.34 ml as compared to group I 512.7±8.55 ml. Mean heart rate 71.4±6.17 beats/min and blood pressure 70.3±4.23 mmHg in group I was higher as compared to group II 68.9±7.31 beats/min and 66.10±8.34 mmHg.

Conclusion: We concluded in this study that the dexmedetomidine was effective in terms to reduce blood loss and maintain blood pressure and heart beat of cases as compared to metroprolol during craniotomy among patients.

Keywords: Craniotomy, Metroprolol, Dexmedetomidine, Blood Loss

INTRODUCTION

For surgical blood loss and improved eyesight in the operating field, controlled hypotension or intentional or decreased hypotension is used. This is done by deliberately reducing the arterial blood pressure (BP). In order to reduce bleeding and the need for blood transfusions while also creating a bloodless surgical environment, it has been utilised for more than half a century. Endoscopic microsurgery (sinus or middle ear), spinal surgery and other neurosurgery (aneurysm), major orthopaedic surgery (hip and knee replacement), prostatectomy, cardiovascular surgery, and liver transplant surgery have all been recommended for the use of this medicine. [3] This technique has been used for a variety of procedures, including tympanoplasty, functional endoscopic sinus surgery (FESS), septoplasty, rhinoplasty, and the removal of angiofibromas. Hypotension may be caused or regulated by altering myocardial contractility (inhalation anaesthetics and beta-blockers) or peripheral vasodilation, which results in a reduction in mean arterial blood pressure to 50–70 mm Hg (regional anesthesia, sodium nitroprusside, nitroglycerine, and trimethaphan).The most common surgical therapy for chronic sinusitis is FESS. It is the most frequent surgical procedure for inflammatory and infected sinus illness. The FESS method is a sensitive one that takes a long time to complete. [5] Anesthesia for this procedure might be general or regional, depending on the patient's preference. This means that anesthesiologists must think about how they might help their operating team to achieve a bloodless field and prevent intra-operative bleeding, which can block the operating endoscope's view of the nasal tissues. Thus, hypotensive anaesthesia comes into play. [6]

Sedative, anti-anxiety, anti-sympathomimetic, and analgesic-sparing actions are all associated with dexmedetomidine, a 2-adrenoceptor agonist. It has a high affinity for 2-receptors and is quite powerful. [7] In the locus coeruleus, dexmedetomidine has a hypnotic effect because it activates central pre- and post-synaptic 2-receptors in the brain. When administered intravenously, dexmedetomidine is quickly distributed and mostly eliminated from the body via the hepatic glucuronidation and hydroxylation process. [8] The autonomic and cardiovascular systems are controlled by 2-receptors. Vasoconstriction is induced in blood vessels by these receptors, while norepinephrine release is inhibited in sympathetic terminals by these receptors. [9]The primary advantages of this medicine are analgesia, sedation, and a reduced risk of respiratory depression

It also stabilises the heart during anaesthesia, decreases the amount of anaesthetic and narcotics needed, and resulting in a lower minimum alveolar concentration (MAC) for inhaled anaesthetic. [11] Hypotension and bradycardia are the most frequent adverse effects. Anticholinergics may be used to treat the latter without causing any problems. [12] Reducing the need for opioids, which may cause nausea and vomiting, during surgery decreases the likelihood of problems. [13]

Dexmedetomidine and metoprolol were evaluated to see whether one reduced blood loss during surgery in individuals undergoing craniotomies after severe brain traumatic trauma.

MATERIAL AND METHODS

This randomized double blind study was conducted at Conducted at M.Islam Medical College Gujranwala/Rashid Latif Medical College Lahore, during from Feb 2021 to September 2021. and comprised of 70 patients. Age, gender, and BMI were all collected after informed written agreement was obtained from all participants. Only those individuals who did not have a history of cardiovascular disease, respiratory difficulties such as asthma or lung disease, uncontrolled diabetes or a history of convulsions and epilepsy, renal or hepatic disorders, and patients with coagulation problems were included.

Each patient's vital indicators including heart rate and respiration rate and blood pressure and oxygen saturation were meticulously tracked as soon as they walked into the surgery room. Each individual received 50-100 g of Fentanyl and 1 mg of Midazolam. An arterial line was made using the nondominant radial artery of the patient. There were fentanyl and midazolam administered to the patient, as well as atracurium and propofol given to the patient at this point to prepare them for anaesthetics. As soon as the patient had been draped and prepared, a craniotomy may begin.

Two groups of patients were formed. 0.5 mg/kg/h of metoprolol was administered in Group I. It was done in a manner

that all patients were completely oblivious of what they were taking. An anesthesiologist prepared the drugs in each group and raised the first dosages to 5 ml with normal saline. Metoprolol (2.5 mg/kg) and dexmedetomidine (1 g/kg) were delivered in Group I and Group II, respectively, at a volume of 5 ml in the two intervention groups. 0.5 g/kg/h of dexmedetomidine was administered to Group II following anaesthesia and intubation.The full dataset was analyzed using SPSS 24.0.

RESULTS

There were 20 (57.1%) males and 15 (42.9%) females in group I while in group II 22 (62.9%) males and 13 (37.1%) females.(fig 1)

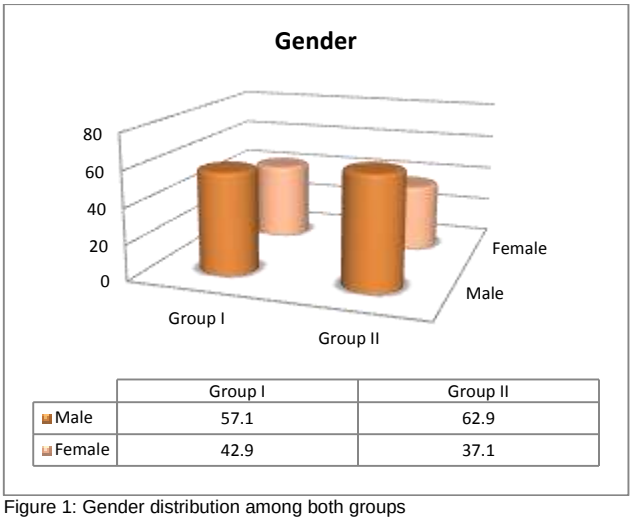

Figure 1: Gender distribution among both groups

In group I mean age was 49.4±4.13 years with mean BMI 24.9±5.23 kg/m^2 and in group II mean age was 50.7±5.42 years with mean BMI 24.8±6.32 kg/m^2.(table 1)

Table 1: Characteristics of enrolled cases

Variable	Group I	Group II
Mean age (years)	49.4±4.13	50.7±5.42
Mean BMI (kg/m^2)	24.9±5.23	24.8±6.32

Mean blood loss after 2 hours of surgery in group II was lower 411.4±6.34 ml as compared to group I 512.7±8.55 ml.(table 2)

Table 2: Comparison of blood loss with different intervals of time

Blood Loss	Group I	Group II
Interval of time during surgery		
30 minutes	90.1±4.26	80.3±4.46
1 hour	312.5±3.43	150.8±9.44
2 hours	512.7±8.55	411.4±6.34

Mean heart rate 71.4±6.17 beats/min and blood pressure 70.3±4.23 mmHg in group I was higher as compared to group II 68.9±7.31 beats/min and 66.10±8.34 mmHg.(table 3)

Table 3: Comparison of heart beat and blood pressure

Variable	Group I	Group II
Mean heart rate (beats/min)	71.4±6.17	68.9±7.31
Mean blood pressure (mmHg)	70.3±4.23	66.10±8.34

DISCUSSION

The anesthesiologist and the neurosurgeon must work together to limit and decrease blood loss during craniotomy. Some narcotics and alpha-agonists as well as betablockers and calcium channel blockers were employed to attain this purpose. [13]General anaesthesia has several benefits, including an immobile surgical area for conducting surgery, excellent respiratory tract protection, appropriate analgesia and ventilation. It has been shown that local anaesthetic may cause pain and an incomplete block, hence general anaesthetic is preferable. [14]

In this study 70 patients were included. Patients were equally divided into two groups. There were 20 (57.1%) males and 15 (42.9%) females in group I while in group II 22 (62.9%) males and 13 (37.1%) females. In group I mean age was 49.4±4.13 years with mean BMI 24.9±5.23 kg/m^2 and in group II mean age was 50.7±5.42 years with mean BMI 24.8±6.32 kg/m^2.Our results were comparable to the previous studies.[15,16] The estimated blood loss, the mean blood pressure, and the mean heart rate were lower in the dexmedetomidine group compared to the metoprolol group at various periods following the commencement of the operation in patients of the latter group.According to our findings, prior investigations have shown the same thing. For individuals with traumatic brain injury (TBI), Zangbar and colleagues found that those who got metoprolol had a better prognosis than those who did not. Metoprolol (a beta-blocker) was shown to have a substantial impact on the survival of individuals who had suffered brain damage. [17] The findings of this research are in line with our own, since decreased blood loss during surgery had a favourable influence on the survival of both groups of patients.

Dexmedetomidine (D) and clonidine (C) were tested by Das et al. in FESS surgery, and the quantity of TNG needed to produce hypotension in group D was substantially lower than that in group C ($P = 0.034$). Even though group D received much less fentanyl than group C, both groups were able to achieve the same level of hypotension. There was less bleeding and a better view of the surgical field in the Group D patients. Because dexmedetomidine has a shorter half-life than clonidine, the recovery period was shorter. [18]Dexmedetomidine has been shown to improve the outcomes of patients following FESS surgery, according to Guven et al. The patients who got dexmedetomidine during induction and surgery experienced less bleeding, postoperative discomfort, and nausea, as well as improved hemodynamics, than those who received normal saline throughout the procedure. [19]

Dexmedetomidine against nitroglycerine was compared in terms of intraoperative blood loss during FESS by Vineelach et al., who used controlled hypotension with the former. The goal MAP was obtained in both groups, however blood loss was considerably lower in the dexmedetomidine group. Dexmedetomidine has a considerable impact on the prevention of bleeding, despite the fact that hemodynamic state may be regulated with a variety of other medicines.[20]Researchers from O Nazir and colleagues evaluated the effects of esmolol and dexmedatomidine on the induced hypotension during spinal operations. However, dexmedetomidine was shown to have a better impact in controlling hypotension and reducing blood loss during surgery than esmolol. The findings of this research are in line with those of ours. [21]

CONCLUSION

We concluded in this study that the dexmedetomidine was effective in terms to reduce blood loss and maintain blood pressure and heart beat of cases as compared to metroprolol during craniotomy among patients.

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