Original Article

Role of Dexmedetomidine on Hemodynamics and Anesthetic Requirement in Patients Undergoing Elective Infratentorial Tumor Surgery: A Prospective, Randomized, Double-blind, Placebo-controlled Study

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Abstract

Background: Infratentorial tumor resections can pose a considerable anesthetic challenge because the posterior fossa is close to critical brainstem and cranial nerve structures. Surgical manipulation here can cause significant changes in cerebral blood flow and hemodynamics, complicating the regulation of intracranial pressure and cerebral perfusion in patients already at elevated risk. This study was conducted to evaluate the impact of dexmedetomidine compared with a placebo on intraoperative hemodynamics and anesthetic requirements during surgery for infratentorial brain tumors. **Methods:** A total of 120 American Society of Anesthesiologists 2 patients scheduled for elective infratentorial tumor surgery were divided into two groups, Group D and Group C, each comprising 60 individuals. Group D received dexmedetomidine at 1 μg/kg over 10 min, followed by a maintenance infusion of 0.4 μg/kg/h, which was discontinued at skin closure. In contrast, Group C received a normal saline infusion. Thirty minutes after initiating the maintenance infusion, general anesthesia was induced with fentanyl, propofol, vecuronium, air, oxygen, and isoflurane. The trachea was intubated. Fentanyl was administered intermittently in response to increases in heart rate (HR) and blood pressure. Throughout the intraoperative period, HR, mean arterial pressure, SpO_2, $EtCO_2$, and the requirements for isoflurane and fentanyl were recorded and compared. **Results:** The group receiving dexmedetomidine had stable hemodynamics throughout the intraoperative period. The mean blood pressure across time points in the dexmedetomidine group was lower than in the control group. The consumption of isoflurane was lower in Group D than in Group C across different time points during the surgery. The requirement of fentanyl in Group D was 111.76 ± 16.43 μg, whereas that in Group C was 151.16 ± 29.34 μg ($P \leq 0.001$). This finding suggests a possible enhanced analgesic or opioid-sparing effect of dexmedetomidine in Group D. **Conclusion:** The use of dexmedetomidine infusion in patients scheduled for infratentorial brain tumor surgery ensures stable perioperative hemodynamics, reduces isoflurane requirements, and reduces intraoperative fentanyl needs.

Keywords: Anesthesia, brain neoplasms, dexmedetomidine, hemodynamic, posterior cranial fossa

Résumé

Contexte: Les résections de tumeurs infratentorielles peuvent représenter un défi anesthésique considérable, car la fosse postérieure est située à proximité de structures critiques du tronc cérébral et des nerfs crâniens. Les manipulations chirurgicales dans cette région peuvent entraîner des modifications significatives du débit sanguin cérébral et de l'hémodynamique, compliquant ainsi la régulation de la pression intracrânienne et de la perfusion cérébrale chez des patients déjà à haut risque. Cette étude a été menée afin d'évaluer l'impact de la dexmédétomidine, comparée à un placebo, sur l'hémodynamique peropératoire et les besoins anesthésiques lors de la chirurgie des tumeurs cérébrales infratentorielles. **Méthode:** Au total, 120 patients

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ASA II programmés pour une chirurgie élective de tumeur infratentorielle ont été répartis en deux groupes, D et C, comprenant chacun 60 patients. Le groupe D a reçu de la dexmédétomidine à la dose de 1 µg/kg sur 10 minutes, suivie d'une perfusion d'entretien de 0,4 µg/kg/h, arrêtée lors de la fermeture cutanée. En revanche, le groupe C a reçu une perfusion de solution saline normale. Trente minutes après le début de la perfusion d'entretien, une anesthésie générale a été induite avec du fentanyl, du propofol, du vécuronium, de l'air, de l'oxygène et de l'isoflurane. La trachée a été intubée. Le fentanyl a été administré de façon intermittente en réponse aux augmentations de la fréquence cardiaque et de la pression artérielle. Pendant toute la période peropératoire, la fréquence cardiaque, la pression artérielle moyenne, la SpO_2, l'$EtCO_2$ ainsi que les besoins en isoflurane et en fentanyl ont été enregistrés et comparés. **Résultats:** Le groupe recevant de la dexmédétomidine a présenté une hémodynamique stable tout au long de la période peropératoire. La pression artérielle moyenne à différents moments était plus basse dans le groupe dexmédétomidine que dans le groupe contrôle. La consommation d'isoflurane était également plus faible dans le groupe D que dans le groupe C à différents moments de la chirurgie. Les besoins en fentanyl dans le groupe D étaient de 111,76 ± 16,43 microgrammes, contre 151,16 ± 29,34 microgrammes dans le groupe C ($P < 0,001$). Ce résultat suggère un effet analgésique accru ou un effet d'épargne opioïde de la dexmédétomidine dans le groupe D. **Conclusion:** L'utilisation d'une perfusion de dexmédétomidine chez les patients programmés pour une chirurgie de tumeur cérébrale infratentorielle permet d'assurer une hémodynamique périopératoire stable, de réduire les besoins en isoflurane et de diminuer la consommation peropératoire de fentanyl.

Mots-clés: Anesthésie, tumeurs cérébrales, dexmédétomidine, hémodynamique, fosse crânienne postérieure

Introduction

The posterior fossa of the brain is vital because it contains crucial structures, including the brainstem and cranial nerves. Consequently, surgical procedures involving infratentorial brain tumors present unique challenges for anesthetic management. These procedures often lead to complex hemodynamic changes due to surgical manipulation and the patient's prone or lateral positioning.[1] Patients with intracranial pathology experience compromised brain dynamics, intracranial pressure, and perfusion. Cerebral autoregulation maintains stable cerebral blood flow despite fluctuations in cerebral perfusion pressure or mean arterial pressure (MAP) by adjusting cerebrovascular resistance.

Laryngoscopy, endotracheal intubation, and surgical stimulus consistently trigger sympathetic stimulation, elevating plasma catecholamine levels and inducing an adrenergic stress response. This, in turn, produces specific hemodynamic effects, such as increased heart rate (HR) and blood pressure, as well as occasional disturbances in cardiac rhythm.[2,3] Sudden changes in blood pressure can result in unfavorable alterations in intracranial pressure, cerebral blood flow, and cerebral blood volume, as the autoregulation mechanism takes 30–120 s to stabilize. A sudden increase in arterial blood pressure above the autoregulatory threshold raises the risk of neurological damage. High intracranial pressure may cause brain herniation.[4] Consequently, the goals of neuroanesthesia are to maintain stable cerebral hemodynamics and create optimal surgical conditions without sudden increases in brain volume and intracranial pressure. Dexmedetomidine, a selective α-2 adrenoreceptor agonist, possesses sedative, analgesic, and anesthetic-sparing properties.[5,6] By reducing norepinephrine release, it has been shown to decrease HR and MAP. Numerous studies have shown that it reduces the need for volatile anesthetics during the perioperative period.[7,8] These effects help attenuate the neuroendocrine and hemodynamic responses associated with anesthesia and surgery, thereby reducing the requirement for anesthetic agents and opioids.[9,10] The objective of this study was to evaluate the impact of intravenous dexmedetomidine on hemodynamics and the requirement for isoflurane and intraoperative opioids in adult patients undergoing elective infratentorial tumor surgeries.

Methods

This study is a double-blind, randomized trial conducted at a tertiary healthcare center over 2 years, following approval from the institutional ethics committee. It was registered in the Clinical Trials Registry-India (CTRI/2024/11/076623). A total of 120 patients, aged between 18 and 60 years, classified as American Society of Anesthesiologists Class II, undergoing elective infratentorial brain tumor surgery under general anesthesia, and providing informed consent were included in the study. The exclusion criteria comprised chronic pulmonary, renal, cardiac, and liver diseases; pregnancy; hypertension; severe intracranial hypertension; and allergies to the study medication.

The randomization process was performed using computer-generated random numbers, and allocation concealment was ensured by opening the opaque, sealed envelopes in the operating room.

Randomization was performed, and the patients were allocated to two groups: Group C (control) or Group D (dexmedetomidine).

Blinding was achieved by giving either dexmedetomidine–saline or saline in similar-looking 50 mL syringes to the respective groups. The anesthesiologist who gave the drugs was different from the person who recorded the data. The anesthesiologist in the operating room collected the data, while the statistician analyzing the data was blinded to group allocation. An anesthesia technician, not involved in the research, prepared the study solution in a 50 ml syringe. In Group D, the syringe contained 2 ml of dexmedetomidine at 100 µg/ml, diluted with 48 ml of normal saline, resulting in a final volume of 50 ml with a dexmedetomidine concentration of 4 µg/ml. A loading dose of 1 µg/kg was administered over 10 min, followed by a maintenance infusion of 0. 4 µg/

kg/h that continued throughout the surgery and was stopped when skin suturing began. The loading dose was administered by adding 1 μg/kg of dexmedetomidine to 100 ml of saline. This was given for over 10 min, after which the infusion was started at 4 μg/kg/h. In Group C, 100 ml of normal saline was administered over 10 min, and the saline infusion continued until the end of surgery, i.e. when skin suturing began, same as in Group D, to ensure proper blinding. Preanesthetic evaluation was performed for all patients. Patients were kept nil per oral for 6 h for solids and 2 h for clear liquids. All patients received the morning doses of anticonvulsants and steroids, along with an H 2 blocker. All essential monitors were attached, and baseline vitals (ECG, NIBP, and Spo_2) were recorded. A large-bore intravenous cannula (18G) was inserted for drug and continuous fluid administration. Both groups received 1 mg of IV midazolam and 2 μg/kg of IV fentanyl, with titrated doses of propofol (1–2 mg/kg) until loss of verbal response. Bispectral index (BIS) monitoring was done, and a BIS value of 40–60 was maintained throughout the surgery. Tracheal intubation was performed with an endotracheal tube after 3 min of vecuronium administration at 0.1 mg/kg. Anesthesia was maintained with a 50:50 air–oxygen mixture and isoflurane, with intermittent IV vecuronium doses. Ventilation was adjusted to maintain an end-tidal carbon dioxide level of 30–35 mmHg, and radial artery cannulation was performed for invasive blood pressure monitoring. A central line was inserted in the right subclavian vein using the Seldinger technique. Minimum Alveolar Concentration (MAC) was monitored on the Dräger workstation, and the dial setting was adjusted to maintain a BIS of 40–60. The vaporizer dial setting, i.e. the volume percentage (vol %) of Isoflurane, was recorded every 10 min from the start of isoflurane administration. The patient was assumed to have pain during surgery when systolic blood pressure (SBP) and HR increased by >20% from baseline, when the BIS was 40–60. In that case, 25 μg/kg of IV fentanyl was administered in both groups. The total amount of fentanyl used during the surgery in both groups was recorded. Symptomatic bradycardia (HR <50) was treated with an intravenous injection of 6 mg of atropine IV stat, while hypotension (MAP <20% of preinduction value or systolic BP <90 mmHg in two consecutive readings taken 3 min apart) was initially treated with 10–15 ml/kg of normal saline. If hypotension persisted, 6 mg of intravenous mephentermine was administered, and if it continued, the dexmedetomidine infusion was stopped. The dexmedetomidine or placebo infusion was discontinued at the start of skin closure. The following parameters were recorded every 5 min after the dexmedetomidine/placebo infusion began: HR, Spo_2, and invasive blood pressure (SBP, diastolic blood pressure [DBP], and MAP). The following parameters were recorded every 10 min after induction until the skin was sutured: HR, SpO_2, noninvasive blood pressure (SBP, DBP, and MAP), $EtCO_2$, and isoflurane MAC. The total dose of fentanyl required for each patient was recorded. After surgery, the patients were not extubated and were transferred to the intensive care unit for further management. The primary objective of this study was to record hemodynamic changes in both groups, and the secondary objective was to assess the intraoperative fentanyl requirement and record the percentage of Isoflurane used in both groups during the surgery.

The sample size was determined using Epi Info™ 3.5.3, a statistical software trademarked by the Centers for Disease Control and Prevention. The calculation was based on the study by Gertler *et al*.[11] The required number of patients for this study was 120 (60 per group), with 89% power and a 95% confidence interval.

Table 1: Demographic profile of the patients

Description	Group D	Group C	*P*
Age	36.31±13.42	37.68±13.06	0.494
Gender (male/female)	30/30	38/22	1.00
Height	162.80±6.49	163.48±9.12	0.642
Weight	55.38±9.20	55.76±6.68	0.785
BMI	20.98±3.80	20.78±1.83	0.703

BMI=Body mass index

Table 2: Comparison of heart rates between Group D and Group C at multiple time points

HR	Group D (mean±SD)	Group C (mean±SD)	*P*
Baseline	81.81±13.95	81.00±11.93	0.734
5 min	81.71±13.07	80.76±11.11	0.677
10 min	80.96±13.49	80.81±10.93	0.949
15 min	77.11±10.69	82.21±11.11	0.012
20 min	80.65±11.44	85.58±8.14	0.014
25 min	77.78±10.96	84.53±10.47	0.001
30 min	78.55±11.57	83.23±10.65	0.017
40 min	79.73±11.56	84.88±10.34	0.006
50 min	80.36±11.21	84.70±10.02	0.024
1 h 0 min	80.11±10.54	85.13±9.72	0.007
1 h 10 min	80.81±11.67	81.95±11.95	0.596
1 h 20 min	81.60±11.53	81.71±11.29	0.956
1 h 30 min	80.11±12.57	82.15±11.58	0.362
1 h 40 min	79.10±11.06	84.95±10.08	0.003
1 h 50 min	79.26±10.74	84.61±9.53	0.003
2 h 0 min	79.20±11.39	84.90±8.97	0.001
2 h 10 min	78.45±10.62	83.10±10.17	0.016
2 h 20 min	79.03±10.86	83.31±9.83	0.012
2 h 30 min	81.06±9.34	83.10±10.23	0.251
2 h 40 min	78.68±10.55	82.88±10.53	0.019
2 h 50 min	78.96±10.98	84.28±10.28	0.004
3 h 0 min	82.93±11.05	84.33±11.36	0.479
3 h 10 min	79.76±10.94	84.88±13.57	0.016
3 h 20 min	79.11±10.54	84.41±13.44	0.01
3 h 30 min	78.51±10.85	83.88±13.70	0.014
3 h 40 min	79.93±12.73	85.05±12.98	0.024
3 h 50 min	78.95±10.82	84.68±12.82	0.012
4 h 0 min	78.96±12.03	84.56±12.02	0.012
4 h 10 min	77.33±10.40	83.20±10.16	0.018
4 h 20 min	78.65±11.86	82.86±15.09	0.369
4 h 30 min	68.65±7.05	86.85±7.02	<0.001
4 h 40 min	68.00±4.96	84.50±8.52	0.001

SD=Standard deviation, HR=Heart rate

Table 3: Mean arterial pressure of Group D and Group C at different time points

MAP	Group D Mean±SD	Group C Mean±SD	*P* Value
Baseline	86.92±9.09	97.52±7.04	<0.001
5 min	87.62±8.16	97.68±7.74	0.003
10 min	88.55±8.32	95.02±8.14	0.001
15 min	88.40±8.18	93.93±9.05	0.002
20 min	84.62±8.62	95.82±7.38	0.002
25 min	87.63±8.57	94.43±7.68	0.005
30 min	89.37±8.39	94.82±7.13	0.002
40 min	88.67±8.22	96.50±7.28	0.001
50 min	85.92±8.69	97.62±5.50	0.009
1 h 0 min	84.58±8.22	97.77±6.61	0.004
1 h 10 min	83.88±8.77	95.97±6.95	0.002
1 h 20 min	90.02±9.08	95.55±9.32	0.007
1 h 30 min	87.75±8.18	94.33±9.15	0.001
1 h 40 min	83.88±10.48	95.08±10.79	<0.001
1 h 50 min	85.40±8.41	91.87±10.40	0.001
2 h 0 min	83.67±8.81	94.07±10.48	<0.001
2 h 10 min	87.12±7.84	92.13±11.38	0.011
2 h 20 min	88.43±8.23	93.78±11.22	0.008
2 h 30 min	84.25±9.25	94.37±12.82	<0.001
2 h 40 min	84.97±9.11	96.52±9.56	0.008
2 h 50 min	86.73±8.02	96.95±7.29	<0.001
3 h 0 min	85.32±7.92	96.57±6.41	<0.001
3 h 10 min	89.97±8.67	96.23±7.77	0.006
3 h 20 min	88.60±8.71	94.32±8.54	0.002
3 h 30 min	88.05±8.35	92.47±9.93	0.018
3 h 40 min	83.82±8.54	97.37±5.44	0.000
3 h 50 min	85.87±8.51	96.47±6.65	<0.001
4 h 0 min	89.18±8.70	95.07±6.70	<0.001
4 h 10 min	88.51±7.07	95.41±8.78	<0.001
4 h 20 min	83.47±9.95	94.04±8.62	0.001
4 h 30 min	79.60±7.98	96.10±7.83	<0.001
4 h 40 min	83.60±10.71	93.50±7.35	0.08

Table 4: Percentage volume of Isoflurane at various time points between Group D and Group C

Isoflurane volume (%)	Group D (mean±SD)	Group C (mean±SD)	*P*
50 min	0.79±0.30	1.06±0.31	<0.001
1 h 0 min	0.77±0.31	1.10±0.32	<0.001
1 h 10 min	0.75±0.29	1.02±0.26	<0.001
1 h 20 min	0.76±0.30	0.94±0.28	0.001
1 h 30 min	0.74±0.29	0.90±0.23	0.001
1 h 40 min	0.74±0.29	1.27±0.56	<0.001
1 h 50 min	0.73±0.28	1.40±0.57	<0.001
2 h 0 min	0.74±0.31	1.49±0.61	<0.001
2 h 10 min	0.71±0.26	1.37±0.59	<0.001
2 h 20 min	0.74±0.30	1.45±0.62	<0.001
2 h 30 min	0.71±0.28	0.59±0.22	0.01
2 h 40 min	0.75±0.29	0.64±0.23	0.007
2 h 50 min	0.75±0.29	1.51±0.58	<0.001
3 h 0 min	0.72±0.25	1.44±0.55	<0.001
3 h 10 min	0.72±0.23	0.69±0.35	0.655
3 h 20 min	0.78±0.28	0.65±0.34	0.065
3 h 30 min	0.75±0.26	0.61±0.30	0.016
3 h 40 min	0.71±0.24	0.62±0.28	0.098
3 h 50 min	0.77±0.33	1.31±0.55	<0.001
4 h 0 min	0.76±0.32	1.41±0.53	<0.001
4 h 10 min	0.66±0.19	0.65±0.30	0.964
4 h 20 min	0.67±0.32	0.66±0.34	0.928
4 h 30 min	1.22±1.81	1.55±0.39	0.57
4 h 40 min	0.65±0.41	0.82±0.53	0.724

SD=Standard deviation

Table 5: Requirement of fentanyl in Groups D and C

	Group D (mean±SD)	Group C (mean±SD)	*P*
Fentanyl required	111.76±16.43	151.16±29.34	<0.001

SD=Standard deviation

Data analysis was conducted using Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) software version 27.0 (IBM Corp., Armonk, NY, USA). Data were summarised as means and standard deviations for numerical variables and as counts and percentages for categorical variables. Unpaired proportions were compared with the Chi-square test or Fisher's exact test, as appropriate. $P \leq 0.05$ was regarded as statistically significant.

Results

The study included 120 patients. Group D comprised 60 patients who received an intravenous bolus and infusion of dexmedetomidine, while Group C comprised 60 patients who received a bolus and infusion of saline [Figure 1].

Demographic profile

No significant differences were observed in age ($P = .494$), gender ($P = 1.00$), height ($P = .642$), weight ($P = .785$), or BMI ($P = .703$) between the two groups [Table 1].

Comparison of heart rate at different time points between groups D and C

Initially, the two groups had similar HRs ($P = 0.734$), indicating no initial difference between them. However, during the intraoperative period, Group D showed superior HR control compared with Group C at most time points [Table 2].

Comparison of mean differences in mean arterial pressure across different time points between Group D and Group C

A comparative analysis of MAP between Group D and Group C at different time points suggests that Group D had a consistently lower MAP than Group C throughout the study [Table 3].

Comparison of the volume percentage of isoflurane over different time points between Group D and Group C

Group D required a lower Isoflurane concentration than Group C, particularly during the first 3 h of surgery, highlighting a potential anesthetic-sparing effect in this group [Table 4].

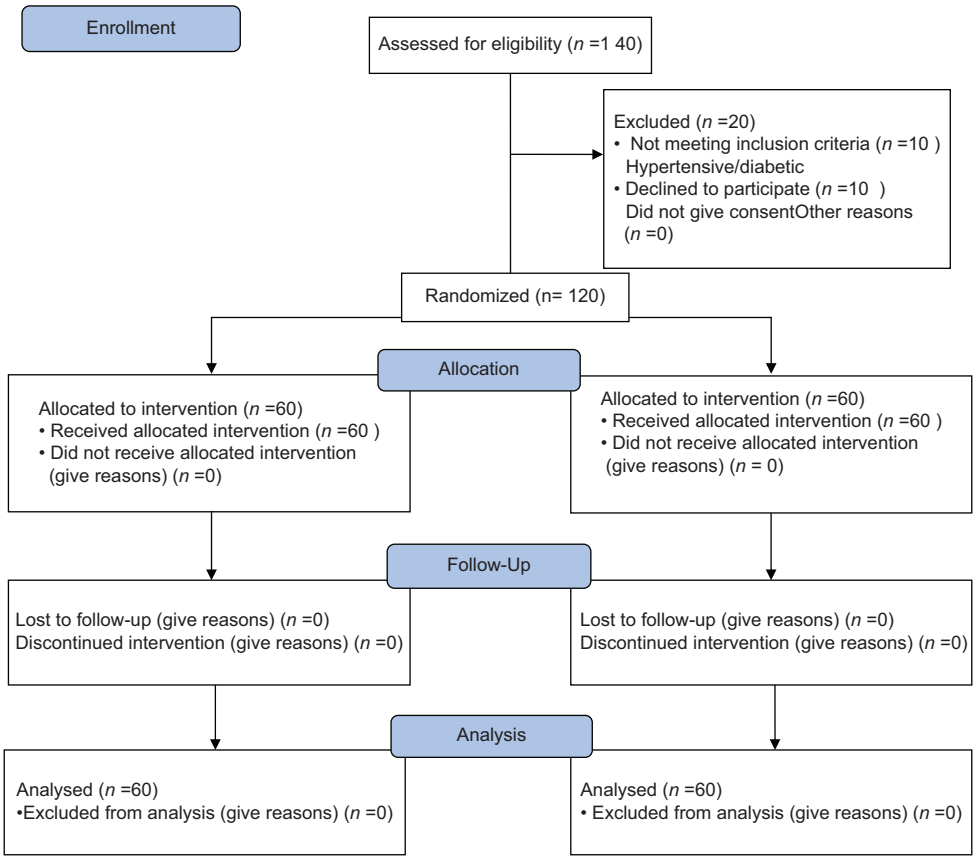

Figure 1: Consort flow diagram

Fentanyl requirement in groups D and C

Patients in Group D required significantly less fentanyl than those in Group C, suggesting a potential enhanced analgesic or opioid-sparing effect of dexmedetomidine [Table 5].

Discussion

The present study was conducted to assess whether dexmedetomidine infusion during infratentorial tumor surgery helps maintain a better hemodynamic profile and to assess the requirement for fentanyl and inhalational agents.

Dexmedetomidine is a highly selective alpha-2 adrenergic receptor agonist that primarily acts on the pontine locus ceruleus and on postsynaptic alpha-2 receptors in vascular smooth muscle.[12] Notably, it does not cause respiratory depression. During the perioperative period, it reduces plasma epinephrine and norepinephrine levels.[13] The minimal respiratory depression, limited impact on neuronal function, and minimal interference with neurophysiological monitoring make it suitable for use in awake craniotomies. Dexmedetomidine is widely employed as an adjunct in general anesthesia, subarachnoid block, peripheral nerve block, topical anesthesia, and postoperative analgesia.[14]

Hemodynamic stability is one of the most important principles of neuroanesthesia. An abrupt increase in arterial blood pressure during neurosurgery can cause bleeding and edema at the surgical site. Conversely, low blood pressure can predispose to cerebral ischemia because autoregulation of cerebral blood flow is often impaired near tumors.[15]

A rise in blood pressure can lead to a breach in the blood–brain barrier, causing leakage of blood in the brain parenchyma and hence causing a rise in intracranial blood pressure, which can damage the neurons.[16] Therefore, maintaining stable hemodynamics during neurosurgery is very important to improve patient outcomes. Dexmedetomidine given during surgery maintains stable hemodynamics and thus prevents the rise in intracranial pressure. Hypertension during intracerebral surgery may prove detrimental and may result in bleeding at the surgical site, which may make it difficult for the surgeon to operate.

In this study, Group D experienced stable MAP at various intervals during the surgery. In addition, Group D required less fentanyl (111.76 ± 16.43) than Group C (151.16 ± 29.34), indicating an opioid-sparing effect of dexmedetomidine infusion. Dexmedetomidine has analgesic properties, which lead to a reduction in the requirement of fentanyl in Group D. Opioids can cause side effects such as nausea, vomiting, paralytic ileus, and respiratory depression, which can be mitigated using adjuncts such as dexmedetomidine during surgery.[17] Although dexmedetomidine has analgesic effects, it is not potent enough to be used as the sole analgesic during surgery. Instead, it should be combined with other analgesics, such as opioids, for intraoperative use.

Tanskanen *et al*., in their randomized study, compared dexmedetomidine infusions with placebo in patients for

elective supratentorial brain tumor surgery.[18] The study had three groups: two groups received dexmedetomidine infusions (two dose levels) and the third group received a placebo. In two groups, dexmedetomidine infusion was maintained to achieve a steady plasma concentration of either 0.2 ng/ml or 0.40 ng/ml. In their study, they concluded that dexmedetomidine increased perioperative hemodynamic stability.

The sedative and sympatholytic effects of dexmedetomidine may account for these advantages by reducing the stress response and providing stable cerebral hemodynamics.

Peng *et al*. conducted a meta-analysis of randomized controlled trials to evaluate the efficacy of dexmedetomidine as an anesthetic adjuvant for perioperative hemodynamic control and its effect on opioid requirements in neurosurgical patients.[19] The authors concluded that dexmedetomidine infusions provide superior hemodynamic stability, reduce intraoperative opioid consumption, and decrease the incidence of postoperative nausea and vomiting. The good safety profile, sedative and sympatholytic effects, and rapid onset of action of dexmedetomidine make it a valuable agent in neuroanesthesia, especially when hemodynamic control is critical.

Li Wang *et al*., in their meta-analysis of randomized controlled trials, reported that dexmedetomidine, when used as an adjunct to general anesthesia, provides superior hemodynamic stability and significantly reduces intraoperative opioid consumption, thereby contributing to a lower incidence of postoperative nausea and vomiting.[20] The present findings reinforce these conclusions, demonstrating that dexmedetomidine maintains stable intraoperative parameters and minimizes opioid-related adverse effects. These opioid-sparing and hemodynamic-stabilizing properties make dexmedetomidine valuable in neurosurgical patients.

In 2018, Liu *et al*. conducted a meta-analysis to assess the effect of dexmedetomidine infusion on perioperative opioid use and postoperative pain severity.[21] The analysis included 11 randomized controlled trials and showed that dexmedetomidine infusion decreases both perioperative and postanesthesia care unit opioid consumption, as well as pain intensity.

The limited sample size in this study restricts its generalisability to a broader patient population. In addition, the study focused only on intraoperative parameters. It did not evaluate long-term postoperative outcomes, such as patient recovery, neurological status, or side effects that might occur with dexmedetomidine administration.

Conclusion

Dexmedetomidine, when used as an adjuvant in surgeries such as elective infratentorial brain tumor surgeries, has been found to provide significant benefits, including stabilizing hemodynamics and reducing anesthetic and opioid dose requirements. The drug's pharmacodynamic profile is highly advantageous in the context of neuroanesthesia. However, to determine the role of the drug in neuroanesthesia, extensive long-term research is necessary to evaluate its effects on surgical neurological outcomes and side effects.

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Conflicts of interest

There are no conflicts of interest.

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