Dissertation on

EFFICACY AND SAFETY OF USE OF DEXMEDETOMIDINE WITH FENTANYL Vs DEXMEDETOMIDINE FOR HYPOTENSIVE ANAESTHESIA IN PATIENTS UNDERGOING FUNCTIONAL ENDOSCOPIC SINUS SURGERY.

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ABBREVATIONS

GA -General Anaesthsia

FESS-Functional endoscopic sinus suregery

ASA-American Society of Anaesthesiologists

ECG-Electrocardiogram

NIBP-Non invasive blood pressure

SPO2-Oxygen saturation

S.D-Standard deviation

Min-minutes

n-Number of subjects

p-p value

SL.NO-Serial no

BMI-Body Mass Index

IV-Intravenous

Mcg-microgram

HR-Heart rate

PONV-Post operative nausia and vomiting.

SBP-Systolic blood pressure

DBP-Diastolic blood pressure

RA-Regional anaesthesia

PACU-Post anaesthesia care unit

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ABSTRACT

Background:

Functional Endoscopic Sinus Surgery (FESS) demands a bloodless operative field and stable hemodynamics to ensure surgical precision and minimize complications. Controlled hypotension is a vital anesthetic technique in achieving optimal visibility. Dexmedetomidine, a selective α2-adrenergic agonist, is commonly used due to its sedative and sympatholytic effects. Fentanyl, a potent opioid analgesic, helps blunt sympathetic responses but lacks sufficient hypotensive effect when used alone. The present study evaluates whether the combination of dexmedetomidine and fentanyl offers superior outcomes over dexmedetomidine alone in FESS.

Aim:

To compare the efficacy and safety of infusion of inj. dexmedetomidine with inj. fentanyl versus infusion of inj. dexmedetomidine alone in providing hypotensive anesthesia in patients undergoing FESS.

Methods:

A randomized, controlled, prospective study was conducted on 106 patients (ASA Grade I/II) aged 18–60 years scheduled for elective FESS. Patients were divided into two groups: Group D received 0.5μg/kg/hr dexmedetomidine infusion; Group DF received 0.5 μg/kg/hr dexmedetomidine plus 0.5μg/kg/hr fentanyl infusion. Hemodynamic parameters (HR, SBP, DBP, MAP) were monitored at various intraoperative intervals. Surgical field quality was assessed using Boezaart's scale, and surgeon satisfaction and adverse events were documented.

Results:

Group DF showed significantly better hemodynamic control with lower mean HR (68.7 ± 5.1 bpm vs. 72.1 ± 5.9 bpm, $p = 0.001$) and MAP (62.9 ± 3.1 mmHg vs. 81.2 ± 3.1 mmHg, $p < 0.001$). The Boezaart score was significantly better in Group DF (2.04 ± 0.6 vs. 2.42 ± 0.8, $p = 0.006$). Surgeon satisfaction rated 'excellent' was higher in Group DF (56.6% vs. 45.3%). Adverse events such as bradycardia (7.5% vs. 30.1%) and hypotension (5.7% vs. 22.6%) were fewer in Group DF. Only 5.6% in Group DF required postoperative analgesia versus 32% in Group D ($p < 0.05$).

Conclusion:

The combination of dexmedetomidine and fentanyl infusion provides superior hemodynamic stability, improved surgical field visibility, fewer adverse events, and reduced postoperative analgesic requirement compared to dexmedetomidine alone. This combination is safe, effective, and offers a better anesthetic choice for controlled hypotension in FESS.

Keywords: Dexmedetomidine, Fentanyl, Hypotensive Anaesthesia, FESS, Boezaart Grading, Hemodynamic Stability, Surgeon Satisfaction.

INTRODUCTION

Functional Endoscopic Sinus Surgery (FESS) has revolutionized the management of chronic rhinosinusitis (CRS), nasal polyposis, and other sinonasal pathologies, particularly in cases refractory to medical therapy. The fundamental goal of FESS is to restore physiological sinus ventilation and drainage while preserving normal mucosal structures [1].

Despite being a minimally invasive technique, FESS poses significant intraoperative challenges, the most critical being excessive bleeding, which can significantly impair endoscopic visibility, prolong operative duration, and increase the risk of surgical complications such as cerebrospinal fluid (CSF) leaks, optic nerve injury, and orbital hematoma [2,3].

Achieving a clear and bloodless surgical field is paramount to ensuring optimal surgical precision and minimizing patient morbidity [4]. Given that the sinonasal mucosa is richly vascularized, even minor surgical trauma can result in substantial bleeding. Hence, effective intraoperative hemodynamic control is crucial in optimizing the surgical field [5].

Various techniques, such as head elevation 30* (Reverse Trendelenburg) infiltration or topical application of epinephrine and electively controlling hypotension by pharmacological methods, are used to reduce bleeding at the surgical site in order to minimize these complications during sinus surgery [6,7].

To mitigate the impact of intraoperative bleeding, controlled hypotensive anesthesia has become an essential component of anesthetic management during FESS. In order to reduce intraoperative blood loss without sacrificing important organ perfusion, controlled hypotension is the intentional pharmacological reduction of mean arterial pressure (MAP) to 50–65 mmHg or a 30% decrease in baseline systolic blood pressure (SBP).

This technique enhances surgical field visibility, decreases the need for frequent suctioning, shortens operative time, and improves surgeon satisfaction. Vasodilators (sodium nitroprusside, nitroglycerin). beta-blockers (esmolol, labetalol), calcium channel blockers (nicardipine), and inhalational anaesthetics (isoflurane, sevoflurane) are among the pharmacological drugs that have been used to produce controlled hypotension [8,9].

Because of their quick onset and short duration of action, these pharmacological agents precisely control blood pressure, but they are linked to cyanide toxicity from nitroprusside, resistance to vasodilators or tachyphylaxis, delayed recovery from inhaled anaesthetics, and the need for unambiguous hemodynamic monitoring.[10,11].consequently, newer pharmacological agents such as dexmedetomidine and fentanyl are being increasingly explored due to their superior safety profile and hemodynamic stability[12].

Dexmedetomidine, a highly selective alpha-2 adrenergic receptor agonist, is widely recognized for its sedative, anxiolytic, sympatholytic, and analgesic characteristics, making it an attractive candidate for controlled hypotensive anesthesia.By inhibiting norepinephrine release in the central nervous system, dexmedetomidine induces dose-dependent vasodilation, reduces systemic vascular resistance (SVR), and decreases heart rate and blood pressure, leading to a controlled hypotensive state[13] .Unlike conventional vasodilators, dexmedetomidine achieves stable hemodynamic control with minimal fluctuations, reducing the likelihood of excessive hypotension or rebound hypertension [15]. Furthermore, dexmedetomidine has an opioid-sparing effect, contributing to improved postoperative pain control and reducing the need for opioid analgesics.

Several clinical studies have demonstrated that dexmedetomidine significantly reduces intraoperative bleeding, enhances surgical field conditions, and improves surgeon satisfaction. However, its use is often limited by its potential to cause excessive bradycardia and profound hypotension, necessitating careful dose titration and the use of adjunct agents to counteract its cardiovascular depressive effects [13].

A strong synthetic mu-opioid receptor agonist, fentanyl is frequently used in anesthesia because of its quick onset, strong analgesic effects, and capacity to reduce the sympathetic nervous system's reaction to surgical stress [18].

Fentanyl reduces fluctuations in blood pressure and heart rate, making it an effective adjunct in controlled hypotensive anesthesia. By blunting the baroreceptor-mediated sympathetic response, fentanyl prevents intraoperative tachycardia and hypertension, ensuring a more stable anesthetic state [19].

Studies have demonstrated that pre-induction fentanyl infusion effectively maintains intraoperative hypotension while providing superior postoperative analgesia. However, fentanyl alone does not provide adequate sedation and hypotensive effects, making it a suitable adjunct rather than a primary agent for controlled hypotension [14].

RATIONALE FOR THE STUDY:

Despite the increasing use of dexmedetomidine and fentanyl in controlled hypotensive anaesthesia, limited comparative data exists on their combined efficacy in optimizing intraoperative conditions for FESS. Most studies have assessed the individual effects of dexmedetomidine or fentanyl, but few have systematically analysed whether their combination offers synergistic benefits in hemodynamic stability, intraoperative blood loss reduction, and postoperative analgesia.

In literature search no supportive data are present on combined use of infusion of inj dexmedetomidine and infusion of inj fentanyl for FESS.

Therefore, the goal of the current study was to assess the clinical effectiveness, safety, and benefits of combining the infusion of injectable dexmedetomidine and fentanyl in order to provide an optimal oligemic surgical field, improved hemodynamic stability to lower the dosages of individual medications, thereby preventing complications like bradycardia and hypotension, and surgeon satisfaction during the procedure.

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AIM AND OBJECTIVES

Aim:

Efficacy and safety of use of infusion of inj dexmedetomidine with inj fentanyl vs infusion of inj dexmedetomidine for Hypotensive Anaesthesia in patients undergoing functional endoscopic sinus surgery.

Objective:

Primary Objective: To evaluate the efficacy of intravenous Dexmedetomidine with Fentanyl versus intravenous Dexmedetomidine for hypotensive Anaesthesia in patients undergoing functional endoscopic sinus surgery with respect to the following parameters:

1. Heart Rate (HR)
2. Systolic Blood Pressure (SBP)
3. Diastolic Blood Pressure(DBP)
4. Mean Arterial Pressure (MAP)

Secondary Objective:

1. Assessment of Surgeon Satisfaction Grading Profile.
2. Evaluation of the Surgical Field Grading Scale using the Boezaart Grading Scale.

REVIEW OF LITERATURE

1. **Kohaf et al. (2024)** conducted a randomized, triple-blind trial comparing intranasal (IN) and intravenous (IV) dexmedetomidine for controlled hypotension during functional endoscopic sinus surgery (FESS). Sixty adult patients were randomly assigned to receive either IN (1 μg/kg diluted in saline 45–60 minutes preoperatively) or IV dexmedetomidine (1 μg/kg infused over 10 minutes). The primary outcome was the total amount of atropine administered, while secondary outcomes included hemodynamic parameters, sedation levels, surgical field quality, and postoperative recovery. The results showed a significantly lower atropine requirement in the IN group, with a slower onset of sedation and hypotension compared to the IV group. However, both groups had comparable surgical field quality, patient satisfaction, and postoperative recovery. The study concluded that IN dexmedetomidine is a simple and effective alternative for premedication, requiring administration about an hour before surgery for optimal effect [(15).]

2. **Mugabo et al. (2024)** conducted a comparative study to evaluate the efficacy of clonidine and dexmedetomidine for controlled hypotension during functional endoscopic sinus surgery (FESS). Eighty patients were randomly assigned to receive either clonidine (Group C) or dexmedetomidine (Group D), with both drugs effectively reducing mean arterial pressure (MAP) and heart rate (HR) within the target range. The results showed no statistically significant difference in blood loss or surgical field quality between the two groups. However, dexmedetomidine caused more severe hypotension and bradycardia, leading to prolonged anesthesia and postoperative sedation. The study concluded that both agents effectively improved surgical visibility, but clonidine may be preferable for ambulatory procedures due to its more stable hemodynamic profile. The authors recommended larger multicenter studies to confirm these findings[(16)].

3. **Pooja Giriyapur, Ravi Madhusudhana(2023)**

   A randomized prospective trial was conducted on 68 patients classified as ASA 1 and 2, undergoing Functional Endoscopic Sinus Surgery (FESS). Patients were divided

into two groups:Group 1: Received fentanyl 2 mcg/kg bolus 30 minutes before induction, followed by 2 mcg/kg/hr infusion for 90 minutes.Group 2: Received fentanyl 1 mcg/kg bolus 30 minutes before induction, followed by 1 mcg/kg/hr infusion for 90 minutes.Group 1 had lower mean systolic blood pressure compared to Group 2.Surgical field conditions and surgeon satisfaction (AONO's scale) were significantly better in Group 1.Group 1 experienced lower post-operative nausea and vomiting.Post-operative pain scores (VAS Score) were lower in Group 1during the first 24hours and A higher dose of fentanyl (2 mcg/kg bolus and 2 mcg/kg/hr infusion) resulted in better hemodynamic stability, improved surgical field conditions, greater surgeon satisfaction, and reduced post-operative nausea, vomiting, and pain compared to the lower dose regimen (1 mcg/kg bolus and 1 mcg/kg/hr infusion) during FESS [(17)].

4. **Kewal Krishan Gupta, Vandana Kumari, Sarvjeet Kaur, Amanjot Singh(2022)**
   A prospective randomized trial was conducted on 80 adult patients undergoing Functional Endoscopic Sinus Surgery (FESS) under general anesthesia. Patients were randomly assigned into two groups:Group P Received propofol infusion at 100-200 µg/kg/min.Group D Received dexmedetomidine with a 1 µg/kg loading dose over 10 minutes after induction, followed by a maintenance infusion of 0.4-0.8 µg/kg/h.Mean arterial pressure and heart rate were significantly lower in Group D compared to Group P throughout the surgery, Intra operative blood loss was higher in Group P than in Group D .Only one incidence of bradycardia and hypotension (2.5%) was recorded in GroupD ,Both dexmedetomidine and propofol are effective and safe for controlled hypotension during FESS. However, dexmedetomidine provides better hemodynamic stability and reduces intraoperative blood loss without significant adverse effects [(18)].

5. **Hristopher C. Munhall, Brendon K. Warner, Shaun A. Nguyen, George J. Guldan 3rd, Ted A. Meyer(2022)** The study included adult patients undergoing middle ear surgery (MES) with dexmedetomidine used for controlled hypotension to

enhance surgical field visibility. Fourteen studies were included in the meta-analysis. Dexmedetomidine significantly improved Fromme-Boezaart surgical field scores compared to placebo.Comparison with Other Agents: Dexmedetomidine demonstrated a statistically significant advantage over other hypotensive agents in terms of risk ratio for achieving positive surgical field scores.Surgeon and Patient Satisfaction: Higher satisfaction scores were observed in the dexmedetomidine group.Risk of sub-optimal bleeding scores was significantly lower with dexmedetomidine .it shows Dexmedetomidine is an effective agent for controlled hypotension in middle ear surgery, improving surgical field visibility compared to placebo and other hypotensive agents. It is associated with reduced intraoperative bleeding and higher surgeon and patient satisfaction [(19)].

6. **Bafna et al.2022** conducted a randomized, double-blind interventional study comparing the hypotensive properties of dexmedetomidine and clonidine in 70 adult patients (20-50 years) undergoing elective functional endoscopic sinus surgery (FESS). Patients were randomly divided into two groups: Group A received intravenous (IV) dexmedetomidine (1 μg/kg loading dose followed by 1 μg/kg/h infusion), while Group B received IV clonidine (2 μg/kg loading dose followed by 1 μg/kg/h infusion). The study found that both drugs effectively maintained the target mean arterial pressure (MAP) of 65-70 mmHg, improving the surgical field quality. However, MAP and heart rate (HR) were significantly lower in the dexmedetomidine group, which also showed a longer duration of post-operative analgesia ($P = 0.001$). Both groups exhibited stable haemodynamic parameters without statistically significant adverse effects. The authors concluded that while both dexmedetomidine and clonidine are effective for controlled hypotension, dexmedetomidine provides better haemodynamic stability, prolonged post-operative analgesia, and conscious sedation, making it a preferable[(20)].
7. **Mahajan et al 2021**. conducted a double-blind, randomized controlled trial to compare the effectiveness of intravenous (IV) dexmedetomidine infusion and oral metoprolol as premedication for controlled hypotension in functional endoscopic sinus surgery (FESS). Ninety patients were randomly divided into three groups of 30: Group

A received IV dexmedetomidine (1 μg/kg loading dose over 10 minutes, followed by 0.2-0.5 μg/kg/h maintenance infusion), Group B received oral metoprolol (50 mg the night before and 2 hours before surgery), and Group C served as the control, receiving an oral placebo and intraoperative normal saline infusion. General anesthesia was maintained using sevoflurane, with a target mean arterial pressure of 55-65 mmHg. Results showed that Group A had a significantly better surgical field quality and reduced total blood loss compared to the other two groups. However, the incidence of adverse reactions was higher in the dexmedetomidine group. The study concluded that dexmedetomidine provides superior surgical field visibility and hemodynamic control in FESS, with less blood loss and better overall outcomes than oral metoprolol [(21)].

8. **Sahu et al. 2021**conducted a comparative study to evaluate the efficacy of dexmedetomidine versus esmolol in providing induced hypotension during functional endoscopic sinus surgery (FESS). Sixty patients were randomly divided into two groups: Group DEX received dexmedetomidine, while Group E received esmolol. The study found that while esmolol provided better hemodynamic stability, dexmedetomidine required a lower dose to achieve the desired hypotensive effect. Additionally, dexmedetomidine resulted in significantly prolonged emergence time, higher sedation scores, and a longer time to first analgesic request, indicating superior post-operative analgesia ($P < 0.05$). The study concluded that dexmedetomidine was more effective in controlling intraoperative blood pressure compared to esmolol and offered additional benefits, including improved recovery from anesthesia and prolonged analgesia, making it a preferable choice for induced hypotension in FESS [(22)].

9. **Sujay J N et al.2021** conducted a prospective, randomized, double-blinded clinical study to compare the efficacy of dexmedetomidine versus labetalol in providing controlled hypotension during functional endoscopic sinus surgery (FESS). Sixty ASA grade I or II patients undergoing FESS under general anesthesia were randomly divided into two groups: Group D (dexmedetomidine) and Group L (labetalol), with a

target mean arterial pressure (MAP) of 65-75 mmHg. The quality of the surgical field was assessed using the Fromme and Boezaart scoring system, and intraoperative fentanyl consumption along with postoperative first analgesic request time were recorded. Results showed that while both groups achieved the desired MAP, Group D had a significantly lower MAP compared to Group L . Blood loss scores were lower in Group D than in Group L , indicating better surgical field visibility. Although heart rates were comparable between groups, fentanyl consumption was significantly lower in Group D versus Group L and the first analgesic request time was longer in Group D than in Group L . The study concluded that dexmedetomidine provided superior hemodynamic stability, reduced blood loss, and prolonged postoperative analgesia compared to labetalol, making it a preferable choice for controlled hypotension in FESS [23].

10. **Chhabra et al 2020**. conducted a randomized, double-blinded study to compare the efficacy of dexmedetomidine and magnesium sulfate ($MgSO_4$) in providing controlled hypotension during functional endoscopic sinus surgery (FESS). Sixty-eight patients were randomly divided into two groups: Group D received dexmedetomidine (1 μg/kg over 10 minutes followed by 0.2-0.7 μg/kg/h infusion), and Group M received $MgSO_4$ (40 mg/kg over 10 minutes followed by 10-15 mg/kg/h infusion). Anesthesia was maintained with sevoflurane, aiming for a mean arterial pressure (MAP) of 60-70 mmHg. Results showed that Group D achieved the target MAP significantly faster compared to Group M . Additionally, 73.52% of patients in Group D reached the target MAP with minimal dexmedetomidine infusion (0.2-0.4 μg/kg/h) without sevoflurane, whereas 82.35% in Group M required 4% sevoflurane along with a higher $MgSO_4$ infusion (>12-15 mg/kg/h) to achieve target MAP within 10-20 minutes. The study concluded that dexmedetomidine is superior to $MgSO_4$ in achieving controlled hypotension more efficiently with a lower infusion dose, making it a preferable choice for FESS[24].

11. **Parvizi et al.2019** conducted a double-blind, randomized clinical trial to evaluate the efficacy of dexmedetomidine (DEX) in reducing intraoperative bleeding and

improving surgical field quality during functional endoscopic sinus surgery (FESS). Seventy-two patients aged 16-60 years were randomly assigned to two groups: the DEX group received 1 μg/kg DEX over 10 minutes at anesthesia induction, followed by a maintenance dose of 0.4-0.8 μg/kg/h, while the control group received normal saline as a placebo. Heart rate, systolic and diastolic blood pressure (DBP), mean arterial pressure (MAP), opioid requirements, and the surgeon's assessment of the surgical field were recorded at 15, 30, 60, and 90 minutes after induction. Results showed significantly lower intraoperative bleeding scores ($P = 0.001$) and higher surgeon satisfaction scores ($P = 0.001$) in the DEX group. Additionally, DBP and MAP were significantly lower in the DEX group at the 30th, 60th, and 90th minutes ($P < 0.05$), contributing to better hemodynamic stability. No postoperative adverse effects were observed in the DEX group. The study concluded that dexmedetomidine effectively enhances surgical field quality and hemodynamic stability, making it a safe and beneficial option for controlled hypotension during FESS [(25)].

12. **Choudhary et al. (2019)** conducted a randomized study to evaluate the effects of different pre-induction fentanyl doses on controlled hypotension during functional endoscopic sinus surgery (FESS). A total of 120 patients were divided into three groups receiving fentanyl at 2 μg/kg, 3 μg/kg, or 4 μg/kg. The primary outcome measured was intraoperative heart rate and mean arterial pressure, while secondary outcomes included the need for additional hypotensive agents, surgical field conditions, and surgeon satisfaction. The results showed that fentanyl at 3 μg/kg and 4 μg/kg achieved better controlled hypotension, with significantly lower heart rates and reduced need for additional hypotensive agents compared to the 2 μg/kg group ($p < 0.05$). Additionally, surgical field conditions and surgeon satisfaction were significantly superior in the 3 μg/kg and 4 μg/kg groups. The study concluded that fentanyl at 3-4 μg/kg is more effective in achieving optimal hypotension, improving surgical conditions, and reducing the need for adjunct hypotensive medications during FESS [(26)].
13. **Vijayarekha Koti, Sharathbabu Chevuri, Syed Abdul Wasiq, Bashirunnisa 2017** conducted a study to evaluate the effectiveness of dexmedetomidine as an adjuvant in anesthesia for Functional Endoscopic Sinus Surgery (FESS).A randomized controlled

study was conducted on 50 ASA I/II patients (18–55 years) scheduled for FESS from April 2015 to March 2016. Patients were divided into two groups:Group D (n = 25): Received dexmedetomidine (1 mcg/kg loading dose, followed by 0.6 mcg/kg infusion).Group NS (n = 2 Received normal saline in a similar volume,Blood Pressure is Lower in Group D at the end of surgery ,Heart Rate Significantly lower in Group D during surgery , and higher in Group NS after extubation ,Blood Loss Significantly lower in Group D compared to Group NS ,Lower Visual Analog Scale and Reduced isoflurane use in Group D,Dexmedetomidine is an effective adjuvant for hypotensive anaesthesia in FESS, significantly reducing intraoperative bleeding, anaesthetic requirements, and postoperative pain, while providing a stable hemodynamic profile with minimal side effects[27]

14. **Gupta P. Choudhary R., Ojha T., Jethava D 2016.** conducted a randomized, double-blind study on 40 ASA I/II patients (18–55 years) undergoing Functional Endoscopic Sinus Surgery (FESS) to evaluate dexmedetomidine as an adjuvant for hypotensive anaesthesia. Patients were divided into two groups :Group C (Control): Received normal saline. Group D (Dexmedetomidine): Received dexmedetomidine (1 mcg/kg loading dose, followed by 0.6 mcg/kg infusion),Blood Loss Significantly lower in the dexmedetomidine group ($p = 0.03$) and Reduced fentanyl, propofol and isoflurane usage, Lower VAS scores .Dexmedetomidine effectively reduces intraoperative bleeding, lowers anaesthetic requirements, and improves postoperative pain management with minimal side effects, making it a valuable adjuvant for FESS[28].

ANATOMY AND PHYSIOLOGY OF PARANASAL SINUSUS

Anatomy of para nasal sinuses

The nasal cavity's air-filled extensions are called paranasal sinuses. The four paired sinuses—maxillary, frontal, sphenoid, and ethmoid—are called after the bone in which they are found. Mucus-secreting goblet cells are scattered throughout the ciliated pseudostratified epithelium that lines each sinus.

During development, the nasal cavity erodes into the surrounding bones to generate the paranasal sinuses. As a result, all of the sinuses empty back into the nasal cavity; the roof and lateral nasal walls have apertures for the paranasal sinuses [29].

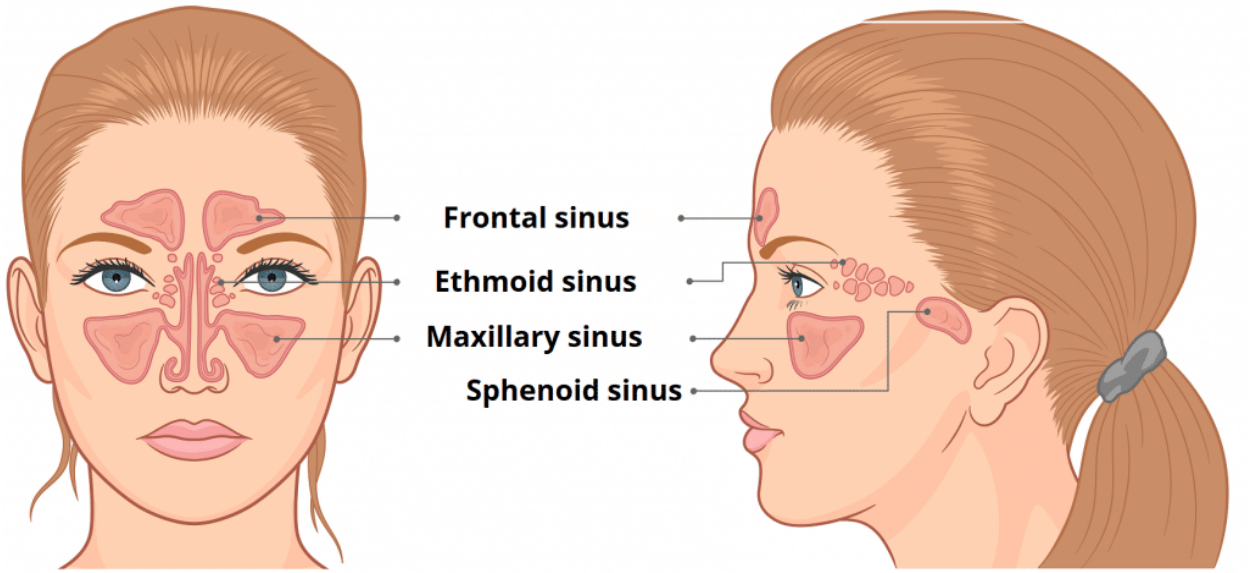

FIGURE 1: Para nasal sinuses

Frontal Sinuses

The frontal bone of the skull contains the two frontal sinuses.
They are trapezoidal in shape and the highest of the paranasal sinuses. The frontonasal duct is the route of drainage. It begins inside the nasal cavity's middle meatus at the hiatus semilunaris.

While the supraorbital nerve, a branch of the ophthalmic nerve, gives sensibility, the anterior ethmoidal artery, a branch of the internal carotid, supplies blood.

The frontal recess is the space behind the frontal beak where the frontal sinus empties. It is bounded anteriorly by the agger nasi cell's posterior wall, laterally by the lamina papyracea, and medially by the middle turbinate. Numerous cells cover this area, which also influences the direction of the drainage outflow. Surgery to treat the common infection of the frontal recess is considered to be challenging [29]. In over half of the cases, the recess opens into the middle meatus; in the remaining cases, it opens into the ethmoid infundibulum

Frontal Cells

To help surgeons better comprehend the complex and diverse classification of frontal sinus architecture and frontal sinus recess, a group of professionals created The International Frontal Sinus architecture in 2016. The resulting classification is described below

Anterior Cells

The anterior cells are made up of the agger nasi, supra, and supra agger frontal cells. They force the drainage either posteriorly, medially, or posteromedially**.**

Agger Nasi Cell

The Agger nasi cell is the most anterior ethmoidal cell. This cell, an ethmoturbinal remnant, is present in almost all patients; the agger nasi cells must be exposed in order to see the frontal recess clearly. There are two possible locations for the agger nasi cell: 1) just above the most anterior middle turbinate insertion into the lateral nasal wall, or 2) anterior to the middle turbinate origin.

Supra Agger Cell

Although it is situated above the agger nasi cell, this anterior-lateral ethmoidal cell does not pneumatize into the frontal sinus.

Supra Agger Frontal Cell

This cell extends into the frontal sinus as an anterior lateral ethmoidal cell. The size of these cells determines how far they can extend into the frontal sinus. They typically only reach the sinus floor if they are little. They stretch farther into the sinus, even into the sinus roof, if they are big.

Posterior Cells

The supraorbital ethmoid cell, suprabulla cell, and suprabulla frontal cell are examples of the posterior cells. The drainage is pushed forward by them**.**

Supra Bulla Cell

It does not penetrate the frontal sinus and rests above the bulla ethmoidalis.

Supra Bulla Frontal Cell

As the name suggests, this cell originates in the suprabulla region and pneumatically enters the posterior frontal sinus area. The base of the skull is the cell's back wall.

Supraorbital Ethmoid Cell

On the roof of the orbit, this anterior ethmoid cell can pneumatize in front of, behind, or around the anterior ethmoidal artery. The supraorbital ethmoid cell may be a component of the sinus' posterior wall if the frontal sinus is heavily pneumatized, necessitating the formation of a bone septum to divide it from the sinus.

Medial Cells

Medial cells are the cells that make up the frontal septum. Attached to the interfrontal sinus septum, these cells are medially based and belong to either the anterior ethmoid sinus or the inferior frontal sinus. They force the drainage in a direction that is frequently posterior and lateral**.**

Ethmoidal Sinuses

The ethmoid bone contains the following three ethmoidal sinuses:

• Middle: Opens onto the middle meatus' lateral wall.

• Posterior: Opens onto the superior meatus' lateral wall.

•Anterior: Opens onto the hiatus semilunaris (middle meatus).

They are innervated by the anterior and posterior ethmoidal branches of the maxillary and nasociliary nerves. The anterior and posterior ethmoidal arteries give blood to the body

Maxillary Sinuses

The largest sinuses are the maxillary sinuses. They are situated slightly inferiorly and laterally to the nasal cavities. At the hiatus semilunaris, beneath the frontal sinus entrance, they empty into the nasal cavity.

An infection could spread through the maxillary sinus if fluid leaks from the frontal sinus. Airflow and mucus outflow between the frontal sinus, anterior ethmoid air cells, and maxillary sinus are facilitated by the group of structures known as the osteo-meatal complex (OMC). It is located on the lateral wall of the nasal cavity and has several discrete borders. Important landmarks in the OMC are the ethmoid bulla, hiatus semilunaris, ethmoidal infundibulum, frontonasal duct (recess), and uncinate process.

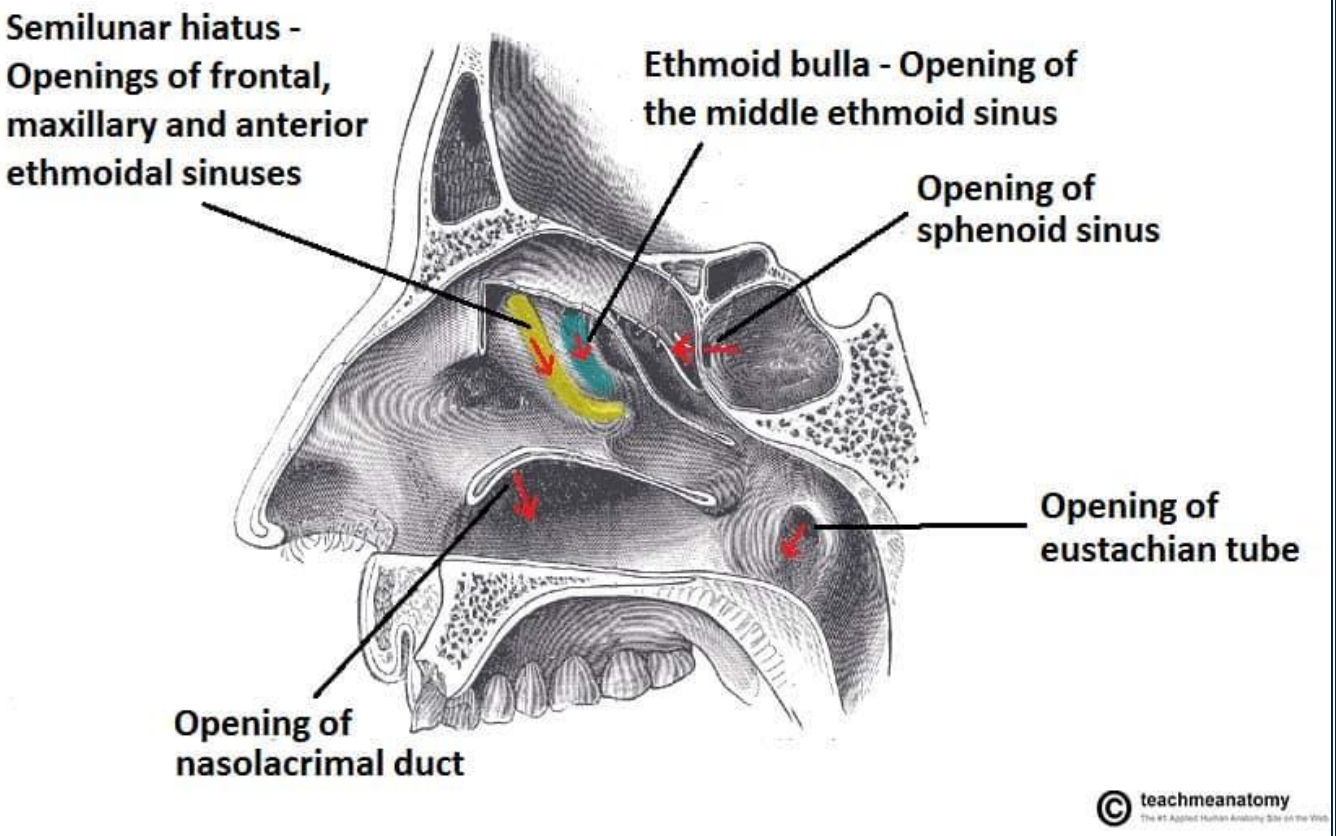

FIGURE 2: OSTEO-MEATAL COMPLEX (OMC)

Sphenoid Sinuses:

The body of the sphenoid bone contains the sphenoid sinuses. The spheno-ethmoidal recess, which is located supero-posterior to the superior concha, is where they open out into the nasal cavity.

Both the posterior ethmoidal nerve, a branch of the ophthalmic nerve, and branches of the maxillary nerve innervate them. They receive their blood supply from the maxillary arteries' pharyngeal branches. (29).

Lateral wall of nose:

Overlying the sinus ducts and turbinates that empty into the ostia are spiral-shaped mucosal folds known as the lateral walls. The turbinates' spiral shape is intended to enhance the inspired air's surface area.

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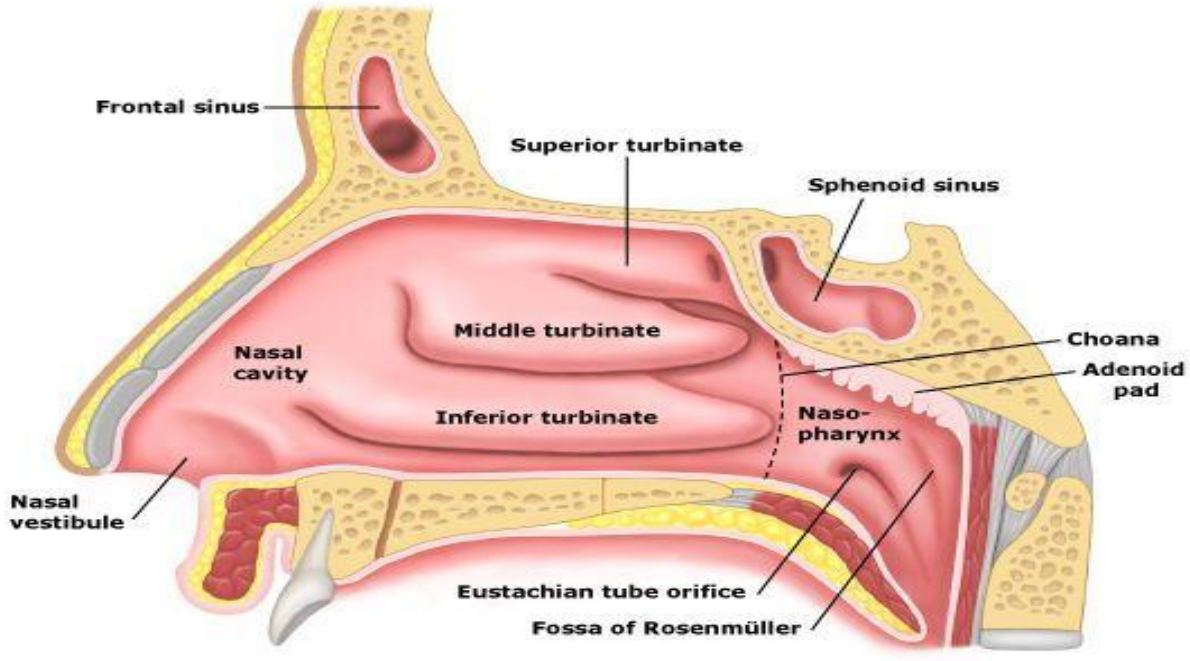

FIGURE 3: Lateral wall of nose

Physiology of paranasal sinuses

There is considerable disagreement over the role of the paranasal sinuses. Numerous roles have been proposed:

- Aiding in the battle against infection: Mucus produced by your sinuses flows into your nose and nasal cavity. The drainage eliminates bacteria that could otherwise cause illness. [30].

- Adding heat and moisture to the air you breathe: Your body's natural humidifier is your sinuses. They change cold, dry air into warmer, moist air that is better for your lungs and airways. [30].

- Lessening the weight of your skull: The light chambers balance out the weight of the bones that comprise your skull.

- In the event of a head injury, the paranasal sinuses act as "crumple zones" or "crash zones," absorbing a portion of the force. They shield vital organs, such as your brain, from direct trauma by taking some of the blow. [22].

- Your sinuses function as resonators, contributing to the distinctiveness of your voice. The walls of the paranasal sinus chamber reflect sound waves when you talk. This enhances the volume, warmth, and complexity of your voice compared to what it would otherwise sound like [30].

Introduction to Functional Endoscopic Sinus Surgery (FESS)

FESS has emerged as a revolutionary surgical technique for managing acute and chronic sinonasal diseases. This minimally invasive procedure aims to restore sinus ventilation and drainage pathways while preserving normal anatomy, thereby minimizing morbidity and improving patient outcomes. The ability of FESS to address complex sinonasal pathologies with precision has made it a cornerstone in modern otolaryngology [1, 2].

History and Evolution of FESS

The roots of FESS can be traced back to the early 20th century when surgical approaches to sinonasal diseases primarily involved open techniques. In 1901, Killian introduced the concept of endonasal surgery, which later became the foundation for endoscopic techniques. However, the modern iteration of FESS began to take shape in the 1970s, when Messerklinger and Stammberger emphasized the importance of preserving mucociliary function while addressing sinus disease. Their approach focused on the functional aspects of the sinuses, moving away from extensive tissue removal to precise targeting of diseased areas [1,2, 3].

By the 1980s, the advent of advanced endoscopic technology, including rigid nasal endoscopes and high-definition imaging systems, enabled surgeons to visualize the paranasal sinuses with unparalleled clarity. This technological advancement facilitated the widespread adoption of FESS as the standard of care for chronic rhinosinusitis and other sinonasal pathologies. The evolution of FESS has been further enriched by the incorporation of computer-assisted navigation systems, which enhance surgical precision and safety by providing real-time anatomical mapping [4]

PHARMACOLOGY:

Pharmacological Agents Used for Controlled Hypotension: An Overview

Several pharmacological agents have been employed to achieve controlled hypotension during FESS, including vasodilators, beta-blockers, alpha-2 adrenergic agonists, and opioids.

Vasodilators: Agents like sodium nitroprusside and nitroglycerin are effective in lowering blood pressure by dilating systemic arteries. However, their use is often limited by side effects such as cyanide toxicity (sodium nitroprusside) and tachyphylaxis [2,4].

Beta-blockers: By lowering peripheral resistance and cardiac output, short-acting medications such as labetalol and esmolol lower blood pressure. It has been demonstrated that these medications efficiently preserve hemodynamic stability with few adverse effects. [5,6, 9].

Alpha-2 Adrenergic Agonists: Because of its sedative, analgesic, and sympatholytic qualities, dexmedetomidine, a selective alpha-2 agonist, has become the go-to medication for managed hypotension. Studies demonstrate that dexmedetomidine provides superior hemodynamic stability, reduces intraoperative bleeding, and improves surgical field conditions compared to traditional agents [5,9].

Controlled hypotension is an integral anesthetic technique aimed at reducing intraoperative blood loss and improving surgical visibility by lowering mean arterial pressure (MAP). These agents are categorized into opioids inhalational agents, vasodilators, beta-blockers, and alpha-2 adrenergic agonists(7).

Opioids:

Fentanyl, a potent synthetic opioid, is often used as an adjunct in hypotensive anesthesia. Its ability to reduce heart rate and systemic vascular resistance contributes to blood pressure reduction while providing analgesia. Recent studies suggest that the combination of dexmedetomidine and fentanyl offers synergistic benefits, achieving better bleeding control and surgeon satisfaction than either agent alone [8,10].

Inhalational Agents

Inhalational anesthetics are commonly used to induce controlled hypotension due to their predictable dose-response relationship and ability to induce systemic vasodilation.

Isoflurane

Isoflurane, a halogenated volatile anesthetic, achieves controlled hypotension by causing dose-dependent vasodilation and a reduction in vascular resistance. It decreases MAP by relaxing vascular smooth muscles and lowering cardiac output. Additionally, isoflurane maintains cerebral blood flow autoregulation while reducing cerebral metabolic oxygen demand. However, it may cause myocardial depression, leading to concerns in patients with compromised cardiovascular function. Despite these drawbacks, it is effective in reducing intraoperative bleeding.

Sevoflurane: another widely used volatile anesthetic, is known for its rapid onset and offset due to its low blood-gas partition coefficient. It induces controlled hypotension by promoting vasodilation with minimal myocardial depression compared to isoflurane. Sevoflurane's ability to provide a smoother anesthetic induction and maintenance phase has made it a preferred agent for surgeries like

FESS. Its favorable pharmacokinetics and lower incidence of postoperative nausea and vomiting also contribute to its popularity [11].

Vasodilators

Vasodilators are potent pharmacological agents used to achieve controlled hypotension by directly relaxing vascular smooth muscle.

Sodium Nitroprusside

A strong, short-acting vasodilator that efficiently lowers preload and afterload is sodium nitroprusside. It works by producing nitric oxide, which causes vascular smooth muscle cells' guanylyl cyclase to become active and cause vasodilation, Sodium nitroprusside offers precise control over MAP but requires continuous hemodynamic monitoring due to potential side effects, such as cyanide toxicity and rebound hypertension. Its rapid onset and short half-life make it particularly useful in surgeries requiring swift blood pressure adjustments [5,6].

Nitroglycerine

Nitroglycerine primarily acts on venous capacitance vessels, reducing preload and to a lesser extent on arterial resistance. Its ability to selectively reduce venous tone makes it particularly useful in patients with coronary artery disease, as it improves myocardial oxygen supply. However, its hypotensive effects are less predictable compared to sodium nitroprusside, and tolerance may develop with prolonged use, limiting its efficacy during longer procedures [7,8].

Beta-Blockers

Beta-blockers are commonly used for controlled hypotension due to their ability to reduce cardiac output and sympathetic nervous system activity.

Esmolol:

Esmolol, a short-acting cardioselective beta-1 adrenergic receptor antagonist, effectively reduces MAP by decreasing heart rate and myocardial contractility. It is particularly useful in patients requiring intraoperative hemodynamic stability and is well-tolerated in those with cardiovascular comorbidities.

It is perfect for treatments like FESS because of its quick onset and brief duration of effect. where precise blood pressure control is critical [11,12].

Labetalol:

Labetalol, a non-selective beta-blocker with additional alpha-1 adrenergic receptor blocking properties, induces both arterial and venous dilation. This dual mechanism provides effective blood pressure control while maintaining organ perfusion. Although its prolonged duration of action may limit its use in procedures requiring rapid MAP adjustments, it remains a reliable option for achieving controlled hypotension in various surgical settings [11,12].

Alpha-2 Adrenergic Agonists:

Alpha-2 adrenergic agonists are increasingly favored for controlled hypotension due to their combined sedative, analgesic, and sympatholytic properties

Clonidine:

A partial alpha-2 adrenergic agonist, clonidine decreases sympathetic nervous system output, resulting in systemic vasodilation and reduced MAP. It also decreases anesthetic and opioid requirements, offering additional benefits during surgery. However, its slower onset and risk of rebound hypertension upon discontinuation limit its widespread adoption for controlled hypotension [13,14].

Dexmedetomidine:

History:

The effects of α 2 adrenergic receptor agonists include hypnotic, analgesic, sedative, anxiolytic, and sympatholytic actions. It has also been used in combination with local anesthetics to prolong regional blocks. Most commonly, dexmedetomidine is used for procedural sedation (eg, during awake craniotomy procedures or fiberoptic intubation), ICU sedation (eg,ventilated patients recovering from cardiac surgery), or as a supplement to general anesthesia to reduce the need for intraoperative opioids or to reduce the likelihood of emergence delirium (most often in children) after an inhalation anesthetic. It has also been used to treat alcohol withdrawal and the side effects of cocaine intoxication [31].

Physicochemical Characteristics

The S-enantiomer of medetomidine, dexmedetomidine, has long been utilized in veterinary medicine for sedation and pain relief. It is a full αh2-agonist due to its high specificity ratio for the α2-receptor (α2/α1 = 1600:1).

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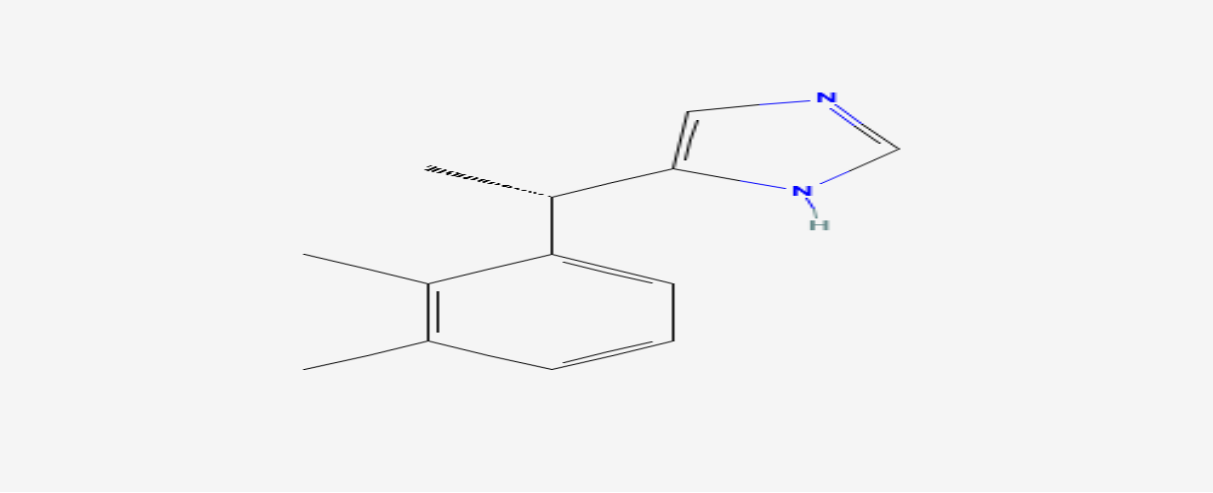

FIGURE 4: structure of dexmedetomidine

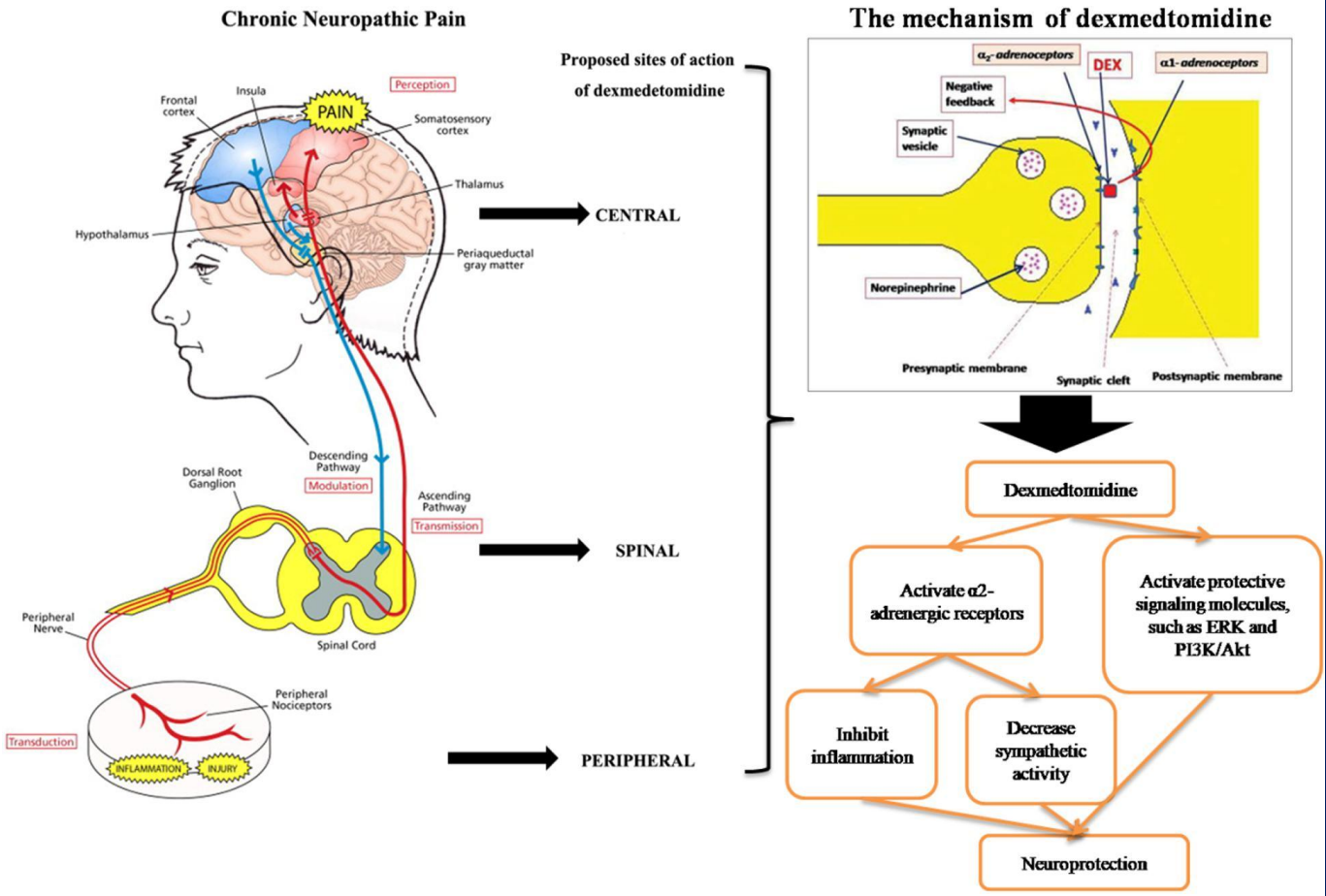

Figure 5: Mechanism of action of dexmedetomidine

An alpha agonist with sedative, anxiolytic, hypnotic, analgesic, and sympatholytic effects is dexmedetomidine. By blocking the brainstem's alpha receptors, it prevents norepinephrine from being released, which in turn inhibits central sympathetic outflow. Compared to alpha1, its selectivity for the alpha2 receptor is 1600 to 1. When compared to clonidine, another alpha agonist, which has a selectivity of 220 to 1, this selectivity is particularly noteworthy. It is unclear exactly how dexmedetomidine could lengthen the duration of a peripheral nerve block, although it is thought to be a perineural mechanism rather than a systemic or central mechanism that seems to do so by inhibiting the cation current [(31).]

Metabolism and Pharmacokinetics: With very little dexmedetomidine remaining unaltered in urine and feces, dexmedetomidine undergoes nearly total biotransformation. Direct glucuronidation and cytochrome P450-mediated metabolism are both involved in biotransformation. The three main metabolic processes of dexmedetomidine are N-methylation, hydroxylation (mostly mediated by CYP2A6), and direct N-glucuronidation to inactive metabolites. Clinical dosage schedules are unaffected by CYP2A6 polymorphisms. Dexmedetomidine has a concentration ratio of 0.66 between whole blood and plasma and is 94% protein bound.

Compared to healthy patients, people with varying degrees of hepatic impairment (Child-Pugh Class A, B, or C) had slower dexmedetomidine clearance. The mean clearance values for patients with mild, moderate, and severe hepatic impairment were 74%, 64%, and 53%, respectively, as compared to normal healthy individuals.

With a context-sensitive half-time that varies from 4 minutes following a 10-hour infusion to 250 minutes following an 8-hour infusion, dexmedetomidine has an elimination half-life of 2 to 3 hours. Age and renal impairment (creatinine clearance <30 mL/min) have no effect on its pharmacokinetics. Because there is less plasma protein binding in patients with severe renal impairment, the sedative effect may be higher [(23)].

ADMINISTRATION:

The normal dosage for anesthesia is 0.5–1.0 mcg/kg as a loading dose, followed by a continuous infusion of 0.2–0.7 μg/kg per hour, titrated to the appropriate sedation levels.

Higher infusion dosages can aid in achieving the intended outcome, as was

previously mentioned. In order to obtain the necessary prolongation, the amount of dexmedetomidine utilized as an adjunct for peripheral nerve block is typically 1 mcg/kg [32].

USES:

- Pretreatment with dexmedetomidine attenuates hemodynamic responses to tracheal intubation, decreases plasma catecholamine concentrations during anesthesia, decreases perioperative requirements for inhaled anesthetics and opioids, and increases the likelihood of hypotension
- Complete IV anesthesia is achieved without the associated respiratory depression when large doses of dexmedetomidine are given (loading dosage of 1 µg/kg IV, followed by 5–10 µg/kg/hour IV). Preserving breathing is one potential anesthetic technique for people with a difficult upper airway.

- More recent studies show that adding 0.5 µg/kg dexmedetomidine to lidocaine to induce IV regional anaesthesia improves anaesthesia quality and postoperative analgesia without causing adverse effects.

- Monitoring anesthesia care: Dosage: 0.7 µg/kg/min IV infusionThe indications for awake fibro optic intubation include: patients receiving LA, RA; pediatric patients undergoing MRI; awake craniotomies requiring patient cooperation; awake carotid end-arterectomy; cardiac catheterization studies in children; and a loading dose of 1µg/kg IV over 10 minutes and a maintenance dose of 0.2–0.7 µg/kg/hr.

- TiVA: Helpful when: Rapid waking is necessary; Access to the airway is pr

oblematic; and spontaneous ventilation must be preserved.

- Anesthesia maintenance: 0.5-0.8 µg/kg IV bolus, followed by 0.4 µg/kg/hr infusion Benefits: Optimizes opioids, lowers the need for narcotics in OSAS patients, and results in low postoperative pain scores

  .
- Treatment of narcotic, benzodiazepine, alcohol and recreational drugs withdrawal

ADVERSE EFFECTS: Dry mouth, bradycardia, hypotension, and hypertension are the most frequent side effects of dexmedetomidine. Stimulating alpha subtypes of receptors in vascular smooth muscles can cause hypertension. The loading dose can be skipped or administered slowly to prevent hypertension, which typically doesn't need to be treated. In addition to the reduction in central sympathetic outflow, presynaptic alpha receptor stimulation results in a decreased release of norepinephrine, which causes bradycardia and hypotension. Regardless of the administrative route, these are issues.[33].

FENTANYL: A synthetic opioid agonist derived from Phenyl piperidine . fentanyl is 75–125 times more potent than morphine as an analgesic. It was initially created by Janssen Pharmaceutica in 1960 and marketed as Sublimazeg, a citrate salt. Intravenous (IV), intramuscular (IM), transdermal (TD) as skin patches, intranasal (IN) as a volatile nasal spray, and intrathecal (IT) are the usual methods of administering fentanyl. Like the sublingual tablet, it is also offered as a buccal soluble thin film that dissolves in the mouth [31].

Pharmacokinetics: Compared to morphine, the duration of action of a single intravenous dose of fentanyl is shorter and its onset is faster. Because fentanyl is more lipid soluble than morphine, it can pass through the blood-brain barrier more easily, which accounts for its higher potency and quicker onset of action. As a result, unlike morphine, fentanyl plasma concentrations exhibit a strong correlation with CSF concentrations. A single dose of fentanyl also has a brief duration of action because it quickly redistributes to inactive tissue locations including adipose and skeletal muscles, which lowers the drug's plasma concentration.

With an estimated 75% of the initial fentanyl dose going through first-pass pulmonary absorption, the lungs also function as a sizable inactive storage site. The pharmacokinetic profile of fentanyl may be significantly influenced by this nonrespiratory function of the lungs, which also restricts the initial quantity of medication that enters the systemic circulation [(31)].

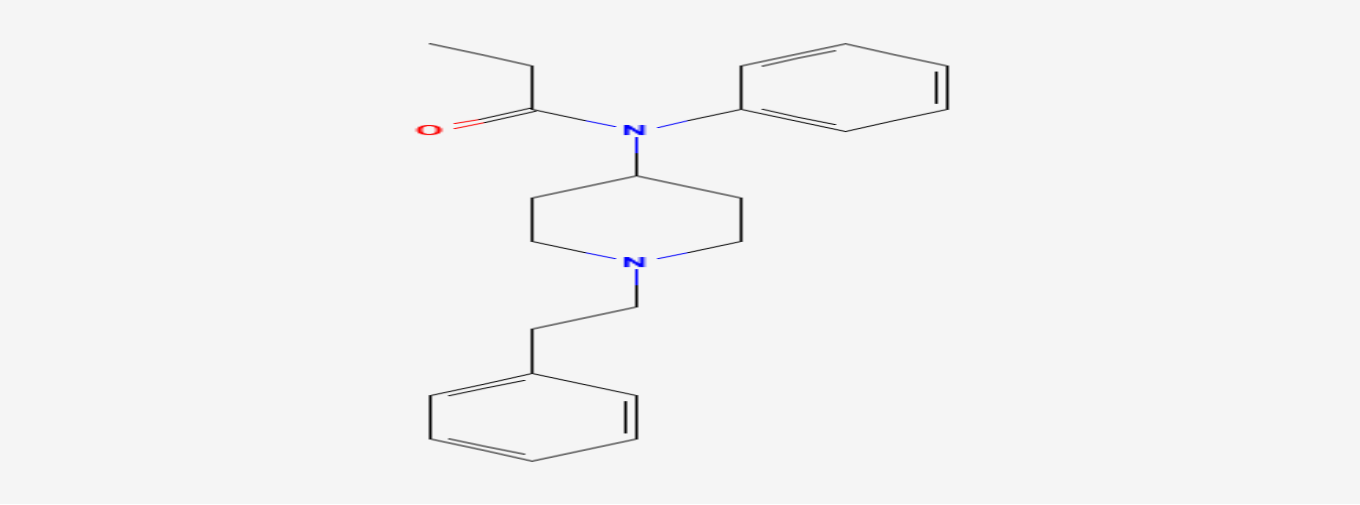

FIGURE 6: Structure of fentanyl

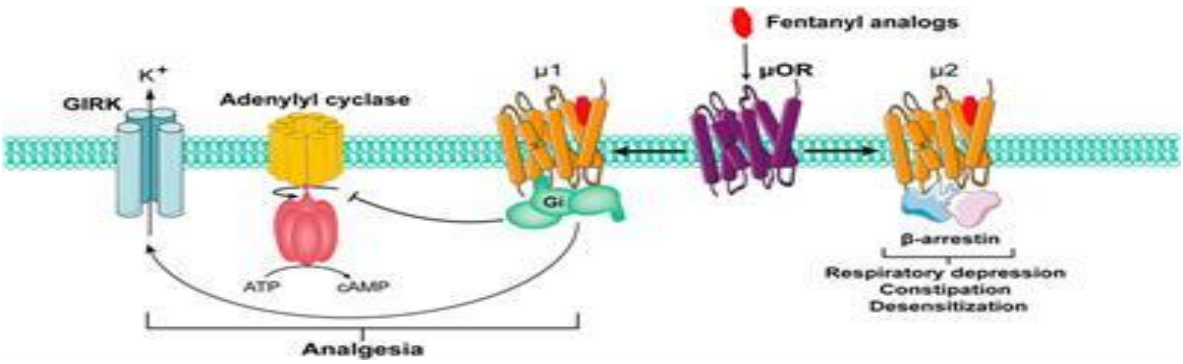

FIGURE 7: FENTANYL MECHANISAM OF ACTION

Mechanisam of action:

Fentanyl and other opioids are comparable. A subclass of opioid receptor systems in the body are targeted by fentanyl molecules; many of these receptor systems are located in the brain within specific neuroanatomical structures and are specifically involved in the regulation of emotions, pain, and reward—the substance's notoriously addictive qualities

It is an opioid agonist that is Mu-selective biochemically. It can, however, activate additional opioid system receptors, including delta and possibly kappa receptors. Thus, analgesia results from the activation of these receptors, especially the Mu-receptors. Additionally, the reward regions of the brain exhibit elevated levels of the neurotransmitter dopamine (Da), which is commonly linked to drug addiction and produces the classic exhilaration and relaxing effects. The CYP450 enzyme system, more especially CYP3A4, is responsible for the hepatocellular metabolism of fentanyl. The half-life of the medication is three to seven hours. 75% of excretion occurs in urine, while 9% occurs in feces (33).

Metabolism: Nor fentanyl, Hydroxy proprionyl -fentanyl, and Hydroxy proprionyl - nor fentanyl are the products of the extensive metabolism of fentanyl via N-demethylation. The main metabolite of fentanyl in humans is nor fentanyl, which shares structural similarities with normeperidine. After a single intravenous injection of fentanyl, it is eliminated via the kidneys and remains detectable in the urine for 72 hours. The amount of fentanyl that is eliminated unaltered in the urine is less than 10%.Because it is a substrate for hepatic P-450 enzymes (CYP3A), fentanyl is more prone than alfentanil to cause drug interactions that interfere with enzyme activity.

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Elimination Half-Time:

Fentanyl has a longer elimination half-time than morphine, despite the clinical perception that it acts quickly. Compared to morphine, which is less lipid-soluble, fentanyl has a higher Vd because it is more lipid-soluble and enters tissues more quickly. Fentanyl spreads quickly from plasma to highly vascularized tissues (heart, brain, and lungs) following an intravenous bolus. In less than five minutes, about 80% of the administered dosage departs the plasma. Slow absorption from inactive tissue locations maintains fentanyl plasma concentrations, which explains the long-lasting effects of the medication that coincide with the extended elimination half-time.

Because Vd is unchanged compared to younger adults, elderly patients have a longer elimination half-time for fentanyl, which is caused by slower opioid clearance.

Given that fentanyl is heavily bound (79%–87%) to protein, this alteration might be the result of age-related declines in hepatic blood flow, microsomal enzyme activity, or albumin synthesis. These factors suggest that older patients will likely experience the effects of a particular fentanyl dosage for a longer duration than younger individuals [33].

Administration

Fentanyl comes in an injectable form of 50 mcg/ml. Dosing is as follows by indication:

30 to 60 minutes prior to surgery, provide 50 to 100 mcg IV/IM as a single dose for preoperative analgesia; patients 65 and older may require a lower dosage. Adjunct for anaesthesia: 2–50 mcg/kg/dose IV for one dose, 2–20 mcg for low dosage, and 20–50 mcg for high dosage. For people 65 and older, low dosage is preferred.

50 to 100 mcg IV/IM as a single regional anaesthesia adjunct; patients 65 and older may require a lower dosage. [34].

General anaesthesia:

- For a single IV dose, use 20–50 mcg/kg; patients 65 and older may require lower dosages. Use in conjunction with oxygen and a muscle relaxant for high-risk patients having complex surgical operations; dosages of up to 150 mcg/kg/dose may be required.

Post-operative pain control:

As needed, administer 50–100 mcg IV/IM every 1–2 hours; alternatively, administer 0.5–1.5 mcg/kg/hour IV. When treating adults 65 and older, use a lesser dosage.

PCA (patient-controlled analgesia): start with the lowest effective dose for the shortest effective time; consult institutional protocols; provide 10 to 20 mcg IV every 6 to 20 minutes as needed [34].

Moderate to severe acute pain (off-label):

As needed, administer 1 to 2 mcg/kg intra nasally every hour; a 100 mcg maximum dose is permitted. For the shortest effective period, use the lowest effective dose.

Clinical Uses

- There are many different dosages of fentanyl used in clinical settings. Larger doses of fentanyl may be given as an adjuvant to inhaled anaesthetics in an effort to reduce circulatory reactions to abrupt changes in the amount of surgical stimulation or direct laryngoscopy for intubation, for instance. Low dosages of fentanyl are injected to provide analgesia.

  .

- The Amount of opioids needed to induce analgesia in the postoperative period may be reduced if an opioid, such as fentanyl, is injected prior to painful surgical stimulation.

- The following doses of isoflurane or desflurane with 60% nitrous oxide required to inhibit the sympathetic nervous system response to surgical stimulation are reduced when fentanyl is administered five minutes prior to induction.

- The main reasons that large doses of fentanyl as the only anaesthetic have stable hemo dynamics are that (1) there are no direct myocardial depressive effects, (2) there is no histamine release, and (3) the stress reactions to surgery are suppressed

  .
- For treatment of postoperative pain.

- Cancer patients who are in pain may self-administer this opioid as much as is required to achieve a desired degree of analgesia.

- Parenteral opioids are used less frequently for postoperative analgesia when transdermal fentanyl devices are given before anaesthesia is induced and remained in place for 24 hours

- Plasma fentanyl concentrations peak in around 18 hours when transdermal fentanyl preparations delivering 75–100µg/hr are applied, and they typically stay constant while the patch is in place.

Side Effects: Fentanyl side effects include euphoria, confusion, respiratory depression (which can lead to arrest if severe and untreated), drowsiness, nausea, visual disturbances, dyskinesia, hallucinations, delirium, a subset of the latter known as "narcotic delirium," constipation, narcotic ileus, muscle rigidity, constipation, addiction, and even death. The harmful effects of fentanyl can be exacerbated by alcohol and other drugs (such cocaine and heroin), creating complicated clinical scenarios that can be difficult to address. When taken together, these medications produce adverse effects that worsen the patient's prognosis [33].

Drug Interactions: Fentanyl analgesic concentrations significantly increase the effects of benzodiazepines and reduce the need for propofol dosages. Opioid-benzodiazepine synergy's advantages for preserving patient comfort are carefully weighed against the combination's potentially dangerous depressive side effects in clinical practice. Both hypnosis and ventilation depression are significantly enhanced by the opioid-benzodiazepine combination.

Assessment of Surgical Field Conditions Using Boezaart Grading Scale

The **Boezaart grading scale** is a widely used tool to objectively assess the quality of the surgical field during FESS. This grading system evaluates the extent of bleeding at the surgical site on a scale from 0 to 5:

- **Grade 0**: No bleeding.
- **Grade 1**: Slight bleeding; no suction required.
- **Grade 2**: Slight bleeding; occasional suction required.
- **Grade 3**: Slight bleeding; frequent suction required.
- **Grade 4**: Moderate bleeding; frequent suction required, and the bleeding threatens the surgical field.
- **Grade 5**: Severe bleeding; constant suction required, and surgery is impossible due to bleeding [5].

A Boezaart grade of 0–2 is considered optimal for FESS. Studies indicate that anesthetic agents like dexmedetomidine and fentanyl improve surgical field conditions, reducing bleeding and facilitating surgeon efficiency. In clinical trials, the use of dexmedetomidine alone or in combination with fentanyl consistently resulted in lower Boezaart grades compared to traditional anesthetic regimens [6,7].

Impact of Anesthetic Techniques on Surgeon Satisfaction

Surgeon satisfaction in FESS is closely linked to surgical field quality, operative time, and intraoperative hemodynamic stability. Anesthetic techniques that minimize bleeding, reduce the need for suctioning, and provide stable MAP levels are highly valued. Research highlights that surgeons report higher satisfaction scores when dexmedetomidine is used due to its ability to achieve controlled hypotension and reduce sympathetic responses. Fentanyl, when combined with dexmedetomidine, enhances these effects, further improving surgeon satisfaction **[8,9]**.

Surgeon satisfaction also correlates with the avoidance of adverse events like bradycardia, excessive hypotension, or delayed recovery, which can complicate the surgical process. Anesthetic regimens that balance efficacy with safety are thus critical in optimizing outcomes for both patients and surgeons **[10]**.

MATERIALS AND METHODS

Source of Data

The study was conducted in the Department of Anaesthesiology, BLDE (Deemed to be University), Shri B.M. Patil Medical College, Hospital and Research Centre, Vijayapura. Patients undergoing elective Functional Endoscopic Sinus Surgery (FESS) was served as the study population. Data was collected prospectively during the study period.

Method of Collection of Data

Study Design

This was a prospective, randomized, controlled study. A total of 106 patients were recruited and assigned into two equal groups (53 patients per group) using a computerized random number table to ensure randomization and reduce selection bias.

Study Period

The study was conducted over one and a half years (2023–2025).

Sample Size Determination

The sample size calculation is based on the anticipated mean systolic blood pressure (SBP) at 30 minutes post-induction:

- **Group D (Dexmedetomidine)**: Mean SBP = 85.73 ±13.854.
- **Group DF (Dexmedetomidine + Fentanyl)**: Mean SBP = 91.37 ±10.213.

Using a power of 80% and a level of significance of 5% (two-sided), the minimum required sample size was 53 per group, giving a total of 106 patients. This ensures that the study had sufficient power to detect clinically significant differences between the two groups.

Study Population

The study population consist of adult patients undergoing elective FESS. These patients was matched for age, weight, and sex to ensure comparability between groups.

Inclusion Criteria

1. Patients classified as ASA Grade 1 and 2.
2. Patients Aged between 18–60 years.
3. Patients Scheduled for elective FESS surgery.

Exclusion Criteria

1. Pregnant women.
2. Hemodynamically unstable patients.
3. Heart rate < 55 bpm.
4. Patients on beta-blockers.

Randomization

Patients were allocated into two groups using a computerized randomization table:

- **Group D (Dexmedetomidine)**:Alloted Patients were received 0.5 µg/kg/hr of INJ Dexmedetomidine infusion, starting 10 minutes before induction and

continued throughout the procedure until 10 minutes before reversal of the muscle relaxant.

- **Group DF (Dexmedetomidine + Fentanyl)**: Allotted Patients were received a combination of 0.5 µg/kg/hr of INJ Dexmedetomidine infusion and 0.5 µg/kg/hr of INJ Fentanyl infusion, starting 10 minutes before induction and continued until 10 minutes before reversal of the muscle relaxant.

Pre-Anesthetic Evaluation

All patients underwent a detailed pre-anesthetic evaluation, including:

1. **Medical History**:
    - Underlying illnesses.
    - History of previous surgeries and anesthesia exposure.
    - Any history of hospitalization.
2. **Physical Examination**:
    - General physical condition.
    - Vital signs: Heart rate (HR), blood pressure (BP), respiratory rate (RR).
    - Height and weight measurements.
3. **Systemic Examination**:Respiratory, cardiovascular, central nervous, and vertebral systems.
4. **Airway Assessment**:Mallampati grading for airway evaluation.

5.Investigations: Investigations required in this study are routine standardized procedures like CBC , BT CT, HIV, HbsAg,cxray, ECG , RBS.

6.Patient Counseling:

- The procedure and anesthetic plan was explained to the patient and their attender.

Methodology

The methodology involved dividing patients into two treatment groups and administering the respective anesthetic regimen as described:

1. **Group D (Dexmedetomidine)**:
    - A continuous infusion of Dexmedetomidine (0.5 µg/kg/hr) was administered throughout the procedure, starting 10 minutes before induction and stopping 10 minutes before reversal of the muscle relaxant.
2. **Group DF (Dexmedetomidine + Fentanyl)**:
    - A continuous infusion of Dexmedetomidine (0.5 µg/kg/hr) combined with Fentanyl (0.5 µg/kg/hr) was administered under the same timeline as Group D.

Intraoperative Monitoring

During the procedure, the following parameters were closely monitored at pre-defined intervals:

1. Heart Rate (HR).
2. Systolic Blood Pressure (SBP).
3. Diastolic Blood Pressure (DBP).
4. Mean Arterial Pressure (MAP).

These parameters were recorded:

- At baseline.

- 10 minutes after starting the infusion.
- After induction and intubation.
- At 1, 3, 5, 10 minutes, and every 15 minutes throughout the procedure.
- During the extubation period and postoperatively.

Postoperative Parameters

- First dose of rescue analgesia (IV Paracetamol) was provided depending on VAS (Visual Analogue Scale) pain scores.

Statistical Analysis

Data was analyzed using SPSS (Version 20). The results was presented as Mean ± SD, counts, percentages, and diagrams. Statistical tests include:

1. **Independent t-test** for normally distributed continuous variables.
2. **Mann-Whitney U test** for non-normally distributed variables.
3. **Repeated measures ANOVA/Friedman test** for within-group comparisons over time.
4. **Chi-square test** for categorical data.
5. **$P < 0.05$** was considered statistically significant.

Ethical Considerations

1. The study protocol was reviewed and approved by the **Institutional Ethics Committee**.
2. **Informed consent** was obtained from all participants prior to inclusion.
3. Confidentiality of patient data was maintained throughout the study **.**

OBSERVATIONS AND RESULTS

Table 1: Demographic Distribution of Study Population

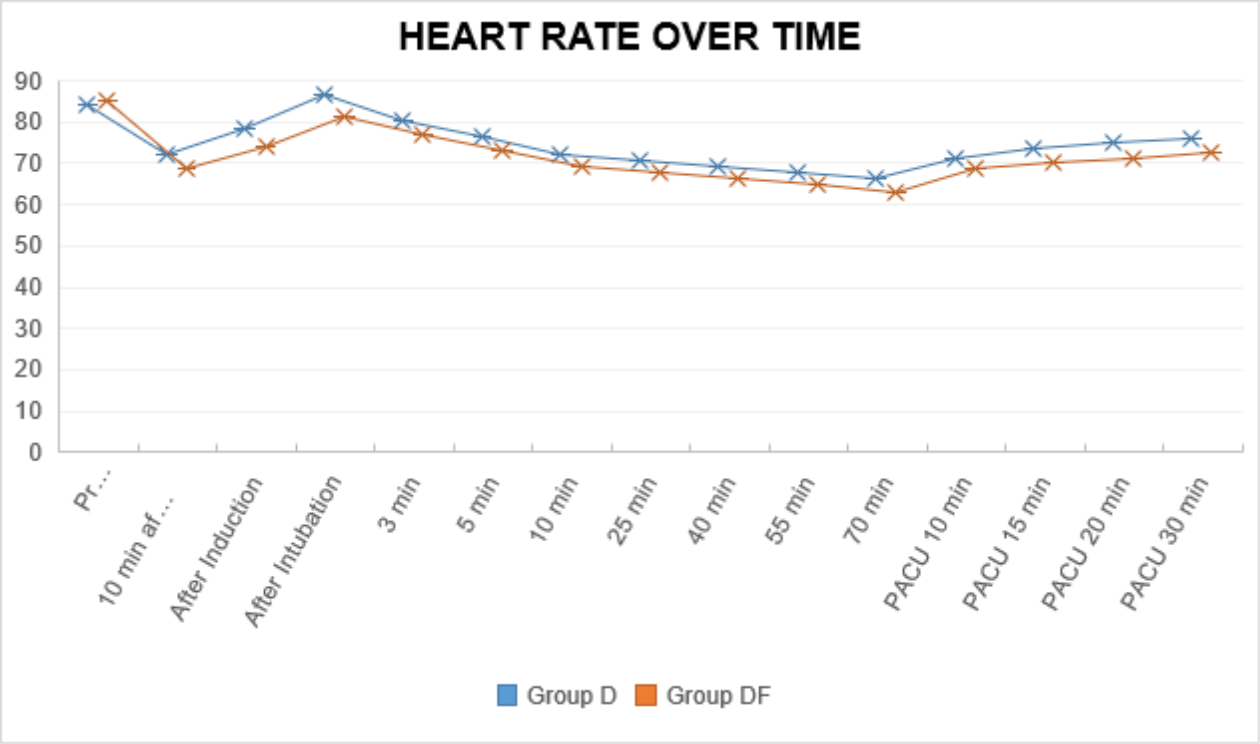
Parameter	Group D (Dexmedetomidine)	Group DF (Dexmedetomidine + Fentanyl)	P-Value
Number of Patients (n)	53	53	-
Mean Age (years) ± SD	42.32 ± 14.13	40.73 ± 14.53	0.569
Age Range (years)	18–60	18–60	-
Male (%)	30 (56.6%)	28 (52.8%)	0.8562
Female (%)	23 (43.4%)	25 (47.2%)	
ASA Grade I (n, %)	31 (58.5%)	29 (54.7%)	0.7835
ASA Grade II (n, %)	22 (41.5%)	24 (45.3%)	

Both groups were comparable in terms of age, gender, and ASA physical status, with no statistically significant difference ($p > 0.05$), ensuring baseline homogeneity for clinical comparison.

Table .2 Heart Rate (bpm) – Intraoperative and PACU Observations

Time Interval	Group D (Dexmedetomidine)	Group DF (Dex + Fentanyl)	P-Value
Prior to Induction	84.3 ± 6.2	85.1 ± 6.0	0.501
10 min After Infusion	72.1 ± 5.9	68.7 ± 5.1	0.001
After Induction	78.4 ± 5.6	74.2 ± 5.2	0.0001
After Intubation (1 min)	86.5 ± 6.0	81.3 ± 5.6	0.0001
3 min	80.2 ± 5.2	76.8 ± 4.9	0.003
5 min	76.5 ± 5.0	73.2 ± 4.7	0.001
10 min	72.3 ± 4.8	69.5 ± 4.3	0.0009
25 min	70.8 ± 4.6	68.0 ± 4.0	0.001
40 min	69.5 ± 4.4	66.3 ± 3.9	0.0001
55 min	67.9 ± 4.3	64.7 ± 3.8	0.0009
70 min	66.2 ± 4.1	63.1 ± 3.6	0.000
PACU 10 min	71.4 ± 5.2	68.9 ± 4.7	0.0002
PACU 15 min	73.6 ± 5.4	70.4 ± 4.5	0.01
PACU 20 min	74.9 ± 5.1	71.3 ± 4.6	0.0001
PACU 30 min	76.2 ± 4.9	72.5 ± 4.2	0.0004

Both groups had a consistent reduction in heart rate after infusion, with Group DF showing a greater reduction across all time points**.** Notably, the heart rate at 10 minutes post-infusion was 72.1 ± 5.9 bpm in Group D and 68.7 ± 5.1 bpm in Group DF. The difference was statistically significant at several intervals, with p-values ranging from 0.0001 to 0.501**,** especially at peak surgical stress points (e.g., intubation, surgical dissection). This implies **better sympathetic suppression and hemodynamic control** in the Dexmedetomidine + Fentanyl group.

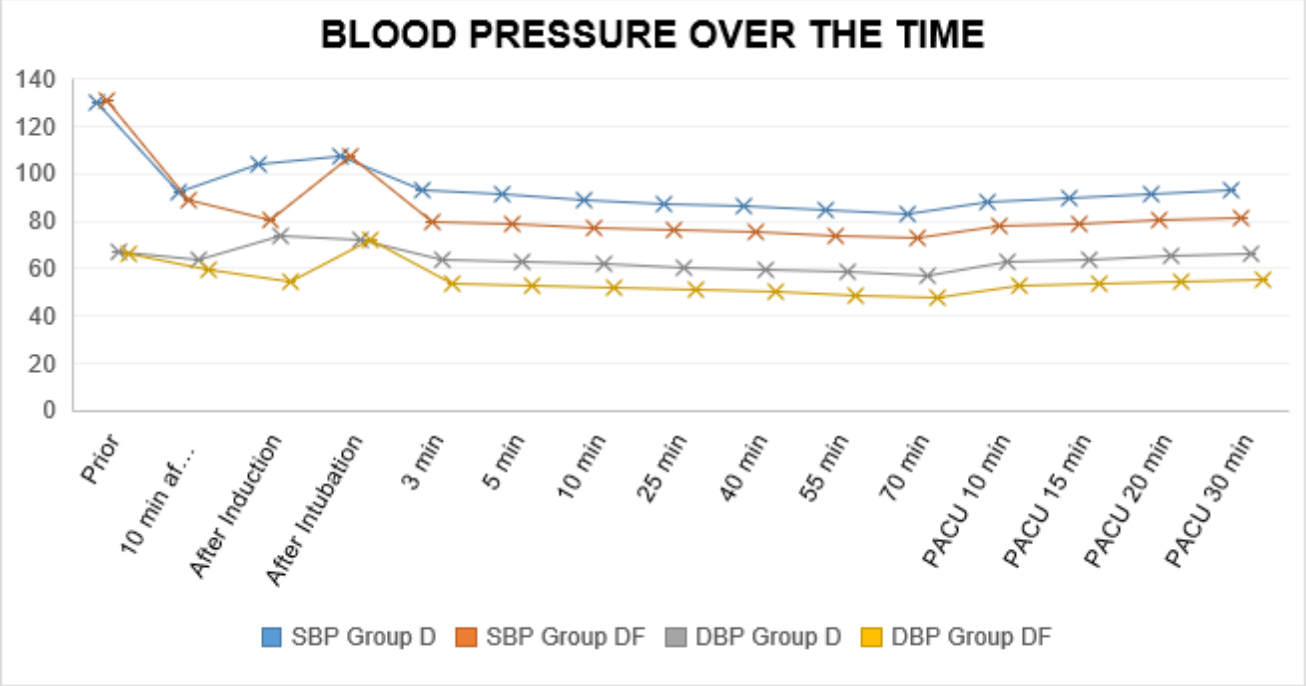


Graph.1 A line graph representation of HR (bpm) – Intraoperative and PACU Observations

Table: 3 Systolic and Diastolic BP – Intraoperative and PACU Observations

Time Interval	SBP Group D	SBP Group DF	P-Value	DBP Group D	DBP Group DF	P-Value
Prior to Induction	130.2 ± 12.7	130.9 ± 12.9	0.778	66.7 ± 5.5	65.8 ± 4.7	0.367
10 min After Infusion	92.4 ± 6.5	89.1 ± 5.6	0.006	63.5 ± 5.8	59.1 ± 5.6	0.0001
After Induction	103.6 ± 5.9	80.2 ± 3.4	0.001	73.3 ± 5.5	54.3 ± 3.4	0.0001
After Intubation (1 min)	107.3 ± 4.7	110.3 ± 5.7	0.003	71.9 ± 4.6	76.9 ± 5.6	0.002
3 min	92.9 ± 6.7	79.8 ± 3.0	0.001	64.0 ± 5.9	53.8 ± 3.0	0.001
5 min	91.0 ± 6.1	78.6 ± 2.8	0.001	62.7 ± 5.6	52.6 ± 2.9	0.001
10 min	88.9 ± 6.2	77.4 ± 2.6	0.001	61.8 ± 5.4	51.7 ± 2.8	0.001
25 min	87.4 ± 6.1	76.3 ± 2.7	0.001	60.3 ± 5.3	50.7 ± 2.7	0.001
40 min	86.0 ± 6.3	75.1 ± 2.6	0.001	59.1 ± 5.4	49.8 ± 2.9	0.001
55 min	84.5 ± 6.0	73.9 ± 2.5	0.001	58.2 ± 5.2	48.9 ± 2.7	0.001
70 min	83.1 ± 5.8	72.8 ± 2.4	0.001	57.0 ± 5.1	48.0 ± 2.6	0.001
PACU 10 min	88.4 ± 6.5	77.6 ± 3.1	0.001	62.5 ± 5.7	52.5 ± 3.2	0.001
PACU 15 min	90.1 ± 6.6	79.0 ± 3.2	0.001	63.7 ± 5.9	53.5 ± 3.3	0.001
PACU 20 min	91.3 ± 6.4	80.3 ± 3.3	0.001	64.9 ± 6.0	054.3 ± 3.2	0.001
PACU 30 min	92.8 ± 6.2	81.7 ± 3.5	0.001	66.1 ± 5.8	55.6 ± 3.1	0.001

Group DF consistently maintained lower SBP and DBP during and after surgery, with statistically significant differences observed throughout ($p < 0.01$), reflecting better hemodynamic suppression and surgical field conditions.

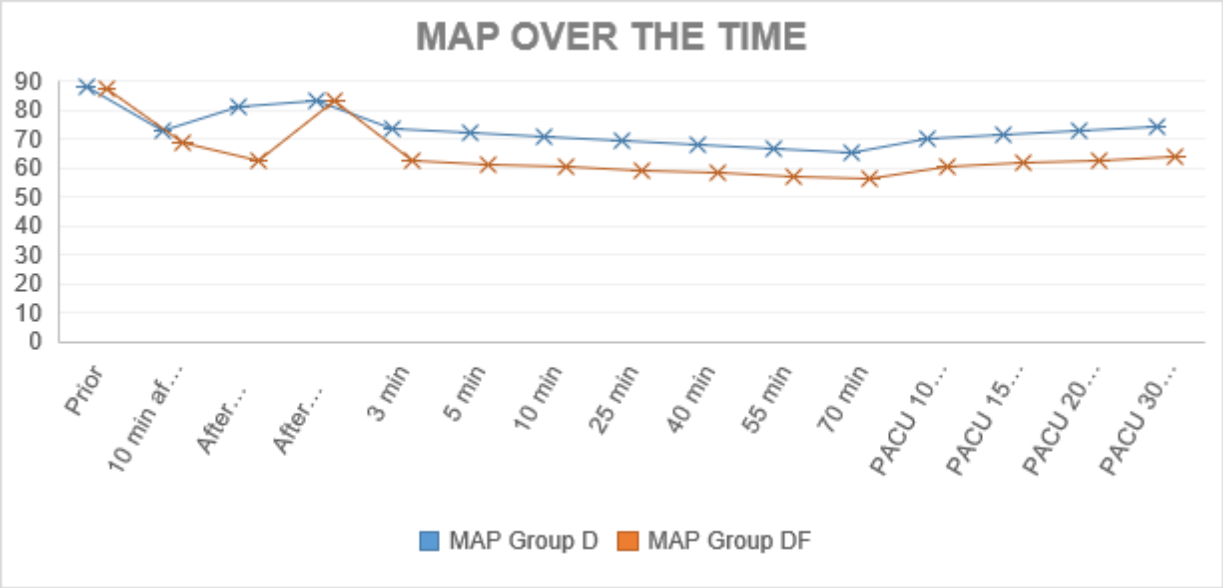


Graph.2 A line graph representation of blood pressure over time

Table: 4 Mean Arterial Pressure (MAP) – Intraoperative and PACU Observations

Time Interval	MAP Group D	MAP Group DF	P-Value
Before Induction	88.1 ± 4.0	87.5 ± 3.7	0.427
10 min After Infusion	73.0 ± 6.0	69.1 ± 5.6	0.0007
After Induction	81.2 ± 3.1	62.9 ± 3.1	0.0001
After Intubation (1 min)	83.5 ± 4.5	73.5 ± 4.5	0.001
3 min	73.6 ± 6.2	62.6 ± 2.7	0.001
5 min	72.1 ± 5.5	61.4 ± 2.6	0.001
10 min	70.8 ± 5.4	60.3 ± 2.6	0.001

Time Interval	MAP Group D	MAP Group DF	P-Value
25 min	69.4 ± 5.2	59.3 ± 2.6	0.001
40 min	68.1 ± 5.3	58.3 ± 2.7	0.001
55 min	66.8 ± 5.1	57.3 ± 2.5	0.001
70 min	65.6 ± 4.9	56.2 ± 2.5	0.001
PACU 10 min	70.2 ± 5.8	60.7 ± 2.9	0.001
PACU 15 min	71.7 ± 6.0	61.7 ± 3.0	0.001
PACU 20 min	73.0 ± 6.1	62.8 ± 2.9	0.001
PACU 30 min	74.3 ± 5.9	63.9 ± 2.8	0.001



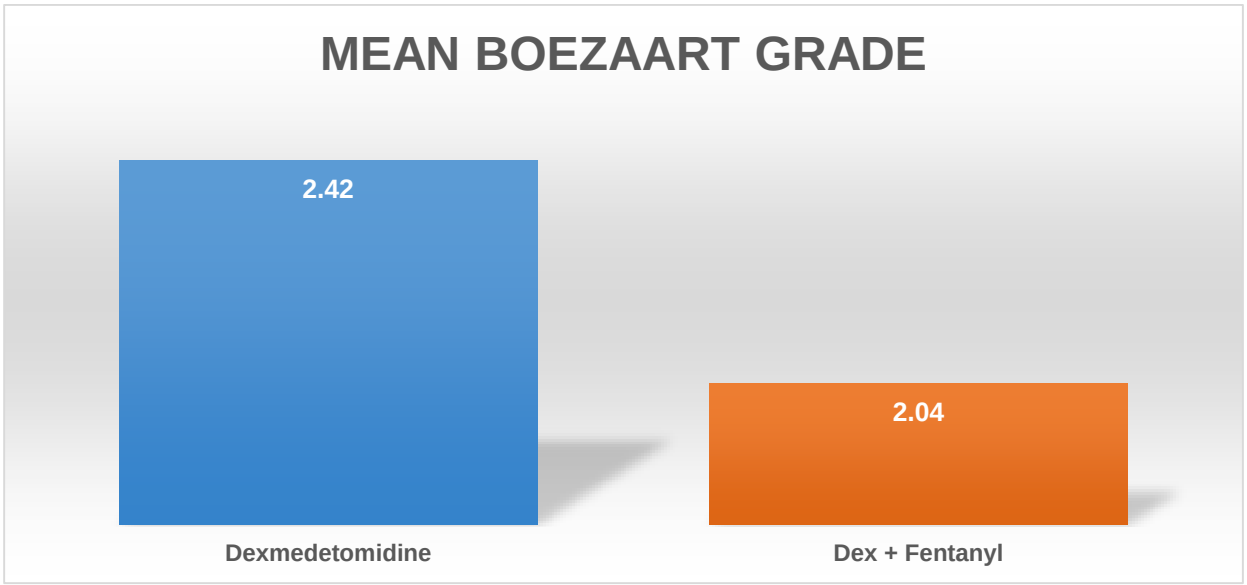
Graph.3 A line graph representation of MAP over time

Group DF consistently maintained lower MAP during and after surgery, with statistically significant differences observed throughout ($p < 0.01$), reflecting better hemodynamic suppression and surgical field conditions**.**

Table: 5 Boezaart Grading Scale (0–5)

Group	Mean Boezaart Grade (± SD)
Group D (Dexmedetomidine)	2.42 ± 0.8
Group DF (Dexmedetomidine + Fentanyl)	2.04 ± 0.6
T-test t-2.76 at sig 0.006 (S)	

Group DF has the lowest scores compared to group D, which indicates optimal surgical field visualization is observed in DF group.

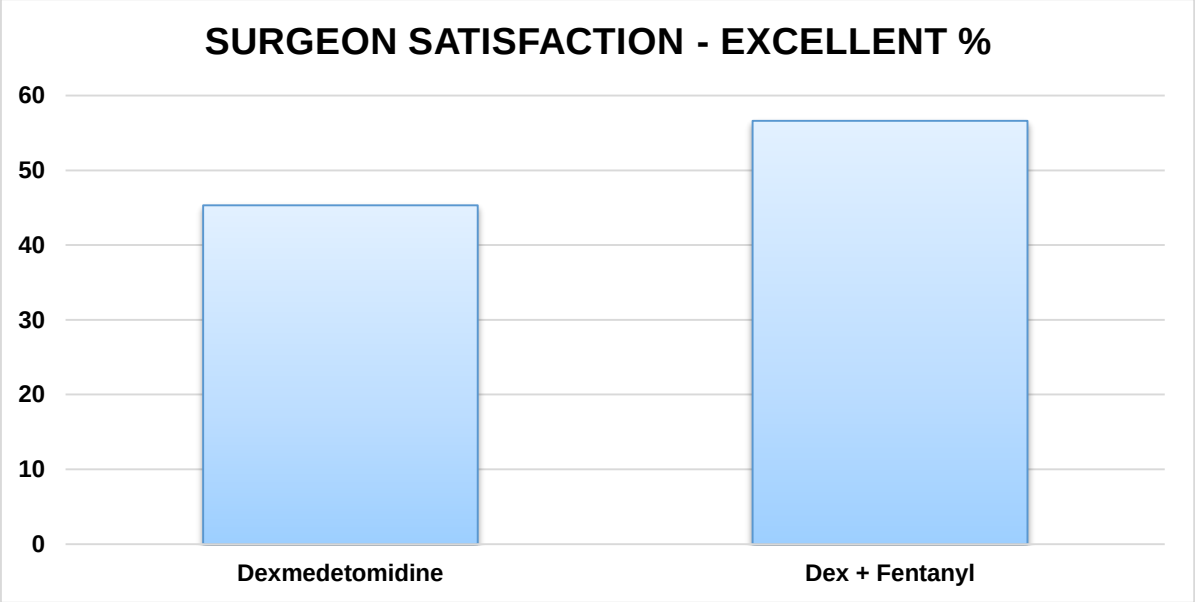


Graph.4 A bar graph representation of the Boezaart Grading Scale (0–5) distribution

Table 6: Surgeon Satisfaction – Excellent (%)

Group	Surgeon Satisfaction – Excellent (%)
Group D (Dexmedetomidine)	24(45.3%)
Group DF (Dexmedetomidine + Fentanyl)	30(56.6%)

Surgeons rated satisfaction significantly higher in the combination group, correlating with clearer fields and stable vitals.

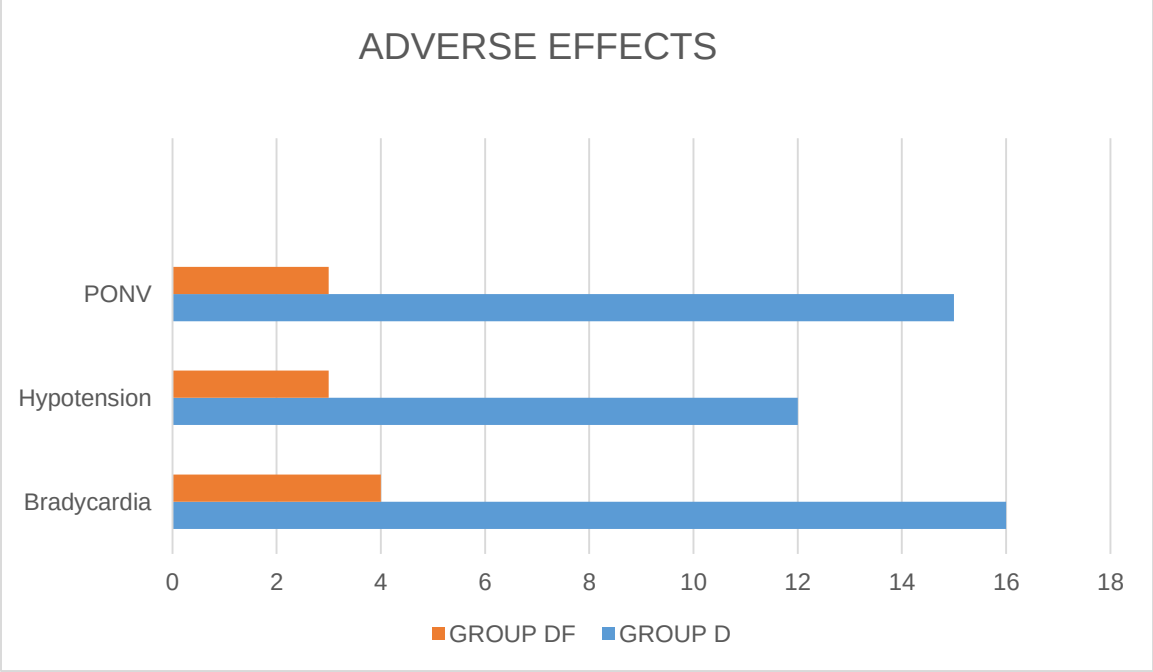


Graph.5 A bar graph representation of Surgeon Satisfaction – Excellent

Table 7: Intraoperative Adverse Events

Adverse Event	Group D (n)	Group DF (n)	P Value
Bradycardia	16	04	0.002
Hypotension	12	03	0.012
PONV (Post-op Nausea & Vomiting)	15	03	0.019

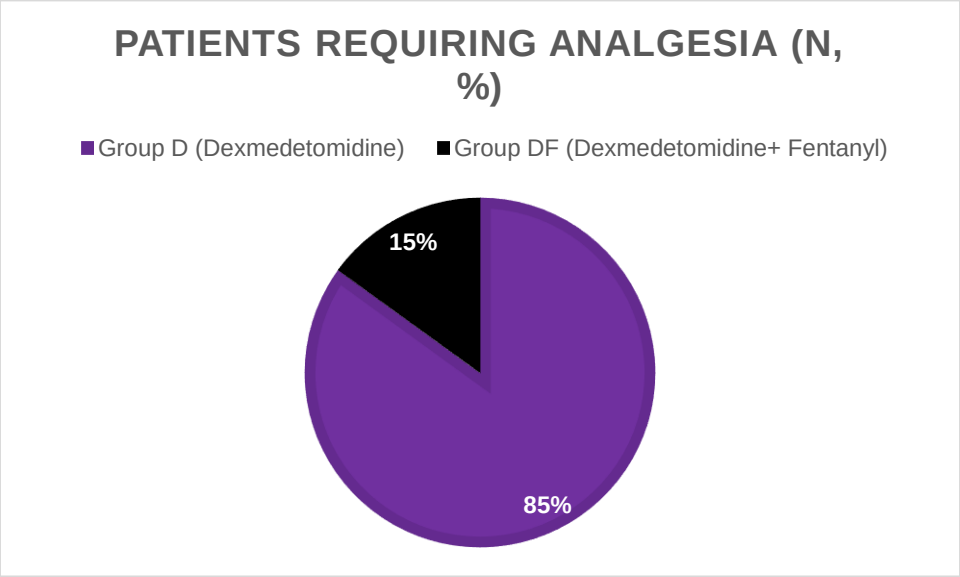
Adverse events were **lower in Group DF**, suggesting improved hemodynamic tolerance when fentanyl is combined with dexmedetomidine.



Graph.6 A column bar graph representation of adverse effects distribution

Table 8: Postoperative Analgesia Requirement (Inj. Paracetamol 1g).

Group	Patients Requiring Analgesia (n, %)
Group D (Dexmedetomidine)	17
Group DF (Dexmedetomidine+ Fentanyl)	03
Chi-square test <0.05 (S)	



Graph.7 A pie chart representation of patients requiring analgesia

Group DF had a lower need for rescue analgesia**,** confirming the better sustained analgesic effect of the combination.

DISCUSSION

Functional Endoscopic Sinus Surgery (FESS) demands optimal surgical conditions for success, which hinges significantly on a clear, bloodless operative field and stable intraoperative hemodynamics. Given the highly vascular nature of the sinonasal mucosa, achieving controlled hypotension becomes a pivotal anesthetic goal. Over the years, various agents have been employed to achieve this, including vasodilators, beta-blockers, and more recently, alpha-2 adrenergic agonists such as dexmedetomidine and potent opioids like fentanyl. The present study undertook a comprehensive evaluation of dexmedetomidine alone (Group D) versus a combination of dexmedetomidine with fentanyl (Group DF) to assess their comparative efficacy and safety in producing optimal hypotensive anesthesia during FESS [15-17].

Controlled hypotension, classically defined as a mean arterial pressure (MAP) reduction of 30% from baseline or an absolute MAP of 50–65 mmHg, is known to reduce intraoperative bleeding, enhance the surgical field, and improve operative efficiency and surgeon satisfaction. However, balancing effective hypotension without compromising vital perfusion remains a clinical challenge. Dexmedetomidine, a selective alpha-2 agonist, offers multiple advantages such as sedation, analgesia, and sympatholysis but is sometimes limited by bradycardia and hypotension. Fentanyl, a potent synthetic opioid, suppresses the sympathetic response and stabilizes hemodynamics without direct vasodilation. The current investigation explores the hypothesis that their combination might synergize to provide superior intraoperative conditions and fewer complications [16,17].

The discussion below analyzes findings across various physiological parameters including heart rate (HR), systolic and diastolic blood pressure (SBP and DBP),

MAP, surgical field quality, surgeon satisfaction, adverse event profile, and postoperative analgesia. These are compared and contrasted with findings from existing literature to contextualize the observations and reinforce the study's conclusions.

The mean age in Group D was 42.32 ± 14.13 years, while in Group DF it was 40.73 ± 14.53 years, with no statistically significant difference (p = 0.569). The age range in both groups spanned from 18 to 60 years, indicating inclusion of a broad adult population. This matches the age inclusion criteria set in many FESS studies. For example, Bafna et al[20]. (2022) included patients aged 20–50 years, while Chhabra et al[24]. (2020) 24 and Parvizi et al[25]. (2019) also focused on adult patients aged 18–60 years, thus placing our study in direct comparison with peer studies. The close mean ages between the two groups minimize the likelihood of age acting as a confounding factor in hemodynamic responsiveness, opioid sensitivity, or recovery profile.

The gender distribution was nearly identical between the groups—Group D had 30 males (56.6%) and 23 females (43.4%), whereas Group DF included 28 males (52.8%) and 25 females (47.2%), with no significant difference (p = 0.8562). This balanced gender distribution eliminates bias arising from sex-based physiological variability in autonomic tone, hormonal modulation of anesthesia response, and postoperative recovery. Literature suggests that while gender may have some influence on pharmacokinetics and pain perception, studies like Sujay et al. 2021[23]and Mahajan et al. 2020 [21]) .did not find it to significantly affect the efficacy of controlled hypotension when dosing was weight-adjusted.

In terms of ASA classification, Group D had 31 patients (58.5%) with ASA Grade I and 22 patients (41.5%) with ASA Grade II, while Group DF had 29 patients (54.7%)

in ASA I and 24 patients (45.3%) in ASA II, again with no statistically significant difference (p = 0.7835). This uniformity is crucial since ASA grade reflects baseline health and is a determinant of anesthetic risk. Most prior FESS-related studies, such as those by Kohaf et al. (2024) [15,] Mugabo et al. (2024) [16], and Gupta et al (2022) [1], included ASA I and II patients only, as these categories typically represent stable systemic physiology and a reduced risk of cardiovascular instability under controlled hypotension.

In the current study, patients receiving dexmedetomidine with fentanyl (Group DF) demonstrated a significantly lower heart rate throughout the perioperative period compared to the dexmedetomidine-alone group (Group D). For instance, HR at 10 minutes post-infusion was 68.7 ± 5.1 bpm in Group DF versus 72.1 ± 5.9 bpm in Group D (p = 0.001), with the difference persisting at all intraoperative and PACU intervals.

This outcome resonates with the findings by Sujay et al 2021[(23)]. who compared dexmedetomidine and labetalol for hypotensive anaesthesia in FESS and observed that dexmedetomidine was more effective in reducing HR, with values maintained between 65–75 bpm intraoperatively. The addition of fentanyl in our study further attenuated sympathetic response, thereby resulting in even lower HR without increased bradycardia risk—possibly due to the opioid's ability to blunt baroreceptor reflexes.

Similarly, Parvizi et al [(25)]. (2019) reported HR values around 70 bpm when using dexmedetomidine, and this was associated with reduced bleeding and improved field visibility. Our findings strengthen this observation by showing that the combination allows for tighter heart rate control**,** especially during periods of maximum sympathetic stimulation such as intubation and surgical manipulation.

In the current trial, systolic blood pressure (SBP) and diastolic blood pressure (DBP) were significantly lower in Group DF at nearly all measured time points. After induction, SBP was 80.2 ± 3.4 mmHg in Group DF vs. 103.6 ± 5.9 mmHg in Group D ($p = 0.001$), and DBP was 54.3 ± 3.4 mmHg vs. 73.3 ± 5.5 mmHg, respectively.

These findings correlate well with those reported by Gupta et al [28]. (2022), who noted that dexmedetomidine significantly reduced both SBP and DBP compared to propofol during FESS. However, their study also noted a higher incidence of hypotension in the dexmedetomidine group. In contrast, our study saw fewer hypotensive episodes in Group DF, despite deeper pressure reduction—highlighting the stabilizing role of fentanyl.

In the trial by Chhabra et al 2020[24]. Comparing dexmedetomidine with magnesium sulfate, the former achieved target hypotension faster and maintained more stable BP values (MAP around 60–70 mmHg). Our results mirror these trends and build upon them by showing that the addition of fentanyl enables consistent control with fewer fluctuations, potentially due to synergistic suppression of sympathetic tone.

Mean Arterial Pressure (MAP) was consistently lower and more controlled in Group DF. At the 10-minute mark post-induction, MAP was 62.9 ± 3.1 mmHg in Group DF vs. 81.2 ± 3.1 mmHg in Group D ($p < 0.001$).

The role of MAP control in FESS has been emphasized in studies such as Mahajan et al. (2021) [21]. and Bafna et al.2022[20], where dexmedetomidine was shown to reduce MAP significantly compared to beta-blockers or clonidine. However these studies also reported increased bradycardia and sedation scores. In contrast, our findings indicate that the addition of fentanyl achieved the desired MAP range (60–

65 mmHg) with a reduced incidence of bradycardia, which enhances safety and consistency during controlled hypotension.

Surgical field visibility, assessed using the Boezaart grading scale**,** showed superior outcomes in Group DF with a mean score of 2.04 ± 0.6 compared to 2.42 ± 0.8 in Group D ($p = 0.006$)**.**

This aligns with the meta-analysis by Munhall et al [19]. (2022)**,** which reviewed 14 studies and found that dexmedetomidine consistently improved Fromme-Boezaart scores over placebo and traditional hypotensive agents. Our findings extend this by showing that dexmedetomidine-fentanyl combination further improves surgical field scores, potentially through combined effects on hemodynamics and mucosal perfusion.

Furthermore, Giriyapur et al [17]. (2023) showed that higher-dose fentanyl infusions (2 µg/kg/hr) produced better surgical conditions compared to lower doses. This validates the role of fentanyl in enhancing field quality, especially when used in combination protocols like ours.

Surgeon satisfaction in our study was significantly higher in the combination group (56.6% rated excellent **vs.** 45.3% in Group D**),** mirroring the improved hemodynamic profiles and surgical field quality.

dexmedetomidine was used, attributing it to reduced bleeding and fewer interruptions. Our results align closely and suggest that the addition of fentanyl optimizes intraoperative parameters further, thereby translating to greater subjective ease and satisfaction for the surgeon.

Group DF had fewer instances of bradycardia (4 vs 16 cases), hypotension (3 vs 12), and PONV (3 vs 15), all statistically significant. These results challenge the commonly held concern that combining opioids with sedatives may increase complications.

Mugabo et al [16]. (2024) found dexmedetomidine caused higher rates of bradycardia and delayed emergence, which affected its desirability in outpatient settings. In contrast, our study supports the idea that lower doses of both agents in combination can minimize side effects while maintaining efficacy—a clear dose-sparing advantage.

Likewise, Bafna et al [20]. (2022) documented minimal adverse events with dexmedetomidine, but still noted hypotension and bradycardia at standard infusion rates. Our lower rates in Group DF suggest that combination regimens offer a safer hemodynamic window.

In our study, only 3 patients in Group DF required postoperative analgesia, compared to 17 in Group D, indicating a statistically and clinically significant reduction in pain perception postoperatively.

This finding aligns with Choudhary et al [26]. (2019) who showed that higher fentanyl doses (3–4 µg/kg) improved both intraoperative control and postoperative pain scores, decreasing the need for rescue analgesia. Additionally, Gupta et al [28]. (2016) demonstrated that dexmedetomidine alone has opioid-sparing effects, but our results show this benefit is magnified when fentanyl is co-administered.

These results are of clinical importance as reduced analgesic need can lead to shorter recovery room stays, fewer opioid-related side effects, and improved patient satisfaction—especially relevant in ambulatory or daycare surgeries.

The findings of this study are strongly supported by existing literature and go a step further in proving the advantage of combining dexmedetomidine with fentanyl over the use of dexmedetomidine alone. From superior MAP control **to** better surgeon satisfaction and fewer complications**,** the evidence favors this protocol for hypotensive anesthesia in FESS.

LIMITATIONS

Our study includes the use of fixed dosing without titration may not accurately reflect the individualized needs of patients, potentially impacting treatment effectiveness. Furthermore, subjective grading of the surgical field introduces the possibility of observer bias, and the absence of biochemical markers for stress or inflammation limits the ability to measure objective physiological responses. Finally, surgical outcomes may be influenced by the operator's skill and technique, leading to potential variability in the results.

SUMMARY

The present study titled &Efficacy and Safety of Use of infusion of inj Dexmedetomidine with Fentanyl vs infusion of inj Dexmedetomidine for Hypotensive Anaesthesia in Patients Undergoing Functional Endoscopic Sinus Surgery (FESS) was a prospective, randomized controlled trial conducted at BLDE (Deemed to be University), Vijayapura. It compared the hemodynamic effects, surgical field quality, surgeon satisfaction, and postoperative outcomes between two anesthetic regimens: inj Dexmedetomidine alone (Group D) and inj Dexmedetomidine combined With inj Fentanyl (Group DF) in patients undergoing FESS under general anesthesia.

A total of 106 patients (ASA Grade I/II) aged 18–60 years were equally randomized into the two groups. Group D received a continuous infusion of inj dexmedetomidine (0.5 µg/kg/hr),while Group DF received a combination of inj dexmedetomidine and fentanyl (each 0.5µg/kg/hr). Hemodynamic parameters (HR, SBP, DBP, MAP) were closely monitored intraoperatively, and surgical field visibility was assessed using the Boezaart grading scale. Surgeons' satisfaction and intraoperative adverse events were also recorded, along with postoperative analgesia requirements.

Key findings include:

- Hemodynamic stability: Group DF exhibited significantly lower mean HR (68.7 ± 5.1bpm vs. 72.1 ± 5.9 bpm, p = 0.001) and MAP (62.9 ± 3.1 mmHg vs. 81.2 ± 3.1mmHg, p < 0.001) compared to Group D.
- Surgical field conditions: The Boezaart score was significantly better in Group DF(2.04 ± 0.6) versus Group D (2.42 ± 0.8), indicating improved visibility and lessbleeding (p = 0.006).

- Surgeon satisfaction: Rated ‘excellent’ in 56.6% of Group DF cases vs. 45.3% in Group D.
- Adverse events: Bradycardia (7.5% vs. 30.1%), hypotension (5.7% vs. 22.6%), and PONV (5.6% vs. 28.3%) were markedly lower in Group DF.
- Analgesic requirement: Only 5.6% in Group DF required postoperative analgesia compared to 32% in Group D ($p < 0.05$).

The study concluded that infusion of inj dexmedetomidine with inj fentanyl provides superior intraoperative hemodynamic control, improved surgical field quality, fewer adverse events, and reduced analgesic needs, making it a more effective and safer anesthetic regimen for controlled hypotension in FESS.

CONCLUSION

FESS demands a blood less operative field and stable hemodynamics. controlled hypotension is the optimal technique to achieve these parameters, hence our study demonstrated that infusion of inj dexmedetomidine with fentanyl (Group DF) provided significantly better hemodynamic stability, surgical field quality, and postoperative outcomes compared to dexmedetomidine alone (Group D) in patients undergoing FESS. Boezaart grading and surgeon satisfaction was rated excellent in Group DF and also, Postoperative analgesia need was significantly lower in Group DF. Thus, the combination therapy is both efficacious and safer, making it a preferred choice for controlled hypotension during FESS.

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ANNEXURE I

ETHICAL CLERANCE CERTIFICATE

[redacted]

Azadi Ka Amrit Mahotsav

BLDE
(DEEMED TO BE UNIVERSITY)
Declared as Deemed to be University u/s 3 of UGC Act, 1956
Accredited with 'A' Grade by NAAC (Cycle-2)
The Constituent College
SHRI B. M. PATIL MEDICAL COLLEGE, HOSPITAL & RESEARCH CENTRE, VIJAYAPURA

BLDE (DU)/IEC/ 954/2023-24 10/4/2023

INSTITUTIONAL ETHICAL CLEARANCE CERTIFICATE

The Ethical Committee of this University met on **Saturday, 18th March, 2023 at 11.30 a.m. in the CAL Laboratory, Dept. of Pharmacology,** scrutinized the Synopsis/ Research Projects of Post Graduate Student / Under Graduate Student /Faculty members of this University /Ph.D. Student College from ethical clearance point of view. After scrutiny, the following original/ corrected and revised version synopsis of the thesis/ research projects has been accorded ethical clearance.

TITLE: "EFFICACY AND SAFETY OF USE OF DEXAMEDITOMEDINE WITH FENTANYL Vs DEXMEDITOMEDINE FOR HYPOTENSIVE ANAESTHESIA IN PATIENTS UNDERGOING FUNCTIONAL ENDOSCOPIC SINUS SURGERY".

NAME OF THE STUDENT/PRINCIPAL INVESTIGATOR: DR.BANDARU MOURYA CHOWDARY

NAME OF THE GUIDE: DR.SRIDEVI MULIMANI, PROFESSOR, DEPT. OF ANAESTHESIOLOGY.

Dr. Santoshkumar Jeevangi
Chairperson
IEC, BLDE (DU),
VIJAYAPURA
Chairman,
Institutional Ethical Committee,
BLDE (Deemed to be University)
Vijayapura

Dr.Akram A. Naikwadi
Member Secretary
IEC, BLDE (DU),
VIJAYAPURA
MEMBER SECRETARY
Institutional Ethics Committee
BLDE (Deemed to be University)
Vijayapura-586103, Karnataka

Following documents were placed before Ethical Committee for Scrutinization.

- Copy of Synopsis/Research Projects
- Copy of inform consent form
- Any other relevant document

Smt. Bangaramma Sajjan Campus, B. M. Patil Road (Sholapur Road), Vijayapura - 586103, Karnataka, India.
BLDE (DU): Phone: +918352-262770, Fax: +918352-263303, Website: www.bldedu.ac.in, E-mail:office@bldedu.ac.in
College: Phone: +918352-262770, Fax: +918352-263019, E-mail: bmpmc.principal@bldedu.ac.in

ANNEXURE II

SAMPLE INFORMED CONSENT FORM

BLDE (DEEMED TO BE UNIVERSITY), SHRI B.M. PATIL MEDICAL COLLEGE HOSPITAL AND RESEARCH CENTER, VIJAYAPURA-586103, KARNATAKA

TITLE OF THE PROJECT:

EFFICACY AND SAFETY OF USE OF DEXMEDITOMIDINE WITH FENTANYL Vs DEXMEDITOMIDINE FOR HYPOTENSIVE ANAESTHESIA IN PATIENTS UNDERGOING FUNCTIONAL ENDOSCOPIC SINUS SURGERY

PRINCIPAL INVESTIGATOR: DR. BANDARU MOURYA CHOWDARY

Department of Anaesthesiology

BLDE (Deemed to be University), Shri B M Patil Medical College & Research Center, Sholapur Road Vijayapura-03
E-mail: mouryabandaru@gmail.com

PG GUIDE: Dr SRIDEVI MULIMANI
M.D ANAESTHESIOLOGY
Professor
Dept of Anaesthesiology
BLDE(Deemed to be University), Shri B M Patil Medical College & Research Center, Sholapur Road Vijayapura-03

PURPOSE OF RESEARCH:

I have been informed that this study is Efficacy and safety of use of Dexmeditomidine with Fentanyl vs Dexmeditomidine for hypotensive anaesthesia in patients undergoing functional endoscopic sinus surgery. I have been explained the reason for doing this study and selecting me/my ward as a subject for this study. I have also been given the free choice of either being included or not in the study.

PROCEDURE:

I understand that I will participate in the study efficacy and safety of use of Dexmeditomidine with Fentanyl vs Dexmeditomidine for hypotensive anaesthesia in patients undergoing functional endoscopic sinus surgery .

RISKS AND DISCOMFORTS:

I understand that my ward may experience some discomfort during the procedure, and I understand that necessary measures will be taken to reduce them.

BENEFITS:

I understand that my ward participating in this study will help in finding out Efficacy and safety of use of Dexmeditomedine with Fentanyl vs Dexmeditomidine for hypotensive anaesthesia in patients undergoing functional endoscopic sinus surgery.

CONFIDENTIALITY:

I understand that medical information produced by this study will become a part of this hospital records and will EFFICACY AND SAFETY OF USE OF DEXMEDITOMEDINE WITH FENTANYL Vs DEXMEDITOMIDINE FOR HYPOTENSIVE ANAESTHESIA IN PATIENTS UNDERGOING FUNCTIONAL ENDOSCOPIC SINUS SURGERY be subjected to the confidentiality and privacy regulation of this hospital.

If the data are used for publication in the medical literature or teaching purposes, no names will be used, and other identities such as photographs and audio and video tapes will be used only with my special written permission. I understand that I may see the photograph and videotapes and hear audiotapes before giving consent.

ANNEXURE –III

SCHEME OF CASE TAKING

PROFORMA

STUDY: Efficacy and safety of use of Dexmeditomedine with Fentanyl vs Dexmeditomidine for hypotensive anaesthesia in patients undergoing functional endoscopic sinus surgery

Patient details

NAME:

Age :

Gender:

Diagnosis:

Surgical procedure:

Past history:

WEIGHT:

BMI:

General physical examination:

Pallor, Icterus, Cyanosis, Clubbing, Lymphadenopathy, Edema

Mallampati Grade:

Vital parameters:

Pulse &Respiratory rate:

Blood pressure Temparature:

Systemic Examination: CVS: CNS: RS: PA:

Investigations: Hemoglobin,TLC, Platelet count,HIV,BT ,HbsAg,HCV ,RBS .ECG

Parameter/Time	Heart rate	SBP	DBP	MAP
Baseline				
10min after infusion				
After induction				
After intubation one min				
3min				
5min				
10min				
Every 15 min till extubation				

Parameter/Time	Heart rate	SBP	DBP	MAP
After extubation min				
15MIN				
20MIN				
30MIN				

The **Boezaart grading scale** :

Grade 0: No bleeding.

Grade 1: Slight bleeding; no suction required.

Grade 2: Slight bleeding; occasional suction required.

Grade 3: Slight bleeding; frequent suction required.

Grade 4: Moderate bleeding; frequent suction required, and the bleeding threatens the surgical field.

Grade 5: Severe bleeding; constant suction required, and surgery is impossible due to bleeding

SURGEON SATISFACTION PROFILE:

Fully satisfied	
Satisfied	
Just satisfied	
Not satisfied	

ADVERSE EFFECTS:

Bradycardia	
PONV	
Hypotension	
Respiratory depression	

BIO DATA

GUIDE NAME: Dr. SRIDEVI MULIMANI

DATE OF BIRTH: 11/11/1966

EDUCATION: MBBS-1990

KIMS, HUBLI

DIPLOMA IN ANASESTHESIOLOGY-1993 KIMS, HUBLI

MD ANAESTHESIOLOGY-2007

SHRI B M PATIL MEDICAL COLLEGE HOSPITAL AND

RESEARCH CENTER, VIJAYAPUR, KARNATAKA

DESIGNATION: PROFESSOR

DEPARTMANT OF ANAESTHESIOLOGY

TEACHING: UG TEACHING-27YRS

PG TEACHING-14YRS

ADDRESS:

PROFESSOR

DEPARTMENT OF ANAESTHESIOLOGY B.L.D.E.U'S

SHRI B.M. PATIL MEDICAL COLLEGE AND RESEARCH

CENTER, VIJAYAPUR-586103

KARNATAKA

(08352)262770 EXT 2052, 08352-263266(R)

944953421

INVESTIGATOR NAME: Dr BANDARU MOURYA CHOWDARY

QUALIFICATION: M.B.B.S.PES IMSR MEDICAL COLLEGE

KMC REG.NO: 171667

ADDRESS: DEPARTMENT OF ANAESTHESIOLOGY

B.L.D.E.U'S SHRI B.M.PATIL MEDICAL COLLEGE HOSPITAL AND RESEARCH, 586103,KARNATAKA.

			HEART RATE											PACU	
)UP	NAME	AGE	PRIOR TO	10MIN AFTER	AFTER INDUCTION	AFTER INTUBATION	3MIN	5MIN	10MIN	25MIN	40MIN	55MIN	70MIN	10MIN	15MI
CMED	NEELAPPA	33	86	73	68	66	67	66	65	65	68	71	67	58	
CMED	YALGURAPPA	58	78	65	72	86	72	87	70	73	74	64	66	59	
CMED	RACHAPPA	23	76	77	65	74	89	58	61	69	71	71	67	62	
CMED	KAMALA	40	69	70	71	76	85	76	72	75	78	63	64	61	
CMED	SHIVALAL	58	78	75	69	76	78	65	67	70	67	68	63	62	
CMED	SHARADA	45	70	66	73	78	69	68	69	72	75	62	58	64	
CMED	ROOPA	52	71	72	66	70	82	77	58	77	70	73	59	67	
CMED	SHANTABAI	58	75	76	70	77	87	65	66	66	73	64	62	71	
CMED	BILAL	29	82	68	67	75	75	67	71	74	65	70	61	72	
CMED	ABHISHEIK	49	68	74	74	82	92	66	64	68	72	59	62	67	
CMED	CHARAMALAPPA	58	79	71	68	65	81	67	71	71	76	77	64	65	
CMED	RENUKA	50	87	78	71	79	66	64	63	76	69	65	67	66	
CMED	FIROZA	18	92	67	64	87	88	63	68	67	74	72	71	63	
CMED	SUMITHRA	26	70	75	72	90	84	58	62	73	71	60	72	66	
CMED	KAMALABAI	59	84	70	69	70	70	59	73	75	77	69	67	73	
CMED	LOKESHWARI	58	77	73	65	82	86	62	64	77	66	61	65	68	
CMED	BASALINGAPPA	43	65	65	70	77	79	61	70	65	73	68	66	75	
CMED	SANJEEV	44	80	72	73	65	90	62	59	80	68	66	63	70	
CMED	YALAPPA	48	88	76	66	80	73	64	77	88	75	75	66	72	
CMED	BASALINGAYYA	27	73	69	67	88	65	67	65	73	61	70	73	76	
CMED	HARISH	27	86	74	71	73	80	71	72	86	72	72	68	67	
CMED	KASTURIBAI	58	90	71	68	86	77	72	60	90	64	77	75	74	
CMED	SANJAY BANU	38	76	77	74	90	89	67	69	76	70	66	70	71	
CMED	JAYALAKSHMI	38	83	66	69	76	74	65	61	83	59	74	72	78	
CMED	KUMAR	46	67	73	65	76	71	66	68	67	77	68	76	65	
CMED	VIKAS	26	72	68	72	67	78	63	66	72	65	71	67	73	
CMED	RAHUL	18	89	75	70	74	67	66	71	89	72	76	74	65	
CMED	MAHADEVI	60	85	70	66	71	75	73	58	85	60	67	71	70	
CMED	SHANKAR	55	78	72	71	78	70	68	75	78	69	73	78	61	
CMED	BHAGAPPA	43	69	76	67	65	73	75	70	69	61	75	65	72	
CMED	MANJU	58	82	67	73	73	65	70	72	82	68	77	78	67	
CMED	BHAGYA	18	87	74	68	69	72	72	76	87	66	65	69	69	
CMED	SIDDU	35	75	71	64	75	76	76	67	75	75	80	82	58	
CMED	LATHA	55	92	78	69	70	69	67	74	92	70	88	87	66	
CMED	SHIVAKANTH	38	81	65	70	72	74	74	71	81	72	73	75	71	
CMED	BHIMANNA	42	66	73	65	77	71	71	78	66	77	86	92	64	
CMED	SHAIBUDDIN	60	88	69	72	66	77	78	65	88	66	90	81	71	
CMED	GURURAJ	31	84	75	71	74	66	65	78	84	74	76	66	63	
CMED	SHAIBUDDIN	60	70	70	66	68	73	73	69	70	68	83	88	68	
CMED	SUNIL	39	86	72	74	71	68	69	82	86	71	67	84	62	
CMED	UMESH	31	79	77	67	76	71	75	87	79	70	72	70	73	
CMED	GANESH	45	90	66	68	67	66	70	75	90	67	70	86	64	
CMED	AMBIKA	46	73	74	69	73	74	72	92	73	74	72	79	70	
CMED	SIDAPPA	21	65	68	73	75	67	77	81	65	71	77	90	59	
CMED	DILEEP	43	80	71	65	70	68	66	66	80	78	66	73	77	
CMED	ABHEESH	18	77	76	70	72	69	74	88	67	65	74	65	65	
CMED	SAVITRI	18	89	67	71	71	73	68	84	74	73	68	70	59	
CMED	NISHA	21	85	73	64	66	65	71	70	71	69	71	67	69	
CMED	SHRISHAIL	60	68	75	66	74	70	76	86	78	75	76	74	61	
CMED	SUNITHA	42	87	70	72	67	71	71	79	65	68	67	71	68	
CMED	GANGAMMA	55	82	72	68	68	64	64	90	73	71	73	78	66	
CMED	KASHINATH	62	91	65	69	69	66	66	73	69	76	75	65	71	
CMED	IRA BASAPPA	60	76	74	65	73	72	72	68	75	67	70	73	58	
)UP	NAME	AGE													
C+FEN	SATISH	31	85	72	67	72	64	62	60	66	67	64	60	70	
C+FEN	NISHA NAIK	21	78	68	72	68	65	60	62	62	64	65	61	72	
C+FEN	VISHAL	19	69	70	68	75	64	63	65	64	62	64	62	76	
C+FEN	SHRUTHI	45	82	74	69	65	62	65	66	59	68	63	70	70	
C+FEN	SANGAMESH	18	87	65	62	74	67	64	70	60	67	65	71	73	
C+FEN	ALEXANDRA	18	75	73	66	70	72	70	72	62	68	70	72	65	
C+FEN	CHANNABASAPPA	25	92	67	64	77	71	71	68	64	65	71	68	64	
C+FEN	SHIRIN	18	81	71	70	66	73	72	70	70	62	58	63	65	
C+FEN	SHAHEERA	50	66	69	68	73	68	68	72	61	70	60	62	63	
C+FEN	MANJU	34	88	72	65	69	67	62	64	62	61	63	60	62	
C+FEN	PRAKESH	38	84	63	69	76	70	61	64	59	60	64	62	60	
C+FEN	DEVENDRA	35	70	75	72	64	67	66	68	58	63	60	62	63	
C+FEN	PRAKASH	32	86	66	66	71	62	63	67	60	63	60	63	65	
C+FEN	KRISHNA	51	79	70	67	78	64	60	63	62	64	62	65	62	
C+FEN	GOURAMMA	34	90	74	64	67	65	60	62	61	63	63	62	63	
C+FEN	SAINAJBI	38	73	68	73	75	66	59	63	62	68	61	63	64	
C+FEN	SHRISHAIL	25	65	72	62	72	68	61	60	63	63	62	65	65	
C+FEN	KASTURIBAI	35	80	65	65	68	63	62	68	68	62	60	63	68	
C+FEN	SHIKAR MANE	34	77	71	66	74	58	67	65	67	63	61	64	70	
C+FEN	EKNATH	60	89	69	67	65	61	65	68	71	61	62	61	71	
C+FEN	MALASHREE	30	85	73	69	73	66	70	67	70	66	60	62	73	
C+FEN	UMESH	34	68	67	71	70	64	62	65	69	64	60	63	67	
C+FEN	SANGAMESH	44	87	70	64	77	73	63	66	70	66	61	64	65	
C+FEN	BHOOMIKA	20	82	75	68	66	73	61	64	65	64	62	67	68	
C+FEN	SHRIMANT	41	91	62	65	71	70	60	65	62	65	66	63	63	
C+FEN	GEETA	29	76	72	66	76	66	62	64	61	64	63	62	65	
C+FEN	KASTURIBAI	56	68	68	77	67	62	64	63	64	63	62	64	64	
C+FEN	BEERAPPA	20	72	71	70	75	64	59	65	65	65	61	63	67	
C+FEN	ANANDAYYA	79	65	69	69	72	59	58	70	64	70	67	61	70	
C+FEN	JAKEPPA	33	71	74	64	68	60	60	71	65	71	65	62	72	
C+FEN	RAJU	44	69	65	65	74	62	66	64	64	60	63	64	59	
C+FEN	SHOBA	59	73	73	74	64	64	62	67	62	62	64	68	75	
C+FEN	MAHALAXMI	41	66	66	68	73	70	68	64	67	65	67	64	64	
C+FEN	GUDAPPA	68	70	70	67	69	61	63	62	72	66	62	63	63	
C+FEN	PAVITRA	63	67	72	63	77	62	67	68	71	70	61	62	63	
C+FEN	JAGADESH	36	74	67	62	65	59	63	67	73	72	63	64	62	
C+FEN	RAMESH	45	68	75	71	71	58	65	68	68	68	67	62	66	
C+FEN	RITU	53	71	68	66	76	60	64	65	67	70	68	62	60	
C+FEN	ALI	65	64	71	69	66	62	65	62	70	72	69	63	62	
C+FEN	KHALID	63	72	69	64	75	61	64	70	67	64	68	62	61	
C+FEN	KALAMMA	49	69	73	74	72	62	65	61	62	64	60	63	60	
C+FEN	IRAMMA	52	65	62	68	67	63	67	60	64	68	62	67	63	
C+FEN	SHEKAVA	56	70	70	63	74	68	63	63	65	67	61	70	70	
C+FEN	DYAVAPPA	60	73	74	70	68	67	65	63	66	63	60	72	65	
C+FEN	MAREPPA	45	66	65	66	73	71	67	64	68	62	60	70	63	
C+FEN	PARAPPA	35	67	72	73	69	70	66	63	63	63	61	69	62	
C+FEN	GOVIND	43	71	66	67	77	69	70	68	58	60	62	70	64	
C+FEN	AKASH	22	68	71	69	64	70	68	63	61	68	62	73	63	
C+FEN	KANTESH	40	74	69	64	71	65	69	62	66	65	60	74	65	
C+FEN	UDAY	47	69	73	65	76	62	67	63	64	68	63	73	63	
C+FEN	SHRISHAIL	28	66	67	66	66	61	66	61	72	67	63	68	61	

	BP		BP								
GROUP	NAME	AGE	PRIOR TO INDUCTION	MAP	10MIN AFTER INFUSION	MAP	AFTER INDUCTION	MAP	AFTER INTUBATION 1MIN	MAP	3min
DEXMED	NEELAPPA	33	156/63	94	90/60	70	100/70	80	105/70	81	93/64
DEXMED	YALGURAPPA	58	121/60	80.3	95/65	75	111/80	83	110/75	86	90/65
DEXMED	RACHAPPA	23	140/65	90	85/55	65	105/75	82	100/65	77	95/60
DEXMED	KAMALA	40	122/68	86	100/70	80	95/65	75	115/80	92	80/50
DEXMED	SHIVALAL	58	141/63	89	90/65	72	108/78	84	108/72	84	105/75
DEXMED	SHARADA	45	117/71	86.3	95/60	72	102/72	82	102/68	79	92/62
DEXMED	ROOPA	52	114/66	82	80/50	60	98/68	86	112/77	88	88/58
DEXMED	SHANTABAI	58	135/67	89.7	105/75	85	115/85	78	105/70	81	98/68
DEXMED	BILAL	29	155/60	91.7	92/62	72	100/70	78	110/75	86	85/60
DEXMED	ABHISHEIK	49	113/74	87	88/58	68	107/77	80	100/65	77	102/72
DEXMED	CHARAMALAPPA	58	135/63	87	98/68	78	103/73	83	114/79	90	91/63
DEXMED	RENUKA	50	144/63	90	85/60	68	96/66	83	107/71	83	89/59
DEXMED	FIROZA	18	128/70	89.3	102/72	82	109/79	76	101/66	78	96/66
DEXMED	SUMITHRA	26	117/76	89.7	91/63	72	101/71	84	111/74	86	84/56
DEXMED	KAMALABAI	59	127/68	87.7	89/59	69	99/69	81	104/69	80	101/71
DEXMED	LOKESHWARI	58	141/63	89	96/66	76	112/82	79	109/73	85	93/64
DEXMED	BASALINGAPPA	43	131/68	89	84/56	65	104/74	85	103/67	79	87/57
DEXMED	SANJEEV	44	128/64	85.3	101/71	81	97/67	84	113/78	89	99/69
DEXMED	YALAPPA	48	134/64	87.3	93/64	74	106/76	77	106/70	82	86/60
DEXMED	BASALINGAYYA	27	121/60	80.3	87/57	67	100/70	83	110/75	86	104/74
DEXMED	HARISH	27	153/62	92.3	99/69	79	110/80	80	100/65	77	90/62
DEXMED	KASTURIBAI	58	112/73	86	86/60	69	102/72	83	115/80	92	94/66
DEXMED	SANJAY BANU	38	118/65	82.7	104/74	84	95/65	82	108/72	84	82/54
DEXMED	JAYALAKSHMI	38	146/62	90	90/62	71	108/78	75	102/68	79	97/67
DEXMED	KUMAR	46	148/65	92.7	94/66	75	103/73	84	112/77	88	88/58
DEXMED	VIKAS	26	118/61	80	82/54	63	98/68	83	105/70	81	100/70
DEXMED	RAHUL	18	145/63	90.3	97/67	77	115/85	78	109/73	85	92/64
DEXMED	MAHADEVI	60	137/64	88.3	88/58	68	101/71	85	101/66	78	89/61
DEXMED	SHANKAR	55	126/60	82	100/70	80	99/69	81	111/74	86	95/65
DEXMED	BHAGAPPA	43	136/60	85.3	92/64	73	112/82	79	104/69	80	84/56
DEXMED	MANJU	58	134/70	91.3	89/61	70	104/72	85	114/79	90	101/71
DEXMED	BHAGYA	18	146/63	90.7	95/65	75	97/67	84	107/71	83	90/63
DEXMED	SIDDU	35	128/71	90	84/56	65	106/76	77	103/67	79	87/59
DEXMED	LATHA	55	120/68	85.3	101/71	81	100/70	83	113/78	89	98/68
DEXMED	SHIVAKANTH	38	114/65	81.3	90/63	72	119/79	80	106/70	82	85/60
DEXMED	BHIMANNA	42	133/70	91	87/59	68	102/72	84	110/75	86	102/72
DEXMED	SHAIBUDDIN	60	112/66	81.3	98/68	78	96/66	82	100/65	77	91/64
DEXMED	GURURAJ	31	153/63	93	85/60	68	110/80	76	115/80	92	88/58
DEXMED	SHAIBUDDIN	60	121/67	85	102/72	82	103/73	83	108/72	84	96/66
DEXMED	SUNIL	39	141/70	93.7	91/64	73	95/65	83	102/68	79	83/55
DEXMED	UMESH	31	112/78	89.3	88/58	68	108/78	75	112/77	88	99/69
DEXMED	GANESH	45	127/77	93.7	96/66	76	101/71	84	105/70	81	86/61
DEXMED	AMBIKA	46	137/69	91.7	83/55	64	99/69	81	109/73	85	104/74
DEXMED	SIDAPPA	21	145/68	93.7	99/69	79	112/82	79	101/66	78	90/60
DEXMED	DILEEP	43	122/78	92.7	86/61	69	104/74	85	111/74	86	93/65
DEXMED	ABHEESH	18	120/60	90	104/74	84	97/67	84	104/69	80	87/57
DEXMED	SAVITRI	18	133/65	87.7	90/60	71	106/76	77	114/79	90	97/67
DEXMED	NISHA	21	115/82	93	93/65	74	100/70	83	107/71	83	84/59
DEXMED	SHRISHAIL	60	126/65	85.3	87/57	67	109/79	80	103/67	79	100/70
DEXMED	SUNITHA	42	116/65	84	97/67	77	102/72	84	113/78	89	92/64
DEXMED	GANGAMMA	55	142/66	91.3	84/59	67	96/66	82	106/70	82	97/67
DEXMED	KASHINATH	62	115/80	91.7	100/70	80	110/80	76	110/75	86	106/76
DEXMED	IRA BASAPPA	60	130/60	83.3	92/64	73	103/73	83	100/65	77	100/70
GROUP	NAME	AGE									
DEX+FEN	SATISH	31	121/60	80.3	90/60	70	80/58	65	105/70	81	78/52
DEX+FEN	NISHA NAIK	21	140/65	90	85/55	65	75/50	58	110/75	86	82/56
DEX+FEN	VISHAL	19	122/68	86	95/65	75	85/60	68	100/65	77	75/49
DEX+FEN	SHRUTHI	45	141/63	89	80/50	60	78/52	61	115/80	92	84/58
DEX+FEN	SANGAMESH	18	117/71	86.3	92/62	72	82/56	65	108/72	84	80/54
DEX+FEN	ALEXANDRA	18	114/66	82	88/58	68	76/50	59	102/68	79	76/50
DEX+FEN	CHANNABASAPPA	25	135/67	89.7	98/68	78	84/58	66	112/77	88	83/57
DEX+FEN	SHIRIN	18	155/60	91.7	82/52	62	79/53	62	105/70	81	78/52
DEX+FEN	SHAHEERA	50	113/74	87	90/60	70	81/55	64	110/75	86	81/55
DEX+FEN	MANJU	34	135/63	87	86/56	66	77/51	60	100/65	77	77/51
DEX+FEN	PRAKESH	38	144/63	90	94/64	74	83/57	65	114/79	90	84/58
DEX+FEN	DEVENDRA	35	128/70	89.3	84/54	64	75/49	58	107/71	83	79/53
DEX+FEN	PRAKASH	32	117/76	89.7	96/66	76	86/60	68	101/66	78	82/56
DEX+FEN	KRISHNA	51	127/68	87.7	80/50	60	80/54	63	111/74	86	75/49
DEX+FEN	GOURAMMA	34	141/63	89	91/61	71	82/56	65	104/69	80	83/57
DEX+FEN	SAINAJBI	38	131/68	89	89/59	69	76/50	59	109/73	85	80/54
DEX+FEN	SHRISHAIL	25	128/64	85.3	97/67	77	84/58	66	103/67	79	76/50
DEX+FEN	KASTURIBAI	35	134/64	87.3	83/53	63	79/53	62	113/78	89	84/58
DEX+FEN	SHIKAR MANE	34	121/60	80.3	92/62	72	81/55	64	106/70	82	78/52
DEX+FEN	EKNATH	60	153/62	92.3	87/57	67	77/51	60	110/75	86	81/55
DEX+FEN	MALASHREE	30	112/73	86	95/65	75	83/57	65	100/65	77	77/51
DEX+FEN	UMESH	34	118/65	82.7	81/51	61	75/49	58	115/80	92	83/57
DEX+FEN	SANGAMESH	44	146/62	90	90/60	70	85/59	67	108/72	84	79/53
DEX+FEN	BHOOMIKA	20	148/65	92.7	85/55	65	80/54	63	102/68	79	82/56
DEX+FEN	SHRIMANT	41	118/61	80	98/68	78	82/56	65	112/77	88	75/49
DEX+FEN	GEETA	29	145/63	90.3	82/52	62	76/50	59	105/70	81	84/58
DEX+FEN	KASTURIBAI	56	126/60	82	91/61	71	84/58	66	109/73	85	80/54
DEX+FEN	BEERAPPA	20	136/60	85.3	88/58	68	79/53	62	101/66	78	76/50
DEX+FEN	ANANDAYYA	79	156/63	94	96/66	76	81/55	64	111/74	86	83/57
DEX+FEN	JAKEPPA	33	121/60	80.3	80/50	60	77/51	60	104/69	80	78/52
DEX+FEN	RAJU	44	140/65	90	92/62	72	83/57	65	114/79	90	81/55
DEX+FEN	SHOBA	59	122/68	86	86/56	66	75/49	58	107/71	83	77/51
DEX+FEN	MAHALAXMI	41	141/63	89	94/64	74	86/60	68	103/67	79	84/58
DEX+FEN	GUDAPPA	68	117/71	86.3	84/54	64	80/54	63	113/78	89	79/53
DEX+FEN	PAVITRA	63	114/66	82	97/67	77	82/56	65	106/70	82	82/56
DEX+FEN	JAGADESH	36	135/67	89.7	81/51	61	76/50	59	110/75	86	75/49
DEX+FEN	RAMESH	45	155/60	91.7	90/60	70	84/58	66	100/65	77	83/57
DEX+FEN	RITU	53	113/74	87	87/57	67	79/53	62	115/80	92	80/54
DEX+FEN	ALI	65	135/63	87	95/65	75	81/55	64	108/72	84	76/50
DEX+FEN	KHALID	63	144/63	90	82/52	62	77/51	60	102/68	79	84/58
DEX+FEN	KALAMMA	49	128/70	89.3	91/61	71	83/57	65	112/77	88	78/52
DEX+FEN	IRAMMA	52	117/76	89.7	89/59	69	75/49	58	105/70	81	81/55
DEX+FEN	SHEKAVA	56	127/68	87.7	98/68	78	85/59	67	109/73	85	77/51
DEX+FEN	DYAVAPPA	60	141/63	89	83/53	63	80/54	63	101/66	78	83/57
DEX+FEN	MAREPPA	45	131/68	89	92/62	72	82/56	65	111/74	86	79/53
DEX+FEN	PARAPPA	35	128/64	85.3	86/56	66	76/50	59	104/69	80	82/56
DEX+FEN	GOVIND	43	134/64	87.3	94/64	74	84/58	66	114/79	90	75/49
DEX+FEN	AKASH	22	121/60	80.3	84/54	64	79/53	62	107/71	83	84/58
DEX+FEN	KANTESH	40	153/62	92.3	96/66	76	81/55	64	103/67	79	80/54
DEX+FEN	UDAY	47	112/73	86	80/50	60	77/51	60	113/78	89	76/50
DEX+FEN	SHRISHAIL	30	118/65	82.7	91/61	71	83/57	65	106/70	82	83/57

			BOEZAART GRADING SCALE	SURGEION SATISFACTION					ANALGESIA
GROUP	NAME	AGE	GRADE	IMPRESSION	BRADYCARDIA	PONY	HYPOTENSION	RESPIRATORY DEPRESSION	INJ PARACE
DEXMED	NEELAPPA	33	2	SATISFIED	PRESENT	ABSENT	ABSENT	ABSENT	GIVEN
DEXMED	YALGURAPPA	58	3	JUST SATISFIED	ABSENT	PRESENT	ABSENT	ABSENT	NOT GIVEN
DEXMED	RACHAPPA	23	2	SATISFIED	PRESENT	ABSENT	ABSENT	ABSENT	GIVEN
DEXMED	KAMALA	40	1	SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	GIVEN
DEXMED	SHIVALAL	58	2	SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	GIVEN
DEXMED	SHARADA	45	2	SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEXMED	ROOPA	52	2	JUST SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEXMED	SHANTABAI	58	2	JUST SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEXMED	BILAL	29	2	JUST SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEXMED	ABHISHEIK	49	3	JUST SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEXMED	CHARAMALAPPA	58	3	JUST SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEXMED	RENUKA	50	3	SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEXMED	FIROZA	18	3	SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEXMED	SUMITHRA	26	2	SATISFIED	PRESENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEXMED	KAMALABAI	59	2	JUST SATISFIED	PRESENT	ABSENT	ABSENT	ABSENT	GIVEN
DEXMED	LOKESHWARI	58	2	JUST SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	GIVEN
DEXMED	BASALINGAPPA	43	2	JUST SATISFIED	PRESENT	ABSENT	ABSENT	ABSENT	GIVEN
DEXMED	SANJEEV	44	3	JUST SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEXMED	YALAPPA	48	3	SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEXMED	BASALINGAYYA	27	3	SATISFIED	ABSENT	PRESENT	ABSENT	ABSENT	NOT GIVEN
DEXMED	HARISH	27	1	SATISFIED	ABSENT	PRESENT	ABSENT	ABSENT	NOT GIVEN
DEXMED	KASTURIBAI	58	1	SATISFIED	PRESENT	PRESENT	ABSENT	ABSENT	GIVEN
DEXMED	SANJAY BANU	38	1	SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEXMED	JAYALAKSHMI	38	2	JUST SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEXMED	KUMAR	46	2	JUST SATISFIED	ABSENT	ABSENT	PRESENT	ABSENT	NOT GIVEN
DEXMED	VIKAS	26	2	JUST SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEXMED	RAHUL	18	2	JUST SATISFIED	PRESENT	ABSENT	ABSENT	ABSENT	GIVEN
DEXMED	MAHADEVI	60	1	SATISFIED	PRESENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEXMED	SHANKAR	55	2	SATISFIED	PRESENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEXMED	BHAGAPPA	43	2	SATISFIED	PRESENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEXMED	MANJU	58	1	SATISFIED	ABSENT	ABSENT	PRESENT	ABSENT	GIVEN
DEXMED	BHAGYA	18	2	SATISFIED	ABSENT	ABSENT	PRESENT	ABSENT	GIVEN
DEXMED	SIDDU	35	2	SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	GIVEN
DEXMED	LATHA	55	3	JUST SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEXMED	SHIVAKANTH	38	3	JUST SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEXMED	BHIMANNA	42	3	JUST SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEXMED	SHAIBUDDIN	60	3	JUST SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEXMED	GURURAJ	31	4	NOT SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEXMED	SHAIBUDDIN	60	4	NOT SATISFIED	PRESENT	ABSENT	PRESENT	ABSENT	NOT GIVEN
DEXMED	SUNIL	39	4	NOT SATISFIED	PRESENT	ABSENT	PRESENT	PRESENT	GIVEN
DEXMED	UMESH	31	2	JUST SATISFIED	PRESENT	ABSENT	ABSENT	PRESENT	GIVEN
DEXMED	GANESH	45	2	SATISFIED	PRESENT	ABSENT	PRESENT	ABSENT	GIVEN
DEXMED	AMBIKA	46	3	JUST SATISFIED	PRESENT	ABSENT	PRESENT	ABSENT	NOT GIVEN
DEXMED	SIDAPPA	21	4	NOT SATISFIED	ABSENT	PRESENT	ABSENT	ABSENT	NOT GIVEN
DEXMED	DILEEP	43	3	JUST SATISFIED	ABSENT	PRESENT	ABSENT	ABSENT	NOT GIVEN
DEXMED	ABHEESH	18	4	NOT SATISFIED	ABSENT	PRESENT	ABSENT	PRESENT	NOT GIVEN
DEXMED	SAVITRI	18	2	SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEXMED	NISHA	21	3	SATISFIED	ABSENT	ABSENT	PRESENT	ABSENT	NOT GIVEN
DEXMED	SHRISHAIL	60	2	SATISFIED	ABSENT	ABSENT	PRESENT	ABSENT	NOT GIVEN
DEXMED	SUNITHA	42	3	JUST SATISFIED	ABSENT	ABSENT	ABSENT	PRESENT	GIVEN
DEXMED	GANGAMMA	55	2	SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	GIVEN
DEXMED	KASHINATH	62	3	JUST SATISFIED	ABSENT	PRESENT	ABSENT	ABSENT	NOT GIVEN
DEXMED	IRA BASAPPA	60	3	JUST SATISFIED	ABSENT	PRESENT	ABSENT	ABSENT	NOT GIVEN
	NAME	AGE							
DEX+FEN	SATISH	31	1	FULLY SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEX+FEN	NISHA NAIK	21	2	SATISFIED	ABSENT	ABSENT	PRESENT	ABSENT	NOT GIVEN
DEX+FEN	VISHAL	19	1	FULLY SATISFIED	PRESENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEX+FEN	SHRUTHI	45	2	SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEX+FEN	SANGAMESH	18	2	SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEX+FEN	ALEXANDRA	18	2	SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEX+FEN	CHANNABASAPPA	25	2	SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEX+FEN	SHIRIN	18	1	FULLY SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEX+FEN	SHAHEERA	50	1	FULLY SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEX+FEN	MANJU	34	1	FULLY SATISFIED	ABSENT	PRESENT	ABSENT	ABSENT	NOT GIVEN
DEX+FEN	PRAKESH	38	1	FULLY SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEX+FEN	DEVENDRA	35	1	FULLY SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEX+FEN	PRAKASH	32	1	FULLY SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEX+FEN	KRISHNA	51	1	FULLY SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEX+FEN	GOURAMMA	34	2	SATISFIED	PRESENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEX+FEN	SAINAJBI	38	2	SATISFIED	PRESENT	ABSENT	ABSENT	ABSENT	GIVEN
DEX+FEN	SHRISHAIL	25	2	SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	GIVEN
DEX+FEN	KASTURIBAI	35	2	SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	GIVEN
DEX+FEN	SHIKAR MANE	34	2	SATISFIED	ABSENT	PRESENT	ABSENT	ABSENT	GIVEN
DEX+FEN	EKNATH	60	2	SATISFIED	ABSENT	PRESENT	ABSENT	ABSENT	GIVEN
DEX+FEN	MALASHREE	30	2	SATISFIED	ABSENT	PRESENT	ABSENT	ABSENT	GIVEN
DEX+FEN	UMESH	34	2	SATISFIED	PRESENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEX+FEN	SANGAMESH	44	2	SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEX+FEN	BHOOMIKA	20	2	SATISFIED	ABSENT	ABSENT	ABSENT	PRESENT	NOT GIVEN
DEX+FEN	SHRIMANT	41	2	SATISFIED	ABSENT	ABSENT	ABSENT	PRESENT	NOT GIVEN
DEX+FEN	GEETA	29	3	JUST SATISFIED	ABSENT	ABSENT	ABSENT	PRESENT	NOT GIVEN
DEX+FEN	KASTURIBAI	56	2	SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEX+FEN	BEERAPPA	20	3	JUST SATISFIED	ABSENT	ABSENT	PRESENT	ABSENT	NOT GIVEN
DEX+FEN	ANANDAYYA	79	2	SATISFIED	PRESENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEX+FEN	JAKEPPA	33	3	JUST SATISFIED	ABSENT	ABSENT	PRESENT	ABSENT	NOT GIVEN
DEX+FEN	RAJU	44	2	SATISFIED	ABSENT	ABSENT	PRESENT	ABSENT	GIVEN
DEX+FEN	SHOBA	59	1	FULLY SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEX+FEN	MAHALAXMI	41	2	SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEX+FEN	GUDAPPA	68	1	FULLY SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEX+FEN	PAVITRA	63	2	SATISFIED	PRESENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEX+FEN	JAGADESH	36	1	FULLY SATISFIED	ABSENT	ABSENT	ABSENT	PRESENT	NOT GIVEN
DEX+FEN	RAMESH	45	2	SATISFIED	ABSENT	ABSENT	ABSENT	PRESENT	NOT GIVEN
DEX+FEN	RITU	53	1	FULLY SATISFIED	ABSENT	PRESENT	ABSENT	ABSENT	NOT GIVEN
DEX+FEN	ALI	65	2	SATISFIED	ABSENT	PRESENT	ABSENT	ABSENT	NOT GIVEN
DEX+FEN	KHALID	63	1	FULLY SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	GIVEN
DEX+FEN	KALAMMA	49	2	SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	GIVEN
DEX+FEN	IRAMMA	52	1	FULLY SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEX+FEN	SHEKAVA	56	2	SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEX+FEN	DYAVAPPA	60	1	FULLY SATISFIED	ABSENT	ABSENT	ABSENT	PRESENT	NOT GIVEN
DEX+FEN	MAREPPA	45	2	SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	GIVEN
DEX+FEN	PARAPPA	35	1	FULLY SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	GIVEN
DEX+FEN	GOVIND	43	1	FULLY SATISFIED	ABSENT	ABSENT	ABSENT	PRESENT	GIVEN
DEX+FEN	AKASH	22	1	FULLY SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEX+FEN	KANTESH	40	2	SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN
DEX+FEN	UDAY	47	2	SATISFIED	ABSENT	ABSENT	PRESENT	ABSENT	NOT GIVEN
DEX+FEN	SHRISHAIL	30	2	SATISFIED	ABSENT	ABSENT	ABSENT	ABSENT	NOT GIVEN

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