In The Name God

Dexmedetomidine and Post Operative Pain

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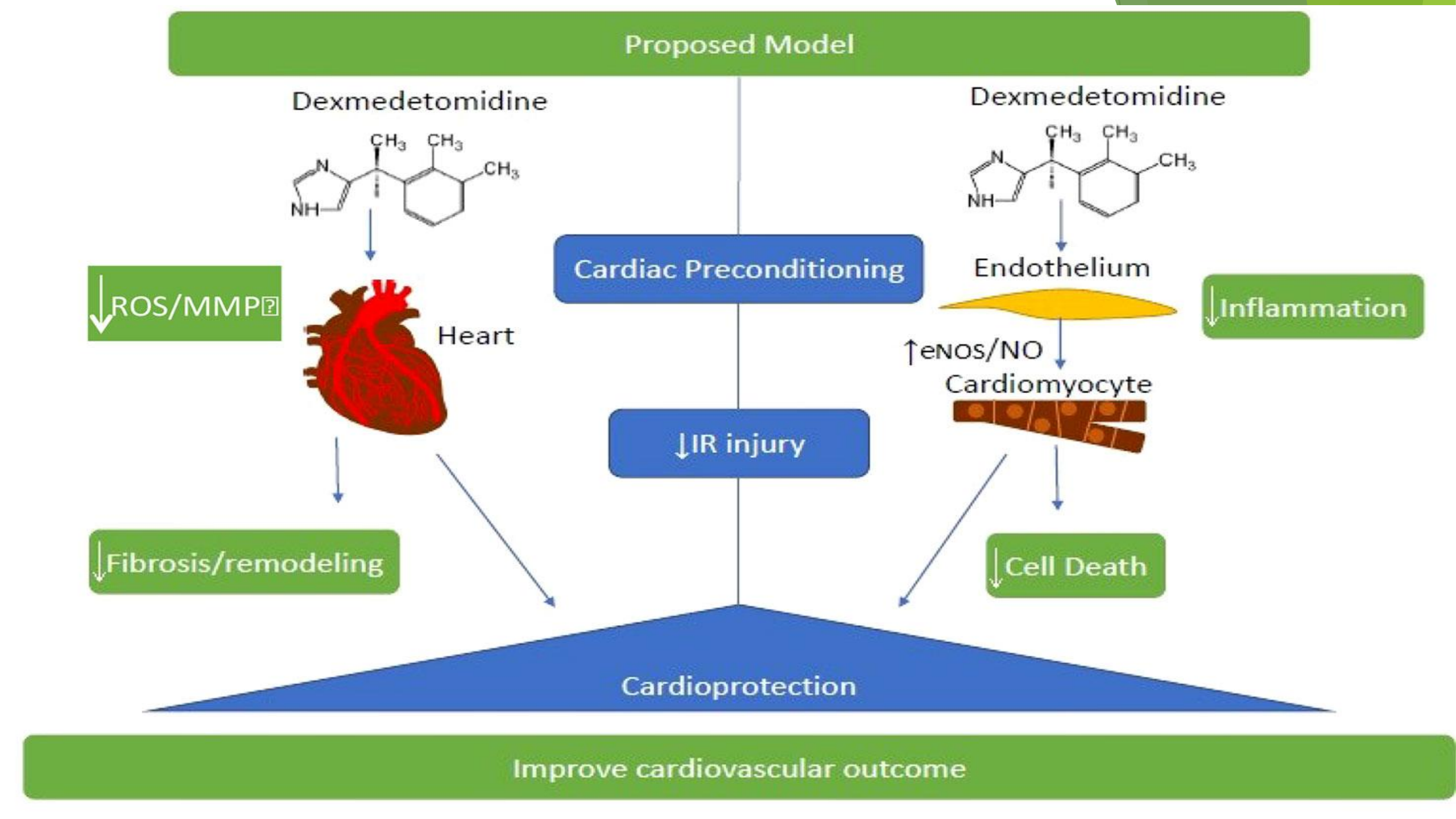
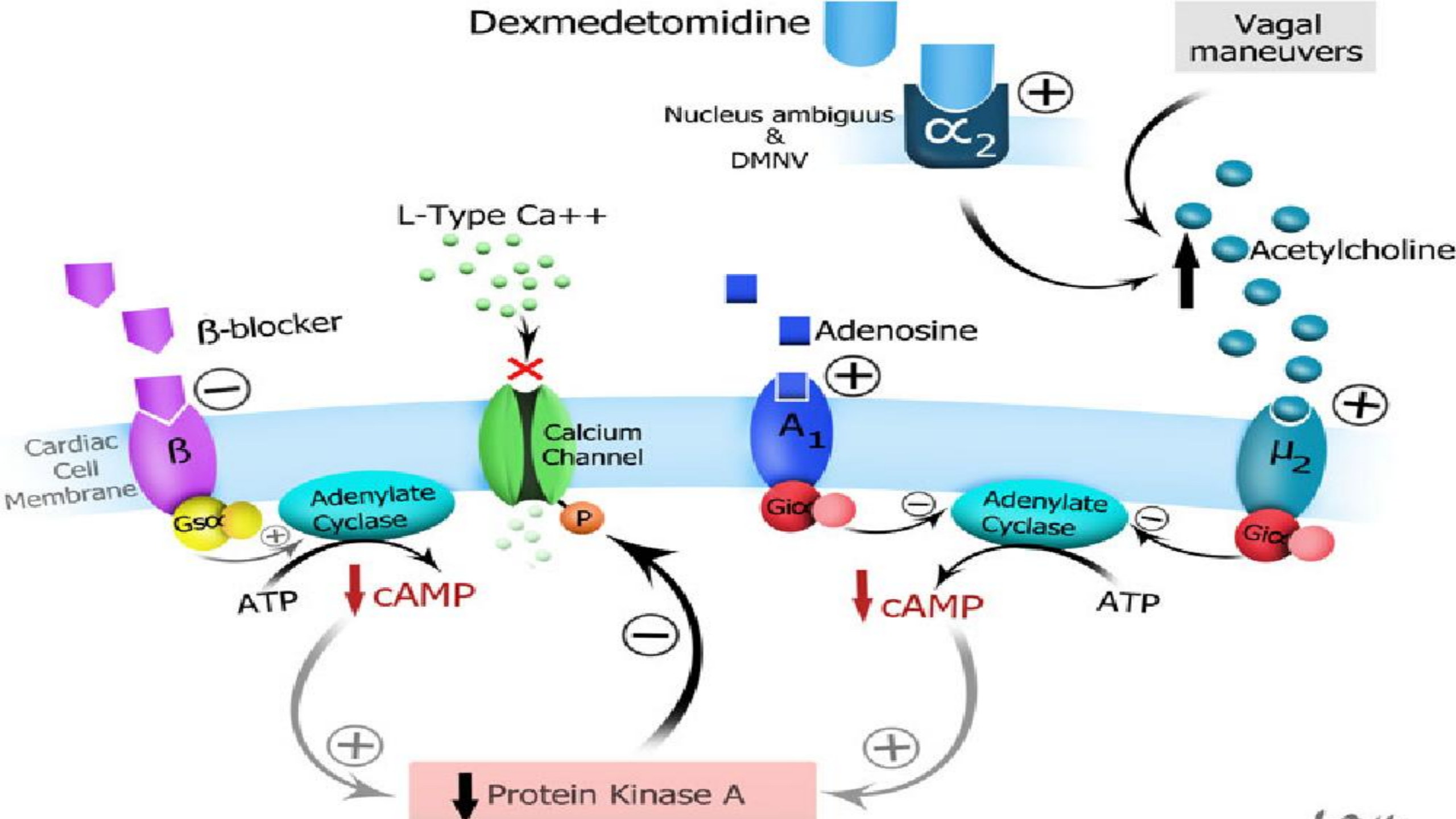
Dexmedetomidine
HCl Injection
200 mcg (base) per 2 mL
(100 mcg (base) per mL)
For intravenous infusion.
MUST BE DILUTED.
Discard unused portion.
2 mL Single Dose Vial
Rx only

Objectives Pharmacology of dex :

alpha 2 agonist
Molecular targets neural substrates
locus coeruleus
natural sleep pathways
Clinical paradigms for use of dex in anesthesia
sedation analgesia w/o respiratory depression
attenuation of tachycardia
smooth emergence weaning from mechanical vent

- Pharmacology:
- Establish and maintain adequate drug concentration at effector site to produce desired effect
- sedation
- hypnosis
- analgesia
- paralysis
- Predict the time course of drug onset offset


Proposed Model
Dexmedetomidine
Dexmedetomidine
Cardiac Preconditioning
ROS/MMP
Heart
Endothelium
Inflammation
↑eNOS/NO
Cardiomyocyte
↓IR injury
Fibrosis/remodeling
Cell Death
Cardioprotection
Improve cardiovascular outcome

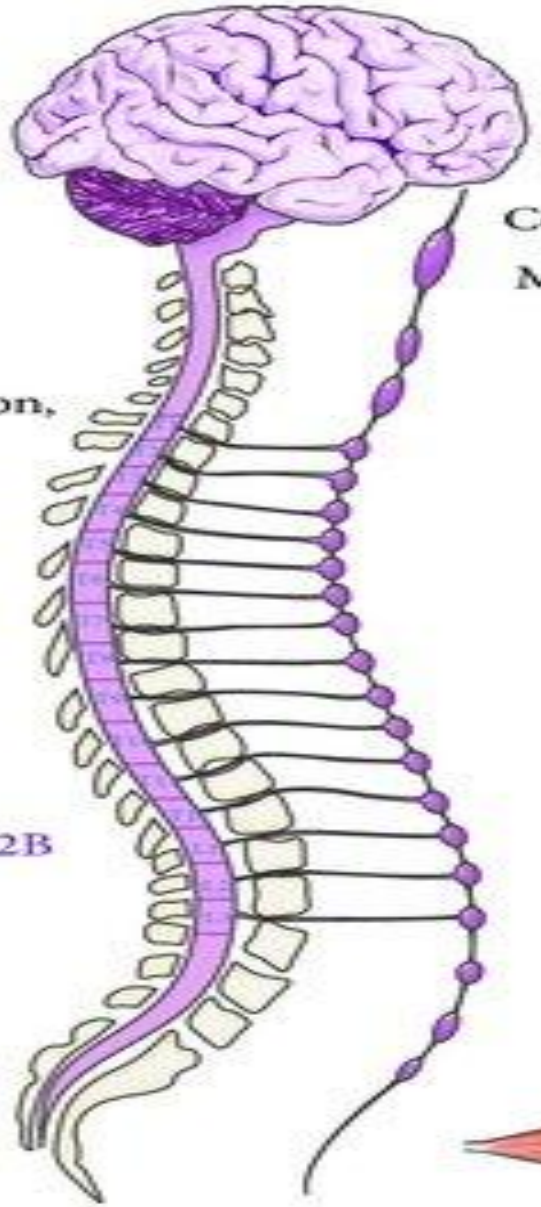

Dexmedetomidine
Vagal maneuvers
Nucleus ambiguus & DMNV
α_2
L-Type Ca++
Acetylcholine
β-blocker
Adenosine
Cardiac Cell Membrane
β
Calcium Channel
A_1
μ_2
Gsα
Adenylate Cyclase
Giα
Adenylate Cyclase
Giα
ATP
cAMP
cAMP
ATP
P
Protein Kinase A

Dexmedetomidine clinical effects

Sedation-*Locus ceruleus*-α2A, α2C

Cognition, sensory processing, mood-α2C.
Memory and neuroprotection-imidazoline 2

Anxiolysis, hipnose,
algesia, neuroprotection,
↓ insulin-α2A



↓ Heart rate and contractility-α2A, α2C.
Antiarritmic-imidazoline 1

Vasodilation-α2A

Vasoconstriction-α2B

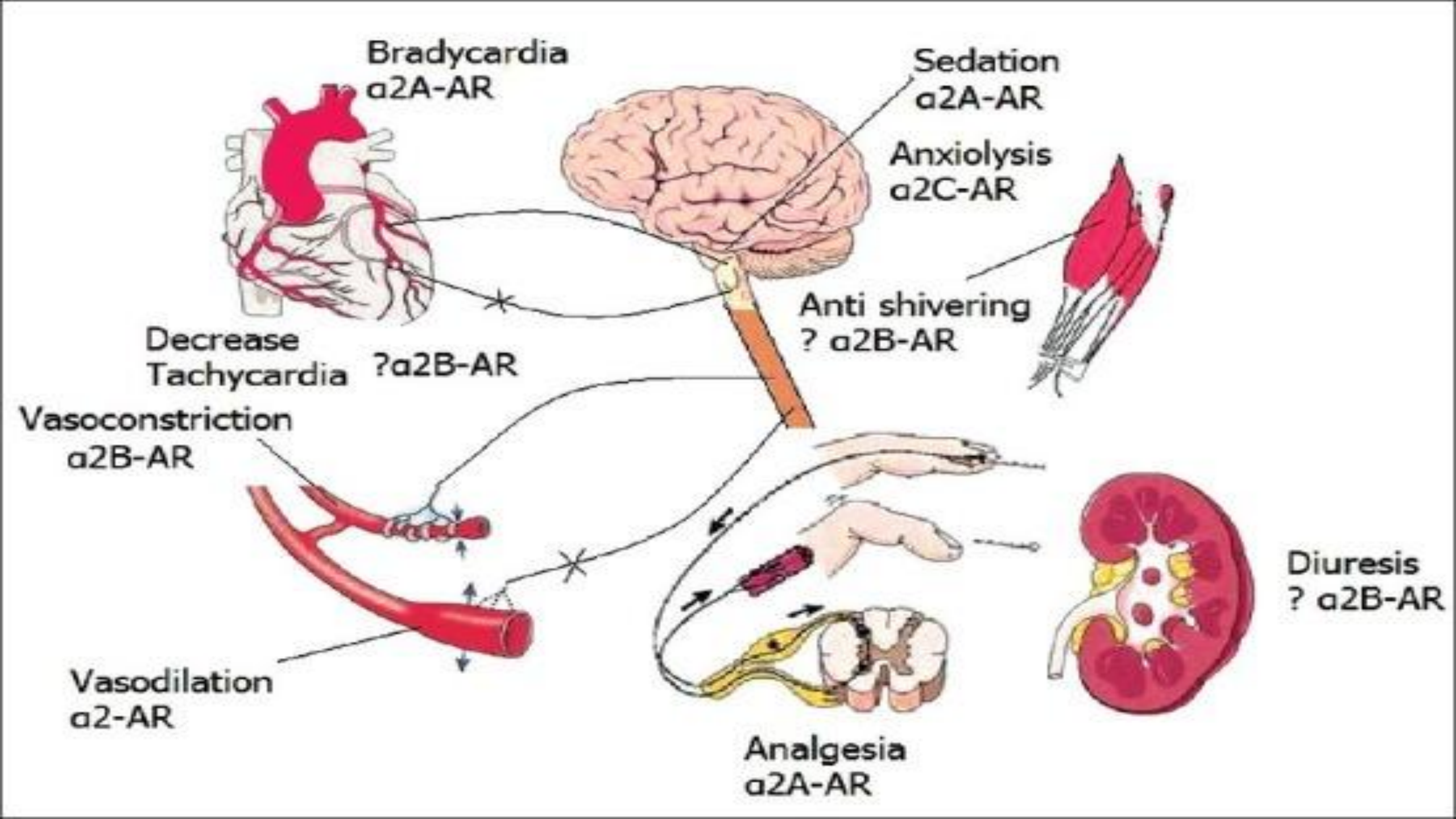
Spinal analgesia-α2B

↑ Diuresis-α2B

↓ Adrenal medulla
epinephrine outflow-α2

Anti-shivering-central
thermoregulatory inhibition-α2B

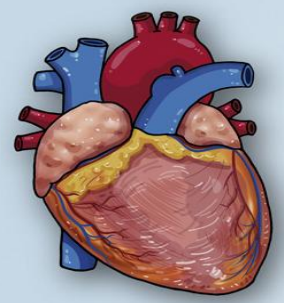
- Pharmacokinetics :
- Rapid redistribution 6 min
- Elimination half-life 2 h
- Clearance 39 L/h
- Protein binding 94
- Metabolism biotransformation in liver to inactive metabolites excreted in urine
- No accumulation after infusions 12-24 h
- Pharmacokinetics similar in young adults elderly


Bradycardia
α2A-AR
Sedation
α2A-AR
Anxiolysis
α2C-AR
Anti shivering
? α2B-AR
Decrease
Tachycardia
?α2B-AR
Vasoconstriction
α2B-AR
Vasodilation
α2-AR
Analgesia
α2A-AR
Diuresis
? α2B-AR

Dexmedetomidine

α_{2A}, α_{2C} Locus Ceruleus
Sedation and anxiolysis

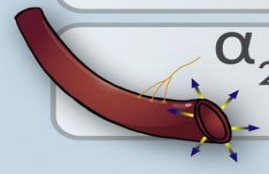
α_{2A} Brainstem vasomotor center
Anxiolysis



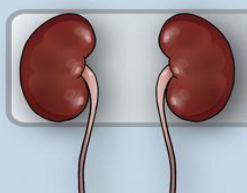
α_{2A} Bradycardia
Vagomimetic action

α_{2A} Decrease Tachycardia
Blocks cardioaccelerator nerve

α_{2B} Cerebral vessels and peripheral vasculature
Vasoconstriction

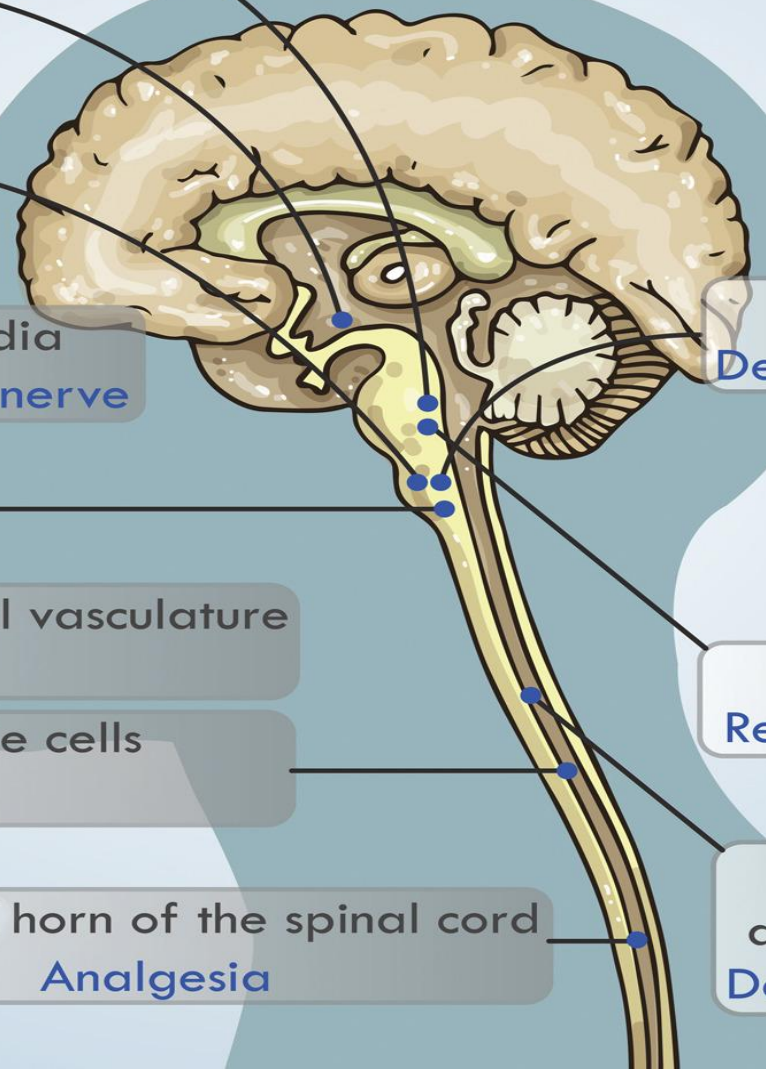


α_{2A} Periphereal smooth-muscle cells
Vasodilation



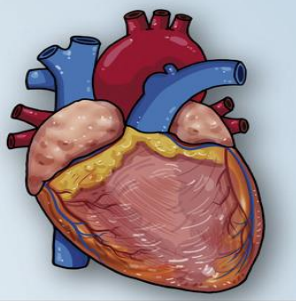
α_{2B}
Diuresis

α_{2A} Dorsal horn of the spinal cord
Analgesia



Propofol

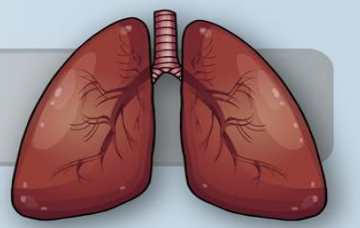
$GABA_A$ Cortex
Sedation and anxiolysis



M_2-acetylcholine Brainstem
Decrease central sympathetic activity

↓ SVR
↓ Cardiac contractility
Impairs baroreflex

$GABA_A$ Brainstem
Respiratory depression



$GABA_B$
adeonsine A1 receptor Spinal cord
Decrease spinal sympathetic activity

Clinical Uses of Dex in Anesthesia:

- Bariatric surgery :
- Sleep apnea patients
- Craniotomy aneurysm, AVM hypothermia
- Cervical spine surgery
- Off-pump CABG
- Vascular surgery
- Thoracic surgery
- Conventional CABG
- Back surgery, evoked potentials
- Head injury
- Burn
- Trauma
- Alcohol withdrawal
- Awake intubation

Clinical Use :

- Dex Improves Postop Pain Mgt after Bariatric SurgeryRCT, n 25. Dex started at 0.5 to 0.7 ug/kg/hr 1 hr prior to end of surgery vs.saline. Double-blind
- Infusion adjusted according to need
- Dex continued in PACU
- PACU pain control with PCA
- Dexmedetomidine
- Morphine use ? in dex gp (P lt 0.03)
- Pain score better in dex gp 1.8 vs 3.4 (P lt 0.01)
- time pain free in PACU ? in dex gp
- 44 vs 0 (P lt 0.002)
- Better control of HR in dex gp

Clinical Use:

- **Procedural sedation**
- Dexmedetomidine is an attractive agent for short-term procedural sedation and has been safely used in transesophageal echocardiography,[37] colonoscopy,[38] awake carotid endarterectomy,[39] shockwave lithotripsy,[34] vitreoretinal surgery,[40] elective awake fiberoptic intubation,[41] pediatric patients undergoing tonsillectomy,[42] and pediatric MRI.[43] The usual dose of dexmedetomidine for procedural sedation is 1 μg/ kg, followed by an infusion of 0.2 μg/kg/h. Its onset of action is less than 5 minutes and the peak effect occur within 15 minutes. As the pharmacologic effects of dexmedetomidine can be reversed by the α2-AR antagonist atipamezole,[44] dexmedetomidine provides a titratable form of hypnotic sedation that can be readily reversed.
- **Controlled hypotension**
- Dexmedetomidine is an effective and safe agent for controlled hypotension mediated by its central and peripheral sympatholytic action. Its easy administration, predictability with anesthetic agents, and lack of toxic side effect while maintaining adequate perfusion of the vital organs makes it a near-ideal hypotensive agent. Spinal fusion surgery for idiopathic scoliosis,[45] septoplasty and tympanoplasty operations,[46] and maxillofacial surgery[47] have been safely done with dexmedetomidine-controlled hypotension.
- **Analgesia**
- Dexmedetomidine activates α2-AR in the spinal cord reducing transmission of nociceptive signals like substance P. It has significant opioid sparing effect and is useful in intractable neuropathic pain.[14]
- **Cardiac surgery**
- Dexmedetomidine in addition to blunting the hemodynamic response to endotracheal intubation also reduces the extent of myocardial ischemia during cardiac surgery.[48] Dexmedetomidine has been successfully used to manage patients with pulmonary hypertension undergoing mitral valve replacement, with reduction in pulmonary vascular resistance, pulmonary artery pressure, and pulmonary capillary wedge pressures.[5]

- ## Clinical Use:
- ### Neurosurgery
- Dexmedetomidine provides stable cerebral hemodynamics without sudden increase in ICP during intubation, extubation, and head pin insertion. It attenuates neurocognitive impairment (delirium and agitation) allowing immediate postoperative neurological evaluation. It exerts its neuroprotective effects through several mechanisms which make the usage of this drug a promising tool during cerebral ischemia.[14] It does not interfere with neurological monitors[5] and has an upcoming role in “functional” neurosurgery. This includes awake craniotomy for the resection of tumors or epileptic foci in eloquent areas, and the implantation of deep brain stimulators for Parkinson's disease.[5]
- ### Obesity
- Dexmedetomidine does not cause respiratory depression and has been infused at a dose of 0.7 μg/kg intraoperatively to avoid respiratory depression due to narcotic usage in a morbidly obese patient.[49]
- ### Obstetrics
- Dexmedetomidine has been successfully used as an adjunct to unsatisfactory analgesia by systemic opioids in laboring parturients who could not benefit from epidural analgesia.[50] It provides maternal hemodynamic stability, anxiolysis, and stimulation of uterine contractions. It is retained in placental tissue and passes less readily into the fetal circulation than clonidine because of high lipophilicity and thereby has less susceptibility to cause fetal bradycardia.
- ### Pediatrics
- It is currently being used off-label as an adjunctive agent in pediatric patients for sedation and analgesia in the critical care unit and for sedation during noninvasive procedures in radiology like computed tomography and magnetic resonance imaging


Propofol TCI Cortinez
ce 0.39 µg/ml
cet 3.50 µg/ml
RATE
DATA
1200
350
syramed
Remifentanil TCI Minto
ce 1.00 ng/ml
cet 1.00 ng/ml
syramed


PCA


ml/h
4
mcg/kg/4
300
5mg/ml
70kg
0.94ml/h
1.119
mcg/kg
OK
BOL
Start
Stop

Key Points

- Postoperative pain, especially when poorly controlled, results in harmful acute effects (i.e., adverse physiologic responses) and chronic effects (i.e., delayed long-term recovery and chronic pain).

- By preventing central sensitization, preemptive analgesia may reduce acute and chronic pain. Although experimental studies overwhelmingly support the concept of preemptive analgesia, the evidence from clinical trials is equivocal because of methodologic issues

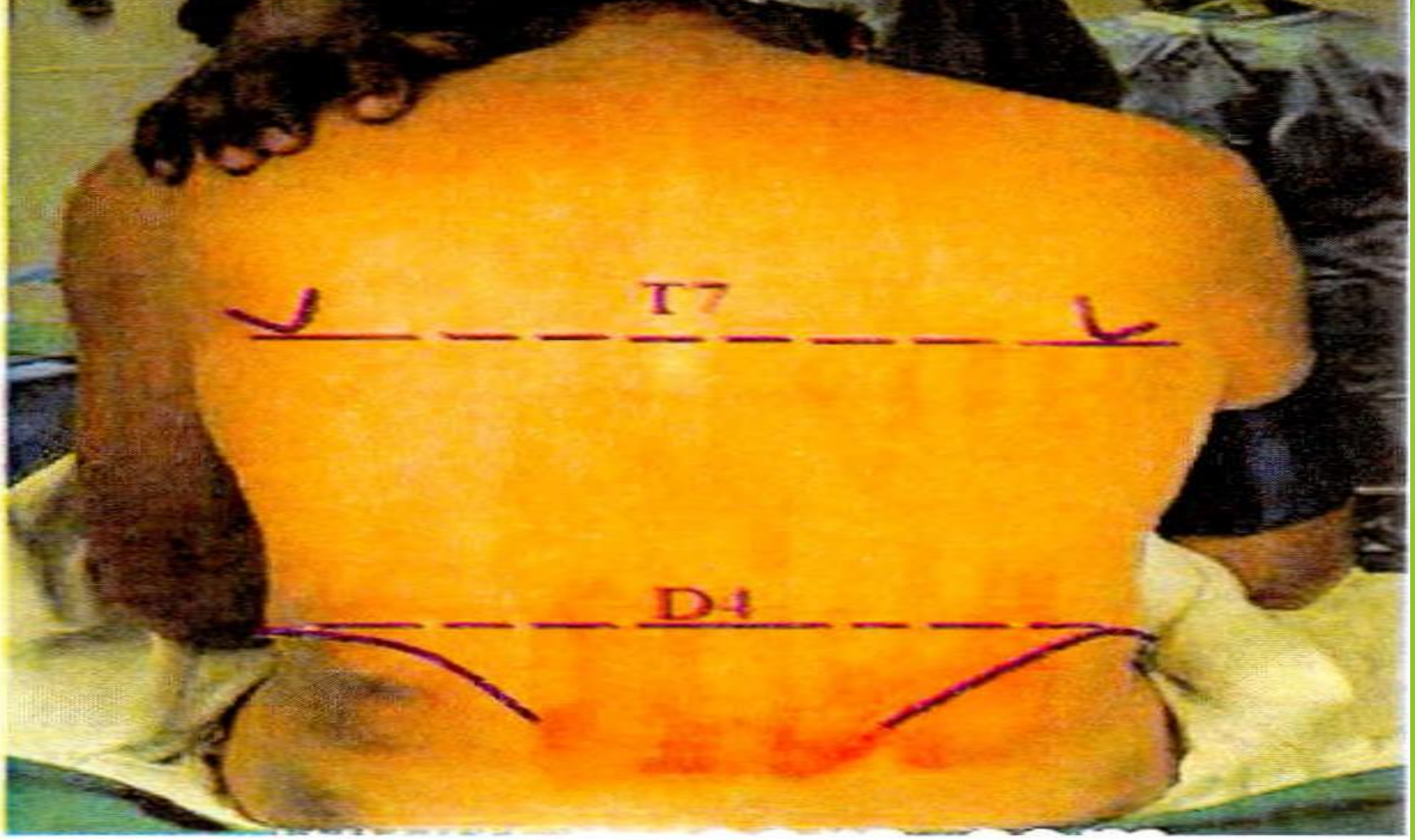
- Side Effects

- Cardiovascular: hypotension, bradycardia, or tachycardia , Respiratory status: respiratory rate, level of sedation Nausea and vomiting, pruritus, urinary retention Neurologic examination Assessment of motor block or function and sensory level Evidence of epidural hematoma

- Dexmedetomidine activates α2-AR in the spinal cord reducing transmission of nociceptive signals like substance P. It has significant opioid sparing effect and is useful in intractable neuropathic pain

Regional Block

- 1- Epidural & caudal block
- 2- Upper extremity blocks
- 3- lower extremity blocks
- 4- Spinal block
- 5- Subcutaneous and Intraperitoneal
- 6- IV & Infusion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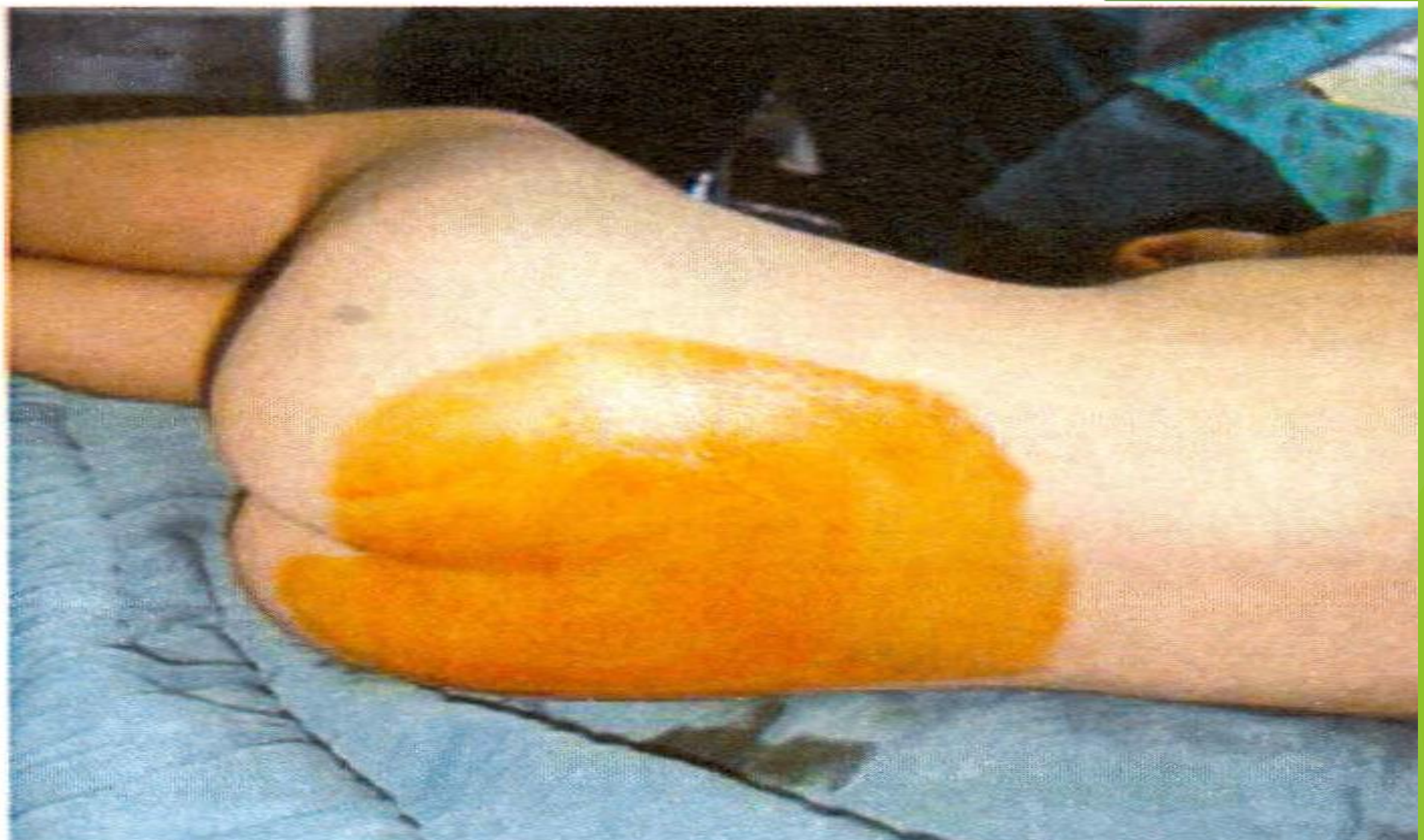
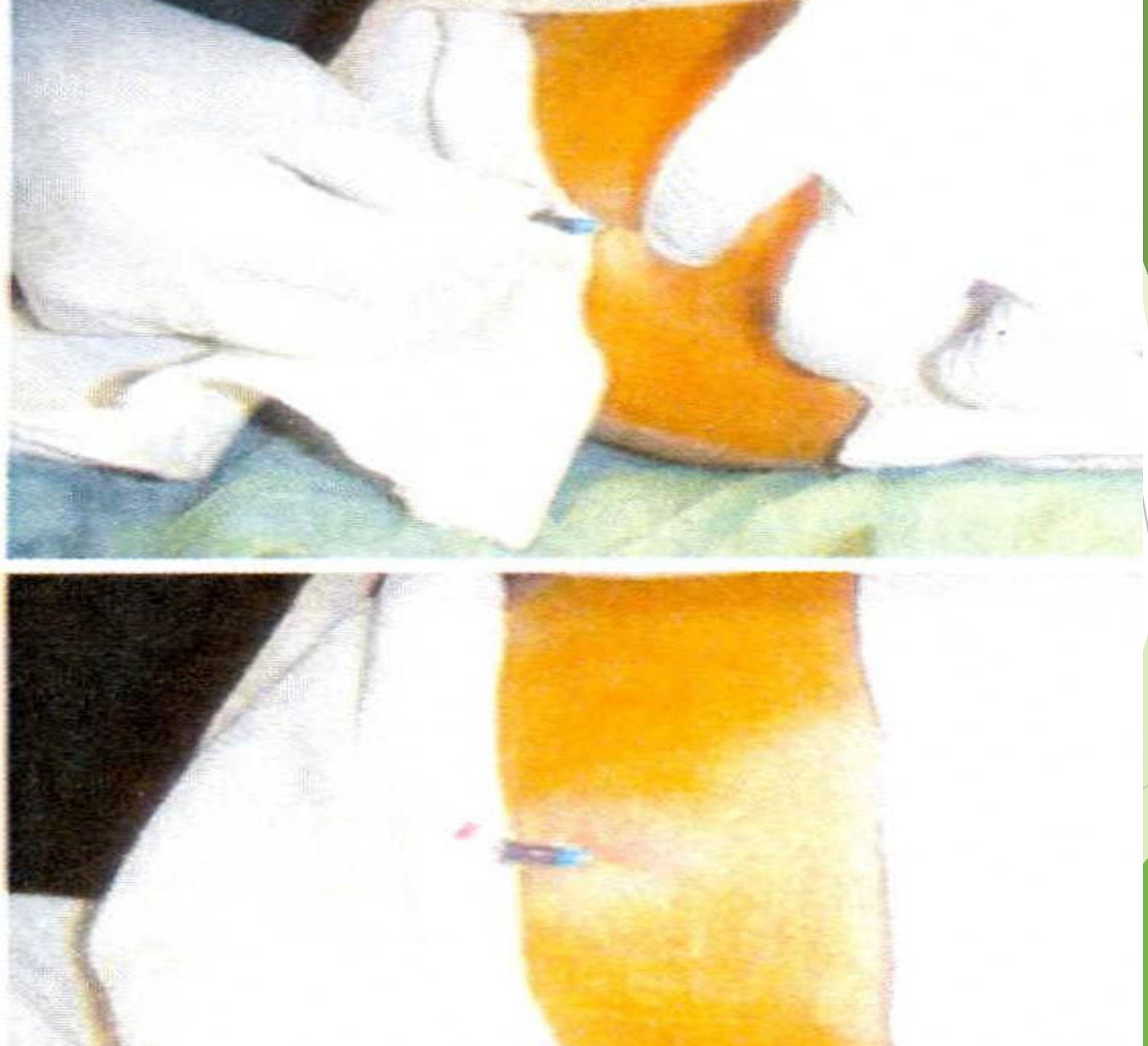
D4





- **Comparison of the prophylactic effect of dexamethasone and dexmedetomidine and their combination in reducing postoperative nausea and vomiting in patients undergoing laparoscopic cholecystectomy**

- Siamak Rekei,[1] Amir Reza Naeimi,[1] Behnam Mahmodiyeh,[2] Roya Golmoradi,[1] and Alireza Kamali[2]

- **Abstract**
- Nausea and vomiting are some of the most common complaints of patients after any anesthesia, which is often associated with postoperative pain. The double-blind clinical trial study aimed to compare the prophylactic effect of dexamethasone and dexmedetomidine and their combination in reducing postoperative nausea and vomiting in patients undergoing laparoscopic cholecystectomy. One hundred sixty-two patients undergoing laparoscopic cholecystectomy were enrolled in the study. In the first group of patients, 25 mg of dexmedetomidine were administered slowly. In comparison, the patients in the second group received dexamethasone (4 ml/2 mg) with 0.1 mg/kg of normal saline solution. The third group received a combination of dexmedetomidine and dexamethasone. Hemodynamic changes were recorded during surgery and after surgery, and the patients were admitted to recovery. Nausea and vomiting scores were recorded 2 and 4 hours after surgery. Blood pressure and heart rate were lower in the dexmedetomidine group at all times ($P<0.05$). Two hours after surgery, the dexamethasone and dexmedetomidine combination group had less vomiting ($P=0.012$). The incidence of nausea 2 and 4 hours after surgery was lower in the dexamethasone and dexmedetomidine combination group ($P<0.05$). Blood pressure and heart rate were lower in the dexmedetomidine group at all times. The dexmedetomidine and dexamethasone combination decreased postoperative nausea and vomiting in patients. Therefore, we recommend using a dexmedetomidine and dexamethasone combination for reducing postoperative nausea and vomiting.

- **Keywords:** dexmedetomidine, dexamethasone, vomiting, nausea, laparoscopy

Comparison the Sedation Effect and Satisfaction of Two Combinations, Dexmedetomidine and Fentanyl with Midazolam and Fentanyl, in Patients Undergoing Bronchoscopy

Alireza Kamali,Sepideh Sarkhosh, Hosein Kazemizadeh Department

Abstract

1. Objectives: The aim of this study was to compare sedative effects of dexmedetomidine and fentanyl with midazolam and fentanyl in patients undergoing bronchoscopy.
Methods: This study was a double-blind randomized clinical trial that was performed on 92 patients who referred to Amir al Momenin Hospital in Arak for bronchoscopy and underwent ASA 1 or 2 underlying grading procedure. Patients were randomly divided into two groups of dexmedetomidine and fentanyl (D) midazolam and fentanyl (M). Primary vital signs including hypertension and arterial oxygen saturation were monitored and recorded. Then all patients were injected with 2 µg / kg fentanyl as a painkiller and after 3 minutes 30 µg dexmedetomidine in syringe with code A and midazolam 3 mg in syringe with code B were injected to patients by an anesthesiologist. Then the two groups were compared in terms of pain at injection, conscious relaxation, satisfaction of operation, recovery time, hypotension and arterial oxygen saturation and drug side effects and data were analyzed by using statistical tests.
Results: There was no significant difference between the two groups in terms of mean age and sex distribution. According to the results of this study, there was no significant difference between the two groups in mean blood pressure (P-value = 0.6) and mean heart rate (P-value = 0.4) at the time of bronchoscopy, but at 5 and 10 minutes after bronchoscopy there was a significant difference, mean blood pressure and heart rate were significantly lower in dexmedetomidine group.
Conclusion: Both dexmedetomidine and midazolam drug groups contributed to the development of stable and sedative hemodynamics and satisfaction in patients undergoing bronchoscopy, however, the dexmedetomidine and fentanyl group showed a significant decrease in blood pressure and heart rate compared to midazolam and fentanyl and a weaker decrease in arterial oxygen saturation, and patients with bronchoscopy were more satisfied in the dexmedetomidine group

Comparison of Dexmedetomidine-Thiopental and Dexmedetomidine-Ketamine Combinations in Hemodynamic Changes, Seizure Duration, and Recovery Time in Patients Candidate for ECT

Abstract

Introduction: Electroconvulsive therapy is a procedure in which an electrical stimulation of central nervous system is performed to trigger seizure. Seizure duration depends on patient's age, released energy, electrodes location, seizure threshold, prescribed drugs, etc. To prevent different mental-physical damages during ECT, anesthesia and neuromuscular blocking are necessary. Different types of intravenous anaesthetics are used for anesthesia; therefore, the present study aimed to compare dexmedetomidine-thiopental and dexmedetomidine-ketamine combinations in hemodynamic changes, seizure duration, and recovery time in patients candidate for ECT. Materials and methods: This double-blind clinical trial was conducted on 52 patients, randomly divided into 2 groups. Group 1: Dexmedetomidine-thiopental combination with a dose of 0.5 mg/kg and 1 mg/kg-2 mg/kg of body weight, respectively; Group 2: Dexmedetomidine-ketamine combination with a dose of 0.5 mg/kg and 0.8 mg/kg of body weight, respectively. Recovery time, seizure duration, MAP, PR, blood pressure, and heart rate before and during recovery time were recorded after ECT and seizure. Data were also analyzed by SPSS version 24 software.

Results: No significant difference was observed between the seizure duration in the two groups (27 sec) (P=0.6); however, there was a significant difference between the two groups in terms of recovery time (P=0.001). Recovery time in dexmedetomidine-thiopental group was longer than dexmedetomidine-ketamine group. Although, there was no significant difference between the MAP and PR before ECT in the two groups (P=0.4), MAP and PR in dexmedetomidine-thiopental group (P=0.02) was significantly lower than those of dexmedetomidine-ketamine group (P=0.03). Regarding the patients satisfaction score, there was also no significant difference between the two groups (P=0.4).

Conclusion: The mean PR and MAP were decreased in the dexmedetomidine-thiopental group, however; in the dexmedetomidine-ketamine group, there was a slight increase in the mean PR and MAP. Therefore, dexmedetomidine-ketamine combination could stabilize the hemodynamic without any change in seizure duration and recovery time. Keywords: Central nervous system • Electrodes • Blood pressu

- The hemodynamic and analgesic efficacy of subcutaneous dexmedetomidine versus Marcaine 0.5% in postoperative pain management following herniorrhaphy
- Shirin Pazoki1 , Hesameddin Modir2*, Alireza Kamali1 , Amirreza Naimi2 , Mehdi Maktubian3 , Nazanin Amini
- Background: This study addressed the comparative hemodynamic and analgesic effects of subcutaneous dexmedetomidine versus Marcaine 0.5% on herniorrhaphy scheduled patients, as well as postoperative pain management.
- Materials and Methods: A double-blind trial was conducted in three groups of patients (n = 120) scheduled for herniorrhaphy. The study groups were (i) Marcaine + dexmedetomidine (MAR-DEX) group, receiving Marcaine 0.5% (5 mg) + dexmedetomidine (1 mcg/kg), (ii) MAR group, Marcaine 0.5% (5 mg), and (iii) PBO group, placebo, subcutaneously. Vital signs (blood pressure/heart rate/SaO2), as well as pain scores (using the Visual Analog Scale) at recovery and certain time points (1, 2, 4, 6, 12, and 24 h postoperatively) were measured. Moreover, the overall opioid administered postoperatively and the side effects were recorded. Data were analyzed by SPSS (version 20) software by analysis of variance and repeated measurement tests.
- Results: Lower pain score was revealed in the MAR-DEX group and higher one in the PBO group ($P < 0.001$), whereas the lowest opioid use was observed in the MAR-DEX group ($P < 0.001$).
- Conclusion: Adding dexmedetomidine had benefits of relieving pain and reducing opioid use without any side effects. Keywords: Dexmedetomidine, hemodynamic changes, Marcaine 0.5%, subcutaneous injection

- Comparison of the Effect of Dexmedetomidine and Remifentanil on Controlled Hypotension During Rhinoplasty: A Clinical Trial Study
- Farzad Zamani1 Narges Naseri1 Farzaneh Farmani2 Alireza Kamali2 *
- ABSTRACT
- Introduction: One of the most important problems during cosmetic nose surgery is excessive bleeding. Controlled hypotension is an appropriate technique for reducing intraoperative bleeding as well as satisfactory and non-bloody surgical field. Different drugs, such as dexmedetomidine and remifentanil, are used to control hypotension. The aim of this study was to compare the effect of dexmedetomidine and remifentanil on the creation of control hypotension during rhinoplasty.
- Material and Method: This study is a randomized, double-blind clinical trial which was performed on 60 patients randomly divided into two groups D (Dexmedetomidine) and R (Remifentanil). In group D (0.5 mg / kg / h) Dexmedetomidine infusion and in group R (50-100 µg / kg / h) Remifentanil infusion. The study groups were compared in terms of hemodynamics and intraoperative bleeding. The data obtained from completed questionnaires were analyzed using SPSS software, T-test and ANOVA statistical tests and were presented in tables and statistical charts.
- Results: The results of this study showed that the mean MAP (Mean Arterial Pressure) was significantly lower in remifentanil group patients than in dexmedetomidine group, while the intraoperative bradycardia rate was different at various time.
- Conclusion: During rhinoplasty surgery, both dexmedetomidine and remifentanil were effective in controlling hypotension and reducing intraoperative bleeding, but the effect of remifentanil was more pronounced than dexmedetomidine. Keywords: Rhinoplasty, Controlled Hypotension, Dexmedetomidine, Remifentanil

- **Change in saturation oxygen and hemodynamic responses by adding intrathecal dexmedetomidine *vs*. sufentanil to bupivacaine in patients undergoing dynamic hip screw operation: a randomized clinical trial**

- Bijan Yazdi,[1] Hesameddin Modir, [1*] Alireza Kamali,[1] Hanieh Masouri[2]

- **Abstract**
- Sufentanil (SUF) and dexmedetomidine (DEX) are used as bupivacaine in the spinal technique that providing stable hemodynamic conditions with least side effects. This study aimed to compare the change in saturation oxygen and hemodynamic responses after intrathecal DEX and SUF as adjuvants to bupivacaine in patients undergoing dynamic hip screw. This clinical trial was conducted with 80 patients referring to Valiasr Hospital, Arak, Iran, who were randomly assigned to two groups (*n* = 40): DEX group (8 mg bupivacaine with 5 µg DEX) and SUF group (8 mg bupivacaine with 2.5 µg SUF).
- The pain severity was lower in DEX group at different hours and the systolic pressure and diastolic blood pressure were lower in DEX group than in SUF group after surgery. Saturation oxygen was generally lower and more stable in DEX group but there was no significant difference between two groups. The incidence of sensory and motor block was lower in DEX group than in SUF group, but the duration of assessment of sensory block was lower in SUF group than in DEX group. DEX relieves pain up to 24 hours postoperatively. Nevertheless, Care should be taken to avoid the DEX induced shivering in patients.

- **Keywords:** adjuvants, bupivacaine, dexmedetomidine, intravenous, spinal anesthesia, sufentanil

- **Effect of adding dexmedetomidine or remifentanil to thiopental in patients with mood disorder candidate for electroconvulsive therapy**

- Faezeh Heidarbeigi, Hamidreza Jamilian, Anita Alaghemand, Alireza Kamali[2]

- **Abstract**
- Electroconvulsive therapy (ECT) is one of the appropriate treatments for many neuropsychiatric patients, especially those with mood disorders. Short-term complications of ECT include agitation and postictal. In this study, we compared the addition of dexmedetomidine or remifentanil to thiopental as the main anaesthetic used in ECT. In this double-blind randomised clinical trial, 90 patients with mood disorders (candidates for ECT) were divided into two groups based on their therapy: dexmedetomidine or remifentanil. In the first group (DG), patients were slowly injected intravenously with 0.5 μg/kg dexmedetomidine before induction of anesthesia. In the second group (GR), 100 μg of remifentanil was slowly injected intravenously.In addition, we collected demographic information such as respiratory rate, heart pulse rate, seizure time, mean of arterial blood pressure, recovery duration and the oxygen arterial saturation recorded after recovery. Data obtained were analysed by use of statistical software, SPSS-23.
- The mean age of both groups was approximately 37 years with the majority being men. There was no significant difference between the two groups in terms of age and sex, blood pressure, heart rate, duration of seizures and arterial oxygen saturation before ECT. The mean blood pressure and heart rate in the recovery group were lower in the dexmedetomidine group than in the remifentanil group and the hemodynamics in the dexmedetomidine group were more stable. The recovery time in the dexmedetomidine group was longer than that of the remifentanil group ($p = 0.001$). Both groups had approximately the same satisfaction and the rate of agitation after ECT was the same.
- Both remifentanil and dexmedetomidine as adjuvants lead to a decrease in patients' post-ECT hyperdynamic responses. In our study, we demonstrated that the effect of dexmedetomidine is greater than remifentanil. On the other hand, neither dexmedetomidine nor remifentanil had a negative effect on seizure duration, but dexmedetomidine significantly prolonged recovery time, when compared to remifentanil.

- **Key Words:** Mood disorder, Electroconvulsive therapy (ECT), Dexmedetomidine, Remifentanil

- **Analgesic Effects of Dexmedetomidine and Remifentanil in Patients with Herniated Disc**
- Mohsen Dalvandi, Taher Amini Maleki, Alireza Kamali and Ali Nazemi Rafie
- Abstract
- Introduction:
- The purpose of this study was to compare analgesic effects of dexmedetomidine with those of remifentanil in patients undergoing herniated disc surgery.
- Material and Methods: In this double-blind clinical trial study, 96 patients who were candidates for herniated disc surgery were enrolled. Patients were randomly divided into three groups with epidural block. In all three groups, leg and back pain were recorded within 2, 6, 12 and 24 hours after surgery. Patient sedation was recorded by Ramsay sedation score within 2, 6, 12 and 24 hours postoperatively. Data were analyzed by SPSS 20 software.
- Results: Foot pain and low back pain were lower in the dexmedetomidine-apotel group within 2 to 24 hours after surgery ($p < 0.05$). There was a statistically significant difference between the three groups in terms of sedation within 2 to 24 hours after surgery ($p < 0.05$). Furthermore, sedation was found to be higher in the apotel normal saline group than the other two groups, 2 to 6 hours after surgery. But no signoficant difference was observed between the dexmedetomidine-apotel and remifentanil-apotel groups ($p < 0.05$).
- Conclusion: Dexmedetomidine-apotel was capable of reducing back and leg pain in postoperative period, but there is no difference between dexmedetomidine-apotel and remifentanil-apotel in sedation.

- Clinical Comparison of Adding Sulfate Magnesium and Dexmedetomidine in Axillary Plexus Block for Prolonging the Duration of Sensory and Motor Block: Study Protocol for a Double-blind Randomized Clinical Trial
- Seyed Yousef Shahtaheri1, Mohammad Tavakoli Rad1, Bijan Yazdi1, Mehran Azami2, Alireza Kamali1
- The purpose of this study was to compare the effect of magnesium sulfate adjunct to dexmedetomidine on increasing the duration of sensory and motor block in axillary block.
- Materials and methods: This study is a double-blind clinical trial. Ninety-nine patients were included in the study. They were undergoing forearm and hand surgery and were referred to Vali-e-Asr Hospital in Arak. The patients were divided into three groups. The first group received lidocaine (1.5%) and dexmedetomidine (0.5 µg/kg). The second group patients were given lidocaine (1.5%) plus magnesium. In the control group, lidocaine (1.5%) was adjusted to 35 cc with normal saline. The final volume was 35 cc in the three groups. Sensory and motor block and pain were measured and data were analyzed using SPSS v. 20. The final volume was 35 cc in the three groups.
- Results: The sensory and motor block onset time and the stabilization time of the sensory and motor block in the magnesium sulfate group were lower .

- Dexmedetomidine:

- a α2-adrenergic agonist, is an analgesic, antipyretic and antihypertensive drug.
- Adding dexmedetomidine to topical anesthetic drugs can be effective during the peripheral nervous block.
- The axillary block is more commonly used for forearm and/or hand surgeries due to its ease, safety and reliability.
- Dexmedetomidine is useful as an adjuvant for faster anesthesia and longer anesthesia and can improve hemodynamic changes in forearms and hands.

- **Comparing intravenous dexmedetomidine and clonidine in hemodynamic changes and block following spinal anesthesia with ropivacaine in lower limb orthopedic surgery: a randomized clinical trial**
- Maryam Javahertalab,[1] Alireza Susanabadi, [*] Hesameddin Modir,[1] Alireza Kamali,[1] Alireza Amani,[2] Amir Almasi-Hashiani[3]
- **Abstract**
- Dexmedetomidine (DEX) can prolong duration of anesthesia and shorten onset of sensory and motor block relative to clonidine.
- This study attempted to compare the efficacy of intravenous DEX and clonidine for hemodynamic changes and block after spinal anesthesia with ropivacaine in lower limb orthopedic surgery. In a double-blind randomized clinical trial, 120 patients undergoing spinal anesthesia in lower limb orthopedic surgery were recruited and divided into three groups using balanced block randomization: DEX group (n = 40; intravenous DEX 0.2 μg/kg), clonidine group (n = 40; intravenous clonidine 0.4 μg/kg), and placebo group (n = 40; intravenous normal saline 10 mL) in which pain scores were assessed using visual analogue scales (at recovery, and 2, 4, 6, and 12 hours after surgery) and time to achieve and onset of sensory and motor block.
- Statistically significant differences were found in mean arterial pressure among the groups at all times except baseline (P = 0.001), with a less mean arterial pressure and a prolonged duration of sensory and motor block (P = 0.001) in the DEX group where pain relieved in patients immediately after surgery and at above mentioned time points (P = 0.001).
- Simultaneous administration of intravenous DEX with ropivacaine for spinal anesthesia prolongs the duration of sensory and motor block and relieves postoperative pain, and however, can decrease blood pressure. Although intravenous DEX as an adjuvant can be helpful during spinal anesthesia with ropivacaine, it should be taken with caution owing to a lowering of mean arterial pressure in patients especially in the older adults.

- **Comparison of the effect of dexmedmotidine and ketamine on controlling pain after cesarean section via intra-peritoneal method**
- dexmedmotidine and ketamine on controlling pain after cesarean section
- Alireza Kamali , Maryam Maktabi , Zoha Khademi , Taha Fereidooni
- **Abstract**
- The present study aimed to compare the effect of dexmedmotidine and ketamine on controlling pain after cesarean section via intra-peritoneal
- Methods: In this clinical and double-blind clinical trial, patients were randomly divided into two groups (dexmedmotidine and ketamine). In the first group, 5 mg / kg ketamine and 1 mg / kg dexmedetomidine were injected in 100 mg normal saline. Pain score was measured on the basis of the visual analog pain scale during the recovery at 4, 6 and 12 hours after the surgery. The data were then analyzed by SPSS (version 20).
- Results: 70 patients participated in the study. The results showed that the mean pain scores were the same in different postoperative hours in patients ($P \geq 0.05$). The mean opioid use in the ketamine group was lower than inter-peritoneal dexmedmotidine ($P = 0.03$). Moreover, the mean postoperative analgesia in the ketamine group was higher than inter-peritoneal dexmedmotidine ($P = 0.04$).
- Conclusion: According to the results, the mean opioid consumed in the ketamine group was less than inter-peritoneal dexmedmotidine. Additionally, the mean postoperative analgesia in the ketamine group was higher than that of inter-peritoneal dimethomidine. Therefore, it can be concluded that ketamine has a better effect on reducing pain after cesarean section.

- **Addition of dexmedetomidine and neostigmine to 1.5 % lidocaine and triamcinolone for epidural block to reduce the duration of analgesia in patients suffering from chronic low back pain**
- Shima Zargar,[1] Ali Nazemi Rafie,[2] Alireza Sosanabadi,[1] and Alireza Kamali[1]
- **Abstract**
- Lower back pain is one of the leading causes of disability in the world. The aim of this study was to evaluate the effect of supplementation of dexmedetomidine and neostigmine with lidocaine 1.5% and triamcinolone for epidural block in increasing the duration of analgesia among patients suffering from chronic low back pain. In this double-blind, randomized clinical trial, 33 patients with chronic low back pain were included in three groups of 11 patients for epidural blockage. Triamcinolone (40 mg/ml) was added to lidocaine 1.5% solution (2 cc/segment) for all three groups. In group N, neostigmine was used at a dose of 1 mg (mg), followed by group D (dexmedetomidine 35 µg [0.5 µg/kg]), and grou [ND (neostigmine 0.5 mg, and 35 µg dexmedetomidine, all of which were added to the triamcinolone and lidocaine solution in each group. Medications were injected into the epidural space using an interlaminar approach. Subsequently, scores of pain and duration of analgesia were recorded in questionnaires and analysed using SPSS version 23.
- One month after the injections, pain scores recorded in the N group were 7.6±1.4, followed by 5.88±1.2 in group D and 5.42 ±1.1 in group ND. Therefore, the pain scores were significantly higher in the neostigmine group than the other two groups ($p = 0.02$), but no significant difference was found between the two groups that received dexmedetomidine and a combination of dexmedetomidine + neostigmine. Three months after the injections, there was a significant difference in pain scores between the two groups ($P = 0.01$). Both neostigmine and dexmedetomidine were capable of reducing the pain of patients with chronic low back pain after epidural block. However, neostigmine's impact is lower compared to dexmedetomidine. The combination of the two drugs also reduced the pain scores of the patients after the intervention.

- Epidural Block :

- Different adjuvants have been used in combination with local anesthetics to improve analgesia and to reduce complications, but none have been accepted
- Other adjuvant drugs include dexmedetomidine, which is a highly sensitive and highly selective α-2 adrenergic receptor agonist with a tendency of more than 8-fold in comparison with clonidine, thus reducing undesired side effects of alpha-1 receptors .
- Various studies have shown that dexmedetomidine is capable of increasing the sensory block, motor block and also the duration of analgesia .
- According to these interpretations, this study was aimed to compare the effect of two drugs (neostigmine and dexmedetomidine) as adjuvant drugs along with lidocaine and corticosteroids in increasing the duration of analgesia in patients suffering from chronic low back pain for improving the quality of life among these patients.

- **Addition of dexmedetomidine, tramadol and neostigmine to lidocaine 1.5% increasing the duration of postoperative analgesia in the lower abdominal pain surgery among children: a double-blinded randomized clinical study**
- Tara Hasani Goudarzi,[1] Alireza Kamali,[1*] Bijan Yazdi,[1] Gholamreza Nouri Broujerdi[2]
- **Abstract**
- Pain is a common complication after surgery. Insufficient control of postoperative pain has adverse effects on the physiological, metabolic and psychological state of the child. The use of local analgesics and anesthetics alone cannot produce complete anesthesia and intraoperative comfort. The addition of adjuvant drugs is commonly used to improve the quality of the block. Therefore, adding new supplements may increase the duration of analgesia. The aim of this study was to compare the addition of dexmedetomidine, tramadol and neostigmine to lidocaine 1.5% in increasing the duration of postoperative analgesia in the lower abdominal pain surgery in children aged 2–8 years. This double-blind randomized clinical trial was conducted on children candidate for lower abdominal surgery. The 96 patients were randomly divided into 3 groups including dexmedetomidine, neostigmine, and tramadol. For all children, 3 mg of midazolam was administered orally before entering the operating room. The patients underwent general anesthesia with 2 μg/kg fentanyl, 0.03 mg/kg midazolam, 0.5 mg/kg atracurium and 5–6 mg/kg thiopental. After determining the hiatus membrane, 2 mL syringes containing air and distilled water (each of which 1 mL) slowly entered the space. After eliminating caudal resistance, 1.5% lidocaine was injected at dose of 0.5 mL/kg. A total of 96 patients were enrolled in this study.
- The results revealed that pain scores in the dexmedetomidine group in recovery, 2, 6 and 12 hours after surgery were less than the other two groups. Furthermore, the tramadol group showed a lower score in comparison with the neostigmine group and the duration of analgesia in the dexmedetomidine group was more than the other two groups. In addition, the mean of analgesic at 24 hours after operation in the dexmedetomidine group was lower as compared to the other two groups, indicating the effect of dexmedetomidine as an adjuvant in increasing the duration of analgesia and reducing postoperative pain in patients along with lidocaine 1.5%. All three drugs (neostigmine, tramadol and dexmedetomidine drugs), along with other local anesthetic, increased the duration of analgesia and decreased postoperative pain in children. The effect of dexmedetomidine was greater than the other two drugs.

- Caudal Block :

- Despite the simplicity and high success rate of this method, it has some limitations due to the short duration, which can be resolved by adding adjuvant drugs to local anesthetics.
- These drugs include tramadol, neostigmine, and dexmedetomidine. Tramadol inhibits the neuronal uptake of serotonin and also strengthens the effects of local anesthetic drugs when combined with peripheral nerve blocks.
- Dexmedetomidine is a highly selective alpha-2 adrenergic receptor agonist and is defined to be over 8 times more specific for α2 receptors as compared to clonidine.
- This reduces the unwanted side effects of alpha-1 receptor. Neostigmine is also used in spinal anesthesia, which may increase the analgesic intensity and length via spinal cord and releasing nicotine.

- **Comparison of midazolam and dexmedetomidine for pain relief during and after hysterosalpingography in women with infertility**
- Fatemeh Safi,[1] Leila Rabiee,[1] Maryam Shokrpour,[2] Alireza Kamali[3]
- **Abstract**
- Patients feel uncomfortable with cervical manipulation, uterine distension and stimulation of peritoneum during hysterosalpingography (HSG) and experience lower abdominal pain during and after the procedure. Pain during the procedure has a negative effect on the adaptation of patients to treatment and physicians are trying to overcome this unpleasant situation. Therefore, the aim of this study was to compare the effect of midazolam and dexmedetomidine on reducing pain and spasm of fallopian tubes during and after HSG procedure in women with infertility. In a double-blind randomized controlled trial, 102 patients were randomly divided into two groups, midazolam and dexmedetomidine. The pain was recorded during injection and immediately after injection and 30 minutes after HSG, and then the complications of injection were recorded. Finally, the data were analyzed using SPSS version 20.
- Based on the results presented herein, no significant difference was found between the two groups in terms of vasovagal reaction, spasticity of the tube and the side of the spastic tube and uterine cavity anomalies ($p < 0.05$). However, the pain showed a significant difference between the two groups during the injection, immediately or at 30 minutes after the procedure ($p = 0.0001$).
- The pain in the midazolam group was less than that of dexmedetomidine. Furthermore, there was no significant difference between the two groups regarding spasticity ($p < 0.05$). There is a benefit in terms of pain reduction with the use of dexmedetomidine when comparing with midazolam injection. However, dexmedetomidine does not cause side effects in patients and can be used to reduce pain during injection.

Comparison of Dexmedetomidine and Fentanyl as an Adjuvant to Lidocaine 5% for Spinal Anesthesia in Women Candidate for Elective Caesarean

Alireza Kamali,[1] Ronak Azadfar,[2] Shirin Pazuki,[1] Maryam Shokrpour[3,*]

Abstract

This study aimed to compare the effect of Dexmedetomidine and fentanyl as an adjuvant to lidocaine 5% in spinal anaesthesia to increase post-operative analgesia among women candidates for elective caesarean.

METHODS:

Eighty-four pregnant women candidates for caesarian were randomly divided into fentanyl and Dexmedetomidine groups. In the first group, 25 µg fentanyl was added to lidocaine 5% while in the second group, 0.5 µg per kilogram Dexmedetomidine was added to lidocaine 5%. After the operation, a pain score of the patients in recovery and within 4, 12 and 24 hours after the operation, the average length of analgesia and the average amount of the analgesics taken within 24 hours and after the operation were recorded.

RESULTS:

The average length of postoperative anaesthesia and the average amount of the drug taken within the first 24 hours after the operation in fentanyl group was more than the Dexmedetomidine group ($P = 0.01$). Shivering in Dexmedetomidine group was more common than what was observed in the fentanyl group ($P = 0.001$). Higher rates of nausea-vomiting were observed in the fentanyl group ($P = 0.001$).

CONCLUSIONS:

Fentanyl results in a longer period of postoperative analgesia and less consumption of drugs after the operation. Fentanyl is recommended in caesarian.

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