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Procedural Sedation in Dentistry Using Alpha-2 Agonists: Clinical Cases

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Funding: No specific funding was received for this work.

Potential competing interests: No potential competing interests to declare.

Abstract

Background: The presence of acute pain is a serious condition, perhaps, the most terrible negative feeling of a person. Therefore, it is advisable to intraoperatively use means of acute pain control for comfort and to prevent the formation of chronic pain syndrome. Using a multimodal approach to acute pain management allows for better outcomes. The more we engage antinociceptive receptors to control pain, the more comfortable our patient feels. Alpha-2-adrenergic agonists clonidine became an important part of the anesthesiologist's set in the perioperative period. It is the selective effect of dexmedetomidine on alpha-2a central and peripheral receptors and alpha-2c receptors that made it possible to use the drug more widely during procedural sedation.

The joint use of several drugs for procedural sedation is aimed at obtaining the maximum possible comfort for the patient, the attending physician, and the anesthesiology team, reducing the medication load and awakening as soon as possible. Gaining practical experience in using certain combinations of drugs and analyzing useful negative effects helps to balance and satisfy all needs.

Personal experience. Two clinical cases with a typical development but differing in surgical load are presented, describing the effects associated with the use of Precedex (dexmedetomidine hydrochloride) in the introduction of procedural sedation in ambulatory dentistry.

Conclusions. The use of clonidine or dexmedetomidine (Precedex) intraoperatively together with propofol during procedural sedation in ambulatory dentistry allows reliable control of pain in the perioperative period when basic traditional drugs (acetaminophen, NSAIDs) are used in safe doses, reduces the maintenance dose of propofol during the procedure, prevents the vomiting reflex, provides the possibility of comfortable execution of the doctor's commands (surgeon, implantologist, orthopedics) and faster transfer of the patient to the recovery room.

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Keywords: Propofol, Dexmedetomidine, Acetaminophen, Clonidine, Anesthesiologists.

Introduction

The presence or occurrence of pain is probably the most terrible negative feeling of a person[1][2]. A toothache is especially noticeable, which due to anatomical and physiological reasons quickly becomes unbearable and requires great efforts to fight it. It is much easier and more expedient to apply acute pain control tools in advance for comfort and to prevent the formation of chronic pain syndrome. The use of a multimodal approach to the control of acute pain at the current stage of scientific and clinical understanding of the causes of pain formation and combating it makes it possible to obtain better results[3][4][5][6].

Clinical experience proves: that the more we use antinociceptive receptors with external pharmacological and non-pharmacological factors to control pain, the more comfortable our patient feels[7][8]. Acetaminophen, local anesthetics, gabapentin, pregabalin, non-steroidal anti-inflammatory drugs, opioids, steroids, and adrenergic agonists have long been among the effective remedies. I would like to emphasize that since the 1980s, alpha-2-adrenergic agonists (clonidine) have become an important part of the anesthesiologist's kit for the administration of analgesia and pain control in the perioperative period [9][10].

Pharmacological evolution gave us the opportunity to include one more representative of this class - dexmedetomidine. It is the selective effect on alpha-2a central and peripheral receptors (analgesic, antihyperalgic and sympatholytic effects) and alpha-2c receptors (anxiolytic and sedative effects) that made it possible to use the drug more widely during procedural sedation (5-7). Most often Currently, imidazolam, propofol, and fentanyl are used for sedation (analgesia). However, each of these drugs causes respiratory disorders, which account for more than 50% of complications during procedural sedation, which, combined with the stress response to surgical intervention, calls for a universal drug that can be safely used in patients of various ages with varying degrees of anesthetic risk [11]. Such a drug must meet certain requirements—provide a quick onset of effect, early awakening, and cause minimal cardiorespiratory depression. Today, such a drug is dexmedetomidine hydrochloride — a selective alpha-2-adrenoceptor agonist with a wide spectrum of pharmacological action [12][13][14][15]. This drug has found wide clinical use all over the world for procedural sedation as an adjuvant to anesthetics (especially in patients with a high risk of cardiovascular complications). The sedative effect (similar

to the phase of deep sleep, without rapid eye movement) is caused by the inhibition of neuronal activity in the area of the blue spot—the main noradrenergic nucleus located in the brain stem and containing a large number of alpha-2-adrenoceptors. At the same time, the patient remains ready for awakening [16][17][18][19]. This depth of sedation ranges from 0 to minus 3 points on the RASS scale (Richmond Agitation Sedation Scale) [17][20].

The joint use of several drugs for procedural sedation is aimed at obtaining the maximum possible comfort of all parties (patient, attending physician, anesthesiological team), reducing the medication load, and awakening as soon as possible. [21][22] Gaining practical experience in using certain combinations of drugs and analyzing beneficial and harmful effects helps to balance and satisfy all needs [21][22][23][24][25].

Personal experience Since January 2022, the drug dexmedetomidine 200 μg/2 ml is used for procedural sedation of adult patients in outpatient dentistry, which is diluted to 20 ml with 0.9% NaCl solution before use [26][27][28][29][30].

The injection of the solution is carried out by perfusion through the cannula of a peripheral vein[31][32][33][34][35][36]. The basic drug for sedation is propofol. At this time, the number of patients who received dexmedetomidine in the scheme of procedural sedation (analgosedation) is 65 (22 women and 43 men). I would like to share typical clinical cases of the use of dexmedetomidine during procedural sedation (analgosedation) to demonstrate beneficial clinical effects[37][38][39][40].

Clinical case No. 1

Patient M., account number 75/2022, born in 1953, 115 kg.**Clinical diagnosis**: Anodontia.

Associated diagnosis: panic fear of dental treatment. The patient was fully examined (general blood analysis, blood glucose, correlogram, ECG, echocardiology, advisory opinion of a cardiologist and a neurologist with recommendations regarding treatment and preparation for intervention. No contraindications were found. A treatment plan for anesthesiological support was agreed upon with the patient, who signed on "Informed consent for pain relief surgery". Operation plan: Installation of 12 implants, bone plastic, and soft tissue plastic. Removal of casts of the jaws. Anesthesiologist's support: intravenous analgesia on spontaneous breathing with continuous insufflation of sleep through nasopharyngeal cannulas (NFC). The patient was taken to the operating room at 9:00 a.m., after installing the sensors of the patient monitor (pulse-oximeter, non-invasive pressure measurement cuff, ECG electrodes, BIS-module electrodes) and installation of a 22G intravenous cannula in the vein of the right forearm, premedication (dexamethasone, ondansetron, dexketoprofen, atropine, fentanyl), administration of sodium thiopental 400 mg; At 9:07, the infusion of propofol at a rate of 600 mg/h (5.2 mg/kg/h) and dexmedetomidine 100 μg/h (0.9 μg/kg/h) was started.

The position on the chair is horizontal. NFK is installed in both nasal passages, and oxygen is supplied from an oxygen concentrator with a flow of 6 l/min, with a subsequent decrease to 3 l/min according to blood saturation indications. The surgeon administered local anesthesia at 9:22. Paracetamol 1% — 100 ml in 15 minutes, cefepime 1 gram was administered intravenously, and a venous line was established for the administration of glucose 5% and 0.9% NaCl solution (80-100 ml/h). After 30 minutes, the dose of propofol was reduced to 500 mg/h (4.3 mg/kg/h), and

dexmedetomidine to 22 μg/h (0.2 μg/kg/h).

The course of analgosedation is calm, heart rate is stable (75-58 beats/min), blood pressure did not decrease below 102/57 mmHg, saturation 99-97%, respiratory rate 12-14/min), BIS 38-66%. At the 90th minute of anal sedation, the dose of propofol was reduced to 450 mg/h (4 mg/kg/h).

After 2 hours of sedation, the administration of dexmedetomidine was stopped. At 1:35 p.m. at the stage of gingival suturing after the end of the main volume of surgical intervention (approximately 20 minutes before the end of the surgeon's work), the rate of propofol administration was reduced to 200 mg/h (1.7 mg/h). End of the surgical stage at 1:54 p.m. Removed NFK at 13:55. After 10 minutes, the patient began to follow the orthopedist's commands, which made it possible to conduct videography and make casts of the jaws with a bite. The full volume of work was completed at 2:40 p.m., the patient was moved to the recovery room. There are no complaints about the transfer time. After 30 minutes, accompanied by his wife with recommendations, he was sent home.

The operation time was 4:32 hours, the orthopedic surgeon's time was 35 minutes. The total time of stay under the supervision of an anesthesiologist is 5 hours 35 minutes.

The total dose of propofol was 1940 mg, and the total dose of dexmedetomidine was 83 mcg (0.72 mcg/kg). days); amoxicillin 1000 mg/2 times/day; Silica oral hygiene products. In addition, dexketoprofen 25 mg (sachet) up to 2-4 times a day is recommended in the case of breakthrough acute pain. After 6 hours, there are no pain complaints (your score is less than 10 out of 100 points). Feelings of discomfort are insignificant. After 18 hours (on the morning of the next day), there is no rest pain, slight pain appears when chewing (VASH 10/20). At night, around midnight, due to the onset of moderate pain and increasing discomfort, he took a solution of 25 mg of dexketoprofen (the pain subsided after 15 minutes, the patient fell asleep). After 24, 32, and 48 hours, if the recommendations were followed, the pain did not bother him (VAS less than 10).

Clinical case No. 2

Female patient U., account number 85/2022, year of birth in 1970, 55 kg.

Clinical diagnosis: Partial Anodontia. Pulpit 16, 26, 36. Sanitation of the oral cavity. Associated diagnosis: post-traumatic syndrome due to combat operations (IDP status), asthenic syndrome, pronounced vomiting reflex. The day before, 3 weeks ago, the patient underwent dental treatment under analgosedation (propofol and dexmedetomidine) lasting 6 hours. Taking into account perioperative comfort and the absence of breakthrough pain in the postoperative period, panic attacks under the influence of loud noises, and the inability to tolerate even moderate pain, the patient wished to perform the planned operation under analgosedation. conclusions of a family doctor and a neurologist with recommendations regarding treatment and preparation for the intervention. There are no contraindications. The patient agreed on a treatment plan with anesthesiological support, and signed the "Informed consent for surgery and analgesia". Surgery plan: Removal of 3 teeth (16, 26, 36), mouth - renewal of 4 implants, bone plastic and soft tissue plastic. Removal of casts of

the jaws.

Anesthesiologist support

intravenous analgesia with spontaneous breathing with continuous insufflation of oxygen through NFK. The patient was taken to the operating room at 1:15 p.m., after installing the sensors of the patient's monitor (pulse oximeter, non-invasive pressure measurement cuff, ECG electrodes, BIS-module electrodes) and intravenous cannula 22G in the vein of the right forearm, premedication was performed (dexamethasone, ondansetron, dexketoprofen, atropine, nefopam), administration of sodium thiopental 300 mg, v13: 22, an infusion of propofol at a rate of 400 mg/h (7.3 mg/kg/h) and dexmedetomidine 55 µg/h (1.0 µg/kg/h) was started. The position on the chair is horizontal. NFK is installed in both nasal passages and oxygen is supplied from an oxygen concentrator with a flow of 6 l/min, with a subsequent decrease to 2.5 l/min according to blood saturation indications. The surgeon applied local anesthesia at 1:35 p.m. Intravenous administration of Paracetamol was carried out 1% — 100 ml in 15 minutes, cefepime 1 gram, administration of 0.9% NaCl solution (50 ml/h) was started. After 30 minutes, the dose of propofol was reduced to 300 mg/h (5.5 mg/kg/h), and the rate of dexmedetomidine administration was reduced to 11 µg/h (0.2 µg/kg/h) after 40 minutes.

The course of analgosedation is calm, heart rate is stable (84-55 beats/min), blood pressure did not decrease below 96/54 mm Hg, saturation 100-97%, respiratory rate 10-12/min), BIS 28-62%. At the 100th minute of analgosedation (15:02), the administration of dexmedetomidine was stopped (the total dose was 47 µg), and the dose of propofol was reduced to 200 mg/h (3.7 mg/kg/h). At 16:20 at the stage of stitching the gums after the end of the main volume of surgical intervention (approximately 20 minutes before the end of the surgeon's work), the rate of propofol administration was reduced to 100 mg/h (1.8 mg/h).

The end of the surgical stage at 16:40. The NFK was removed at 16:42. After 15 minutes, the patient began to follow the orthodontist's commands, which made it possible to conduct videography and make casts of the jaws with a bite to install temporary dental prostheses. End of work of the orthopedist at 18:15. After 30 minutes, the patient was transferred to the recovery room. Complaints at the time of transfer to weakness and moderate drowsiness. After 40 minutes, accompanied by her husband with recommendations, the patient was sent home.

The operation time was 4 hours 40 minutes, and the orthopedist's work time was 1 hour 15 minutes. The total time of stay under the supervision of an anesthesiologist is 6 hours and 25 minutes.

The total dose of propofol was 1600 mg, and the total dose of dexmedetomidine was 47 mcg (0.85 mcg/kg). days); amoxicillin 625 mg/2 times/day; lactovit; oral hygiene products. In addition, when pain breaks out, dexketoprofen 25 mg (sachet) is recommended up to 2-4 times a day as needed. After 14 hours, there are no pain complaints (your score is less than 10 out of 100 points). Feelings of discomfort are insignificant. There was no breakthrough pain. After 24 hours, there is no pain relief, slight pain appears when chewing (VASH 10/20). There was no breakthrough pain. After 48 hours, if the recommendations were followed, the pain did not bother (VAS less than 10).

Conclusions

1. Intraoperative use of dexmedetomidine (Precedex) allows controlling pain in the perioperative period when using basic traditional drugs (acetaminophen, NSAIDs) without - in moderate doses, it provides pain-free comfort for at least 10 hours.
2. The use of dexmedetomidine (Kvanadex) together with propofol during procedural sedation in stomatology and maxillofacial surgery reduces the maintenance dose of propofol.
3. Thanks to the use of dexmedetomidine (Kva-nadex) and reducing the total dose of propofol, it becomes possible to comfortably carry out the commands of the doctor (surgeon, implantologist, orthopedist) and quickly transfer the patient to the recovery room.
4. When using dexmedetomidine (Precedex) together with propofol, there is no vomiting reflex for at least 6 hours after the patient wakes up.

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