Proper diagnosis of psychoactive substance abuse and addiction, as well as acute intoxication, withdrawal syndrome and overdosing are of great importance in patients who are preparing for surgical intervention. There are some specific details in their preoperative preparation whether they underwent emergency or elective surgery. Good knowledge of the characteristics of psychoactive substance abuse and addiction, interaction of psychoactive substances and anesthetics and any other drugs that could be used in the perioperative period is important especially for anesthesiologist.

In this work we present key issues for recognizing these patients as well as some guidelines for adequate preoperative preparation and postoperative care.

Key words: preoperative preparation, alcoholism, abuse of psychoactive substances

INTRODUCTION

Alcohol, as the most commonly abused psychoactive substance, as well as the other psychoactive substances abuse and addiction, are of great importance in preoperative preparation, anesthesia and perioperative treatment of patients. Many authors emphasize the importance of knowing the effects of certain psychoactive substances for better preoperative preparation and less postoperative complications related to the substance abuse.

Generally, there are two different approaches in preoperative period depending on the urgency of surgery:

- in emergency surgical intervention in the life threatening conditions (with or without reanimation) and
- in elective operations.

Emergency surgery is most due to injuries (often life-threatening) in acute intoxication condition. Surgical interventions for an abscess, perivascular aneurysmas, chemical burns etc. caused by using of non-sterile needle or paravenous injecting drugs, are often too.

In elective surgery, when the dependence of psychoactive substance is recognized, if it is possible, we should postpone the intervention, due to appropriate preoperative preparation.

First, it is necessary to obtain information on the type of abused substance, because of possible interactions with anesthetics or other drugs that can be used in the perioperative period. It must be determined if the subsence is depressor (heroin, alcohol, sedatives, hypnotics), stimulant (cocaine, amphetamines, designer drugs), or some other psychotropic substance (canabis, hallucinogens, inhalates).

Then make a detailed assessment of the patient’s condition (check the liver functions markers, the level of albumin, the coagulation state and other somatic functions which could be damaged because of the chronic abuse of psychoactive substance). And, of course, consult a psychiatrist.

In postoperative period, surgical treatment can be complicated because of the withdrawal crysis, postoperative delirium, postoperative cognitive deficit, skin and subcutaneous tissue damage caused by non-sterile injection etc.

THE INFLUENCE OF SPECIFIC SUBSTANCES ON PREOPERATIVE PREPARING

ALCOHOL

Chronic alcohol consumption can cause damages of central nervous system, cardio-vascular system, liver, immunity and other functions. There may be heart problems, circulatory disorders and bleeding during and after surgery.

Withdrawal syndrome appears in 25% patients in intensive care units (ICU) after reduction of sedatives. Profilaxis of withdrawal syndrome should begin preoperatively by giving benzodiazepines or their combination with...
clonidin. Haloperidol is a drug of choice in alcohol withdrawal syndrome with psychotic symptomatology.

Medical problems caused by alcohol appear in more than a third of the whole adult population. Table 1 shows disturbances of various organs and organ systems related to alcoholism, which are important to keep in mind during preoperative preparation.

For the preoperative preparation, it is necessary to know the form of drinking alcohol, length of alcohol abuse and other features of alcoholism relevant to anesthesia, resuscitation and intensive care. Higher doses of anesthetics and other drugs, used during the operation, as well as shorter dose interval are often needed. On the other side, sometimes the reduction of drugs for 30-50% is necessary. Anesthetics and other drugs without the cumulative effects and with a shorter half-life should be chosen. Disulfiram, which is used in the treatment of the alcoholics can have negative interreactions with another drugs. During the operation, the cleaning of operative area should be done without alcoholic solutions. Medicaments doses should be reduced because of coexisting sedation and Disulfiram’s ability to inhibit the other drugs’ metabolism. Alcohol emphasizes the benzodiazepines effect. Acute hypotension is possible in anesthesia because of the inhibition of dopamin B-hydroxyase and reduced production of norepinephrine. Phenylephrine (rather than epinephrine) is recommended for treatment of hypotension. Regional anesthesia should be done carefully because of the possible polynuropathy.

In postoperative period the alcoholics can threaten the recovery by violent removing of catheter (venous, artery, urinary), drains and suture on the operative wounds etc.

Giving the glucose without the vitamins to these patients can be the precipitating factor for Wernicke’s disease or it can aggravate the condition of the patients who have Wernicke’s disease leading to circulatory collapse or death. It is recommended to give the glucose together with tyamine and vitamins B-complex to prevent the Wernicke’s disease.

The risk of acute coronary syndrome and heart rhythm disturbances is higher among alcoholics who suddenly stop drinking. Independently of the habits and model of drinking, the level of HDL is higher and also the level of total cholesterol is slightly higher in the alcoholics comparing to the abstinent. At the moment when the alcoholic suddenly stop drinking comparing to the period when he has been drinking, changes in his lipid status occurs - decreasing of the total cholesterol (TH), slightly increasing of LDL cholesterol and significant decreasing of HDL cholesterol, which all together changes the relation between TH/HDL and LDL/HDL and consequently increases the risk of arteriosclerosis.

Acute intoxicated patients by alcohol need to be exposed to the procedure of elimination of non-resorbed alcohol by induction of vomiting or by stomach emptying (by gastric lavage). These patients need adequate hydration with cristalloid solutions, glucose and vitamins. Hypertonic glucose solution I.V. with vitamins: B1(50-250mg), B6 (50-150mg), C(1000mg) should be given.

### Table 1

<table>
<thead>
<tr>
<th>Organic system</th>
<th>Disturbance</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNS</td>
<td>Psychiatric disturbances (anti-social behaviour, depression);</td>
</tr>
<tr>
<td>CVS</td>
<td>Cardiomyopathy; Hypertension; Cardiac arrhythmia</td>
</tr>
<tr>
<td>GIT and hepato-biliary tract</td>
<td>Oesophagitis; Gastritis; Pancreatitis;</td>
</tr>
<tr>
<td>Endocrine and metabolic</td>
<td>Hypoglicemia; gluconeogenesis; ketoacidosis; albuminemia; Mg</td>
</tr>
<tr>
<td>Hematological</td>
<td>Anemia; Thromboctiyenia; Leucocenia</td>
</tr>
<tr>
<td>Muscles /skin/bone</td>
<td>Myopathy; Osteoporosis</td>
</tr>
</tbody>
</table>

One teaspoon of Na-bicarbonate mixed with 250ml of water could be given on every 1-2 hours to prevent the acidosis (could be given IV, too). At the same time a urinary catheter should be placed to provide diuresis monitoring. It is recommended to avoid CNS depressors, such as benzodiazepines with long effects and barbiturates because of possible depression of the respiratory centre. Short-acting benzodiazepines: alprazolam, lorazepam in doses of 1-2 mg per os should be used to remove the psichomotory restlessness. If a patient becomes aggressive, parenteral administration of haloperidol is recommended.

If intoxicated patient undergoes surgery and anesthesia, rapid induction of anesthesia (‘crash induction’) is necessary to prevent the aspiration of stomach content into the respiratory system. Permanent monitoring of vital parameters is necessary when benzodiazepines, anesthetics and opioids are given to substances addicted patients. Keep in mind that usually smaller doses of anesthetics and other drugs should be given to the acute and chronic alcoholic with low level of tolerance. On the other side, higher doses are usually necessary to be given to the chronic alcoholic in abstinence.

### BARBITURATES

The symptoms and the signs of barbiturate addictions are similar to the symptoms of benzodiazepines and opiodes addiction. The most important characteristics of overdosing by these substances are CNS depression, sedation, hyperthermia, respiratory depression (bradipnea). Barbiturate intoxication is a life-threatening condition. There is no specific antidote for barbiturates, so the gastric lavage is needed, as well as endotracheal intubation (because of the deep depression of breathing) and protection against aspiration. Monitoring of the cardiovascular function is necessary because of the possible myocardial depression, increased venous capacity and hypotension. Monitor-
The kidney function also must be provided because of the real risk of acute renal failure and rhabdomyolysis related to hypotension and hypoperfusion. The first step of the therapy is maintenance of diuresis and alcalisation of urine. Vasoactive agents are also useful.

If a patient who is intoxicated by barbiturates undergoes surgery and anesthesia, some important facts should be considered:
- Possible mixed tolerance on depressive effect of other anesthetic agents
- Barbiturates are the strongest inductors of mycrosomal enzymes of liver. Only one consumation of barbiturates can cause this effect which even can be long lasting. So consequently, higher doses of medicaments are necessary and also shorter interval between doses. Considering the length of effects of specific barbiturates, the time of withdrawal syndrome appearance can be determined. The symptoms of barbiturates withdrawal syndrome are: tremor, hyperreflexion, tachycardia, orthostatic hypotension, cardiovascular collapse, hyperthermia, "grand mal" seizures. Therapy includes oral use of pentobarbital 200-400 mg, or fenobarbital. Diazepam is an alternative.

**COCAINE AND AMPHETAMINES**

The most important signs of cocaine and amphetamine addiction are: anxiety, hallucinations, delirium, convulsions, tremor, increased sympathetic tonus, unstable blood pressure, hypertension, hyperpexia, sweating, exausting, mydriasis. In overdosed, there are changes of consciousness including coma.

If the cocaine and amphetamine addicts are going to the operation and anesthesia, be aware of increased sympathetic tonus, because it causes strong vasoconstriction, tachycardia and hypertension. Cardiac arrhythmias are possible and also ischemia and cerebro-vascular disturbances (subarahnoid bleeding, cerebral infarct). Respiratory depression is possible, too. This is the reason for avoiding all drugs with sympaticomimetic effects for urgent operations. For elective operations, abstinence is recommended for at least 24 hours before surgery which contributes to safe anesthesia. Some authors advice at least a week of abstinency before surgery.

There are opinions that regional anesthesia is a better choice than general anesthesia. However, one paper described the case of 29 years old woman who underwent femur fracture operation. She got the spinal anesthesia by bupivacaine and during the operation the ECG verifies myocardial ischemia. The authors concluded that the cocaine addicts can develope transitory myocardial ischemia after appliance of local anesthetics which are similar to the cocaine.

**INHALANTS**

Colours, lacquers and glues are the most frequently used inhalants. Naphtaline is the most important ingredient of lacquers, colours, air-freshners and other matheria and it causes the symptomes of euphoria. Higher doses can cause generalised intoxication. Chronic use leads to damage of vital organs, primarily liver, and according to some reports, it can lead to cardiac dysrhythmias and hemolytic anemia. That is why the information about abuse of these substances is important in preoperative preparation. The symptoms and signs of inhalants intoxication are perception disturbances and euphoria at the begining, and later comes depression of respiratory and cardiovascular system. Ventricular extrasistoles are possible (especially when halogenic hydrocarbons are given parallely in anesthesia) and coma.

**CANNABIS**

At the beginning of cannabis use there are: euphoria, anxiety, panic reaction, and possible psychotic reaction. Longer use causes alteration of memory functioning and lack of motivation. Physical addiction is rare. Withdrawal syndrome is gentle and possible symptoms are irritability, insomnia, nausea, vomitus and diarhoea.

If these patients undergo surgery and anesthesia, we can expect unstable blood pressure (high or low, and orthostatic hypotension), tachycardia and decreasing of a lung function.

**SYNTHETIC DRUGS**

It is believed that there are several thousands of synthetic drugs. The most common are MDMA (Extasy), GHB (liquid extasy), LSD, rophinol, ketamines, metaam-
phetamines etc. Increased use of synthetic drugs, increases the frequency of injuries and the need for emergency surgery in patients under the influence of drugs. Therefore, the anesthesiologist must be familiar with the effects of synthetic drugs, as potential risk factors for successful anesthesia.  

Exstasy (MDMA) has sympathicomimetic effects. It can cause agitation, muscle spasms, convulsions, renal failure, disseminated intravascular coagulopathy, hypothermia etc. Usage of the Liquid exstasy(GHB) gives nonspecific dose dependent symptoms. Possible symptoms include: euphoria, sedation, hypnosis, agitation, self-injuries tendency, coma etc. Withdrawal syndrome is similar to alcoholic withdrawal syndrome.

OPIOIDES

Opioid addiction has many symptoms- euphoria, agitation, letargy, somnolentia, coma, constricted pupils (dotted at overdosing), opstipation, respiratory depression, hypoventilation, hypotension, bradycardia. If opioid-dependent patients undergo surgery and anaesthesia, it is important to have information on the type, dose and characteristics of abused opioids, because during anesthesia just I.V. opioids are used as the most potent analgesics for visceral pain.

Opioids have an effect on neurotransmission at synapse. Acting on reuptake of the neurotransmitters, opioids may have agonistic or antagonistic activity. The agonistic effects enhance the transmission or increase the production of neurotransmitters, enhance the release of neurotransmitters or activate receptors that normally stimulate a specific neurotransmitter. Antagonistic effects interfere with the release of neurotransmitters, blocking the receptors that would normally be occupied by the neurotransmitter, or cause "leakage" of neurotransmitter from the synaptic vesicles.

Opioids with agonistic-antagonistic effects (pentazocine, butorfanol, nalbuphin) have analgesic effect through κ receptors, and by antagonistic effect on μ-receptors anulate agonist analgesic effect. The practical implication of these characteristics is that in the perioperative period in opioid-dependent patients, opioids with agonistic-antagonistic effect should be avoided due to risk of withdrawal crisis by their antagonistic activity.  

Therefore, for intraoperative analgesia in patients dependent on opioids, pure agonist should be administer. In these patients, it is often seen, tolerance to most anesthetics.

Clonidine administration in opioid addicts, in the perioperative period is very useful. Clonidine is A2- adrenergic agonist with antihypertensive effects. During anesthesia it is used for reducing the dose of anesthetics and analgesics, particularly opioids. Preoperatively, giving 1-3μg/kg IV causes sedation and reduces the need for analgetics and anesthetics during the operation for 30%.

Patients who use opioids, is expected to have increased postoperative pain.

Sometimes the wrong pain therapy could cause the activation of addiction.  

Abstinence from opioids in treated (and cured) addicts can sometimes pose a greater problem than dependance, when these patients undergo surgery and anesthesia. There is a real risk that an intravenous drug addict again becomes addicted if for a long time (intraoperatively and postoperatively) receives IV opioids.

Therefore, the anesthesiologists should consider all alternatives to avoid use of intravenous opioids, but at the same time to ensure that the patient is free of pain. Regional anesthesia is a better choice, whenever is possible. TIVA (total intravenous anesthesia) with propofol is a good choice for short and not very painful surgery. VIMA (volatile induction and maintenance anaesthesia) is also a good choice when it is possible to use high doses of volatile anesthetics with good analgesic potential. The combination of GETA (general endotracheal anesthesia) and epidural analgesia is the technique of choice for major surgery, followed by intense pain. Anesthetics and opioid analgesics are given through the epidural (peridural) catheters. It is proven that intrathecal administration of opioids does not cause addiction. Epidural analgesia is also the method of choice for chronic pain relief in malignancy because it is not addictive.

Opioids overdose (intoxication) can be life-threatening condition, so it is very important to recognize the symptoms and signs and to diagnose as soon as possible so the treatment could start. For opioids there is a specific antagonist (antidote) naloxone that should be immediately applied IV, bearing in mind that doses should be adequate. Start with lowper doses and increase until consciousness is regained. Half-life of naloxone is shorter than most opioids, (so we should repeat the drug at specific time intervals, especially in opioids overdose with long half-life such as methadone, pentazocine, or levometadil). It should be considered the possibility of withdrawal syndrome induced by naloxone. During the treatment of opioid intoxication, it is important to observe patient at least the first 24 hours (for the first 4-8 hours patients should be observed every 15 min.).  

If specific antidot is not available or if too much time has passed from intoxication and hospitalisation, the various complications may exist and they are treated symptomatically. Table 2 shows the consequences of opioids intoxication and also the therapy which should be given.

CONCLUSION

Substance abuse is on the rise, as well as an increased number of patients undergoing surgical treatment with substances dependency as comorbidity. Unlike the other types of comorbidity for which patients like to talk and give relevant anamnestic data, substance abuse is often kept secret. Ignorance of doctors participating in the surgery of the fact that the patient is dependent on the PAS can significantly compromise the success of surgical treatment. From anesthesiological point of view, in intraoperative period, the most important are: the possibility of increased sympathetic tone, hemodynamic instability, induction of microsomal liver enzymes and need for much higher doses of medication. In the postoperative period of
great importance is the prevention and treatment of abstinence crisis.

**SUMMARY**

**PREOPERATIVNA PRIPREMA BOLESNIKA ZAVISNIH OD ALKOHOLA I PSIHOAKTIVNIH SUPSTANCI**

U radu autori ukazuju na značaj pravilne dijagnostike zloupotrebe i zavisnosti od psihootaktivnih supstanci, kao i akutne intoksikacije, apstinencijalnog sindroma i predoziranja supstancama kod pacijenata koji se pripremaju za hiruršku intervenciju. Ukazano je na specifičnosti preoperativne pripreme kod ovih pacijenata koji se podvrgavaju hitnim hirurškim ili planiranim (elektivnim) operacijama. Posebno je istaknut značaj interakcije psihoaktivnih supstanci i anestetika kao i drugih lekova koji će biti korističeni u perioperativnom periodu. Prikazane su karakteristike zloupotrebe i zavisnosti pojedinih supstanci kao i smernice za pravilan pristup u toku preoperativne pripreme i postoperativnog toka.

Ključne reči: preoperativna priprema, alkoholizam, zloupotreba psihootaktivnih supstanci

**REFERENCES**