Meth Mouth

Shaikh SS*, Modi P**, Munde AD***

Abstract

Methamphetamine belongs to drug group termed as amphetamine type stimulant (ATS), which includes ecstasy. Methamphetamine is not a new drug. It has a long and storied history of legitimate clinical use and recreational abuse. Unfortunately, abuse of methamphetamine is increasing with an alarming frequency. Besides being a party drug, meth is also used by workaholics for the boost in energy and concentration that it gives. The last world drug report says more people are addicted to ATS than opium and cocaine put together, (one in 200 have abused ATS). In India ATS use is on an increased trend in the "new urban junkie" (young, educated, working, upper and middle classes). Methamphetamine is a highly addictive powerful stimulant that increases wakefulness and physical activity and produces other effects including cardiac dysrhythmias, hypertension, hallucination, and violent behaviour. Dental patients who abuse methamphetamine can present with poor oral hygiene, xerostomia, rampant caries ('Meth mouth'), and excessive tooth wear. The goal of this article is to summarize the current perspectives on the significance of this problem and to help practitioners to recognize and manage dental patients with a history of illicit meth abuse.

Keywords: *Methamphetamine, meth abuse, meth mouth, oral health*

Introduction

Methamphetamine is currently in the forefront of the public's awareness due to media attention, but it exists as a drug since the late 1800s. Meth is known by a wide variety of street names. The purest forms of meth are known as ice, crystal or Tina. "Glass" usually indicates a chunk form of meth. Meth is also known as "poor man's cocaine" because of its lower cost and the longer high it produces. Additional names include crank, speed, yaba, and zoom.[1] Users are known as "tweakers" or "speed freaks." Manufacturers are known as "cookers." Due to the variety of ingredients and recipes, the forms and colors of meth vary widely. This lack of consistent color and form makes it difficult for law enforcement agents to identify. The powder form of meth is usually white, pink or yellow. Meth also comes in pill form and can be almost any color. Methamphetamine is a synthetic n-methyl homologue of amphetamine and was first synthesized in Japan in 1893.[2] It is a highly addictive substance that can be inhaled, snorted, smoked, taken orally or injected intravenously.[3] Methamphetamine is the most widely illegally manufactured, distributed and abused type of amphetamine.

* Professor and Head ,** Private Practioner, ***Professor
Dept. of Oral Medicine and Radiology

Corresponding author:
Dr. Safia Shoeb Shaikh
Professor and Head , Dept. of Oral Medicine and Radiology,
Rural Dental College,PIMS, Loni, Maharashtra, India
Email: safiasiddiqui68@gmail.com

Pharmacology

Meth is "cooked" from a variety of common, easily obtainable ingredients. The main ingredient is pseudoephedrine or ephedrine found in over-the-counter cold and allergy medicines. Additional ingredients may include anhydrous ammonia, gasoline etc. Methamphetamine is white, odourless, bitter-tasting crystalline powder that easily dissolves in water or alcohol.[4] Methamphetamine powder can be further purified into the 'Ice' form that is usually smoked and very addictive. Smoking methamphetamine leads to rapid uptake into the brain resulting in a 'rush' of extreme pleasure that lasts only for a few minutes but increases the addictive potential of methamphetamine and thus its adverse health effects.[4] The 'rush' experienced by users that smoke or intravenously inject methamphetamine is due to the release of high levels of the neurotransmitter dopamine in the brain.[2,5] Dopamine appears to play an important role in the experience of pleasure associated

with many drugs of abuse as well as other addictive behaviours such as gambling and thrill-seeking.[4]

Methamphetamine Effects

Methamphetamine use can produce devastating, sometimes fatal consequences that affects all systems of the body. Numerous acute and chronic physical, behavioural and psychological side effects are evident.

Short-Term Effects of Methamphetamine

1. Increased attention and decreased fatigue
2. Increased activity
3. Decreased appetite
4. Euphoria and rush
5. Increased respiration
6. Hypothermia

As a powerful stimulant, methamphetamine, even in small doses, can increase wakefulness and physical activity and decrease appetite. A brief, intense sensation, or rush, is reported by those who smoke or inject methamphetamine. Oral ingestion or snorting produces a long-lasting high instead of a rush, which reportedly can continue for as long as half a day. Both the rush and the high are believed to result from the release of very high levels of the neurotransmitter dopamine into areas of the brain that regulate feelings of pleasure. The large release of dopamine produced by methamphetamine is thought to contribute to the drug's toxic effects on nerve terminals in the brain. High doses can elevate body temperature to dangerous, sometimes lethal levels, as well as cause convulsions.

Long-term Effects of Methamphetamine

1. Dependence and addiction psychosis
   - Paranoia
   - Hallucinations
   - Mood disturbances
   - Repetitive motor activity
2. Stroke
3. Weight loss
4. Dental destruction

CNS Effects

Methamphetamine dramatically affects the central nervous system (CNS). It acts as a potent CNS stimulant and is highly addictive. Meth use causes the release of the neurotransmitters dopamine, norepinephrine and serotonin and blocks their re-uptake, which results in a sense of euphoria.[1] This drug causes the release of three times more dopamine than cocaine and a more intense high. Because meth is metabolized slowly, the high is also longer and the potential for damage, including neurological damage, is greater than other drugs of abuse. Whereas cocaine is metabolized in one hour, meth takes 12 hours. Meth is rapidly absorbed and reaches its peak effect in two to three hours. Continued meth use reduces the levels of dopamine in the brain, and symptoms similar to those of Parkinson's disease become evident. However, since meth is a neurotoxin, abusing it can also result in cerebral edema, cerebral haemorrhage, paranoia and hallucinations. Short-term CNS effects of meth abuse includes insomnia, hyperactivity, decreased appetite and tremors.[1] Extended meth abuse can cause depletion of monoamines in the brain, which can have a deleterious effect on learning. Long term use of meth can also lead to psychological addiction, stroke, violent behaviour, auditory hallucinations, mood disturbances, delusions, seizures and short or long term psychosis. Withdrawal from the drug produces severe depression.

Cardiovascular and Respiratory Effects

The ingredients of methamphetamine stimulate the cardiac and respiratory systems which causes uncontrolled hypertension, tachycardia and possibly arrhythmias. [1] Increased respiration and shortness of breath can result. Pericarditis and permanent coronary artery disease have been shown in long-term abusers. Users can experience dangerous hyperthermia, which can lead to seizures, permanent brain damage or death.

Physical Indicators

Clinically, the chronic meth user may present with formication (the sensation of insects crawling beneath the skin) and unusual lesions and scabbing on the face, arms and legs. These cutaneous manifestations are commonly caused by the users scratching at the imaginary insects ("crank bugs").[1] When a meth user is under the influence of the drug, they have decreased appetite and increased activity. Consequently, the long-term user will often have a marked weight loss and may show effects of malnutrition. Additional physical indicators of meth use include unusual body odour, dilated pupils, unexplained bruises from falling, severe lung and kidney damage, inflamed or eroded nasal septum and track marks at injection sites.[1]

Behavioural Indicators

Many meth users abuse the drug in pursuit of the behavioural side effects, which can last for hours and sometimes days. The user may experience prolonged periods of insomnia and increased activity. However, undesired effects include bizarre behaviour, tremors and slurred/rapid speech.[1] Meth users frequently abuse other illegal drugs as well as tobacco and alcohol.

Psychological Indicators

There are numerous psychological effects associated with methamphetamine use, which range from anxiety and confusion to depression, paranoia and homicidal and suicidal thoughts.[1] Hallucinations are also common among those abusing methamphetamine. Hallucinations can lead to psychotic symptoms that persist after the drug has been stopped. Additionally, the user's personality profile may change, involving changes in habits, friends and drug-seeking behaviours.

Other Effects

There is an increased incidence of HIV/AIDS and hepatitis B and C among methamphetamine abusers, primarily due to sharing of needles and to increased libido, which can lead to unprotected and rougher sex. Acute lead poisoning has been documented among intravenous meth users. Meth use during pregnancy poses a significant risk to the developing fetus, causing prenatal complications, increased rate of premature delivery and altered neonatal behavioural patterns.

Oral manifestations of methamphetamine abuse

Methamphetamine abuse is also associated with rapid development of severe dental disease, especially caries (condition termed "meth mouth").[6] Dental patients abusing methamphetamine can present with poor oral hygiene, xerostomia, rampant caries ("meth mouth"), and excessive tooth wear.[2] The rampant caries resembles radiation caries, early childhood caries or "pop rot" but lacks the associated etiology.

Aetiology of Manifestations

The etiology of this dental disease stems from the caustic nature of the drug as well as the lack of concern by the user for daily personal hygiene and professional dental care. The method in which the drug is administered plays a significant role in the oral effects: When smoked, the drug emits toxic fumes.[1] These corrosive vapors produce significant damage to the oral structures. Nasal insufflations (snorting) can also have dental implications. The noxious substances proceed down the nasal pharynx into the back of the throat and coat the oral cavity with the destructive substances.

Xerostomia

The cause of methamphetamine induced xerostomia is unclear but may be due to activation of alpha adrenergic receptors in the vasculature of salivary glands causing vasoconstriction and reduction in salivary flow.[2] Alternatively, stimulation by methamphetamine of inhibitory alpha 2 adrenoreceptors in the salivatory nuclei may decrease salivary flow rate. Dehydration related to methamphetamine induced elevation of metabolism and increase in physical activity may also contribute to xerostomia.[2,7] Xerostomia significantly increases the risk for dental caries, erosion of enamel and periodontal disease.

Dental Caries

The term, Meth Mouth, has been used to describe the rampant caries often found in methamphetamine users.[5] Methamphetamine users describe their teeth as a 'blackened, stained, rotting, crumbling, or falling apart. Poor oral hygiene, high intake of refined carbohydrates, and increased acidity in the oral cavity from oral intake of methamphetamine, high calorie carbonated beverages, GI regurgitation or vomiting also contribute to increased number and severity of carious lesions in patients that abuse methamphetamine.[5,8] The pattern of caries in chronic methamphetamine users is distinctive in that it involves the buccal smooth surface of the teeth and the interproximal surfaces of the anterior teeth.[2] Caries associated with chronic methamphetamine use, while rampant is different form that seen in other disorders such as cocaine or narcotic abuse or postradiation therapy for cancer. Similar to the pattern of caries in these other conditions, the caries occur more frequently in the cervical region. However the pattern of progression of the carious lesions is more similar to that seen in the Sjogren's syndrome. Where in the carious lesions progress more slowly and go through periods of arrest instead of rampantly progressing.[2] Often, restoration of teeth with advanced carious lesions due to methamphetamine is hopeless and the damaged teeth are extracted.[5] Patients, especially teenagers and young adults, who exhibit accelerated caries should be carefully evaluated for other symptoms and signs of methamphetamine abuse. [5]

Periodontal Disease

Methamphetamine users have in increased incidence of periodontal disease. The drug causes vasoconstriction of the vessels that supply blood to the oral tissues. With repeated use of the drug and repeated vasoconstriction, the blood vessels are permanently damaged.[1]

Bruxism

Bruxism and excessive tooth wear may occur more frequently in chronic methamphetamine users. Methamphetamine users have extremely high energy and neuromuscular activity, which can result in parafunctional jaw activity and bruxism.[8] Amphetamine like drugs can produce choreiform motor activity that may involve facial and masticatory muscles and result in unusual patterns of tooth wear.[2] Bruxism and muscle trismus can compound the effects of periodontal disease and produce symptom of temporomandibular disorders, such as tenderness in the temporomandibular joint and masseter muscles.[8]

Oral Ulcers and Infections

Oral ulcerations and infections are common among methamphetamine users. When smoked or snorted, the caustic ingredients of the drug bathe the oral cavity and irritate and burn the oral tissues. This leads to significant oral ulcerations and infections. The tongue and lining of the mouth can become raw and irritated without the surfactant action of saliva.[1] This can lead to secondary infections and limited ability to speak and eat.

Dental management

The most important factor in treating the oral effects of methamphetamine is for the patient to stop using methamphetamine. Chronic methamphetamine abuse can results in psychosis and paranoia that can last for years after methamphetamine is stopped.[2] Thus, the oral health care team must determine how well the patient is able to participate in his or her dental care. If the patient is able to participate, there are treatments that can improve salivary flow and reduce development and progression of caries. Meticulous oral hygiene with a minimally abrasive fluoridated dentifrices and irrigation devices is very important. Frequent oral hygiene instruction and prophylaxis may be needed. The patient's nutrition must also improve with decreased consumption of refined carbohydrates. The patient may benefit from working with a dietician. Frequent application of concentrated fluoride delivered either as a direct brush on or by custom-made tray is imperative to prevent the rapid progression of caries.[5,7]

Xerostomia

Patients with methamphetamine induced xerostomia should be counselled to drink 8-l0 glasses of water per day and to avoid caffeine, tobacco, and alcoholic beverages due to their diuretic effect.[2] Salivary substitutes, oral moisturizers, and artificial saliva may provide some relief from methamphetamine induced xerostomia but are often inadequate. Most of these products are compounds of carboxymethylcellulose or hydroxymethylcellulose and do not have the correct viscosity for the patients. Their effect is often short-lived because they are not retained in oral cavity for very long. Another potential approach for treating xerostomia is pharmacological stimulation of salivary gland. The U.S. FDA has approved the use of pilocarpine HCL (salagen) & cevimeline HCL (Evoxac) for the treatment of hyposalivation. The recommended dose of pilocarpine for most patient is 5 mg, 3 times a day, but the dose can range from 2.5 to 15 mg, 2-6 times a day. Pilocarpine stimulates production of saliva from major & minor salivary gland.[1]

Pain Control

Methamphetamine users may present to the dental office due to dental pain as their oral health is generally poor. When a patient who uses methamphetamine requires analgesic medications, care should be taken to determine what other drugs the patient is using & when the drugs were last used because methamphetamine users may also abuse other drugs, including prescription medications like opioids. Methaphetamine duration of action is generally 8-12 hrs but can be up to 24 hrs in case of intoxication. If the patient has used methamphetamine within the last 24 hrs, the vasoconstrictor in the local anaesthetic could result in further sympathetic drive to the cardiovascular system putting the patient at increased risk for the cardiovascular dysrhythmias, hypertension, myocardial infarction and cerebrovascular accidents.[1] The use of local anesthesia containing a vasoconstrictor should be avoided for 24 hours following meth use.[3]

Conclusion

Dental management for the patient who abuses drugs is always a challenge. However, dentists need to be aware of the clinical presentation and medical risks presented by, these patients and to attempt to get the patient to seek professional help. Additionally, special attention is necessary to monitor for and treat oral manifestations associated with methamphetamine use including: rampant caries, enamel erosion, xerostomia, and bruxisum.

References

1. Patricia Frese, Barbara Kunselman, Elizabeth McClure. Methamphetamine: Implications for the Dental Team. Crest® Oral-B at dentalcare.com Continuing Education Course, February 19, 2009.
2. Hamamoto DT, Rhodus NL. Methamphetamine abuse and dentistry, Oral Dis. 2009;15(1):27-37.
3. Janson H. Goodchild, Mark Donaldson. Methamphetamine abuse and dentistry: A review of literature and presentation of a clinical case. Quintessence Int. 2007;38(7):583-90.
4. U.S. Department of health and human services, National Institutes on Drug Abuse (2006). Methamphetamine abuse and addiction. 2006.
5. American Dental Association. For the dental patient. Methamphetamine use and oral health. J Am Dent Assoc 2005;136:1491.
6. Ravenel MC, Salinas CF, Marlow NM, Slate EH, Evans ZP, Miller PM. Methamphetamine abuse and oral health: a pilot study of "meth mouth". Quintessence Int. 2012;43(3):229-37.
7. Donaldson M, Goodchild JH. Oral health of the methamphetamine abuser, Am J Health Syst Pharm 2006;63:2078-82.
8. McGrath C, Chan B. Oral health sensations associated with illicit drug abuse. Br Dent J 2005;198:159-62.