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METH MOUTH : A CASE REPORT WITH LITERATURE

Dental Science

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ABSTRACT

"Meth mouth" is the general term for methamphetamine induced rampant caries like "early childhood caries" seen in patients who are addicted to use of illicit drug methamphetamine. Drug abusers usually complaint of "blackened, stained, rotting, crumbling or falling apart" teeth. Oral examination describe a typical pattern of decay involving the facial and cervical areas of both the maxillary and mandibular teeth commonly anterior with less progression to frank coronal involvement. Methamphetamine, a central nervous system stimulant is highly addictive drug of abuse and is used worldwide most commonly because it is cheap and readily available when compared with other illicit drugs. Methamphetamine can be smoked, swallowed, snorted and injected during drug use. The prevalence of specific type of dental caries among users is high along with other oral manifestations. Concentrating on effects of methamphetamine drug abuse on the mouth and dentists role in its diagnosis and management, this case report paper also describes its pharmacology and systemic effects.

KEYWORDS

Meth mouth, Methamphetamine, Drug abuse, Dental caries, Illicit drugs.

Introduction:

Drug abuse is an alarming health problem in all countries. Along with the adverse consequences experienced by drug users, such abuse also adversely affects the family members, teachers and law regulatory system. Abusers feel no or little interest in having medical or dental treatment other than as an opportunity for obtaining prescription drugs of abuse. The main categories of drugs involved in abuse include opiates, cannabis, hallucinogens, cocaine- and amphetamine-type stimulants, various "club" drugs, alcohol abuse and heavy smoking. The physical harm caused by a drug needs to be considered in terms of its acute toxicity, as well as its chronicity in producing long-term general and oral health problems. The mouth of a patient who is under prison of drug/substance abuse shows a clinical presentation of generalized caries, periodontal disease, mucosal dysplasia, xerostomia, tooth wear and tooth loss with subsequent other pathological changes. Dentists can play a crucial role in the early detection of abuse by noticing such oral changes and can facilitate the restoration of the health status of patients. All professionals are strongly encouraged to participate in multidisciplinary system in providing patient education, referral to treatment centers and to offer appropriate dental care. [1,2,3]

Methamphetamine was first synthesized in Japan in 1919 as a synthetic substitute for ephedrine, is a central nervous system stimulant is highly addictive drug of abuse and is used worldwide most commonly because it is cheap and readily available when compared with other illicit drugs. Methamphetamine can be smoked, swallowed, snorted and injected during drug use. Its chemical formula and properties are shown in figure-1 and 2.[4,5,6]

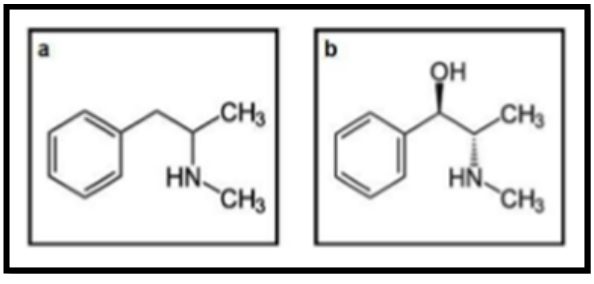

Figure: 1(a) and 1(b) shows chemical formula of Methamphetamine and its precursor Ephedrine respectively.

IUPAC	**(2S)-N-metyl-1-phenyl-propan-2-amine**
Formula	$C_{10}H_{15}N$
Molecular Weight (u)	149,223
Form	Oily brown liquid
Acid dissociation constant at 298.15 K	9,9
Fusion Point	170-175°C (443,15 - 448,15 K)
Boiling Point	300-305°C (573,15 - 578,15 K)
LD_{50} (mg/kg)	15

Figure: 2 show chemical properties of methamphetamine.

Pharmacology of Methamphetamine:

MA acts by altering the levels of certain CNS neurotransmitters. It changes levels of monoamines and neurotransmitters in the brain, releasing dopamine and inhibiting nor-epinephrine uptake which results in cardiac arrhythmia, hypertension and tachypnea. It stimulates the release and blocks the reuptake of dopamine, norepinephrine and serotonin leading to neurodegeneration and neurotoxicity. After getting metabolized by microsomal enzymes in the liver, it gets oxidized by part of the P-450 cytochrome 2D6 isoenzyme and glucuronidized into one active metabolite and two inactive metabolites. It is excreted through blood and kidneys and has half-life of 8-30 hours.[5,6,7,8]

Methamphetamine (MA) commonly known by the names like ice, jib, tina, crank, chalk, meth, speed, fire, crystal, glass, is highly addictive central nervous stimulant, the effects of which are longer lasting and more harmful to the central nervous system as compared with those of amphetamine and is most popular among abusers specially youth due to its long "high" or "rush" period of 12 hours of feeling powerful and confident, energetic, increased productivity, enhanced sexual performance. This drug is usually swallowed or injected intravenously, but one solid form, d-methamphetamine (ice, crystal), can be smoked. Common adverse effects include tachycardia, hypertension, more prone to myocardial infarction, cerebrovascular accidents, hyperthermia, violence and fatigue. MA use may precipitate a range of

psychiatric symptoms including depression, insomnia, anxiety, chest pain, headaches, or seizures, self-inflicted skin lesions in the context of psychotic symptoms, transmission of hepatitis and HIV via needle sharing and even some cases of systemic vasculitis and liver failure are also reported. "Meth- Mouth" is the condition of oral cavity of methamphetamine abusers where different kind of rampant caries (caries on buccal and cervical smooth tooth surfaces and proximal surfaces of the anterior teeth) are seen and patient usually complains of "blackened, stained, rotting, crumbling or falling apart". Along with this kind of caries severe tooth loss, xerostomia, clenching, temporomandibular disorders, tooth sensitivity and compromised oral hygiene are also seen in methamphetamine abusers. [1,2,3,4]

Case report:

A 35-year-old male presented to department of Oral Medicine and Radiology of our College with chief complaint of dental pain in almost all teeth, bad breath, and self-reported poor esthetics. A comprehensive examination including her medical history, and intraoral examination revealed 19 carious lesions, which is not very common for a healthy adult. On intra-oral examination (Figure: 1-4) and radiographic examination (Figure:5), the carious lesions were seen in multiple teeth. Caries were seen on buccal/labial and cervical smooth tooth surfaces and proximal surfaces of the anterior teeth followed by posterior teeth. Carious teeth were blackened and stained. The periodontal examination revealed a generalized soft-tissue inflammation with widespread bleeding upon probing, supragingival calculus and heavy stain deposits, indicating advanced gingivitis but no bone loss was found on radiographic examination.

The oral mucosa appeared dry, depapillated and red dorsal tongue (Figure-3), attrition, crusterations with erythema at angles of mouth bilaterally (angular chellitis) (Figure-3), greyish discoloration of palate with pin point dots in between palatal mucosa (smoker's palate). No significant findings were appreciated in facial muscles and temporomandibular joint. Patient denied any history of allergies, family history of systemic and dental problem and gastroesophageal reflux. On blood examination his hemoglobin was 8.6 gm% suggestive of anemia, whereas no abnormalities were found on blood glucose examination and serological test for hepatitis B virus, syphilis and HIV were all negative.

After careful enquiry, the patient and attendant indicated that patient had been using methamphetamine for six years and he stated he had not experienced any major exposure to dental caries before he started using methamphetamine. Patient also reported that after methamphetamine use he consumes 1-2 liters of cold drinks/ carbohydrate rich beverages per day to get rid of mouth dryness and bad taste. He also reported that he consumes sweets and habitual of chronic smoking since the use of illicit drug. Smoking has increased from one packet to three-four packet cigarettes daily after methamphetamine use. He also felt occasional clenching and temporomandibular joint pain on waking. He also reported that his lifestyle is also totally changed as he stopped going to social gatherings, eat less and occasionally brushes his teeth and believes that drug abuse is responsible for his all problems.

After taking medical history, intra-oral examination and radiographic examination a diagnosis of methamphetamine induced caries (MIC) and "meth mouth" was put forward. In the treatment plan importance of rehabilitation and proper oral hygiene was dictated to patient and his attendant. As the patient was ready to get rid of drug abuse, he was advised to seek professional help. He was eager for esthetic reconstruction, an informed consent was obtained from patient acknowledging an understanding of ill effects of further future drug abuse on dental treatment. Because of anxious nature of patient he was advised to accompany by parents/attendant with short appointments. After full consultation with patient and his attendant the following treatment plan was prepared:

- Periodontal therapy.
- Composite restoration of tooth number.
- Porcelain crowns after endodontic treatment of tooth number….
- Extraction of tooth number…. Followed by fixed partial denture.
- A home care regimen including brushing with fluoridated tooth paste twice daily. Rinse mouth after every meal with chlorhexidine mouth wash.
- Avoid cold/soft drinks. Sip water frequently.
- Quit smoking.

DISCUSSION:

Methamphetamine (MA) is a chemical with stimulant properties similar to adrenaline is a potent central nervous system (CNS) stimulant. Methamphetamine is available as a white, odorless crystalline powder with bitter taste which easily and fast dissolves in water or alcohol. It can be consumed orally, intranasally (by "snorting" the powder), by smoking or by injection. MA hydrochloride, the smokable form, is produced in clear chunky crystals resembling ice is smoked using pipe like crack cocaine. MA shows pharmacological actions like adrenaline by increasing heart rate, blood pressure, breathing rate, constricts blood vessels, dilates pupils, releases sugar and fat into the blood stream and energizes the brain. Methmphetamines act as an appetite suppressant while producing feelings of false sense of wellbeing and euphoria. Meth can produce feelings of increased alertness, anger, fear, or agitation. Crystal meth is known by several different names like crank, jib, tina, crystal, speed, fire, glass, lemon drop, ice, chalk, yellow powder etc and produces a "high" or "rush" that lasts much longer (up to 12 hours) than a crack cocaine. Like all addictive drugs, methamphetamine also produces an initial pleasurable feeling effect followed by a rebound unpleasant adverse effect.[1,2,3,4]

Methamphetamine is used in three ways by abusers. (1) Occasional or low-intensity users abuse it by ingesting pills or inhaling powder to achieve "highs" or weight loss. (2) During uncontrolled use abusers smokes or inject MA to achieve rapid, intense effects, triggering essentially psychological addiction. (3) High-intensity use where abusers become victim of drug by psychologically and physically addicted to it and demand higher and higher doses.[5.]

The World Health Organization reports declared that more than 35 million people worldwide use methamphetamine mainly in the United States, Mexico, South America, Middle East, Asia, and Australia. Methamphetamine production is maximum in the Far East and Southeast Asia countries especially China, Myanmar and Thailand followed by North and Central American countries example USA, Canada and Mexico followed by European countries like Czech Republic.[5,9]

Methamphetamine use results in damage to the blood vessels (excess vasoconstriction) supplying the salivary gland, leading to damaged glands and reduced salivary flow called xerostomia which leads to rampant caries, oral ulcerations, tissue atrophy and intraoral infections. The resultant rampant caries are distinctive, frequently presenting initially in the interproximal region of the anterior teeth, before rampant caries completely destroys the crowns of the teeth. Patient usually report of "blackened, stained, rotting, crumbling or falling apart" of teeth. Along with xerostomia, poor oral hygiene due to lack of attention and inability to care for oneself, the other important causative factor responsible for meth caries include a poor diet that often includes large quantities of carbonated drinks typically having a high sugar content and high acidic ph whether they contain sugar or a sugar substitute. They are frequently consumed by meth users to counteract dry mouth which further results in wasting of dentition, and contribute to erosion due to fallen ph of saliva. Reduced salivary production also leads to difficulties in speaking, swallowing, bad taste sensations, sore mouth, mucositis, glossitis, and burning mouth symptoms that makes food intake difficult. Tooth wear also results due to bruxism caused by jaw parafunction as meth abusers have high energy and neuromuscular activity due to stimulant drugs resulted choreiform motor activity in facial and masticatory muscles. Increased gingival and periodontal destruction in meth users is also explained on the basis of vasoconstriction effect of methamphetamine on capillary constriction responsible for cardiovascular effects and CNS events also results in poor blood supply to the periodontium and increased periodontal disease and bone loss. Also Periodontal disease of increasing severity occurs due to the patient's inability to perform or unwillingness to perform regular oral hygiene.[10,11,12,13]

Role of oral physician:

If the dentist come to know that patient is addicted to drug abuse (though abusers are usually habitual of hiding their drug abuse because of being legally prosecuted) the dentist should carefully interview and examine the patient for associated dental problems by looking for signs and symptoms related to drug abuse. A complete medical history, dental history and general physical examination should be carried out to check cutaneous lesions (soresonthebodyandface), malnutrition status as the drug results in loss of appetite, falling weight, patient's

aggressive behavior, accelerated tooth decay with distinctictive pattern like meth-mouth, poor response to preventive treatment due to unreliability in keeping appointments, excessive tooth wear due to clenching and bruxism.[8,9,13,14]

MA users who are "high" should be devoid of any dental treatment whatsoever until at least 6-12 hours have passed since the drug was taken, because sympathomimetic effects at this stage are associated with a very high risk of myocardial ischemia and arrhythmia. As pain is the main complaint by patient, to control general pain nonsteroidal antiinflammatory drugs (NSAIDs) should be provided – avoid, if at all possible, prescribing narcotics, as many of these patients will willingly habitual of seeking narcotics from dentists for their abuse. In severe cases if narcotics are must to relieve pain, this must first be discussed with the patient's physician/medical team. Severely decayed teeth cannot be saved and are usually advised to extract but long-term meth users have a compromised cardiovascular system and cannot tolerate the vasoconstrictors in local anesthetics, using these could result in increased blood pressure, collapse or death. So always plain local anesthetic agent free of vasoconstrictor should be used. Daily use of a fluoride mouthrinse or a prescription 5000 ppm fluoride dentifrice can help prevent further lesion development. Patient is given oral hygiene instruction, gross debridement and the use of a chemotherapeutic mouthrinse to help prevent infection and reduce microbial loads. In xerostomia mouth the use of xylitol-containing chewing gum is also helpful; patients are encouraged to drink water (8-10 glass/day) and other healthy alternatives, such as milk. Instruct patients to avoid soda pop and other high-sugar/low-pH drinks as well as sugary and complex carbohydrate snacks. Refer the patient to physicians or drug-counselling services or other private sectors which help in drug deaddiction. Finally educate patients about the risks associated with the use of MA and other illicit drugs.[13,14,15]

CONCLUSION:

Methamphetamine abuse remains a serious public health problem worldwide. Unique presentation of oral conditions in the meth abuser especially dental caries and xerostomia, bad taste and grinding of teeth, the dental professional may be the first healthcare professional to suspect a person of meth abuse. The oral care of meth users requires consideration of the medical implications of their habit, including possible drug reactions and adverse reactions to anesthetics. Early identification of meth abuse results in earlier counseling and treatment and a better chance of recovery towards their normal livelihood back.

FIGURES:

Figure-1: Carious 24, 25 & 26

Figure-2: Carious 23, 24, 33 & root stump 34

Figure-3: Angular chellitis, Depapillated erythematous tongue and multiple carious teeth.

Figure- 4: Carious 33 & 43

Figure-5: Reveals multiple carious teeth.

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