SHORT COMMUNICATION

Methamphetamine-induced dental caries: a review of the literature

Ateeq Ur Rehman,[1] Bader Munir[2]

Abstract

Clinical picture of patients taking methamphetamine for long duration includes rampant caries of the smooth surfaces of the whole dentition. The increasing use of methamphetamine in homosexuals is leading to the spread of HIV (human immunodeficiency virus). Easy availability and rapidly spreading nature of this drug (methamphetamine) results in worldwide increase of patients with medical and dental problems. Its effect on human dentition is highly damaging as patients with a beautiful smile begin to present a horrible picture of black, broken, and painful teeth within one year of methamphetamine use. Restoration of aesthetics and function of these teeth is not an easy task, and usually the first step to deal with this condition is counselling the patient to stop using this drug. Knowledge of methamphetamine-induced undesirable effects on the human body is important for the general dental practitioner as referral to mental health services is necessary in this condition.

Keywords: Meth mouth, Rampant caries, Methamphetamine.

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Introduction

Methamphetamine was first synthesised by a Japanese chemist in 1893. It is used historically for the treatment of narcolepsy, asthma, and obesity. During World War II, the Allies and Axis powers both used the drug to keep the troops awake. Crystal meth is a solid, crystalline form of the drug. It may look like shreds of glass or clear-white rocks.[1] (Fig.1). Methamphetamine induces a body response similar to the epinephrine which induces alertness to work for longer hours and a willingness to take risks whether its a war or any other event in life.

[1]Department of Operative Dentistry and Endodontics, Faisalabad Medical University, Faisalabad, Pakistan, [2]Department of Operative Dentistry and Endodontics, de'Montmorency College of Dentistry, Lahore, Pakistan.
Correspondence: Ateeq Ur Rehman. Email: ateeq_rehman75@yahoo.com
ORCID ID. 0000-0002-4173-2406

Figure-1: Methamphetamine
(National Institute on Drug Abuse)

Methamphetamine has many visible harmful effects like mydriasis, xerostomia, energy surges, hyperhidrosis, excitability, headache, irritability, anorexia, paranoia, insomnia, talkativeness, and unpredictable behaviours.[2,3]

Patients using methamphetamine for a long time present with inconsistent care of their teeth, bleeding gums, dry mouth (cottonmouth), rapid decay of teeth, jaw clenching, bad taste in the mouth, cravings for sweets and habit of tooth grinding. The term 'meth mouth' is used mostly to refer to the rapid decay of teeth due to chronic use of methamphetamine drug. Meth mouth dental caries mostly occur in the cemento enamel junction areas of the teeth, where the tooth surface narrows at the junction of the crown and the root; caries are primarily centred on the buccal side of the posterior teeth, and on mesial or distal tooth surfaces that are adjacent to incisors and canines. These lesions ultimately involve the crown portion of the teeth and gross destruction occurs. Dental caries are chronic in nature in methamphetamine users because the patients do not maintain their routine oral care. Bad dental hygiene, increased intake of sucrose, acidity from GERD (Gastro-oesophageal reflux disease), and bulimia nervosa also contribute to the aggressive problem of caries-erosion in methamphetamine abusers. Counselling the patient to seek professional help especially of a psychiatrist or a psychologist is an important step to deal with the problem of drug addiction.[4-6]

Figure-2: A graphic image of meth mouth (www.ada.org)

Literature Review: Methamphetamines induce profound effects on the libido and sexual behaviour that lead to increased chances of transmission of HIV. Several research studies found a high relation between methamphetamine use and sexually transmitted diseases, such as HIV, syphilis, gonorrhoea, and hepatitis. Due to these life-threatening concerns, early diagnosis and management is important in these cases.[7, 8]

Meth mouth results in soft tissue as well as hard tissue changes, such as swollen gingiva, short length of the teeth, dryness in the oral cavity, grinding of teeth, and sensitive and mobile teeth (Fig. 2). Mechanism of this type of rampant decay is multifactorial; initially the dentition is weakened by grinding habits and then improper oral care, increased sugar intake, local erosive effect of the drug, dry mouth, and compromised blood supply lead to catastrophic destruction of the teeth.

The rapid destruction of teeth in 'meth mouth' presents with features which mimic dental caries due to bottle feeding in children. Usually involved are smooth surface lesions like buccal surfaces of molars and mesio distal surfaces of anterior teeth. Due to this rapid destruction, the crown portion breaks away and the patient present with multiple roots in the oral cavity.[9]

The exact mechanism of dry mouth is still unknown but it might be due to the effect of the drug on salivary flow rate by centrally inhibiting salivatory nuclei via stimulation of alpha-2 receptors in the brain. The half-life of the drug is 10 hours. It takes about 10 hours for half of the ingested dose to be metabolised and eliminated from the bloodstream. Orally used drug concentration of amphetamine metabolite peaks at 12 hours while intravenously, the elimination half-life is a little longer at about 12.2 hours. This prolonged dryness imbalances the demineralisation-remineralisation state of the tooth enamel and there is less chance of buffering with natural saliva that ultimately results in extensive tooth decay.[10,11]

Neglect of hygienic conditions is not limited to mouth but also other body parts. Deterioration of oral hygiene results in tenaciously adherent plaque deposition in different parts of the teeth. Plaques act as a catalyst in dental caries progression and, therefore, the picture of meth mouth is horrible.

Some case reports show that no or minimal caries were seen in patients who focus on teeth brushing and maintaining good oral hygiene. It also proved that adequate teeth brushing can compensate the effects of dryness of mouth in initiating dental caries. Although methamphetamine is acidic in nature, the cause of dental caries is mainly dryness of oral cavity and grinding or clenching of teeth.

Dental caries is a chronic condition that is mainly caused by streptococcus mutans. Levine's theory support the "SEESAW" mechanism i.e. there is a balance by minerals released from the enamel and ultimate addition from saliva. According to Stephan curve, after intake of refined carbohydrate a drop in PH is reported. Enamel caries initiate when PH drops below the critical level of 5.5.[11-13]

Erosion of teeth also occurs in meth mouth patients. Although meth is acidic in nature, extrinsic use of cola drinks and juices, and intrinsic problems of GERD and bulimia nervosa lead to rapid erosion or chemical dissolution of teeth.

Drug contaminants resulting from improper preparation of drugs or home-made preparation of drugs lead to bruxism or grinding of the teeth which promotes progression of tooth decay. In addition to these contaminants, patients taking methamphetamine for obesity or other medical problems also present with extensive teeth decay.

Dental Management of Methamphetamine Abusers: Detailed medical and dental history and physical examination of the drug abuser is of utmost importance in establishing the diagnosis. Dental treatment is usually deferred if he/she has used methamphetamine on that day. Minimum gap period must be one day after using the drug to start dental procedures. Sedation procedures are usually avoided in patients using methamphetamine. Local anaesthesia without vasoconstrictor is recommended in meth mouth patients. Methamphetamine used within the last 24 hours and the

vasoconstrictor in the local anaesthetic may lead to cardiac dysrhythmias, hypertension, myocardial infarction, and cerebrovascular accidents.

According to the American Dental Association[14], the following may indicate possible methamphetamine use:

- Unaccounted for and accelerated decay in teenagers and young adults.
- Distinctive pattern of decay on the buccal smooth surface of the teeth and the interproximal surfaces of the anterior teeth.
- Malnourished appearance in heavy users, because methamphetamine acts as an appetite suppressant.

The phrase 'prevention is better than cure' is strictly applied to 'meth mouth'. Discussing the effects of methamphetamine on the oral cavity and dental procedures with the patients is of paramount importance. Counselling the patient and his/her family and referral to a professional is mandatory. Preventive measures in reference to 'meth mouth' is to drink plenty of water daily and avoid carbonated beverages. Different treatment options, such as artificial saliva, xylitol chewing gum, pilocarpine, or cevimeline, are available to treat xerostomia. Oral hygiene motivation and education is important. Modified Bass technique of teeth brushing twice a day with onetime dental flossing is necessary. Fluoride application as varnish or fluoride from toothpaste and/or mouthwash can help prevent dental caries.[15-17]

Dentists as recovery agent: 'Meth mouth's' significant oral and dental features highlight the importance of dentists in early detection and management of these patients. Oral hygiene instructions as well as dietary modifications can improve the lifestyle of the patients. The chief complaint of most patients regarding oral cavity is aesthetic. Early intervention, preventive measures, drug stoppage, and oral rehabilitation lead the patients towards a new life full of happiness and self-esteem.[18-20]

Conclusion

The use of methamphetamine is life-threatening and, unfortunately, its worldwide spread is because of easy availability. Meth mouth reflecting rampant spread of dental caries is an early and major sign of methamphetamine abusers. Patients presenting with extensive decay of the teeth in very short period of time must be asked about methamphetamine history as this drug is also used in other medical conditions. Main causes of rampant caries are dry mouth, dehydration, frequent sugar intake, and poor oral hygiene. Early detection and immediate management can lead to good prognosis of dental treatment in methamphetamine abusers.

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