

Cocaine and Oral Health

By: James Kim

Cocaine

- Cocaine (benzoylecgonine) is derived from coca leaves (*Erythroxylon coca*).
- The main method of cocaine use is snorting. Within a few minutes of cocaine inhalation there is an euphoric high feeling that lasts 20 to 90 minutes.
- Cocaine can also be smoked, but the cocaine power must be converted to a smokable form – this formulation is called 'crack cocaine', because of the cracking sound it makes during smoking. Introduction of crack cocaine made intravenous administration of cocaine less popular.
- Abuse of cocaine in Canada is low (~1%). However, it is the third most used substance after alcohol and cannabis among general population and adults (Canadian Centre on Substance Abuse, 2015).

Metabolism of Cocaine

- Cocaine's half-life is between 30 and 60 minutes.
- Mostly metabolized in the plasma by plasma pseudocholinesterase.
- Cocaine is found in saliva between 3 to 8 hours after intravenous administration or smoking.

Systemic Effects of Cocaine

- Cocaine in non-ionic molecular form crosses the neuronal lipid membrane and binds to sodium channels when it becomes cation – this inhibits action potential generation, resulting in anesthetic effect.
- Cocaine also inhibits the re-uptake of norepinephrine and dopamine. This stimulation of dopamine induces euphoria and arousal.
- Common symptoms of cocaine use include: light-headedness, dizziness, blurred vision, tinnitus, disorientation.
- Cocaine may also result in paranoia, hallucinations, restlessness, aggressive behavior, shivering, insomnia, dilated pupils, hyperthermia, hypertension, tachycardia, increased respiration.
- Cocaine increases the heart rate and oxygen demand of the heart. At the same time, cocaine increases vasoconstriction of coronary arteries, decreasing the oxygen supply. Increased oxygen demand and decreased oxygen supply in combination can lead to angina, myocardial infarction, or cardiac dysrhythmias.
- Cocaine increases peripheral vasoconstriction which raises the arterial blood pressure 15~20% above baseline. Such acute hypertension can lead to aortic dissection or rupture of an intracranial aneurysm.

Cocaine Use and Oral Health

- Cocaine users commonly experience severe bruxism that leads to painful temporomandibular joint and masticatory muscles (Brand *et al.*, 2008).
- Cocaine powder dissolved in saliva significantly lowers salivary pH which leads to dental erosion.
- Oral use of cocaine causes gingival lesions at the application site, resulting in ulceration and erythema – most gingival lesions resulting from cocaine application resolved within 2 weeks to 18 months after abstaining from cocaine (Brand *et al.*, 2008).
- A study reported that crack users exhibited 2 times more fundamental oral lesions (spot, plaque, nodule, papule, vesicle, blister, erosion, ulcer, pseudomembrane, hyperplasia) compared to non-crack users (Antoniazzi *et al.*, 2018). Crack users exhibited a significant reduction in stimulated salivary flow, independent of socio- demographic, behavior or clinical factors. However, hyposalivation due to crack use was not significantly associated with xerostomia (Antoniazzi *et al.*, 2017).
- A cross sectional study reported that DMFT score was not associated with crack/cocaine addiction (Crack/cocaine use was associated with higher decayed teeth index but lower filled/missing index) (Cury *et al.*, 2017).
- A cross sectional study in Brazilian population found that periodontal depth was significantly greater in crack-cocaine users. However, bleeding on probing, clinical attachment loss, and destructive periodontal diseases were not significantly different between addicted and non- addicted groups (Cury *et al.*, 2017).

Cocaine Use and Palatal Perforation

- Chronic cocaine use can cause perforation of palate – although this complication is rare.
- The perforation is between 2 to 30 mm in size. Most perforations occur on hard palate.
- Majority of patients with cocaine-induced palatal perforation are female.
- Patients with palatal perforation may suffer from speech impairment (poor articulation and hypernasal sound), difficulty eating and drinking (due to oronasal reflux).
- Treatment of palatal perforation include complete abstinence from the drug, and ruling out other possible cause of palatal defect (tumor, trauma, infection, tertiary syphilis).
- Definitive reconstruction of palatal defect should only be made after a long period of complete cocaine abstinence. Reconstruction can be surgical, or fabrication of removable obturator.

Cocaine and Local Anaesthetic

- Cocaine causes vasoconstriction. Therefore, administration of local anaesthetic with epinephrine shortly after use of cocaine can trigger acute increase in blood pressure.
- There is one documented case where a healthy female patient undergoing nasal surgery developed angina and heart attack after receiving 2 mL of 25% topical cocaine and 15 mL of 1% lidocaine with 1:100 000 epinephrine injection. However, the authors did not clarify whether the myocardial infarction was the result of drug interaction or cocaine alone (Chiu *et al.*, 1986).
- Animal experiment showed that combination of cocaine and local anaesthetic with epinephrine can be fatal (Yagiela, 1999).
- Another animal experiment showed that combining lidocaine with cocaine can increase risk for convulsions. 5 mg/kg injection of lidocaine or cocaine alone in rats did not result in seizures. Concomitant injection of 5 mg/kg lidocaine and 5mg/kg cocaine resulted in seizure nearly equal to that produced after injection of 20 mg/kg cocaine (Barat and Abdel-Rahman, 1996).
- As a precaution, local anaesthetics with epinephrine and epinephrine-impregnated retraction cords should not be used when the patient used cocaine recently.
- Dental treatment should be postponed for 6 to 24 hours after the use of cocaine to allow for drug elimination.

Take Home Message

Cocaine is an illicit drug with high addictive potential that can cause many adverse effects such as hallucinations, aggressive behavior, dizziness, and disorientation. Cocaine also increases peripheral vasoconstriction and heart rate, resulting in increased blood pressure. Thus, administration of local anaesthetic with epinephrine shortly after cocaine use can trigger acute increase in blood pressure resulting in heart attack. As a precaution, local anaesthetics with epinephrine and epinephrine-impregnated retraction cords should not be used if the patient abused cocaine recently. Dental treatment should be postponed for 6 to 24 hours after the use of cocaine to allow for drug to leave the body system.

References

- Antoniuzzi R.P., Largo F.B., Jardim L.C., Sagrillo M.R., Ferrazzo K.L., Feldens C.A. Impact of crack cocaine use on the occurrence of oral lesions and micronuclei. *Int J Oral Maxillofacial Surg* 2018 [Epub ahead of print].
- Antoniuzzi R.P., Sari A.R., Casarin M., de Mores C.M.B., Feldens C.A. Association between crack cocaine use and reduced salivary flow. *Braz Oral Res* 2017; 31:e42.
- Barat S.A., Abdel-Rahman M.S. Cocaine and lidocaine in combination are synergistic convulsants. *Brain Research* 1996; 742:157-162.
- Brand H.S., Gonggrijp S., Blanksma C.J. Cocaine and oral health. *British Dental Journal* 2008; 204(8):365- 369.
- Canadian Drug Summary – Cocaine. Canadian Centre on Substance Abuse (2015); URL: <http://www.ccsa.ca/Resource%20Library/CCSA-Cocaine-Drug-Summary-2015-en.pdf>
- Chiu YC, Brecht K, DasGupta DS, Mhoon E. Myocardial infarction with topical cocaine anesthesia for nasal surgery. *Arch Otolaryngol Head Neck Surg* 1986;112(9):988-90.
- Cury P.R., Oliveira M.G.A., de Andrade K.M., de Freitas M.D.S., Santos J.N. Dental health status in crack/cocaine-addicted men: a cross-sectional study. *Environ Sci Pollut Res* 2017; 24:7585-7590.
- Cury P.R., Oliveira M.G.A., Santos J.N. Periodontal status in crack and cocaine addicted men: a cross- sectional study. *Environ Sci Pollut Res* 2017; 24:3423-3429.
- Yagiela J.A. Adverse drug interactions in dental practice: Interactions associated with vasoconstrictors. Part V of a series. *Clinical Pharmacology* 1999; 130:701-709.