

Ozone - A Healing Touch In Dentistry - A Review

Abstract

Ozone, an allotropic form of oxygen, is successfully used in the treatment of different diseases for more than a hundred years. The use of ozone in dentistry represents an absolutely new solution of acute problems in treatment of diseases of both therapeutic and surgical profile. Owing to the antiinflammatory, immunomodulating effects of ozone and its positive influence on the microcirculation, the ozone therapy is now widely used in dental field. This article focuses the ozone therapy and its application in dentistry.

Key Words

ozone, ozonated oil

Introduction

Ozone is a gas composed of three atoms of oxygen and present naturally in the upper layer of atmosphere in abundance. It has got the capacity to absorb the harmful ultra-violet rays present in the light spectrum from the sun. Ozone is an unstable gas and it quickly gives up nascent oxygen molecule to form oxygen gas. Due to the property of releasing nascent oxygen, it has been used in human medicine since long back to kill bacteria, fungi, to inactivate viruses and to control hemorrhages.^[1]

History Of Ozone

Ozone, the tri-atomic state of di-oxygen, symbol O₃, has had a history in medical and dental usage.^[2] In 1785 Van Marum noticed that air near his electrostatic machine acquired a characteristic odor when electric sparks were passed. In 1801, Cruickshank observed the same odor at the anode during electrolysis of water. Finally, in 1840, Shonbein named the substance which gave off this odor, ozone, from the greek word "ozein"- to smell. In 1857 werner Von Siemens designed an ozone generator that has since evolved into the present day, cylindrical dielectric type that makes up most of the commercially available ozone generators in use, and which has sometimes been called the "simens type" ozone generator. Ozone was first applied in Dentistry in 1932 by a Swiss dental surgeon, Dr. Edwin Fisch.

Generation Of Ozone

Ozone is very useful in the stratosphere by absorbing dangerous B and c ultraviolet radiations but is toxic for the pulmonary tract in the troposphere, particularly mixed with carbon monoxide(CO), N₂O and traces of acids as it occurs in smog. It must be clear that if we want to use ozone in medicine, we must avoid its toxicity that can be controlled only if we operate cautiously by:

1. Using precise ozone generator equipped with a well-standardized photometer;
2. By collecting a precise gas volume with defined ozone concentration
3. By knowing the optimal dose for achieving a therapeutic effect.^[4]

There are three systems for generating ozone gas.^[5]

Ultraviolet system: produces low concentrations of ozone, used in esthetics, and for air purification.

Cold plasma system: used in air and water purification

Corona discharge system; produces high concentrations of ozone. It is the most common system used in the medical and dental field. It is easy to handle and it has a controlled ozone production rate.

Routes Of Administration:

Parenteral, intravenous, intra-arterial, intramuscular, subcutaneous, intraperitoneal, myofacial, intralesional, dental sulcus.^[6]

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Usage Of Ozone In Dentistry:

In dentistry, ozone has got its role in various dental treatment modalities. Ozone therapy presents great advantages when used as a support for conventional treatment.^{[1],[7]}

The main use of ozone in dentistry relies on its antimicrobial properties. It is proved to be effective against gram positive and gram negative bacteria, viruses and fungi.^[8]

The influence of ozonized water on the epithelial wound healing process in the oral cavity was observed by filippi. It was found that ozonized water applied on the daily basis can accelerate the healing rate in oral mucosa.^[9] for dental extraction due to periodontitis or aggravated apical lesions the method of choice is ozonated water through its disinfectant effect. Before surgery it is recommended for disinfection to rinse the oral cavity with ozonated water and then is used for rinsing of abscess cavity after its opening.^[10]

Ozone Therapy In Prosthodontics:

Microbial plaque accumulating on the dentures is composed of several microorganisms, mainly *Candida albicans*. Denture plaque control is essential for the prevention of denture stomatitis. In an attempt to solve this problem Arita et al, assessed the effect of ozonated water in combination with ultrasonication of *C. albicans*. Following exposure to flowing ozonated water (2-4mg/l) for one minute they found no viable *C. Albicans* suggesting the application of ozonated water in reducing the number of *C. Albicans* on denture bases.^[11]

Ozone Therapy In Endodontics:

During cavity preparation of the tooth, ozonated water is used for disinfection. Ozonated physiological saline at ozone concentration of 2000mcg/l is used in the form of rinsing on the stage of tooth cleaning. The influence of ozonated water on the epithelial wound healing was observed by Filppi. It was found that ozonated water applied on the daily basis can accelerate the healing rate of oral mucosa as it has anti inflammatory and immune modulatory capacities. Ozone and ozonised oils can be used during root canal therapy to clean and sterilize the canal systems.^{[12],[13]}

Periodontal Pockets:

Ozonated oils are made by strict manufacturing standards with medical grade oxygen. This oxygen is 99% pure, and is passed into a converter to form ozone. Ozone is then combined with pure vegetable oils and extracts.^[14]

Desensitization Of Sensitive Tooth Necks

Quick and prompt relief from root sensitivity has been documented after ozone spray for 60 seconds followed by mineral wash onto the exposed dentine in a repetitive manner. Ozone removes the smear layer opens up the dentinal tubules broadens the diameter and then calcium and fluoride ions flow into the tubules easily, deeply and effectively to plug the dentinal tubules, preventing the fluid exchange through the tubules. Thus ozone helps in terminating the root sensitivity problem within seconds and lasts for a long period than the conventional methods.^[15]

Contraindications

1. Pregnancy
2. Hyperthyroidism

3. Severe anemia
4. Acute alcohol intoxication
5. Ozone allergy in the event of ozone intoxication the patient must e placed in the supine position, inhale humid oxygen, and take ascorbic acid, vitamin E and n-acetylcysteine.^{[5],[15]}

Conclusion

The future of ozone therapy must focus on the establishment of safe and well-defined parameters in accordance with randomized controlled trials to determine the precise indications and guidelines in order to treat various medical and dental pathologies. Scientific support, as suggested by demonstrated studies, for ozone therapy presents a potential for a traumatic, biologically-based treatment for conditions encountered in dental practice. Ozone therapy holds promising alternative dental treatment according to many case studies, but further research is needed to standardize indications and treatment procedures of ozone therapy.

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