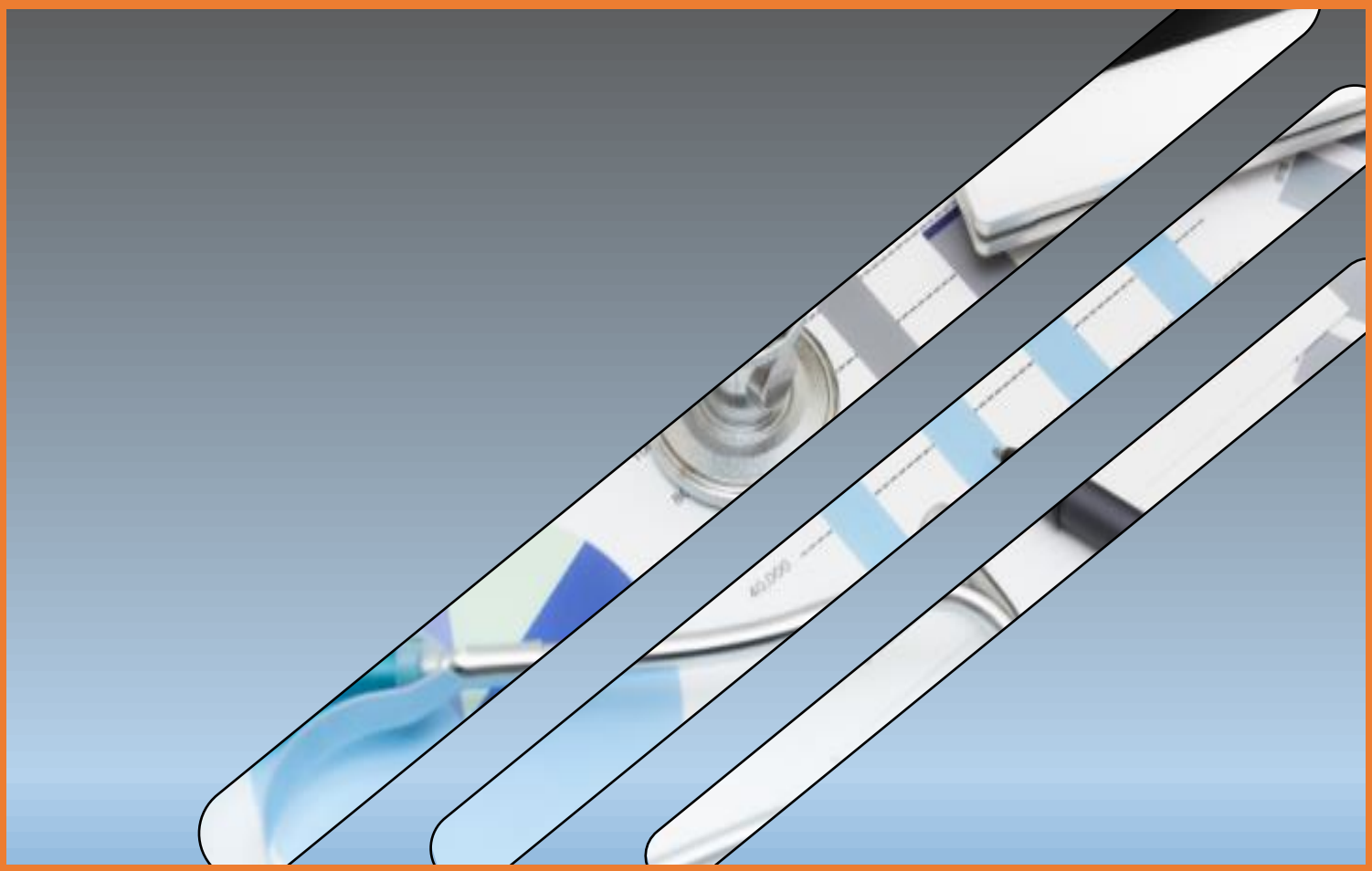

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CONTENTS (VOLUME 5, ISSUE 3, JUNE 2021)

GUEST COMMENT

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Homoeopathy for COVID-19: A Public Health Emergency

KANAGAVALLI MATHIVATHANAN

SARS-CoV-2 (COVID-19) has become the major public health concern. As of May 31st, 2021 more than 3.5 million deaths have been reported due to COVID-19.[1] Appropriate behaviour like hand washing, wearing mask, maintaining social distance can inhibit the COVID-19 transmission. Mild cases of COVID-19 should practice action plan of home quarantine, hygiene measures, stockpiling of food, vitamin supplements and herbal remedies. Severe cases require hospitalization and prompt adaptable treatment strategy may reduce mortality.

Low-and middle-income countries like India with poor public health strategy faced high mortality rate. Unfortunate sudden surge of COVID-19 second wave in India made a catastrophic disaster. Weak surveillance, poor health care facilities, paucity of hospital beds and testing services leads to health inequity and reveals unpreparedness. India's healthcare system is evolved with usage of conventional as well as complementary therapies in decades. Unequal quality treatment and vaccine distribution, economic burden leaves poor people deprived of healthcare facilities. Easy accessibility and cost-effectiveness of complementary therapies especially Homoeopathy, contributes to health equity. Additionally, continuous efforts of Ministry of AYUSH in creating awareness and distributing prophylactic COVID-19 medicines increased the use of Homoeopathy. Hence, it is important to emphasize the significance of Homeopathy in public health emergency.

Homoeopathy was founded by Dr.Samuel Hahnemann in late 1700's, based on symptomatic individualized treatment. Effectiveness of Homoeopathic medicine is significant in epidemics. Historic evidence suggested Homoeopathic treatment is effective in reducing mortality of scarlet fever, cholera and spanish flu. Homoeopathy in epidemics is subjected to Genus Epidemicus (GE), wherein medicine is selected on characteristic signs and symptoms. GE is used as preventive and curative treatment.[2]

Besides, scientific evidence reported significant outcomes in Chikungunya and Japanese Encephalitis after homoeopathic intervention. Rapid recovery is shown in cases of Influenza by Homeopathic medicines Arsenicum album and Bryonia alba.[3] However, scientific exploration of efficacy/effectiveness of Homoeopathy in COVID-19 is yet to be generated.

Health advisory by Ministry of AYUSH, GOI proposed Arsenicum album as prophylactic for COVID-19. Previous evidences suggested that Arsenicum album is effective in Influenza like Illness (ILI). Similarities of early expression of the COVID-19 and ILI, repurposing of Arsenicum album in COVID-19 may reduce mortality and morbidity. There is a constant variation in the manifestations of dynamic epidemic transmission. Keeping in view, GE may also vary according to symptom clusters of epidemic and geographical location. Evidence from COVID-19 case reports by China doctors reported Bryonia alba and Gelsemium as the most indicative remedy.[4]

A single blind controlled trial conducted in Bhopal COVID-19 hospital showed hasty recovery in group receiving homoeopathy as compared to modern medicine. Integrative treatment of Homoeopathy with conventional medicine reported early recovery and reduced mortality rate in moderate to severe COVID-19 cases and reduced the severity of infection in geriatric age groups. A study in Delhi prison complexes showed beneficial prophylactic effect of the Arsenicum album in mitigating COVID-19 infection. Another study in containment zone in Maharashtra police, potential prohylactic effects of Arsenicum album were observed.[5] Repurposing of homoeopathic medicines as an add-on or stand-alone approach provides early recovery and decreased mortality.

Evidences from clinical experience suggested adjuvant homeopathic treatment in interstitial pneumonia demonstrated beneficial outcome in non-responders to the conventional medicine.[6] Increase in

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homoeopathy usage is due to the safe nature and inexpensive treatment. Despite aforementioned studies, Holandino C et al. reported insignificant effect of homoeopathic complex medicine in sick and healthy groups.[7] GE of the particular epidemic is fruitful than homoeopathic complex.

Growing body of literature urges integrative approach has potential benefits. Yet, challenges encounted by policy makers due to lack of high-quality data demonstrated prophylactic and curative effects of homeopathic medicines. Ministry of AYUSH, GOI launched "AYUSH Sanjivani" application to generate the high-quality evidence. Target of Sanjivani app is to reach 50 lakh people and to build the strong evidence of usage of AYUSH advocacies in COVID-19. A cross-sectional analysis from the Sanjivani app showed that Homoeopathy and Ayurveda are being widely used among AYUSH system. Arsenicum album was extensively used as compared to other system prophylaxis. Understanding the data trends from app, ought to put forward robust clinical trials in Homoeopathy.[8]

Finally, COVID-19 pandemic revealed long term neglect of public health in India. Pluralistic treatment approach is required for benefitting the poor families. In addition, welcoming attitude about Homeopathy has been observed in doctors from countries like China and Spain. To strengthen and implement the policies, methodologically rigorous clinical trials in homoeopathy are warranted.

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SHORT COMMENTARY

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What Role, if any, Should Economic Evaluation Play in Market Access Decisions of Pharmaceutical Treatments for Cancer Patients with Short Life Expectancy?

ANGEL JUSTIZ-VAILLANT

I believe that economic evaluation plays an important and essential role in the market access decisions of pharmaceutical treatments for cancer patients with a short life expectancy. Increasing health care expenditures, a rapid introduction of new medical technologies has led to a growing interest in information from economic evaluations for decision making about resource allocation in health care. Economic evaluations can provide valuable information in relation to drug use, other healthcare intervention/programmes, and investments in research and new technologies. However, there are currently the most widely used pricing and reimbursement decisions for new drugs and health technology assessments of cancer patients.[1]

An example of economic evaluation in market access decisions of pharmaceutical treatments for cancer patients with short life expectancy in the UK is value-based pricing (VBP), which is a potential solution to barriers to accessing new expensive drugs for healthcare providers, and to improve market access/reimbursement for the industry. Examples of VBP include cost-effectiveness analysis (CEA) and therapeutic added value (TAV). CEA tries to determine the value of spending on medicines or policies that are returned to sufferers, such as longer life and better quality of life.[2]

The CEA of drugs is assessed for reimbursement price using QALY and incremental costs relative to existing treatments. QALYs are calculated by multiplying how much a given treatment will lengthen a patient's life by improving the quality. CEA for drugs is regarded by economists as being, in theory, compatible with efficient resource allocation. TAV assessments typically include a relationship with other instituted medications in the same class used in the standard of care. Higher costs settled for improved health or different values recognized by payers.[2]

Health economics and outcomes researchers generally measure value using the CEA tool with the QALY as the health gain measure.[3] Most health technology assessment (HTA) systems base their decision-making on QALY. Health care systems should recognize a wide range of cost savings in the present and the future if they result directly from interventions of interest, as recommended by the second panel on cost-effectiveness in health and medicine.[3]

The benefit is measured from the patient's perspective addressed by healthcare technology in question. Ideally, QALY can be used to measure the health gains of any technology. Costs and QALYs frequently form the basis of CEA value assessments. The QALY continues to be seen as a measure of the medical benefits to be used in population decision-making.[3]

Figure 1 shows the incorporation of additional elements of value into CEA (the preferred method of showing value), where twelve potential elements of value are considered. Four of them— productivity, net costs, adherence-improving factors, and QALY— are traditionally included in value assessments. Eight others currently have novelty in economic assessments, such as disease severity, the value of hope, fear of contagion, reducing uncertainty, insurance value, equity, real option value, and scientific spillover. Many of these theoretical elements of value are well known and are ready for incorporation in value assessments, with the difference of two exceptions: scientific spillover and equity, which so far have not the required attention, possibly because they require more consensus and theoretical improvement.[4] These elements are important for the economic evaluation of end-of-life care patients.

Up to £50,000/QALY can be spent on end-of-life pharmaceutical products. It differs from other pharmaceutical products for the general population, which have a lower value, such as £5000/QALY or much less. For example, the management of chronic pain remains a challenge for physicians. Opioids are the main source of treatment for chronic severe pain.

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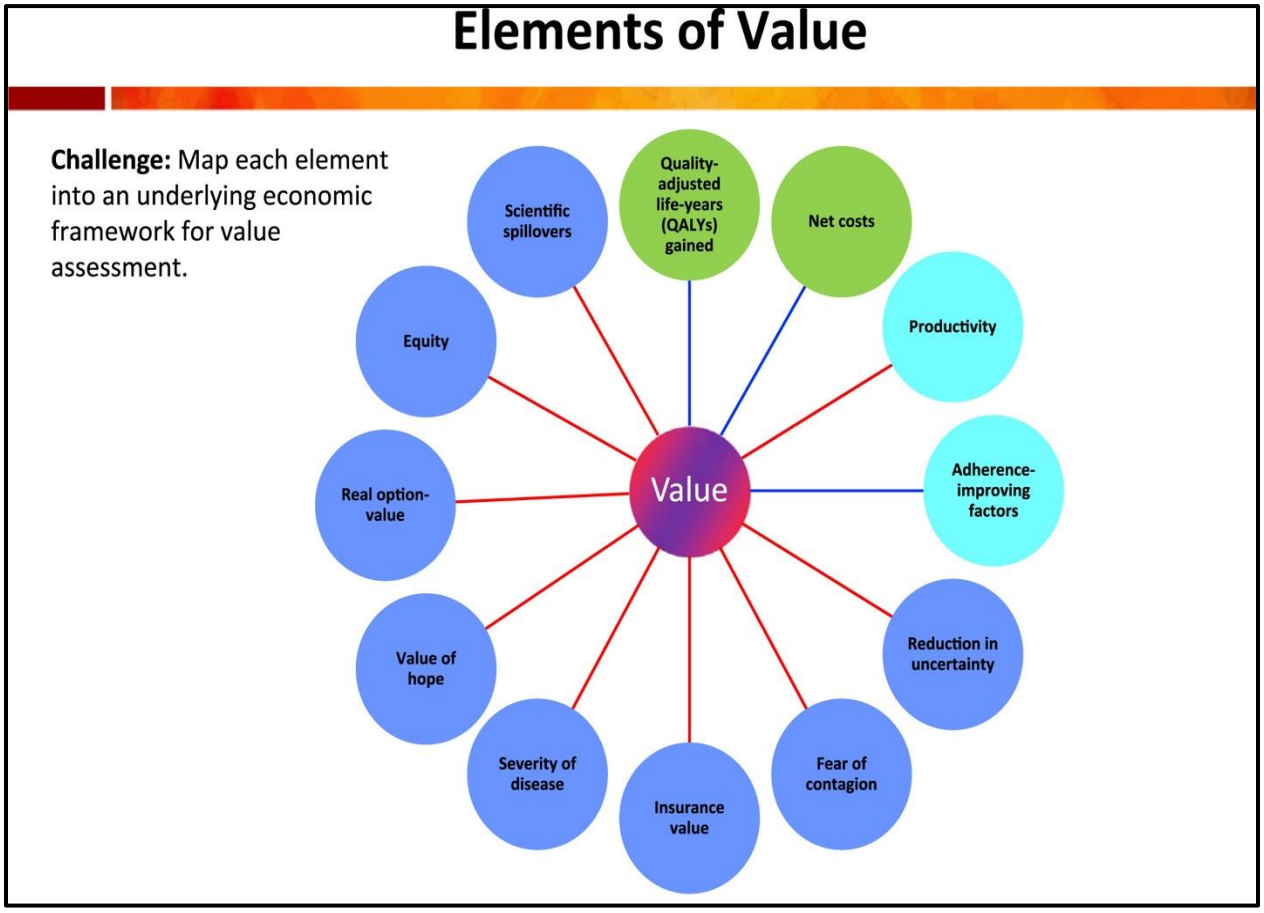

Figure 1. Twelve elements of value incorporated into CEA.[4]

A recent meta-analysis showed that tapentadol PR (TAP PR) and oxycodone/naloxone (OXN) both drugs have a better tolerability profile than a traditional opioid, such as oxycodone CR. OXN gained in one year 0.29 QALYs compared to its counterpart OXY CR.[5]

End-of-life care drugs have a higher QALY compared to other pharmaceutical products for the general population. Many innovative end-of-life drugs are biologics, such as monoclonal antibodies that have a high cost of production. Previous rigorous research and clinical trials have made them even more expensive. Therefore, their QALY thresholds are much higher than those of other pharmaceutical products for the general population.

I agree with the idea of the existence of an 'end-of-life' premium for such treatments with monthly affordable price contributions to health insurance institutions that agree to cover any palliative care, medical treatment, or diagnostic interventions for end-of-life care of patients. This would facilitate the use of a large amount of money to pay for drugs and may release the NHS hardship that would otherwise have had to contribute to the treatment using the highest QALY thresholds to purchase medicines for the pharmaceutical industry.

The insurance would pay for drugs that give an extra few months of life expectancy to terminally ill patients, and it helps to prepare patients' families psychologically for the short span of life of their loved ones. On the other hand, for a shorter life span period and overall survival insurance could also contribute to other alternative medicine care to decrease the burden of end-of-life care for patients and their families.

In January 2019, a voluntary scheme for branded medicines and access (VPAS) was introduced to replace the UK Pharmaceutical Price Regulation

Scheme (PPRS). This scheme aims to strike a balance between supporting innovation in the pharmaceutical industry, helping to get the most cost-effective medicines to patients as quickly as possible, and ensuring complete predictability of spending for the entire branded medicines bill for the NHS. The VPAS means that the branded medicines bill will not grow by more than 2% in any of the next five years.[6]

The government predicts that this will end in profits of £ 930 m. Nevertheless, further steps to expedite decision-making on new medications suggest that they could reach sufferers up to six months more quickly than today. The aforementioned low rate of growth, coupled with new cost controls launched by NHS England on new innovative medicines, signifies that the pharmaceutical division is 'not dancing for satisfaction' over the deal. However, it provides stability and predictability for the United Kingdom sector, where the doubts of Brexit remain to endanger the overall UK marketability.[7]

The cost-benefit evaluation of health interventions should be analyzed in all modalities of treatment, whether palliative or pharmaceutical. It is essential to assess differences, if any, that may exist in the economic evaluation of such treatments. Likewise, QALY as a part of CEA is assessed for all treatments and health interventions as an example that economic evaluation of non-pharmaceutical interventions/initiatives in palliative care or end-of-life care should not differ from pharmaceutical treatments.

I consider that buying expensive drugs to extend end-of-life patients should also be linked to the ability of the drugs to improve the quality of life of those with end-of-life diseases. New policies should be developed in the application of more palliative care, pain management, and use of alternative and traditional medicine modalities to ameliorate the suffering of many of these end-of-life conditions versus increasing the QALY threshold for purchasing expensive drugs, with little information on extending or improving quality of life. It is understood that all deserve the best treatment at any stage of their disease. This finding is significant for patients with rare cancers. Therefore, the use of orphan drugs is essential. However, monetary resources should be allocated to improve the existing programs on vaccinations in childhood. In addition, nationwide vaccination programs should be implemented to prevent the emergence of diseases. The NHS should achieve comprehensive cancer screening programs for the most common cancers that affect humans as breast, lung, prostate, and colorectal cancers, or purchasing or developing new treatments for new diseases such as COVID-19. Public perceptions can be aligned to NICE policies by recommendations on lower prices of medicines for the end of life and improve people's quality of life. A lower QALY threshold for end-of-life drugs is made cheaper and more widely available, with easy access to the sick.

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REVIEW

QR CODE

Ozone in Dentistry: A Review

VINIT KUMAR*[1], CHANDNI[2]

ABSTRACT

Ozone (O_3) is a natural gaseous molecule made up of three oxygen atoms. It leads to lyses of the cell membrane of most of the bacteria that causes dental problems due to its oxidant and oxidizer properties. Ozone therapy opens a new vista in treatment of dental problems due to its atraumatic, biologically based treatment. This review explores the use of ozone in dentistry.

KEYWORDS: Ozone, Dental Caries, Osteonecrosis, Root Canal Treatment

INTRODUCTION

Ozone is a blue gas naturally present in stratosphere. It is made up of three oxygen atoms that give unstable oxygen gas which has highest oxidation potential. The highest oxidation potential of ozone leads to lyses of the outer membrane of the micro-organisms and therefore used in dentistry. The word ozone originates from the Greek word "ozein", which means odor and was first used in 1840 by German chemist Christian Friedrich Schonbein, 'the father of ozone therapy'.[1]

Ozone was first of all used by E.A. Fisch in 1930's to treat dental problems.[2] However, at that time ozone resistant materials like dacron and teflon were not available which led to difficulty in use of ozone at that time. Manufacturing of ozone resistant material began in 1950, which boosted the use of ozone in dentistry. In 1957, Joachim Hänsler, a German physicist and Hans Wolff, a German physician developed ozone generator for medical use.

However, it was only at the end of 1980s, medical ozone became subject of dental research and practice. Subsequent to this, it was used increasingly for medical and dental purposes.[3]

OZONE GENERATING SYSTEM

There are three ozone generating systems[4]

1.UV system: In this system, a UV Lamp at 185 nm creates ozone from oxygen by disrupting the oxygen molecule and splitting it into two oxygen atoms. These two oxygen atoms attempt to attach to each other to form an oxygen molecule. This attachment of third oxygen molecule leads to formation of ozone.

2. Cold plasma system: Cold plasma is a gas which is partially ionized and created at room temperature or lower. Ionization of pure oxygen takes place between two electrodes, which are separated by a dielectric barrier. When the plasma is formed oxygen molecules split into single oxygen atom which then recombines with oxygen and forms ozone.

3. Corona discharge system: In this method air is channelled into corona discharge tube in which plasma is created by applying a strong electric field. This plasma then dissociates into single oxygen atoms, which then are free to recombine with oxygen molecule to form ozone. The handling of this design is easy and the ozone production rate can be controlled, hence most commonly used in the medical and dental fields.

ROUTES OF OZONE ADMINISTRATION

1. Gaseous form: Ozone in gaseous form is used to treat various dental problems. Gaseous ozone is administered either topically or by sealed suction system. It can be used for the treatment of dental caries and as dental disinfectant. Main problem with system is toxicity, when inhaled.[5] It is a non-invasive therapy for treatment of dental caries and may be used as a disinfectant before the placement of a direct restoration.

2. Ozonated water: Hutch et al. evaluated the biocompatibility of aqueous form of ozone and reported

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that ozone is potent antiseptic agent.[6] It is less cytotoxic than gaseous form. It is effective against both gram positive and negative microorganisms. Ozone water accelerates healing of mucosa when applied daily.[7]

3. Ozonized oil: It is also as effective as gaseous and aqueous form. It is effective against Streptococci, Enterococci, Staphylococci, Pseudomonas, Escherichia coli and is used for the cure of fungal infections.[8] Commercially, it is available as Oleozone and Bioperoxoil.

APPLICATIONS OF OZONE IN DENTISTRY

Ozone is a very good alternative and/or an additional disinfectant to standard antiseptics due to its undisputed disinfection power over other antiseptics. According to Krammer,[9] a German dentist, aqueous ozone can be used:

1. Treating Caries: Ozone helps in treating dental caries. It leads to re-mineralization of enamel and prevents caries progression. It also leads to destruction of all kind of micro-organisms in oral cavity and their waste acidic by products. Reversal is shown in non cavitated root caries.[10]

2. Ozone in Endodontics: Often caries lesion leads to pulp infection due to ingress of micro-organisms. Tooth root has multiple lateral canals and a periapical space that can all be inhabited by pathogenic bacteria. Sodium hypochloride, the main irrigant in root canal treatment is also not able to reach all the canals and especially in lateral canals, which if left unclean act as a potent source of root canal treatment failure, studies show that ozone is more potent than hypo in these cases and clean effective lateral canals and also more effective against Enterococcus faecalis, major causative factor in endodontic disease which is particularly resistant to sodium hypochlorite. Ozone also helps in reducing the number of microorganisms in the periapical region and helps in healing of the osseous structures.[11,12]

3. Managing Periodontal Infection: Periodontal (gum) disease is most commonly associated with loosening and loss of teeth. Ozone helps in this condition. Firstly, the deep pockets are irrigated around the roots using ozonated water during debridement processes, and then insufflate the deep, infected crevices with ozone gas using fine cannulae, followed by placement of ozonated oils for longer term disinfection. Patients may also be given their own supply of ozonated oils to place into hard-to-reach areas on a daily basis. And, again, tray insufflations are often recommended as a periodic preventive regimen. Ozonated water inhibits the accumulation of experimental dental plaque in vitro.[13]

4. Viral and Fungal Infections: Ozone reduces the load of virus and fungus in oral infection. Both gaseous and aqueous forms are effective in reducing the viral infection.

5. Sinusitis and Temporomandibular Joint Dysfunction: Sinusitis is an infection of the paranasal sinuses due to bacteria, virus, fungus and allergens. Ozone Therapy can neutralize toxins and impurities in the body, rid the body of carbon monoxide and combat allergy causing substances. Ozone Therapy can also kill viruses & bacteria in the body, relieve fever, increase white blood cell count, boost the immune system and fight bronchitis & asthma. Petrov GM et al. in a controllable study showed early healing in patients treated with 0.9% solution of sodium chloride, saturated with ozone.[14]

Daif ET documented that patients who received ozone gas injections into the superior joint space either completely recovered or improved early in comparison to those who took non-steroidal anti-inflammatory drugs and muscle relaxants.[15]

6. Bisphosphonate Lesion Treatment: Osteonecrotic lesions mostly of the mandible are always a great challenge to treat and even more challenging in patients on bisphosphonate medications. Many of these are secondary to infections or tooth extractions on patients who have received significant doses of bisphosphonate medications. Ozone seems well suited to resolution of these problematic lesions that otherwise require multiple surgical interventions and treatment with exotic and very costly antibiotics.

7. Uses in Oral Surgery: Ozone is used from simple tooth extraction to large surgical procedures. Ozone increases oxygen release in the tissue by erythrocytes that leads to faster healing of wounds. It also leads to vasodilation and increase blood supply to the ischemic areas that leads to faster healing. Kazancioglu et al. concluded that ozone application reduces post-operative pain after 3rd molar surgery.[16] Ozone has anti-hypoxia and haemostatic properties that overcome the use of hyperbaric oxygen in osteomyelitis. Studies showed that ozone provides favorable environment by reducing inflammation and necrosis.[17]

8. Ozone and Dental Unit Water Lines: Water lines are one of the most vulnerable and most neglected site in dental clinic that harbor large number of micro-organisms. Condition becomes worse in stagnant water lines. Splatters from these pipelines due to back flow of water lead to infection in health care workers. Szymanska and others identified moulds, fungus and other opportunistic pathogens from the dental water lines sample.[18]

Ozone in gaseous or aqueous form can be effectively used for the sanitization of the dental water lines/units. Kohno S et al. showed reduction of microorganisms in the dental water units/pipes and they advocated developing a design in dental water lines that incorporates automatic devices to clean water line units.[19] Studies show 55% reduction of microorganisms from water line units by ozone.[20]

MECHANISM OF ACTION

Ozone therapy has a wide range of applications in treating various diseases owing to its unique properties including antimicrobial, immunostimulant, analgesic, anti-hypnotic, detoxicating, bioenergetic and biosynthetic actions.

1. Anti-Microbial Effect: Ozone has high oxidation potential. After entering the cell, it oxidized all essential components of the cells and leads to lyses of the cell/bacteria. It also inhibits the cell growth of the fungus[21] and inhibits growth of the virus by damaging the virus capsid.[22] Ozone in concentration of 0.1ppm is effective for inactivating the growth of the bacteria.[23] Ozone therapy increases oxygen perfusion to the tissues by the erythrocytes due to activation of 2,3-diphosphoglycerate which in turn is activated due to increase in the red blood cell glycolysis rate. Ozone also stimulates production of ATP via Krebs cycle by enhancing oxidative carboxylation of pyruvate. It also causes a significant reduction in NADH and helps to oxidize cytochrome C. Ozone also stimulates the production of enzymes which act as free radical scavengers and cell-wall protectors: glutathione peroxidase, catalase and superoxide dismutase and prostacycline, a vasodilator.[24]

2. Activation of Immune System: Ozone activates the cascade of immunological reactions by increasing the production of interferon, tumor necrosis factor and interleukin-2 at concentration between 30 and 55 lg/cc.[25]

ADVANTAGES OF USING OZONE

It is a safe and painless procedure.

DISADVANTAGES OF USING OZONE

The main disadvantage of the ozone is the instability and toxicity if its level increases above .0007% per application.

Ozone Toxicity: Although ozone is safe and good alternative in dentistry, but main side effect is toxicity. Ozone is safe at .05ppm for 8 hours, above this, it leads to toxicity when inhaled. A maximum concentration of ozone in oral cavity amounts to 0.01 ppm, during ozone therapy. Studies showed that the bronchial–pulmonary system is very sensitive to ozone and this gas should never be inhaled.[26] The respiratory tract lining is very thin and contains a minimal amount of antioxidants that make mucosal cells extremely vulnerable to oxidation. Pulmonary embolism occurs during direct intravenous administration of O_2/O_3, an application prohibited by the European Society of Ozone therapy since 1983.[27] Some other minor side effects are epiphora and upper respiratory irritation, rhinitis, cough, headache, occasional nausea, and vomiting. To prevent Ozone intoxication, patient is placed in supine position and humid oxygen is given. Vitamin E and C are prescribed.[8]

CONTRAINDICATIONS WHILE USING OZONE

Acute alcohol intoxication, pregnancy, severe anemia, recent myocardial infarction, hyperthyroidism, active hemorrhage, and thrombocytopenia.

CONCLUSION

Ozone is a new tool for the treatment of the patients in dentistry. It is potent agent for removing microorganisms from oral cavity and sanitization of the dental waterline units. Main advantage with ozone is that it is biocompatible and side effects are less when given in proper ratio and judiciously. In dentistry it is used in three forms viz. gaseous, aqueous and oil form.

In dentistry it is used for irrigation of root canals in root canal treatment to remove microorganisms that are resistant to hypochloride solution, mostly used to clean root canals, also used in the treatment of periodontal diseases, as an alternative to hyperbaric oxygen in osteomyelitis, also used to remove/ arrest the progression of the dental caries. It is also effective in sanitization of the dental water units.

It is a good and new weapon for the dentists. Like every medicine ozone also has few limitations/ side effects. Future of dentistry is bright with ozone if used judiciously but still more studies are needed in field of ozone to make it safer and more efficient. Present laboratory studies show brighter future of the ozone in dentistry and medicine.

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REVIEW

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How Safe is the use of Antiseptics and Disinfectants in Children?

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ABSTRACT

A wide range of antiseptic preparations and disinfectants have been used in varying concentrations and combinations in children but much research work regarding their safety and efficacy is not available. The aim of this review is to expand and broaden the pre-existing guidelines useful to the health care professionals so that antisepsis in the pediatric field can be performed appropriately, and at the same time, guarantee safety for children. Previously published studies were also assessed while writing this review. As per the data, there may be several local and systemic toxic effects related to the use of antiseptics and disinfectants in children. Properly designed large multicenter randomized clinical trials are required to direct the healthcare professionals regarding the most appropriate and safe antiseptic and disinfectant to use in pediatric patients.

KEYWORDS: Antiseptics, Disinfectants, Children

INTRODUCTION

Antiseptics and disinfectants are used in children from birth, and their use is still poorly understood, because, as is the case with drugs, there is little literature available in this regard. Aside from infections in the uterus, newborns can come into contact with pathogens during childbirth, due to blood, feces, and microorganisms of the female genital tract, and in the post-partum phase, from contact with relatives, healthcare workers, contaminated objects and devices. In particular, in daily clinical work, the greatest critical issues arise for preterm infants, who may need invasive procedures, such as intubation or insertion of a central venous catheter, the use of complex devices, such as endoscopes, and frequent assistance maneuvers, such as venous sampling or endotracheal aspirations. The immune system of these newborns is often immature, as are many of their organs and systems which, under physiological conditions, act as a barrier for pathogens, such as the skin and the lungs. For this reason, infections can easily be acquired. This immaturity of cellular and antibody defenses in preterm infants with low weight, sometimes less than 1 kg, continues until and beyond the first year of age.[1,2]

Unfortunately, especially for neonatology, there are only a few medications that the therapists have at their disposal, and it is no news that the number of drugs authorized in the correct pediatric dosage is rather small. For this reason, many drugs and antibiotics are used outside the indications, in dosages or pharmaceutical forms other than those reported in the authorization, for which safety data are not available. Therefore, antisepsis and disinfection of the environment and of all objects that come into contact with the pediatric patient have preventive importance. The skin antisepsis of preterm newborns presents particular aspects, related to the thin epidermis, with an insufficient stratum corneum, with the ongoing keratinization of the granular layer, and with the evolving mucosal and basal germinative cells.[3] The fewer anchoring fibrils in the dermoepidermal junction reduce the barrier effect and increase the risks of local and deep infection and general toxicity.[1] A good antiseptic must therefore combine maximum topical tolerability with the highest efficacy. Given the scarcity of guidelines and studies in pediatric literature, the aim of this work is to deepen and develop guidelines that will be of use to healthcare workers, so that they can perform the antisepsis in the neonatal pediatric context in an appropriate manner, while ensuring safety for young patients. One of the studies lists the characteristics of chlorine, which, may exhibit specific antiseptic properties of particular interest through its derivatives and is widely used in various pediatric and neonatal care settings.[3]

It should be noted that the widespread use of sodium hypochlorite as an antiseptic is especially due to its effectiveness on lipophilic and hydrophilic bacteria and viruses, as well as on spores, in low concentrations, and in a short time. Inexpensive and non-flammable, if concentrated it may be corrosive to steel and other metals. It is applied to damaged and undamaged skin, and to mucous membrane, in pediatric and neonatal age, at least half minute before carrying out the planned activities, taking care, for preterm infants, to rinse with

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sterile water after half minute, in order to avoid any type of skin irritation. French Society for Hospital Hygiene recommends the use of sodium hypochlorite also on the ocular mucous membrane, in concentrations equal to 0.06% in newborns and preterm infants. Alcohols are antiseptics tolerated on adult skin but cannot be used on mucous membranes and near the eyes. Volatile disinfectants for small surfaces have no persistent effect and are flammable. They can be dangerous in neonates and therefore the risk of percutaneous intoxication must be assessed, due to the surface/volume ratio, with particular attention to high concentration solutions. Cases of hemorrhagic necrosis of the skin have been reported in preterm infants, resulting from the use of products containing 70% ethyl alcohol.

A 0.5% chlorhexidine in 70% alcohol is also contraindicated in preterm infants and in newborns less than one month of age. Two of the studies analyzed highlighted the risk of ulceration associated with the use of both alcohol-based and aqueous solutions in children under two months of age.[4,5] One of these evaluated the use of chlorhexidine for the sterilization of the umbilical cord in underweight infants, highlighting the occurrence of two cases of skin burns localized in the treated area.[4] Instead, it is recommended to use simple soap and water, or sodium hypochlorite, for the care of the umbilical cord. For preterm infants and newborns up to one month of age, the antiseptic solutions to be preferred are the solutions based on 0.25% chlorhexidine in 4% alcohol which have a lower dermatological toxicity and fewer contraindications than the more concentrated solutions used for other age groups.

Unfortunately, concentrations of less than 0.5% chlorhexidine alone in water are easily contaminated, therefore they should be avoided. The cationic biguanide surfactant acts mainly on vegetative microorganisms, destroying the cell membrane, and partially coagulating its contents. A 2% chlorhexidine diluted in water, of rapid and persistent efficacy, is more active than povidone-iodine, and even in newborns, a 0.5% chlorhexidine diluted in 70% isopropyl alcohol is more active than povidone-iodine.[6,7] Chlorhexidine is also widely used in obstetrics and gynecology, it does not pose problems of general toxicity, but it may cause anaphylactic reactions and, in concentrations just over 0.02%, it may cause damage to the eye, middle ear, conjunctival tissue, and brain tissue, and may be toxic if used on the oral mucous membranes in the newborn. It should be used with caution in newborns, especially those born prematurely, as it can cause severe chemical burns.[4,5] A larger number of studies have been analyzed to evaluate the most recommended antiseptics for skin disinfection before, during and after the implantation of a central venous catheter in pediatric patients. As regards venous access in adult patients, there is no doubt that the skin antiseptic of first choice is a 2% chlorhexidine gluconate in a 70% isopropyl alcohol solution. Similarly, above two months of age, a 2% chlorhexidine in a 70% isopropyl alcohol solution is considered the first choice for skin disinfection in children with CVC.[8,9] On the other hand, for patients with allergy or sensitivity to chlorhexidine, the use of 10% povidone-iodine as a second-choice antiseptic should be considered, as more than one study demonstrated lower efficacy than chlorhexidine. Curry S. et al., in an Arkansas hospital, used alcohol-based chlorhexidine on newborns weighing over 2 kg, to reduce CLABSI to 1/3. Due to the absence of side effects, he also adopted this antiseptic for preterm infants weighing 1-2 kg, and for those weighing less than 1 kg.[10]

In a prospective randomized controlled study, conducted in a pediatric cardiac surgery unit, the use of sponges impregnated with 2% chlorhexidine, for both, CVC disinfection, that for bathing the patient, in order to avoid the danger of the so-called healthcare-associated infections was found to be safe and effective, significantly reducing CVC colonization rates, compared to polyurethane dressings.[11] Other antiseptics, such as iodophors are effective biocides, and although less irritating, they are contraindicated under 6 months of age. In particular, povidone-iodine is contraindicated as it can lead to reversible changes in thyroid function, especially in children with congenital hypothyroidism. A single application cannot cause such complications, but the use of iodophors should not be applied long-term.

Mothers should also limit the use of these antiseptics in the last months of pregnancy and during breastfeeding. For the cleaning and disinfection of damaged skin, a mixture of Benzalkonium chloride and 96% ethyl alcohol can be used, with a limitation for children under two years of age with a predisposition to laryngospasm and convulsions. Triclosan, on the other hand, a chlorophenolic compound, is an effective antiseptic, and the literature emphasizes the preventive effect with regard to topical infections on damaged skin. Data relating to the use of disinfectants in pediatrics are even more scarce than those relating to antiseptics. All reusable objects and surfaces are classified into critical, semi-critical and non-critical items, which correspond to an equal degree of sterilization, or high-level or low-

level disinfection. There are few clinical cases of children who have shown toxic effects following the use of disinfectants precisely because, unlike it is the case with antiseptics, direct contact of chemical agents with tissues and organs is rather limited. As regards chlorhexidine, Agolini et al. report cases of cyanosis and bradycardia in infants who would have been breastfed from a mother's breast treated with products containing chlorhexidine, and cases of burns to the mouth and pulmonary edema in artificially fed infants who had used bottles and teats disinfected with chlorhexidine solutions and poorly rinsed.[3]

When used at very high concentrations, polyphenols can cause neonatal hyperbilirubinemia. Therefore, the concentrations suggested for environmental and surgical instruments disinfection range from 0.5% to 1%. Chlorine derivatives, in particular sodium hypochlorite, are undoubtedly the most used disinfectants, although at high concentrations they may cause eye damage. One study lists the characteristics that make them widely used disinfectants for water and the environment.[12] In fact, sodium hypochlorite is active on bacteria, lipophilic and hydrophilic viruses, as well as on spores and the much-feared Clostridium Difficile, in concentrations that are not too high and for not too long periods of time. It is an inexpensive non-flammable agent, but incompatible with some metals because it is corrosive and can be deactivated in the presence of organic compounds. A good alternative to sodium hypochlorite is sodium dichloroisocyanurate which, in the form of water-soluble tablets, is easier to handle and less corrosive. It should be emphasized that chlorine derivatives have a good disinfectant action if a good preventive cleaning of the objects and surfaces to be treated is carried out, contrary to other disinfectants, such as polyphenols, which are active even without an effective pre-washing.[12] Chlorine derivatives are used in hospitals to disinfect baby bottles and teats, toys, heat cradles, and normal cradles. Social games used in pediatric wards, considered by the Center for Disease Control and Prevention as vehicles for the transmission of pathogens, also include procedures that recommend sanitization, disinfection with 1,000 ppm chlorine for at least 10 minutes, and rinsing. The procedures for daily cleaning of cradles, on the other hand, involve the use of detergent/disinfectant solutions or ready-to-use wipes that do not require rinsing.

In case of contamination of the cradles by infected microorganisms, and in case of the use of heat, it is recommended to use a 0.1% sodium hypochlorite or a 0.5% chlorhexidine solution, in combination with Cetrimide. Obviously, it is important to take into consideration the information provided by the various cradle manufacturers regarding the procedures and compatibility with the different disinfectants. Hydrogen peroxide has been used for years as a disinfectant but has the limit of presenting stability problems. Considering that no significant literature on disinfection dedicated to the pediatric age is available, it was deemed appropriate to conduct a review of the available literature. The review has shown that there may be various toxic effects associated with the use of antiseptics and disinfectants in children and infants, especially in preterm babies, not only on the skin and mucous membranes, but also on a systemic level.

CONCLUSION

The field of disinfection and antisepsis in pediatric age can be considered, in fact, an orphan field in all respects, but although the available data are limited, the suggested chemical agents guarantee the combination of maximum efficacy and maximum safety, obviously adopting all necessary precautions. The creation and use of best practices, in order to prevent infections at home or in the hospital environment, given the delicacy and physiological immaturity of young patients, is a safer strategy to adopt than the long-term disability that could result from improper use of the aforementioned chemical agents. In fact, attention should be focused on the culture of safety, using teamwork, with the creation of a multidisciplinary team dedicated to the management of infection prevention in pediatric hospital wards, and all pediatricians and pharmacists should be updated. Simple rules, such as rinsing the antiseptic or disinfectant, the correct dilution, the use of applicators, which allow for the use of known doses of antiseptic so as to avoid the build-up effect, use of wipes or disinfectant sprays that do not require rinsing, all improve the administration of therapeutic aids, essential for the fight against infections. In addition, use of galenic formulations in clinical practice may play an important role in the case of pediatric patients and, should there be the need to customize compositions of antiseptic solutions in the absence of readymade products available on the market, they can be used as a tool for responding to otherwise unsolvable clinical problems.

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CASE REPORT

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Managing Class II Malocclusion Using Twin Block Therapy in a Young Adolescent Female: A Case Report

AMAN DEEP[1], DIPTI CHAWLA*[2]

ABSTRACT

Twin block therapy is highly effective in patients with remaining growth potential. However, its successful use is confounded by many patient related factors such as age, gender, compliance of the patient and other miscellaneous criteria's. If treated within time, growth modification and orthopedics can harness suitable forces to cause skeletal correction of the malocclusion. The appliance is highly successful in a patient with retruded mandible and presenting with a positive visual treatment objective. This paper discusses a case of 11-year-old female patient with characteristic twin block appliance indication in which successful skeletal modification was achieved.

KEYWORDS: Malocclusion, Myofunctional Therapy, Adolescent

INTRODUCTION

Class II Malocclusion is the most frequently encountered skeletal problem in orthodontics which is characterized by deficient mandibular growth. A myriad of studies depicting numerous methods for treatment of such skeletal problem can be seen. However, with some portion of residual growth in hand along with treatment timing and growth vector the most favored treatment modality seems to be growth modulation. There are many removable functional appliances available, however, "the Standard Twin Block appliance" is the treatment modality most favored by the clinicians and patients due to its ease of use and easy maintenance.[1-5] The appliance was invented by Clark[6] in 1982 and consisted of removable plates with acrylic blocks for maxillary and mandibular arches. These two blocks were made to engage each other at an angle of 70°. And here lies the point of differentiation between this appliance and other removable functional appliances, which are basically Monoblock's. This appearance of appliance along with less bulky build makes it more comfortable and acceptable to the patients. Additionally, it also provides more freedom in their mandibular movements.[7]

All these considerations eventually produce different treatment results compared with the removable functional monoblock. The following case report illustrates the use of a standard twin block appliance for skeletal correction of a Class II division 1 malocclusion in an 11-year-old female patient.

CASEREPORT

An 11-year-old girl reported to the department with the chief complaint that her upper front teeth were quite forwardly placed and she had a non-pleasing smile. On extra oral examination, patient had an apparently symmetrical face with a convex facial profile, the lips were competent and mento-labial sulcus was deep with receded chin. Intraoral examination showed an Angle's Class II molar relation and Class II Canine relation. Patient had an overjet of 9 mm and an overbite of 90% with coincident midlines (figure 1). Orthopantomogram findings revealed a late transition stage with retained lower second primary molars. [figure 2(a)].

Cephalometric analysis [figure 2(b)] depicted Class II division 1 with a skeletal Class II base and mandibular deficiency. The ANB angle was 6° [figure 3(a)]. Skeletal values depicted that maxilla was normally positioned, however there was a retruded mandible in relation to cranium and a normodivergent growth pattern as confirmed by Frankfurt-mandibular plane angle as 25° [figure 3(b)]. Dento-alveolar findings depicted proclined maxillary anterior teeth and mandibular incisors as normally positioned. [figure 3(c)] Cephalogram indicated that she was reaching peak of her pubertal growth spurt (CVMI-III) with considerable growth remaining. Positive visual treatment objective (VTO) showed favorable results of mandibular advancement.

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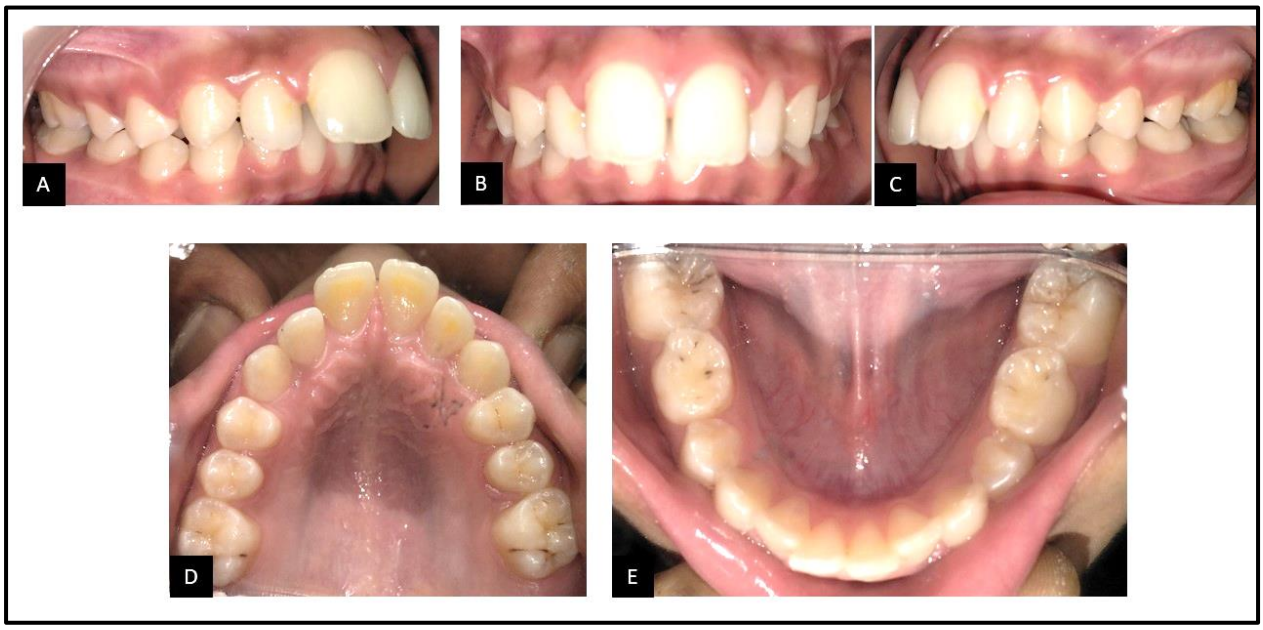

Figure 1. Pre-treatment Intra Oral Photographs

TREATMENT OBJECTIVE

a. Achieving Angle's Class I molar and canine relationship.
b. Normal over jet and overbite.
c. Levelling and alignment of both the arches.
d. Retention of results for long term.

TREATMENT PLAN

As the patient was in her growing period with both skeletal and dental class II relation, a two-phase treatment had to be undertaken;
Phase I: Growth modification using functional appliance (twin block).
Phase II: Fixed mechanotherapy for detailing of occlusion.

TREATMENT PROGRESS

A wax bite registration was done with mandibular arch guided forwardly and twin block appliance was fabricated (figure 4). A 24 hours per day appliance wear was educated to the patient, where periodic recall was done every 1 month, besides this, slight dentoalveolar expansion was done where patient was instructed to

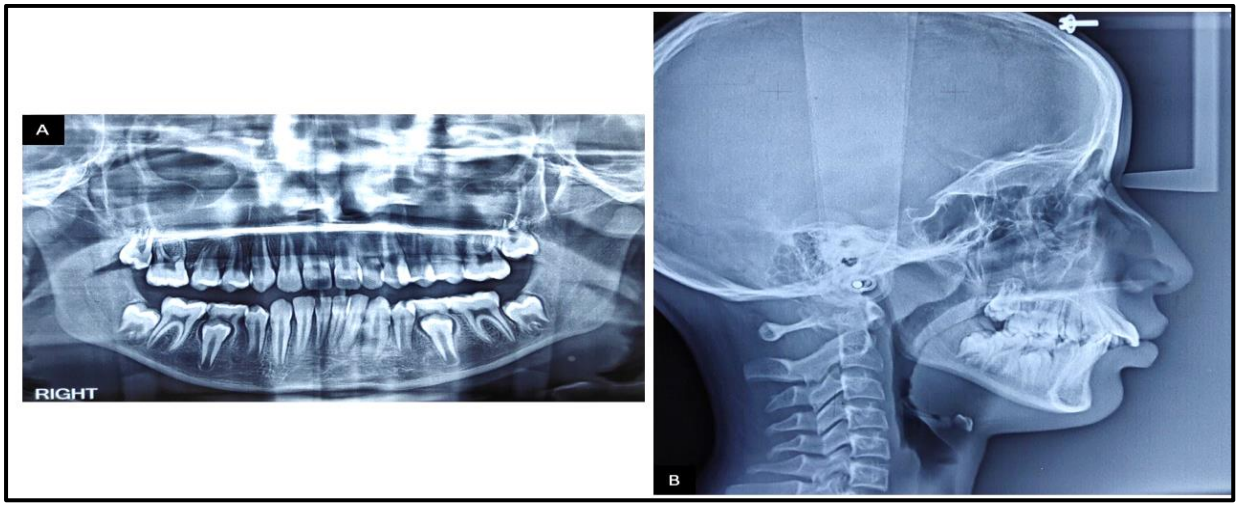

Figure 2(a). Pre-treatment OPG & **2(b).** Pre-treatment Cephalogram

VARIABLE	Preoperative values	Post twin block values
SNA	79°	80°
SNB	73°	78.5°
ANB	6°	1.5°
FMA	27°	27°
SN-MP	30°	30°

A

Figure 3(a). Cephalometric parameters of Skeletal Base

rotate the screw quarter turn once a week and following this patient was revaluated after 6 months. The profile of the patient had significantly improved with marked reduction in overjet and overbite. Correction of molar and canine relation had also occurred. This correction was to be followed by

VARIABLE	Preoperative values	Post twin block values
U1 to A-Pog	10mm	6mm
U1 to NA Linear	6mm	5mm
U1 to NA Angle	30.5°	25.5°
U1 to Palatal Plane	53°	59°

B

Figure 3(b). Cephalometric parameters of Growth Pattern

VARIABLE	Preoperative values	Post twin block values
L1 to A-Pog	1.5mm	1.5mm
L1 to NB Linear	5.5mm	5.5mm
L1 to NB Angle	25°	26°
IMPA	99°	101°
Inter-incisor Angle	118°	125°

C

Figure 3(c). Cephalometeric parameters of dental parameters

retentive phase where the patient was instructed to wear a removable reverse inclined plane appliance which engaged the lower anterior teeth and retained the correction obtained (figure 5 & 6).

DISCUSSION

Class II malocclusion is often associated with skeletal component or a dental component, while it is also true that sometimes both of them could be present. Presence of skeletal component may result in any of the following ways: maxillary prognathism, mandibular retrognathism or their combination.[8] Therefore, identification of the etiology is extremely important for a true diagnosis and finally to device an effective treatment plan.

This functional appliance are built on the notion that they harnesses the adjacent neuromuscular forces so that orthopedic and orthodontic changes can be brought, which thereby causes mandibular displacement. The main advantage is that changes occur at rapid rate, and its comfortable nature to the patient and long-time wear allows this process to culminate.[9] A lot of documentation[10] has been undertaken to gauge the ability of this appliance to produce significant skeletal as well as dentoalveolar changes, where a generalized notion was in favour of the appliance. In this particular case, comparison of

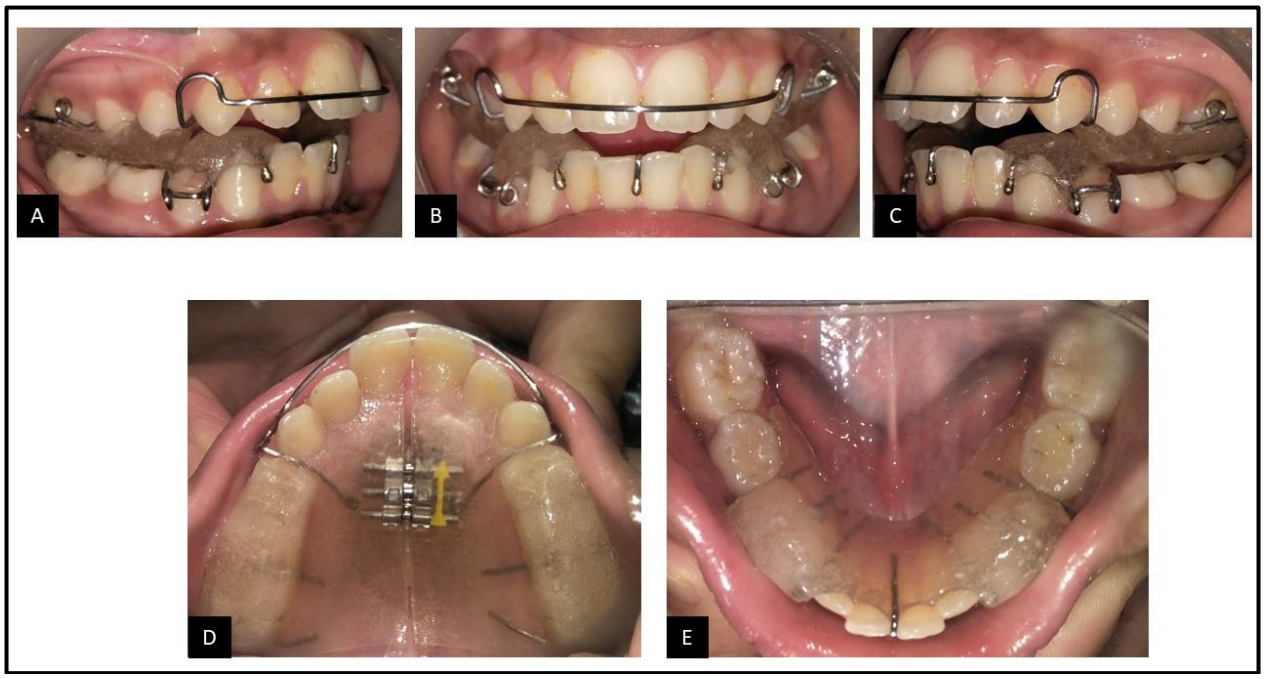

Figure 4. Intraoral photographs of appliance in vivo

pre-treatment and post-twin block treatment lateral cephalogram depicted an increase in SNB angle by 5.5°, while the ANB angle was reduced up to 4.5°. Maxillary incisor inclination was also corrected.

CONCLUSION

Functional appliance therapy is highly effective in treating skeletal Class II malocclusion with some residual growth potential; however, its use is largely confounded by patient compliance and case selection factors. Eventually, they help in simplifying the following phase of fixed appliance by gaining anchorage and achieving Class I molar relationship.

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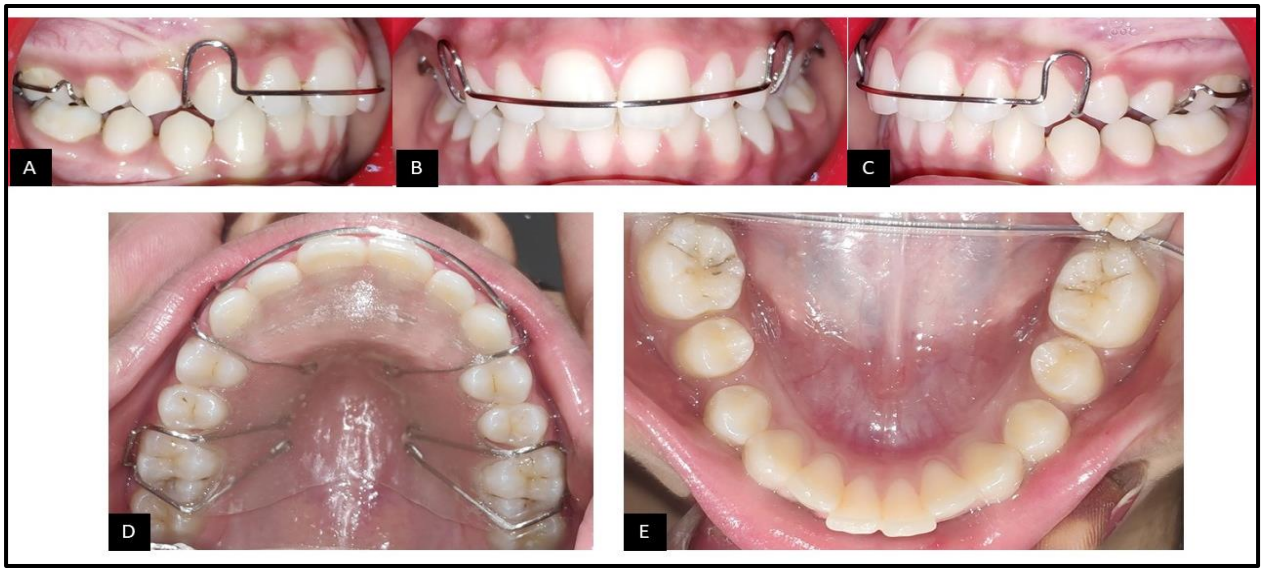

Figure 5. Intraoral photographs of appliance during retention phase

Figure 6. Posttreatment cephalogram

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CASE REPORT

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Pleomorphic Adenoma of the Parotid Gland: A Case Report

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ABSTRACT

Salivary organ tumors are uncommon, including under 3 % of all neoplasia of head and neck district. Pleomorphic adenoma is the most well-known salivary organ tumor, representing 60-80% of amiable tumors of salivary organs. Generally they are found as singular one-sided, firm and portable, effortless, moderate developing mass. The board includes careful resection by shallow or absolute parotidectomy.

KEYWORDS: Benign Tumor, Pleomorphic Adenoma, Parotidectomy

INTRODUCTION

About 70% of all salivary organ tumors emerge in the parotid organ, and around 85% are favorable. Pleomorphic adenoma (PA) addresses 45-74% of all salivary organ tumors and 65% of them happen in the parotid gland.[1-3] PA presents clinically as an easy, moderate developing mass, generally differing from 2-6 cm when resected.[4] Cases of monster PA have been accounted for in the parotid organ, introducing as an unpredictable multinodular mass that can gauge more than 8 kg.[1] Most instances of goliath PA were seen before 1980's, yet a few cases have been distributed recently.[4-5] These strange cases are treated by parotidectomy, however the chance of positive careful edges and dangerous changes should be thought of. This paper depicts an instance of a goliath pleomorphic adenoma emerging in the parotid organ and treated by absolute parotidectomy with facial nerve safeguarding.

CASE REPORT

A man aged 45 years presented a complaint of a tumor on the right side of the face for more than 10 years. The patient's history dated back to 10 years when patient noticed swelling on left side of his face. Swelling was small in size earlier and growed gradually to attain its present size. The mouth opening was reduced since 1 month. He had taken some medications for swelling but there was no relief. The nature of medication taken was not known to the patient. He was referred to the dental college for treatment. Patient did not give any history of previous dental treatment. Patient is married and has one child. All the family members were apparently healthy and do not suffer from any related illness. Patient was of moderate built and moderately nourished with normal gait and posture. Patient was well oriented to time, place and surroundings. Patient was calm and quiet and answered to all questions and his eyes to hand coordination were good. Face of the patient was asymmetrical with swelling on left side of his face. Upon extra oral examination, a solitary oval shaped swelling measuring approximately 4 x 5 cm in size was observed on the left side of the face extending superiorly from tragus of the left ear to 1 cm below the angle of the mandible inferiorly and anteriorly from 4 cm in front of tragus of left ear to the posterior border of ramus of mandible. The left ear lobule was raised. The colour of the overlying skin was same as that of adjacent skin. The margins of the swelling were well defined. No visible pulsations; sinus or discharge of pus or bleeding were seen. A slight reduction in the mouth opening was noted. The overlying skin had same temperature as that of adjacent skin. The swelling was found to be firm along with being slightly tender, non-fluctuant, non-compressible, non-reducible, non-pulsatile in nature and was not fixed to the underlying structures (figure 1).

Gingiva around 37 and 38 region was firm and non tender upon intraoral examination. The teeth in the affected area were sensitive to percussion but no mobility could be demonstrated. Based on clinical examination a diagnosis of pleomorphic adenoma of parotid gland was given.

On further investigations, a panoramic radiograph

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Figure 1. Image of left lateral view of face showing lesion of pleomorphic adenoma

revealed partially edentulous maxilla w.r.t 26 and partially edentulous mandible along with root stumps w.r.t. 16, 17, 28, 37 and generalized bone loss. No other significant findings were observed (figure 2).

Figure 2. Panoramic image

CT Scan: The antero inferior part of the left parotid gland was extending more anteriorly in a well-defined encapsulated homogeneously hypodense soft tissue swelling of size 3.3 cm(ML) X 5.6 cm(AP) X 4.4 cm(SI) in the superficial lobe of parotid gland. It was extending into the soft tissue of cheek. The left masseter muscle could not be visualized separately from the mass. The deep lobe of the parotid gland, major vessels appeared normal with no extension of the mass seen into surrounding tissues. The CT scan also reported no destruction of mandible (Figure 3).

Histopathological examination revealed epithelial tumor cells arranged in the form of sheets and duct like pattern surrounded by fibrous capsule. The duct like spaces contained eosinophillic coagulum. The connective tissue stroma showed vessels and areas of haemorrhage. A chondroid metaplasia and highly

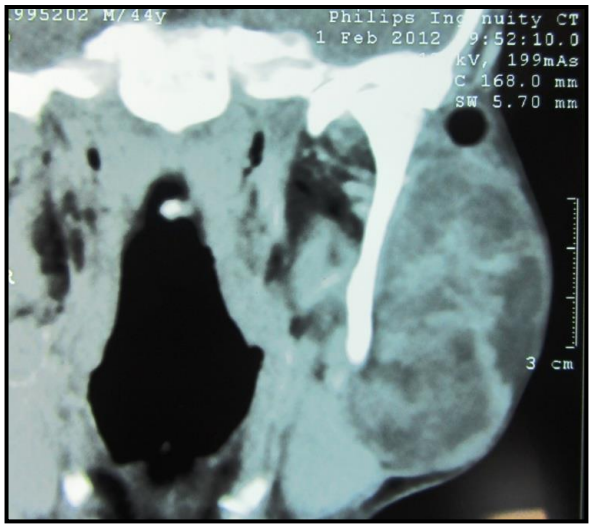

Figure 3. CT Scan

cellular areas were observed. These features were suggestive of pleomorphic adenoma (figure 4).

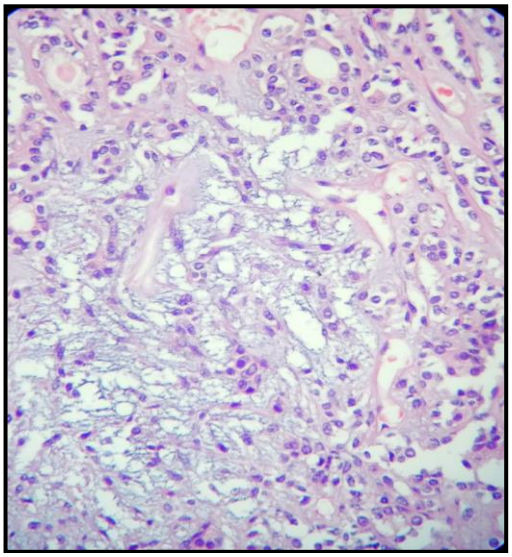

Figure 4. H and E stained section in higher magnification showing typical features of a pleomorphic adenoma including islands and strands of epithelium in a myxoid stroma

TREATMENT

Under general anesthesia, a right total parotidectomy with preservation of the facial nerve and complete removal of the tumor en bloc was done. The postoperative course was uneventful. Macroscopically, the mass was measured 28cm x 20cm x 16cm, and weighed 4.0 Kg. Microscopically the tumor was composed of islands and strands of epithelial cells

immersed in a hyaline stroma, some showing squamous differentiation.

DISCUSSION

Pleomorphic adenoma is the most well-known salivary organ tumor with parotid organ being the most well-known influenced site. The ordinary parotid tumor is found beneath the lobule of the ear and overlying the point of the mandible. On net discovering, pleomorphic adenoma is a solitary, firm, versatile, well circumscribed mass. The tumor might be whitish-tan to dark to somewhat blue in shading. It might shift from a couple of millimetres to few centimetres or even to goliath size. They are unpredictably formed[1,2] and have a bosselated surface. Usually they are found as lone, one-sided, firm and versatile, moderate growing asymptomatic mass.[1,2] Manifestations and signs rely upon the area. At the point when the tumor happens in the parotid organ, indications of facial nerve shortcoming are only from time to time experienced; in enormous ignored tumors, facial nerve shortcoming is probably going to emerge as the consequence of a dangerous change. Minutely, PAs are described by a heap of morphological variety. Epithelial cells are organized in sheets and islands showing ordinary ductal structures, and different epithelial and myoepithelial qualities as axle, clear, squamous, basaloid, plasmacytoid, oncocytic and sebaceous. The stroma typically is blended, with sinewy, chondroid, mixoyd or hyaline aspects.[6,7]

The present case was framed dominatingly by cuboidal and spindled cells installed in a hyaline and myxoid stroma. The frequency of dangerous change in PAs goes from 1.9% to 23.3%.[8] The exemplary clinical history of carcinoma ex-pleomorphic adenoma is of a sluggish developing mass for a long time, with a new quick growth. An instance of a goliath PA with harmful change with this run of the mill history was as of late revealed by Honda et al. (2005)[5] in a 72-year-elderly person with a lethargic developing parotid injury for a very long time, with a fast expansion over the most recent 3 months. Schultz-Coulon (1989)[6] detailed 31 instances of goliath PAs and in 3 cases harmful regions were found inside the tumor. Our patient introduced each one of the qualities for an expanded danger of threat, anyway either clinically and minutely there were no such confirmations. The treatment of decision for PAs of the parotid organ is shallow parotidectomy with safeguarding of the facial nerve. In the late instances of monster PA revealed in the writing, the resection of the tumors were performed with conservation of the facial nerve.

CONCLUSION

Pleomorphic adenomas are benign tumors and most commonly involve parotid gland. Proper diagnosis and careful surgical resection with preservation of facial nerve, helps in better prognosis with least chances of recurrence.

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ORIGINAL RESEARCH

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Comparative Analysis of Different Flavonoids on the Immediate Shear Bond Strength of Bleached Enamel Surface: An *ex-vivo* Study

NIDHI SHRIVASTAVA*[1], MARISHA BHANDARI[2]

ABSTRACT

INTRODUCTION: Bleaching, although considered as the first choice of treatment for discoloured teeth, can be utilized in conjunction with composite resin bonding or veneering and porcelain laminate veneers, to provide a more esthetic result.
AIM: The aim of the ex-vivo study is to obtain a comparative analysis to evaluate the effectiveness of antioxidants on the immediate composite bond strength on bleached enamel surface.
MATERIALS AND METHOD: Freshly extracted human permanent maxillary central incisors were selected and prepared for the respective study. All the specimens then were randomly divided into two control groups and three experimental groups, each group consisting of 20 specimens each. Among these were three experimental groups 10% Sodium Ascorbate, 5% Grape Seed extracts (Proanthocyanidin, PA) & 10% Green tea extracts (catechins and epigallocatechin gallate, CA and EG) and two control groups (Positive control & Negative control).
RESULTS: When compared to Group 1 (positive control, 26.24 ± 0.90 MPa), Group 3 (5%Grape seed extract; 32.17 ± 1.52 MPa), Group 4 (10% Sodium Ascorbate; 28.91 ±1.50 MPa) and Group 5 (5% Green tea extract; 24.10 ± 1.21MPa) showed significantly higher shear bond strength values.
CONCLUSION: The present study indicated that the shear bond strength of the antioxidant group (Group3) is higher than all three experimental groups. In addition, the shear bond strength of the bleached group (Group 2) is significantly lower than all the other groups. This implies that immediate use of antioxidants, contributes in reversal the bond strength of bleached enamel.

KEYWORDS: Bleaching Agents, Sodium Ascorbate, Grape Seed Extract, Enamel, Adhesive Polymerisation

INTRODUCTION

In the past, dentists were often dismayed by a patient's disappointment in a "Perfect Restoration" pain staking crafted of the finest gold or other restorative material with minimized enamel reduction and long-lasting preservation of function. Bleaching is one of the widely accepted esthetic treatments of 21st century. The earliest evidence of using tooth bleaching to achieve desired esthetic appearance clinically took place more than two centuries ago, where bleaching agents were directly painted onto the tooth surface (labial) or placed just 2mm above cemento-enamel junction inside root canal treated tooth.[1] Vital bleaching has been a viable and effective treatment to discoloured teeth, meeting the esthetic and conservative philosophy of contemporary dentistry.

The bleaching outcomes, however, are not predictable and although it should be considered as the first choice of treatment for discoloured teeth, sometimes it can be utilized in conjunction with composite resin bonding or veneering and porcelain laminate veneers, to provide a more esthetic result.[2] Different types of bleaching agents are available from 10-35% hydrogen peroxide, 10-35% Carbamide Peroxide or commercial available bleaching kits, paint on brushes, dentifrices tooth paste, for in-office power bleaching, waiting room bleaching and at home bleaching, are constantly evolving and the effects of these new whitening systems on enamel bond strengths have not been thoroughly studied.[3] Despite having many advantages every bleaching agent also has some disadvantages. Paramount complication of using bleaching agents, is decreased composite resin bond energy to immediately etched enamel.[4] It has also been reported that the weakening of bond occurrs both superficially and internally. The reduced bond strength could be attributed to the presence of residual oxygen that can adversely affect the adhesive polymerization.[5] Studies have revealed that the reduced bond strength can be reversed by the use of antioxidants such as 10% Sodium Ascorbate, Ascorbic Acid, Butyl-Hydroxianisole, Catalase, Ethanol, Acetone, Gluthione Peroxide, Alphatocopherol, Sodium Bicarbonate, Grape Seed Extract (PA) and Green Tea Extract (catechins and epigallocatechin gallate).[6] The purpose of this ex-vivo study was to obtain a comparative analysis to evaluate the effectiveness of antioxidants on the immediate composite bond strength on bleached enamel surface.

MATERIALS AND METHOD

Hundred freshly extracted human maxillary central incisors were included in the present study after

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collecting the informed consent and stored in deionized water, at 4˚C for 6 months. All the collected teeth were examined under light microscope (Stemi 2000C – Carl Zeiss, Jena, Germany) to evaluate undesirable defects or cracks.

Specimen Preparation: The buccal enamel surface of each specimen was polished with wet 700-grit silicon carbide abrasive paper on a polishing machine, to create a flat enamel surface. Each specimen was embedded 1 mm below the cemento-enamel junction. in self curing acrylic resin, using silicon mould that was 2.5 cm high, 2 cm diameter.

Artificial Saliva Immersion: All the specimens were immersed in 250 mL of artificial saliva solution at 37˚C for 7 days, which were changed twice daily during this period. The artificial saliva was prepared from 1 gram sodium carboxymethyl cellulose, 4.3 gram Xylitol, 0.1 gram potassium chloride, 5 mg calcium chloride, 40 mg potassium phosphate, 1 mg potassium thiocyanate and 100g distilled deionized water at pH 7. After that the specimens were washed with water thoroughly for 30 seconds.

Group Division: These specimens were randomly assigned into five groups, among these were three experimental groups 10% Sodium Ascorbate, 5% Grape seed extracts & 5% green tea extracts and two control groups [(Positive control & Negative control), table 1].

BLEACHING PROCEDURE

All the groups (except group 1: positive control group) were bleached using carbamide peroxide (30%, Opalescence PF, India), according to manufacturer's instructions. Then all specimens were rigorously rinsed with water for 30 seconds, air dried and stored in artificial saliva.

ANTIOXIDANT REQUISITION

Group 1 (Positive Control): No bleaching. Sample stored in artificial saliva for 7 days.
Group 2 (Negative Control): 30% carbamide peroxide bleaching + immediate restorative procedures.
Group 3: Immediately after bleaching procedure, 5% proanthocyanidin was applied with applicator brush for 10 minutes. 5% proanthocyanidin (Vista Nutrition, Medizen Labs, India) was prepared by dissolving, 5g of Grape Seed extract capsule in 100 ml of sterile water.
Group 4: Immediately after bleaching procedure, 10% sodium ascorbate was applied with applicator brush for 10 minutes. 10% sodium ascorbate gel (Leo chemicals Private Limited, Bangalore, India) was prepared by diffusing carbopol in 100 ml sterile water, with addition of ascorbic acid and sodium hydroxide.
Group 5: Immediately after bleaching procedure, 5% catechins and epigallocatechin gallate was applied with applicator brush for 10 minutes. 5% green tea solution was prepared by dissolving a 5 mg catechins and epigallocatechin gallate extract pill (Camgreen, Giah Essence, Iran) into 100 ml sterile water at the room temperature.

After 10 minutes, each specimen was thoroughly rinsed and dried using blotting paper. All specimens were subsequently stored in artificial saliva.

RESTORATIVE PROCEDURES

Acid etching was carried out, according to manufacturer's instruction (35% Etchant, 3M ESPE Scotch Bond, USA), all were thoroughly washed and paper dried.

A total bond adhesive (3M ESPE ADPER Single Bond 2, USA) was used, according to manufacturer's instructions and was gently air thinned followed by light curing (Blue Phase C5, Ivoclar Vivadent, Ltd, 12

GROUPS	SAMPLE SIZE (N)	PROCEDURE DESCRIPTION
Group 1 (Positive control)	20	No bleaching + 7 days delay for restorative procedures
Group 2 (Negative control)	20	30% Carbamide Peroxide Bleaching + immediate restorative procedures
Group 3 (5% Grape seed extract; PA agent)	20	30% Carbamide Peroxide Bleaching +5% Grape seed extract + immediate restorative procedures
Group 4 (10% Sodium ascorbate)	20	30% Carbamide Peroxide Bleaching + 10% Sodium Ascorbate + immediate restorative procedures
Group 5 (5% Green tea extract; CA and EG agent)	20	30% Carbamide Peroxide Bleaching + 5% Green tea extract + immediate restorative procedures

Table 1. Group division of the specimens

omega St. Albany) for 10 seconds. Plastic tube of 4 mm height and 3 mm diameter was used as cylindrical stencil, which were compacted with composite resin (Filtek Z350 XT composite syringe, 3M ESPE, USA) and then light cured (in all directions) for 40 seconds. All the specimens were stored in automatic thermocycler (KARA 1000, Tehran, Iran) for 24 hours.

SHEAR BOND STRENGTH

All the groups were tested in Instron Universal Testing Machine with chisel model (fixture) lying perpendicular to the composite cylinder. Force was applied at a crosshead speed of 1 mm/min until the cylinders got completely fractured from enamel surface. The collected results were statistically analyzed.

RESULTS

It was observed that the shear bond strength in group 1 (26.24 ± 0.90 MPa) was notably higher than group 2 (18.34 ± 1.24 MPa). In comparison with group 1 (26.24 ± 0.90 MPa), Group 3 (32.17 ± 1.52 MPa), group 4 (10% 28.91 ±1.50 MPa) and group 5 (24.10 ± 1.21 MPa) showed significantly higher shear bond strength.

When compared, group 1 (26.24 ± 0.90 MPa) and group 3 (32.17 ± 1.50 MPa) exhibited almost similar values.

Between experimental groups, group 2 (18.34 ± 1.24 MPa) showed lowest mean values compared to other groups. Group 3 (32.17 ± 1.52 MPa) showed significantly higher values than Group 4 (28.91 ±1.51 MPa) followed by group 5 (24.10 ± 1.21 MPa) and is shown in table 2.

GROUP	MEAN ± STANDARD DEVIATION	RANGE
Group 1	26.24 ± 0.90 MPa	29.07-30.97
Group 2	18.34 ± 1.24 MPa	16.36-21.80
Group 3	32.17 ± 1.52 MPa	27.01-34.32
Group 4	28.91 ±1.50 MPa	25.36-34.48
Group 5	24.10 ± 1.21 MPa	20.67-25.89

Table 2. Comparison of Mean Bond Strength Among all the Groups

DISCUSSION

Literature extensively shows that bleaching has an adverse effect on the immediate bond strength of bleached surface.[7] This is due to presence of free oxygen radicals, which inhibits resin polymerization cure due to presence of free radical. If the oxygen rich layer is eradicated, the resin - tooth bond strength is reversed. The exact thickness of oxygen rich layer is not stated. Therefore, it should be > 5-10µm; otherwise, etching would have proved effective.[8]

The present study showed that value of group 1(26.24 ± 0.90 MPa) is remarkably greater than that of Group 2 (18.34 ± 1.24 MPa). These findings are in accordance with the studies performed by various authors such as Titley et al.,[9], Stokes et al.,[10] and Miles et al.[11]

The results of our study showed that value of group 4 (28.91 ±1.51 MPa) was notable higher than that of Group 2 (18.34 ± 1.24 MPa). Alike observations were described by Torres et al.,[12] they concluded that higher bond values were achieved using 10% sodium ascorbate on bleached tooth surface but lower when compared to unbleached tooth surface. Kimyai et al.,[13] reported higher bond value of teeth treated with 10% sodium ascorbate for 10 minutes, then immediately bleached tooth surface.

In the literary work, 10% sodium L- Ascorbate is proven to be favorable antioxidant agent for reversal of reduced strength of instantly bleached enamel, but there are deficient studies using 5% 84929-27-1 Grape seed and 5% green tea extract as viable alternative. Hence in the present study, emphasis was placed on immediate use of 5% 84929-27-1 grape seed and 5% green tea extract as a potent antioxidant (for 10 minutes) on bleached enamel.

Berger et al., reported that green tea extract was used immediately after bleaching for 60 min, the bond strength values were higher than control group (only bleached).[14] The green tea catechins, such as EGCG and EGC, have potent antioxidant activities caused by the three adjacent OH groups in ECG and EC. Thus, green tea catechins were shown to possess potent antioxidant activity that is significantly higher. It is also stated that EGCG can be the main component responsible for capture of free radicals from the bleaching.[15]

This study shows that the treatment with 5% 84929-27-1 grape seed (group 3) increases bond values remarkably, when compared to other groups.

This could be ascribed to the following:
1. Specificity of superoxide free radicals.
2. Presence of assorted donor sites on superoxide that traps oxygen free radicals.
3. The acid esterification of catechin by trihydroxy benzoic acid in superoxide, which magnifies the diradical forage ability.[16-18]

This study shows that, the bond value of group 3 (32.17 ± 1.52 MPa) is higher than other investigational groups. Furthermore, group 2 (18.34 ± 1.24 MPa) value was notably lower than other investigational groups. This suggested that immediate use of antioxidant imparts remarkably high bond value to bleached enamel.

CONCLUSION

Within the limitation of this ex-vivo study, the following conclusions were drawn;

1. Bleached tooth surface reduces shear bond value.
2. Immediate antioxidants administration for 10 minutes imparts notably higher bond strength.
3. Amid the flavonoids tested in the research, group 3 was most successful in overturning the immediate shear bond strength after bleaching.

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