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Photobiomodulation in the Treatment of Dental Extractions: Reduction of Postoperative Pain and Wound Healing

Tola Ahmed*

Department of Oral and Maxillofacial Surgery, College of Dentistry, Taibah University, Saudi Arabia

Abstract

Opportunistic mucormycosis is a life-threatening infection. Since there had not previously been a systematic review to highlight this issue, the purpose of the current review was to provide the most up-to-date summary of the frequency of cases of rhino-orbital-mucormycosis (ROM) following a tooth extraction.

In order to compile case reports and case series regarding post-extraction mucormycosis, the appropriate keywords were used to thoroughly search the PubMed, PMC, Google Scholar, and Ovid Embase databases. This included the human population that had language restrictions, including English literature. A table containing all of the patient's characteristics' details was created, analyzed based on various endpoints, and presented.

Keywords: Genus rhizopus; Mucor species; Corticosteroid therapy; Making dental procedures

Introduction

Mucormycosis is a severe, opportunistic fungal infection that causes extensive orofacial necrosis. A non-septate fungus in the order Mucorales, subphylum Mucormycotina, and class Zycomycia is the primary agent responsible for this severe illness [1]. Paltauf is credited with writing the first paper to describe zygomycosis, "Mycosis mucorina." However, the more general term "zygomycosis," which refers to an infection caused by any organism in the phylum Zygomycota, has been replaced by "mucormycosis" or "entomophthoromycosis" in recent nomenclature. genus Rhizopus, The genus Lichtheimia, and the various Mucor species have been found to be responsible for the majority of mucormycosis cases worldwide, with the first being the most common type that causes the rhinocerebral form of the disease. A global review demonstrates that the other contributing factors differ by region.

People who have debilitating conditions like diabetes mellitus (DM), a history of organ transplant, cancer, neutropenia, iron overload, corticosteroid therapy, immunosuppressive medications, chronic liver diseases, immune-deficiency diseases like AIDS, and more recently Sars-Cov-2, are most likely to develop the fungus. Mucormycosis has six distinct variants that are categorized according to clinical presentation and affected site: rhino-cerebral (the most typical), pulmonary, gastrointestinal, cutaneous, disseminated, and a variety of other sites [2]. The rhino-maxillary form is a subtype of the rhino-cerebral form. It enters the susceptible person through inhalation and spreads to various structures through direct spread or agio-invasion. The current systematic review aims to collect and assess the incidence of post-extraction mucormycosis, as well as its various clinical manifestations and effective treatment options. This more dangerous fungus has a high mortality rate, especially in immunocompromised patients and those with comorbidities, so prompt detection and aggressive treatment are essential [3]. Through clinical suspicion and histopathological examination, dental practitioners can play a crucial role.

For many patients, the fear and anxiety associated with dental examination or treatment is normal. Over the past two decades, dental professionals have tried a variety of techniques to lessen patients' fear of the dental chair. The use of topical local anesthetics and other noninvasive procedures like listening to music are examples of these strategies. The application of a topical anesthetic containing 20% benzocaine at the injection site reduced the postoperative distress that was associated with dental extractions performed under local anesthesia. The usage of meds to control agony and uneasiness is the customary methodology [4]. Dental schools have been teaching inhalation, intravenous, intramuscular, and oral sedation systems for a long time through various training channels. It is generally acknowledged that pharmaceutical sedation does not eliminate or reduce fear; Interestingly, it avoids it. Its quality is primarily based on making dental procedures pleasant for patients by reducing anxiety and establishing a temporary state of calm. The problem affects not only the patient but also the escorts and dental staff. It goes without saying that anxiety needs to be viewed as a problem necessitating treatment for both the doctor and the patient. One could say that the dentist is managing a crisis every time he has to deal with a nervous patient; not an urgent dental issue; However, if the dentist is not equipped to handle the situation professionally, the crisis of apprehension he faces when dealing with the anxious patient may leave him feeling inadequate and dissatisfied.

Taking these facts into consideration, the goal of this study was to lessen the level of fear and anxiety experienced by patients who will undergo tooth extraction under local anesthesia (LA). A recorded video clip of the dental extraction procedure being performed prior to surgery was thought to have a positive effect on anxiety and fear. We are aware of no published study that has examined the effects of using a recorded video clip that demonstrates the extraction process as an educational tool. The current study has officially deemed this comparison to be a potentially useful trial for lowering the level of fear and anxiety experienced by adult patients who are scheduled for tooth extraction under LA. The significant point of this study was to survey the degree of dental trepidation and anxiety in patients going

***Corresponding author:** Tola Ahmed, Department of Oral and Maxillofacial Surgery, College of Dentistry, Taibah University, Saudi Arabia, E-mail: tola.w@ahmed.com

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through teeth extraction under LA [5]. Additionally, a comparison was made between the effects of video clip administration and verbal communication.

Materials and Method

Surgical protocol

All procedures and surgeries were performed by a single skilled surgeon. The bone ring was prepared either centrally or eccentrically to match various bone defects and ensure the best implant position. The 3A2B principle was used to position the implant in the esthetic zone. When the bone ring was not stable enough, a healing abutment was used to secure the cover screw [6]. A resorbable collagen membrane and a bovine bone substitute were used in the standard GBR procedure. After letting the wounds heal for four months, a second-stage surgery was carried out. A temporary CAD/CAM screw-retained resin crown was used to recreate a natural-looking gingival appearance a month later. After six months, the custom-made, all-ceramic crown was put in. At one year, two years, and three years after surgery, patients were brought back for regular follow-up visits.

The Department of Oral and Maxillofacial Surgery at Taibah University College of Dentistry Almadinah Almunawwarah was the site of this single-blind, randomized clinical trial [7]. The research ethics committee at Taibah University Dental College gave their approval to the study. A comprehensive history, oral examination, and any necessary radiographs were taken on all of the patients who came to the oral surgery and maxillofacial department for the purpose of having a tooth extracted. The majority of teeth were extracted because of gross periodontal diseases were followed by caries and dental abscesses as well as orthodontic reasons were treated. 64 patients who met the following requirements were eligible to participate in the study: 1) Male matured 17-60 years old. 2) slated for a straightforward extraction of one to three teeth. 3) Patients with an ASA I or II (American Society of Anesthesiologists) 4) When the patient was able to comprehend the protocol's requirements, cooperate with them, and give informed consent in a suitable written form. Patients who required more than three extractions, required surgical extractions, were too upset or distressed to be approached or had language barriers were excluded from the study.

The patients completed standard 100 mm visual analog scales (VAS) to measure their levels of anxiety, which were marked at the endpoints as "no anxiety" (0 mm) and "severe anxiety" (100 mm). For each patient, these assessments were recorded at three stages: 1) prior to the procedure, 2) following verbal instructions or recorded video, and 3) after the procedure. The underlying causes of their fear were posed to those patients with high anxiety scores. VAS is a method that is well-liked. The information examination was performed utilizing an electronic bundle (SPSS rendition 20) and fitting measurable tests (matched t-test) were utilized for factual information investigation.

Calculating power: test size estimation was made for this review in view of a review [8]. Cortisol concentration in saliva, which has a positive correlation with the patient's level of stress, can be positively correlated with 90% power with a sample size of 26 in each group.

Radiological assessment

The vertical and horizontal bone gain as well as the changes in bone volume were evaluated radiographically using a modified approach that was based on previous protocols. Using Mevislab software (MeVis Research, Bremen, Germany), the presurgical CBCT data were compared to the postoperative ones four months later. At the same sagittal section, the implant's long axis (ILA) line and the implant platform line perpendicular to the ILA were drawn [9]. The vertical/horizontal bone gain value was the difference between the vertical/horizontal lines (red line) before and after implantation.

The One Volume Viewer software was used to adjust the orientation axes of the coronal and sagittal planes. Two parallel lines perpendicular to the ILA were drawn in the coronal slice, one parallel to the implant platform and the other tangential to the apex, and two parallel lines parallel to the implant mesial/distal surface. To survey the leftover vertical bone level (RVBH), the length from the converging focuses in the apical to the place where the following two lines met with the coronal minor bone was recorded as the mesial vertical bone level (MVBH) and distal vertical bone level (DVBH) separately. The buccal vertical bone height (BVBH) and lingual vertical bone height (LVBH) were recorded using the same lines that were drawn on the sagittal slice. By deducting the implant length from the DVBH, MVBH, BVBH, and LVBH values, the RVBH at the implant platform can be determined. The subtraction values of DVBH, MVBH, BVBH, and LVBH between each time point were calculated for vertical bone resorption in various areas around the implant.

Both the buccolingual bone width (BLBW) and the remaining buccal bone width (RBBW) were measured in the sagittal slice to determine the horizontal bone width. The BLBW was measured as the distance between where the implant platform line and the coronal marginal bone meet [10]. From the implant platform to the apical, a line parallel to the ILA was drawn along the implant surface to measure RBBW. The RBBW of Platform and Apex was recorded as the distances from the implant surface of the five points to the intersecting point of the bone surface at each line, which was used to divide the line into five equal parts. The subtraction values of BLBW and RBBW between each time point were also recorded in the same way for horizontal/buccal bone resorption.

Esthetic assessment

On the day of the definitive crown restoration and at each follow-up, photographs were taken to document the soft tissue status [11]. Following a standard evaluation procedure, the soft tissue surrounding the single-tooth implants was evaluated using the White esthetic score (WES), the PES, and the papilla index score (PI). Three seasoned dentists who had not been involved in the prosthetic treatment carried out the assessment. To reduce bias and ensure maximum reproducibility, these assessments were carried out twice on distinct days.

Statistical analysis

SPSS version 26.0 was used to conduct statistical analysis on all of the data. Mean standard deviations (SDs) were used to represent continuous variables. Tables, histograms, and boxplots are used to display the findings as well as the frequency distribution analysis [12]. Analyses of variance were used to demonstrate normal distribution and variance homogeneity of the data.

Results and Discussion

The detailed information for the 15 patients who participated in the study and received implants is listed below. There were a total of 15 bone rings taken, 10 of which were found in situ and 5 from the chin. On the day after surgery, all patients experienced mild postoperative edema, which subsided completely within four to six days. None of the patients complained of numbness, pain, or any other symptom at the

donor or recipient site during the subsequent healing period. After four months, CBCT showed that all 15 implant sites had osseointegrated, and all of the bone rings healed normally. However, the final statistical analysis did not include a bone ring that was discovered exposed four months after surgery. This bone ring was able to survive, but there was some resorption, and the exposed part was well-healed after care. The overall survival rate for the bone ring was 100%, and the complication rate was 6.67 percent. A success and survival rate of 100 percent was achieved in this study, and there were no signs of acute infection or peri-implantitis at any implant site during the average follow-up period of 2.4 years [13]. The final restoration's aesthetic results pleased all of the patients.

As a result of the patient's medical screening in the dental office, four patients were left out because they did not meet the inclusion criteria: two of them needed surgical extractions, one of them refused to give consent, and one of them was unable to speak the language. Due to incomplete data, two patients were excluded; Therefore, the results are based on information from 58 patients, 29 from each group.

Preoperatively, there were no significant differences in the mean dental fear and anxiety scores between the two groups. Postoperatively, however, there was a significant difference between the two groups. The VAS anxiety level was around 50 for both groups before the surgery. It stays the same for group 1 after verbal instructions, but it dramatically drops for group [14]. In postoperative evaluation, VAS score was irrelevantly diminished but a critical decrease was accounted for in bunch 2. The effects of communication strategies on managing anxiety after surgery. Patients in group 1 had a VAS level distribution ranging from 0 to 80, while those in group 2 had a VAS level distribution ranging from 0 to 50. 25 patients had a postoperative anxiety level of 10 or less. The complete ASA anxiety score distribution for Group 1 and Group.

Using the paired sample t-test, changes in dental fear and anxiety scores were made from the preoperative score to the post-video/verbal information score and to the post-operative score for both the tooth extraction video and verbal information and routine warnings groups. When comparing the pre-operative score with the post-verbal information score or the post-operative score, there was no difference between the verbal information group and the routine warning group. However, there was a significant decrease in dental fear and anxiety scores between the pre-operative and either post-video information scores or post-operative scores for the tooth extraction video group.

It is difficult to help anxious patients overcome their fear of dental treatment; However, if achieved, it may alter their oral hygiene and overall level of satisfaction. Patients who exhibit behaviors such as consistently rescheduling, delaying, or cancelling appointments may be experiencing dental anxiety and fear. A variety of measures to manage an anxious or fearful patient may be implemented upon identifying evidence. The majority of patients have a high level of dental fear. Dental anxiety affects more than just patients; The treatment of anxious patients is acknowledged by general dentists as a significant cause of anxiety. From mild sedation to general anesthesia, pharmaceutical strategies have been used to overcome dental fear, and dental specialists frequently use them in conjunction with behavioral techniques. Nitrous oxide, which induces feelings of relaxation and dissociation, is one common medication used in dentistry to reduce tension. Oral calming sedatives, such as temazepam or a benzodiazepine, may be recommended by dentists. Patients are still able to communicate with the dental staff because these narcotics help them feel calmer during dental treatment. A patient's fear of dental treatment can be alleviated by using a variety of distractions.

The tell-show-do approach was initially developed for use in pediatric dentistry, but it can also be used with anxious adult patients. Verbal demonstrations of systems in plain English are followed by non-threatening demonstrations of the strategy's sights, sounds, smells, and tactile elements. Finally, the actual technique is presented. Patients who had a high level of dental fear and anxiety at the baseline assessment were found to have lower scores after watching the tooth extraction video in this study [15]. One possible explanation offered by these patients is that watching a video about painless tooth extraction helped to ease their traumatic dental experience. Another group of patients participated in this study and had high baseline levels of dental fear and anxiety. The patients reported that their fear and anxiety got worse when they saw dental instruments spread out on dental chairs. On the other hand, after watching the tooth extraction video, the level of fear and anxiety significantly decreased. The video's gentle use of dental instruments and the gentle method the dentist used to extract the tooth gave the patients a sense of safety and decreased their apprehension of using instruments.

Conclusion

In conclusion, autogenous BRT resulted in stable soft tissue alteration, acceptable vertical and horizontal bone resorption, pleasing aesthetic outcomes, and significant bone augmentation. For single tooth implant restoration in the esthetic zone, autogenous BRT is therefore an efficient method for horizontal and vertical bone defect reconstruction and predictable aesthetic outcomes.

By showing the patients a video of a tooth extraction prior to the procedure, the fear and anxiety associated with dental extractions performed under local anesthesia can be reduced. Anxiety is unaffected by the number of teeth removed. Dental treatment videos can be useful for educating patients and easing their fears. Therefore, audiovisual equipment for patient education is strongly recommended for all dental clinics and institutions. In addition, it might be beneficial to hold such educational programs on a regular basis in the waiting areas of patients. Due to the fact that Taibah Dental College only treats male patients, the study sample only included males. Females should be included in future studies for more reliable and solid results.

Acknowledgement

None

Conflict of Interest

None

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