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Use of Silver Diamide Fluoride to Manage Rampant Dental Caries and Creating a Path to Oral Health in the Face of Mental Illness: A Case Report

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Abstract

Severe mental illness (SMI) can often lead to severe neglect of self-care, including diminished oral hygienic practices. Medically complex patients, particularly adults, face hardship in finding affordable, consistent dental care that caters to their particular needs. If there are any additional barriers to treatment (i.e. financial, transportation, access, dental fear, imbalance of mental health status, etc.), treatment is at an increased risk of being delayed, aborted, or never initiated. All of these issues can lead to situations where caries control becomes the crucial first step in a comprehensive dental treatment plan where time is of the essence. Training healthcare practitioners who can recognize the challenges faced by their patients in maintaining their oral health and gaining knowledge in preventative options when faced with any delay of definitive dental care can improve the oral health options and outlook for their patients. It is also important for dental practitioners to gain practical knowledge of management and comprehensive treatment modalities for a patient with schizophrenia. The complex medical needs of the patient ties in closely with disease progression, further highlighting the need for dentists who engage and treat patients of varied medical complexity. Use of silver diamide fluoride can aid healthcare providers in preserving a patient's dentition when comprehensive dental care is delayed.

Keywords: ***Mental illness; Preventive dentistry; Rampant decay; Silver diamide fluoride.***

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1. Introduction

Patients with severe mental illness (SMI), particularly adults, face hardship in finding affordable, consistent dental care that caters to their particular needs. Poor oral health can exacerbate depression and feelings of anxiety in an already vulnerable population [1]. They are often marginalized because of their illness, largely due to fear, stigma, misconception and bias by society. SMI can often lead to lower self-esteem, poor nutrition, severe neglect of self-care, including diminished oral hygienic practices and self-perception of dental needs [2]-[4]. Patients who suffer from schizophrenia have higher DMFT (Decayed, Missing, and Filled permanent Teeth) scores and poorer overall oral health than the general population [5], [6]. If there are any additional barriers to treatment (i.e. financial, transportation, access, dental fear, imbalance of mental health status, etc.), treatment is at an increased risk of being delayed, aborted, or never initiated. All of these issues can lead to situations where caries control becomes the crucial first step in a comprehensive dental treatment plan where time is of the essence.

As a result, it is important for dental practitioners take the initiative to study the positive and negative presentations of the illness in order to increase awareness and enhance diagnosis, treatment planning, and comprehensive dental health management for this patient population. Positive symptoms include hearing voices, hallucinations, and/or delusions while negative symptoms include a "flattened" personality effect, social withdrawal or isolation, loss of drive to perform activities of daily living (ADLs) [5], [6]. It is also necessary to establish working dialogue with their respective mental healthcare providers to be able to continually assess if the patient is able to tolerate elective treatment at appropriate intervals. Incorporating treatment protocols and techniques to address complex dental needs when they arise increases the likelihood of success in maintaining the patient's dentition, especially if medical concerns delay access to dental treatment. Silver diamide fluoride (SDF) can play a vital role in both a hospital and dental setting to control decay, desensitize, and preserve the vitality of affected teeth [7], [8].

What are a few of the challenges for a patient with schizophrenia and oral health? The lack of a patient's ability to maintain proper oral health heightens the difficulty of managing these patients from a dental perspective. If the schizophrenia is not well-controlled, comprehensive dental treatment is often not prioritized, and as a result of neglect, the oral health state continues to decline. Also, often there is a lack of access to general practitioners who feel confident managing and treating patients who have severe mental illness reduces the likelihood of timely and comprehensive care for this patient population.

Research shows that there is a very high degree of association with schizophrenics and smoking, often in an attempt to deal with heightened anxiety associated with the disorder, especially with male patients [16]. Smoking can counteract antipsychotics' effects of decreased dopamine and increased anxiety. Because of this habit, however, there is likely an increased risk of oral cancer and periodontal disease in the schizophrenic population as well.

It is imperative that dental practitioners take the initiative to establish working dialogue with their respective mental healthcare providers (and guardians/caregivers) to be able to continually assess if the patient is able to tolerate elective

treatment at appropriate intervals. The present report details use of SDF (silver diamide fluoride) as an integral tool to slow the carious process in our efforts to preserve dentition and render dental care to a patient of record with SMI at the University of Texas School of Dentistry's Special Patient Clinic.

2. Case Report

"I want to be able to take care of my teeth and have a nice smile." Patient stated that prior to diagnosis and stabilization of his mental illness with medication, he neglected his oral hygiene for a prolonged period of time. It is his current desire to save and restore as many of his teeth as possible.

The patient was diagnosed with schizophrenia and depression. Current medications are Zyprexa 10 mg (schizophrenia), and Celexa 40 mg (depression). His physician described his condition as "well-controlled" in a written medical consult that was provided. The legal guardian was present to give consent for treatment, and guardianship documents were obtained to be entered into the patient's record. The patient self-reported that he has had no acute episodes of hallucinations since diagnosis and treatment initiation, and the guardian allowed him to make decisions regarding his dental care.

Intraoral/extraoral exam revealed no significant findings. Periodontal examination revealed generalized incipient periodontitis with localized moderate periodontitis. There was a widespread presence of heavy plaque, bleeding, supragingival and subgingival tartar. Oral hygiene was rated as poor, and the patient's caries risk assessment was rated as high. Multiple frank carious lesions (rampant decay) were noted throughout the patient's dentition, but patient stated that he currently had no dental pain. Twenty-one teeth were tested for pulpal vitality, and all were vital except #7 and #28 (Figs. 1-3).

Fig. 1. Pre-operative picture of dentition.

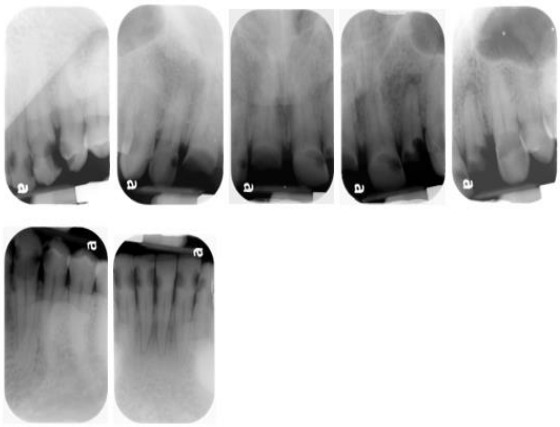

Fig. 2. Pre-operative x-rays.

Fig. 3. Patient shown after SDF application to multiple frank carious lesions.

The initial treatment plan discussed included multiple extractions, limited full coverage crowns, and fabrication of maxillary and mandibular RPDs (removable partial dentures) to restore missing dentition. Due to the patient's request that he retain as many natural teeth as possible, all teeth will be excavated prior to deciding the restorability of each affected tooth. Teeth #8 and #10 were diagnosed as unrestorable and were extracted. Given the speed at which care can be delivered to this patient, there was an obvious concern about the amount of time it would take to do complete caries control. The patient was given the option for his dentition to be treated with SDF, as well as topical fluoride, in an effort to arrest caries and allow more time for treatment [7], [8]. The SDF product used was Advantage Arrest 38% SDF solution. It contains 44,800 ppm of fluoride, making it one of the most concentrated fluoride solutions available. It offers a dual benefit of the antibacterial action of silver and remineralization action of fluoride. It also has been proven to be effective in reduction of sensitivity [9], [10]. Due to the fact that the SDF product Riva Star with KI was not an available option for the patient to reduce staining, he was counselled on the side effects of SDF, noting that application of SDF biannually may be necessary in order to sufficiently arrest caries progression. (11) The patient was also made aware that the SDF used will blacken all carious lesions. An informed consent, with pictures of before-and-after

treatment of carious lesions, was shown and subsequently signed by the patient's guardian and dentist prior to the application of SDF.

The patient was given treatment with SDF on all carious surfaces that were accessible, given oral hygiene instruction, and a prescription for Prevident 5000 + toothpaste. After prophylaxis (periodontal diagnosis of gingivitis), basic restorative dental work was initiated. Hopeless teeth were extracted, and each vital carious tooth was excavated, then evaluated for restorability. Some teeth were restorable, and received definitive direct restorations or build ups for a subsequent crown (Fig. 4).

Fig. 4. Patient shown with teeth #28, and #27 excavated and restored with Fuji IX and Z250 composite. Teeth #26 and #25 are shown in the process of excavation. There is still residual decay, despite almost total loss of supported coronal tooth structure.

Some were deemed non-restorable at this point, but the patient refused to have these teeth extracted without restoring the edentulous areas immediately. The patient was given the option of a removable prosthesis but he refused, stating his preference of only fixed prostheses. It was decided to restore these teeth with protective restorations until the patient was referred to the post-graduate clinic to address the restoration of these areas in a more definitive manner with implants or fixed dental prostheses.

The patient had good family and financial support, and had other family members (legal guardian) receiving dental care from the dental school during the same time, so appointments were coordinated to ensure patient had transportation to each appointment. The COVID-19 pandemic occurred during the basic restorative phase of treatment, causing significant delays. The Fondren Special Patients Clinic, where he received dental care, was closed in March of 2020, and did not re-open until late August 2020. Fortunately, due to the patient's SDF treatments prior to the pandemic's onset, the patient's caries risk was sufficiently stabilized. The patient was able to delay treatment, and did not incur any pain or adverse events during the school's clinic closure. The patient's basic restorative needs were addressed and completed by September of 2020, at which time he was referred to the post-graduate clinic for restoration with implants and fixed prosthodontics, at the patient's request.

3. Discussion

Drug induced xerostomia, prolonged poor hygiene and diet are likely working synergistically to increase caries risk and promote rampant decay in this patient. While there was some improvement noted in the patient's oral hygiene, the introduction of fluoride in the form of SDF, in addition to widely used topicals, likely played a large role in stabilizing the patient's dentition while experiencing a protracted length of time to complete the basic restorative needs of the patient [12]. If SDF had been presented as an option while under the care of a physician, it may have served to slow the progression of decay and resulted in the loss of fewer teeth. The unforeseen barrier of the COVID-19 pandemic was successfully navigated due to the presence of arrested lesions. SDF can be similarly effective if there are other barriers that limit access to comprehensive treatment [2]-[4]. Poor control of positive and negative symptoms has the potential to delay definitive dental treatment for months or years, due to the persistent, underdeveloped ability for dentists to treat SMI patients during these periods [16]. Further study of the effectiveness of SDF in preserving dentition in patients with SMI should be addressed. When the traditional protocols of fluoride varnish, gross caries excavation and provisional restorations cannot be executed, SDF administration is a viable alternative to preserve the dentition (10,11) There should be further development of effective, collaborative treatment protocols among dentists and healthcare professionals that will aid in the preservation of the dentition during time periods when patients with SMI cannot access comprehensive dental care with due to acute medical conditions. SDF can also be administered in a hospital setting, without any special equipment needed. There is still little work in the scientific space that summarizes the major findings related to the impact of nutrition, mental illness, and tooth decay. Raising awareness of the effectiveness of SDF among healthcare professionals is key to its success for patients who need it the most [13]- [15]. All carious teeth in question remained vital (except #7 and #28), and increased his final restorative options moving forward (Fig. 5).

Fig. 5. Patient shown with final anterior prosthesis (FPD #7-11), completed by a resident in the AEGD program at UTSD-Houston.

Communication is key when seeking compliance when aesthetics is compromised for the sake of caries control. The patient and guardian agreed to SDF application after counselling, despite the fact he had numerous large carious lesions in the anterior region that would turn dark and be highly visible. After explaining the risks and benefits involved in

detail, they saw the value, from both a financial and oral health perspective, which gave dental providers the needed time to bring the patient back to oral health and minimizing tooth loss and sensitivity during the process.

4. Conclusion

The unique challenges faced by patients who live with severe mental illness often requires modification of typical dental patient management practices to help ensure a positive and long-lasting result of oral health. By incorporating SDF, one can lengthen the timeline for definitive care, creating much-needed opportunity to preserve the dentition instead of allowing disease progression, infection, and loss of teeth. SDF can also be effective in a medical setting, when access to elective dental care may not be a safe option. The ease of application makes it a viable tool in a hospital setting to treat lesions until definitive dental care can be rendered.

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