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Editor's Column .....	3
Dr. Fabiola Milord's Award Acceptance Speech at the AGD House of Delegates.....	4
Dr. Milord Inspires Peers as 2022 Humanitarian Award Winner .....	5
More Q&A with Dr. Fabiola Milord.....	6-7
Neurotropic Herpes Virus - Varicella Zoster: A Case Study .....	8-10
NYSAGD/NYU Students and Faculty Participate at Health Screening and Residency Fair at the GNYDM 2022.....	10
A 3D Printed Approach to Anterior Provisional Fabrication .....	11-12
Update on the Management of the Pregnant Patient in the Dental Office ...	13-15
Dental Management of Patients with Chronic Kidney Disease .....	16-18
Type 2 Diabetes Mellitus influence on Post-Extraction Socket Healing.....	19-20
Planning for Retirement .....	22-23
Student Chapters.....	24-25
New Members .....	26
Test your knowledge with some questions....	27
CE Calendar .....	29



2 Free  
CE Credits  
see page 27



# Neurotropic Herpes Virus - Varicella Zoster: A Case Study

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## Abstract:

### Introduction:

Varicella Zoster Virus (VZV) is a member of the herpes virus that can infect humans. VZV causes chickenpox in children/adolescents and shingles in adults/geriatric population. Once infected with VZV, the virus tends to stay dormant in a sensory or dorsal root ganglion. Dentists must be familiar with VZV's signs and symptoms to prevent misdiagnosis and inappropriate treatments.

### Case Presentation:

A 75-year-old female presented to the NYU College of Dentistry for an emergency evaluation. The patient's chief complaint was, "My lower left jaw goes numb," and she was concerned if it was due to her recent implant placement of tooth #20. After reviewing the patient's medical, dental, and social histories along with an extra/intra-oral examination, including radiographs and diagnostic exam, an odontogenic cause was ruled out. Her history of shingles and recent life stressors pointed to the possibility of post-herpetic neuralgia. An internal referral to the Orofacial Pain department was made for the patient.

### Conclusion:

Herpes Zoster is highly prevalent in the geriatric population and has different clinical presentations. In this patient's case, it lacked the typical superficial skin lesions that one would expect and instead elicited mild paresthesia as a response to its reactivation. Treatment modifications for this patient included using antiviral prophylaxis before receiving any dental treatment or before getting the shingles vaccine, Shingrix. These precautions will prevent any further reactivation of the virus. Besides the modifications mentioned above, no other specific dental changes are necessary.

### KEYWORDS:

Varicella Zoster Virus, Herpes, Shingles, Life Stressors

### INTRODUCTION:

The term Herpes is derived from an ancient Greek word that means to "creep" or "crawl." This term dates back as far as

2000 years ago and has been termed for its ability to appear, disappear, and spread.<sup>1</sup> Human Herpesvirus III, also known as Varicella Zoster Virus, is a virus known to cause a primary infection, "Chickenpox," in children and young adults and a secondary infection, "Shingles," in adults. This enveloped double-stranded DNA virus belongs to the family Herpesviridae and can enter the human body via droplets in the air or through direct contact with an active lesion. Generally, entering through respiratory epithelial cells eventually spreads to various cell types.<sup>2</sup>

The initial infection of this virus is known as chickenpox or varicella. The virus goes through two stages during the initial infection: primary viremia and secondary viremia. During primary viremia, the virus attacks the reticuloendothelial system and eventually works its way to attack immune response cells such as T-cells, also known as secondary viremia. During secondary viremia, the infected T-cells express proteins that bind to skin cells. Once the virus reaches the skin, they begin infecting the keratinocytes, which can be seen on the skin as lesions. VZV can also retrogradely infect sensory neurons, which will be our primary focus for this case report. Once the virus attacks a sensory cell, it can travel back to either the dorsal root ganglion or the trigeminal ganglion. Upon reaching the ganglion, this virus can stay dormant until its reactivation due to a lowered immune system.<sup>3</sup>

The reactivation is herpes zoster or shingles and usually affects one side/dermatome of the body or face and doesn't cross the midline. Looking into the epidemiology of herpes zoster, it has been reported that an estimated one million cases occur annually in the United States. The rate of incidence is up to 4 cases per 1,000 people. This rate increases for individuals older than 60 or with a compromised immune system to 1 case per 100 people. One complication of herpes zoster is known as post-herpetic neuralgia, defined as persistent neuropathic pain for more than three months following herpes zoster. The symptoms range from allodynia and paresthesia to total paralysis

of the affected area. It has been said that 20% of individuals with herpes zoster experience post-herpetic neuralgia; 50% of all post-herpetic neuralgia cases are individuals over 60, and 75% of all post-herpetic neuralgia cases are older than 70 years of age (CDC).<sup>4</sup>

### CLINICAL REPORT

A 75-year-old Caucasian female presented to the College of Dentistry for an emergency visit. The patient's chief complaint was, "My lower left jaw goes numb," and she wanted to know whether it was due to her implant placement of tooth #20.

### MEDICAL HISTORY:

The patient reported that she had no medical conditions that she was being treated for and was otherwise healthy. The patient does not take any medications. However, the patient mentioned that she was allergic to latex and had a history of shingles. Vitals taken at the time of her emergency visit were within normal limits.

### DENTAL HISTORY:

The patient initially reported for a comprehensive evaluation in 2019. It was then determined that tooth #20 required a distal-occlusal class II restoration, and the tooth was restored. The patient returned two years later stating "pain" in tooth #20, and an internal consult was sent to the Oral and Maxillofacial Surgery (OMFS) department. Tooth #20 was extracted and the socket was preserved using 0.5 cc of cancellous bone with no complications. The post-operative evaluation of the extraction site was performed and was deemed a healthy recovery, and the patient did not report any pain or discomfort. A consult was done the same year to place an implant for tooth #20. Oral surgery performed a surgical endosteal implant placement of the implant body using a 12mm Straumann Narrow CrossFit connection (NC-3.3mm). The postoperative implant evaluation showed routine osteointegration and the patient did not report any pain or discomfort. The patient returned for the second stage of implant surgery for #20, where the cover screw was removed, and the healing abutment was placed. The patient returned for a fractured crown on tooth #19 and to take



final impressions for the implant crown for tooth #20. The patient then reported that after the last visit, she began feeling the signs and symptoms of lower left jaw paresthesia and kept biting the left lateral border of her tongue and cheek. The patient then returned for an emergency visit to address the paresthesia, in which an internal consult was sent to the Orofacial Pain (OFP) department. The patient was seen by the OFP specialist and diagnosed with Herpes Zoster reactivation. The symptoms of paresthesia, which the patient experienced, were diagnosed as post-herpetic neuralgia unrelated to implant placement of tooth #20 and any other dental work done. The paresthesia was believed to be caused by secondary trauma/stress in conjunction with other factors, such as a lowered immune system which triggered the reactivation of the VZV, causing Herpes Zoster.<sup>5</sup>

### SOCIAL HISTORY:

The patient complained that she had a stressful move to her current residence before experiencing the onset of paresthesia. Due to unforeseen events that made her move difficult, the patient exhibited high distress and frustration. Even while she was seated in the dental chair, the patient showed a high level of anxiety as she explained having to pack all her belongings without assistance and transferring all her billing information to her new residence. The patient also mentioned that she had been sleep-deprived from the move and appeared very fatigued during her appointment.

### RADIOGRAPHIC EVALUATION:

Figures 1 and 2 are pre-treatment radiographs that indicate no prior pathology



Figure 1. Pretreatment panoramic radiograph.



Figure 2. Pretreatment periapical radiograph.

and, therefore, no contraindications for the placement of implant #20. It can also be appreciated that the post-treatment radiograph (Figure 3) shows the successful placement of implant #20 without any complications.



Figure 3. Post-treatment periapical radiograph.

### TREATMENT PLAN:

The patient's treatment plan will remain as planned, with the modification of offering the patient the use of viral prophylaxis before a procedure. The treatment plan includes the following:

- 1) Implant crown (Porcelain fused to metal) for tooth #20
- 2) Ceramic crown for tooth #19
- 3) Tooth #7 mesial-incisal-lingual composite restoration
- 4) 6 month recall with prophylaxis cleaning

### DISCUSSION:

Herpes Zoster is highly prevalent among the geriatric population and should always be considered when reviewing a patient's medical history and any planned dental treatment. In our case, this patient presented with paresthesia of her lower left mandible that had gone unnoticed by her prior dental providers because it did not present in its typical form where superficial skin lesions would be located on a dermatome. The pre-operative dental modifications offered to this patient included getting the shingles vaccine (Shingrix), using antivirals during the prodromal stage of the virus, and using tricyclic antidepressants for post-herpetic neuralgia symptoms before receiving any dental treatment.<sup>6,7</sup>

### Cutaneous Modifications:

VZV migrates from a ganglion to neural tissue, and its corresponding dermatome resulting in clinically visible skin lesions that generally present as a burning/stinging sensation, followed by the appearance of blistering, which eventually crust over and heal. The provider must educate the patient

to treat the condition during its prodromal stage and provide the patient with the option of using antivirals such as Valacyclovir (1 gram, q8h x 21 days), Acyclovir (800 mg, 5/day x 21 days), or Famciclovir (500 mg, TID x 21 days), using tricyclic antidepressants for post herpetic neuralgia symptoms, or receive the shingles vaccine.<sup>6,7</sup> Treatment should be postponed to prevent the spreading of the virus.

### Ocular Modifications:

Herpes Zoster patients may experience ocular complications such as but not limited to corneal scarring and irregularity, keratitis, uveitis/iritis, and conjunctivitis. This could be from VZV's migration along the trigeminal ganglion's ophthalmic division.<sup>8</sup> Patients should be referred to an ophthalmologist to evaluate their ocular health.

### Neurological Modifications:

Patients with VZV are prone to experiencing neurological complications such as post-herpetic neuralgia (PHN), Bell's palsy, and even Ramsay Hunt syndrome. Studies have shown that PHN affects 20% of people with herpes zoster; 50% of people with post-herpetic neuralgia are over 60, and 75% of people with post-herpetic neuralgia are over 70. Management considerations for patients with PHN are to: 1) treat acute mucocutaneous shingles using antivirals such as Valacyclovir, Acyclovir, and Famciclovir; 2) Prevent future recurrent mucocutaneous shingles with the shingles vaccine (Shingrix); 3) Reduce the risk of patients at risk of PHN using the antivirals as mentioned earlier with the addition of Tricyclic Antidepressants (TCA) such as amitriptyline and nortriptyline;<sup>7</sup> 4) Treatment of established PHN strictly using TCA's. On the other hand, reactivation of VZV can cause neuritis of the facial nerve (CN-7) within the facial canal causing viral compression neuropathy affecting the lower motor neurons, which results in unilateral paralysis of the face. Treatment of Bell's palsy should be a combination of Acyclovir and prednisone within three days of the onset. Lastly, reactivation of VZV within the geniculate ganglion can present symptoms such as a vesicular rash of the outer ear, ipsilateral Bell's palsy, neuralgia pain, and ipsilateral Bell's palsy loss of taste of the anterior two-thirds of the tongue. The combination of "Bell's" palsy, geniculate neuralgia, and shingles is known as Ramsay Hunt syndrome and must be recognized by the dental provider. Treatment for Ramsay



Hunt syndrome must be started as soon as possible using a combination of an antiviral and prednisone.

## CONCLUSION:

VZV reactivation resulting in herpes zoster has many different clinical presentations, complications, and associated post-herpetic neuralgia. As previous studies have indicated a high prevalence in the geriatric population, dental providers must understand the mechanism of this virus along with its clinical presentations and complications. It is also essential for dental providers to be familiar with the latest pharmacological protocols for treating this disease and be ready to educate the patient about the virus and any prophylactic measures to take before any treatment. Therefore, a provider must conduct a thorough medical and social history with the patient's age in mind. Research in this area is still evolving and growing following updates to VZV treatment protocols and corresponding dental modifications.

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# NYSAGD/NYU Students and Faculty Participate at Health Screening and Residency Fair at the GNYDM 2022

*By Seung-Hee Rhee, DDS, MAGD*

The Greater NY Dental Meeting took place from November 25th to 30th, 2022 at the Jacob K. Javits Convention Center in NYC and NYSAGD was again an active participant in this yearly event. The General Practice Residency Fair was well attended and NYSAGD was there to answer questions about AGD, attaining your Fellowship (FAGD) and Mastership (MAGD), and the importance of life-long learning. Special thanks to our volunteers from NYSAGD Board of Trustees – Dr. Shahram Shekib, Dr. Kayatoon Noroozi-Leibowitz, Dr. Seung-Hee Rhee, and Mrs. Paula Bostick - for their time.

Students and faculty members of NYU Dental were also on hand to perform head & neck and intra & extra oral cancer screening free to all attendees. More than 70 screenings were performed during this 2-day event. Special thanks to our members of AGD Student Chapter at NYU Dental, and our NYSAGD Board of Trustees and NYU Dental faculty members, Dr. Analia Veitz-Keenan, Dr. James Keenan, and Dr. Debra Ferraiolo for participating in this event. More than 33,000 attendees from 162 countries were represented at this year's GNYDM.



*Left to right. Back row: Dr. D. Ferraiolo, Janani Thiruvengadam, Yeonji Lee, Kevin Kim, Di Xu, Zhaohan Jia, and Paula Bostick. Front row: Dr. A. Veitz-Keenan, Zhenhong Li, and Isabelle Cruz.*