Summer 8-2017

A Deeper Look into Herpes Zoster

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Introduction

In the United States, it is estimated that 95% of the population are seropositive for antibodies to the varicella zoster virus (VZV), putting a large majority of the population at risk for developing herpes zoster, otherwise known as shingles (Hadley et al., 2016). Neuzil and Griffin state that shingles is primarily dominant in the older population and affects over half a million people over the age of 60 (2016). The primary VZV is expressed as highly contagious chickenpox in children, which is a viral infection that manifests as a generalized rash with maculopapular lesions and advances to vesicles (Cohen, Salbu, Frank, & Israel, 2013, p. 217). After the primary VZV infection dissipates, the VZV lies dormant in the affected individual's dorsal ganglia and awaits to be reactivated (Cohen et al., 2013, p .217). Reactivation can occur for many reasons, but the most frequent are immunocompromised patients, such individuals in the older population and patients infected with HIV (Cohen et al., 2013, p. 218). It has also been proposed that injury to dermatomes could also reactivate VZV as well as increased psychological stress (Cohen et al., 2013, p. 218). Genetics, specifically the role of interleukin 10, could also play a role in the reactivation of VZV (Cohen et al., 2013, p. 218).

Shingles can easily be misdiagnosed if a thorough history is not obtained and several key features in the clinical exam are missed. In the early stages of reactivation, patients can present with vague symptoms, such as generalized malaise, headache, itching, tingling and localized pain (Cohen et al., 2013, p. 218-219). As the virus progresses, a maculopapular rash presents unilaterally along a dermatome and within 7-10 days of the initial onset of symptoms, the maculopapular rash eventually ulcerates and scabs over (Oakley & Goodband, 2013). Acute pain is the main complaint in 80% of patients 50 years and older and the pain is typically described as "stabbing" or "burning" (Oakley & Goodband, 2013).

Numerous complications ranging in severity, including post-herpetic neuralgia, herpes zoster ophthalmus and cerebral arteritis, can occur with shingles, making early recognition and treatment crucial (Cohen et al., 2013, p. 219). Treatment with acyclovir within 72 hours of onset of symptoms is the gold standard of treatment (Cohen et al., 2013, p. 220). A combination of different NSAIDs and analgesics are used to treat post-herpetic neuralgia, which is the most common complication of shingles (Cohen et al., 2013, p. 221).

Introduction cont'd

A relatively new vaccine, Zostavax, is available for shingles. Current recommendations include only vaccinating individuals over the age of 60, as they are the highest risk (Neuzil & Griffin, 2016). It has been determined through several studies that the vaccine is safe, with minor side effects including redness at the injection site and muscle pain (Simberkoff et al., 2011, p. 547). The effectiveness of the Zostavax vaccine is still being studied because it is relatively new, but thus far, studies have shown that the vaccine is mildly effective for an average of five years after administration, with decreasing efficacy after the first year of administration (Schmader et al., 2012, p. 1323-1324).

Underlying Pathophysiology

Herpes zoster is the secondary infection of VZV, with the primary infection being the chickenpox which is more prevalent in children (Cohen et al., 2013, p. 217). Following the resolution of chickenpox, the virus remains dormant in the dorsal root ganglia and is protected from the host's immune system by the antibodies that were made during the primary VZV infection (Cohen et al., 2013, p. 217). Cell mediated immunity (CMI) is quite successful at keeping VZV in the dormancy phase but as CMI declines with age, immunosuppression or increased psychological or physical stress, VZV can reactivate, resulting in herpes zoster (Wilson, 2014, p. 31-32). Once VZV is reactivated, the T cells of the host's cell-mediated immune system carry the virus through the dorsal root ganglia and the dormant virus begins to replicate and proliferate (Cohen et al., 2013, p. 218). VZV then descends through the neural pathways to the peripheral sensory roots, following a distinct dermatome (Cohen et al., 2013, p. 218) This results in pain and numbness; however, a rash may not yet be visible. When the virus reaches the dermis and epidermis of the affected dermatome, skin inflammation becomes evident and the emergence of maculopapular lesions occurs (Cohen et al., 2013, p. 218). These lesions progressively develop into lesions filled with VZV infected fluid (Cohen et al., 2013, p. 218). Typically, within 10 days, the lesions rupture and form scabs, which signals the ending stages of the infection (Cohen et al., 2013, p. 218).

Significance of Pathophysiology

According to the Centers for Disease Control and Prevention (CDC), in the United States, 1 million people are diagnosed with shingles each year and 1 out of every 3 people will get shingles in their life time (2016). Herpes zoster can be more exaggerated and deleterious in immunocompromised individuals, such as advanced age, individuals infected with HIV, individuals who have had an organ transplant, individuals on immunosuppressive drugs and those with neoplastic diseases (Cohen et al., 2013, p. 218). Immunocompromised individuals are more likely for VZV to reactivate and are more likely to have more serious complications from shingles, such as skin necrosis and scarring (Cohen et al., 2013, p. 218). Presentation of a rash along more than one dermatome or in a bilateral pattern can occur in immunocompromised patients (Wilson, 2014, p. 32). Also, severe complications of shingles can decrease quality of life, such as post-herpetic neuralgia, cerebral arteritis that could potentially lead to a stroke, and herpes zoster ophthalmicus (Cohen et al., 2013, p. 219). Seeing that shingles is a prevalent disorder in the United States and that shingles can potentially have harmful effects on both immunocompromised and immunocompetent populations, it is important for health care providers to accurately and quickly diagnose shingles. Understanding the underlying pathophysiology of shingles and the process in which the disorder presents itself will aid in swift and appropriate diagnosis, thus hopefully preventing adverse complications by treating the patient correctly. For example, the health care provider gathering a detailed history including if the patient has had chickenpox, recent or chronic illness or stressors, and medication the patient is taking along with subjective information from the patient stating they are having numbness or pain along a specific dermatome, could lead to an early diagnosis of shingles and appropriate treatment could be started earlier, thus limiting the course of the virus and any potential complications (Corden, 2014, p. 60).

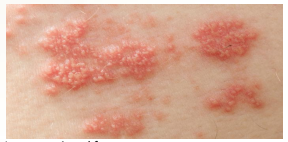
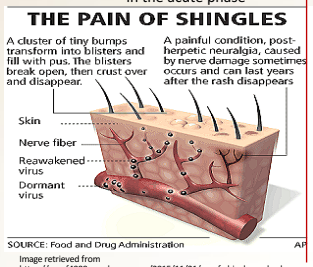


Image retrieved from http://www.healthline.com/health/shingles-contagious

Signs and Symptoms

- One day to three weeks prior to skin eruption, patients may complain of prodromal symptoms (Wilson, 2014, p. 32):
  - Malaise
  - Fever
  - Chills
  - Myalgia
  - Headache
  - Stomach upset
  - Acute neuritis (burning and tingling)
  - Pruritus
- As the virus is released by the nerve endings in the skin and it replicates, skin eruption of the virus occurs (Wilson, 2014, p. 32):
  - Unilateral erythematous maculopapular rash
- Over the next 7-10 days after skin eruption the rash progresses to (Cohen, 2013, p. 219):
  - Pustules and ulceration with crusts and scabbing, which can last for 30 days in the acute phase



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Treatment

- Treatment with antiviral therapy within 72 hours of lesion onset is key treatment to success (Wilson, 2014, p. 33). This is important because starting therapy quickly limits the damage to the sensory nerves from replicating the virus, thus preventing further complications and spread of the lesions (Wilson, 2014, p. 33).
- Antivirals can include (Wilson, 2014, p. 33):
  - Acyclovir administered orally 5 times a day for 7-10 days
  - Famciclovir administered orally every 8 hours for 7 days
  - Valacyclovir administered three times a day for 7 days
- Prescribing corticosteroids for shingles is controversial among health care providers, but several randomized control trials have shown that corticosteroids in addition to acyclovir can lessen the amount of pain of acute shingles (Wilson, 2014, p. 33).
  - Consider prescribing corticosteroids with antivirals in patients over 50 who have moderate-to-severe pain and who have no contraindications (Wilson, 2014, p. 33).
  - A tapered dose of prednisone starting at 60 mg daily for 10-14 days is typically prescribed (Wilson, 2014, p. 33).

The mild-to-moderate acute pain from shingles can be treated with NSAIDs, acetaminophen and tramadol, whereas moderate-to-severe pain can be treated with opioids such as oxycodone (Wilson, 2014, p. 33).

Shingles Vaccination: Is it worth it?

A live attenuated VZV vaccine, Zostavax, was approved in 2006 to prevent the reactivation of VZV, resulting in shingles. It is the only vaccine for shingles allowed in the United States. Zostavax is currently recommended as a one-time dose (Cohen et al., 2013, p. 222).

Zostamax reduces the risk of developing shingles by 51% and post-herpetic neuralgia by 67% (CDC, 2016).

The CDC recommends that people over the age of 60 years and older should get the Zostavax vaccine (2016).

The Zostavax shingles vaccine has proven to be safe. Minor reactions to the vaccine include erythema, swelling and tenderness at the injection site (Simberkoff et al., 2011, p. 547).

Several studies have shown that Zostavax decreases in efficacy progressively, with it being most effective during the first year. After the first year, the efficacy decreases from 79.2% to 54.9% and further declines to 44.4% in years 2 and 3 (Schmader et al., 2012, p. 1323-1324).

In response to the steady decline in efficacy of the Zostavax injection after the first year, a study was completed to determine the safety and immunogenicity of giving a second booster Zostavax injection to individuals over the age of 70 and who have already had a first dose of the vaccination. The results revealed that individuals who received a booster Zostavax injection had elicited a statistically significant rise in VZV antibody titers, suggesting a second injection over the age of 70 may be needed (Levin et al., 2016, p. 20-21).

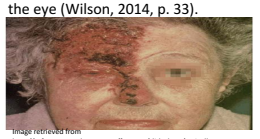
Complications

Post-herpetic neuralgia

- Defined as pain persisting more than 3 months after the onset of the rash in the same affected area (Hadley et al., 2016).
- Affects approximately 20% of shingles cases in ages 60-65 and 30% in ages older than 80 (Wilson, 2014, p. 34).
- Pathophysiology includes damage to peripheral nerves that lose the ability to inhibit nociception pain signals, thus lowering the threshold for nociceptive pain activation and produces spontaneous ectopic pain discharges (Neuzil & Griffin, 2016).
- Pain is typically described as either a constant deep, aching or burning pain (Neuzil & Griffin, 2016).
- Patients suffer from reduced quality of life, physical functioning and psychological well-being (Wilson, 2014, p. 34).
- Pain management can be difficult and various medications may need to be tried before pain is under control.
- Current guidelines suggest tricyclic antidepressants (such as amitriptyline), alpha-2 delta ligands (such as gabapentin), tramadol and opioids (usually reserved for adjunct treatment) (Neuzil & Griffin, 2016).
- Initiating treatment with acyclovir within 72 hours of onset symptoms of initial shingles diagnosis decreases the development of post-herpetic neuralgia (Neuzil & Griffin, 2016).

Herpes zoster ophthalmicus

- Occurs in 10-20% of herpes zoster cases (Vrcek, Choudhury, & Durairaj, 2017, p. 21).
- Occurs when reactivation of VZV presents in the first division of the trigeminal nerve (Vrcek et al., 2017, p. 21).
- Optic neuritis, retinal necrosis, nummular keratitis and uveitis can develop and could potentially result in permanent loss of vision (Vrcek et al., 2017, p. 22).
- A rash typically involves the periocular skin and the tip of the nose (called the Hutchinson sign) (Vrcek et al., 2017, p. 22)
- If the health care provider suspects any ophthalmic involvement, a consultation with an ophthalmologist is recommended (Vrcek et al., 2017, p. 24).
- Treatment needs to be quick and aggressive to avoid permanent damage to the eye (Wilson, 2014, p. 33).



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Nursing Implications

- Since shingles can be quite painful and can progress to serious complications if not treated quickly, it is important for health care providers, such as family nurse practitioners (FNPs), to accurately recognize, diagnose and treat shingles.
- Evaluation of herpes zoster begins with a complete history, including a history of primary VZV infection (chickenpox). FNPs should also target their questioning to determine if the patient is potentially immunocompromised, as shingles can be more aggressive and has the potential for more deleterious complications in those that are immunosuppressed. A thorough physical examination and a detailed review of systems should be completed to exclude other differential diagnoses (Vreck et al., 2017, p. 24).
- Diagnosis can be made by the characteristic appearance of unilateral maculopapular lesions along one dermatome. Early diagnostic criteria includes systemic manifestations like fever and malaise as well as localized manifestations along the affected dermatome, such as pain, burning sensation, itching, hyperesthesia and paresthesia (Corden, 2014, p. 60).
- It is also important for FNPs to educate their patients about shingles. Educating patients that shingles is not contagious, however, the virus that causes shingles, VZV, can be spread to a person who has never had chickenpox is imperative. The exposed person could potentially develop chickenpox, not shingles. VZV is typically spread through direct contact with fluid from the shingle rash's vesicles. Covering the rash during the vesicle phase of the infection can decrease the risk of transmitting VZV (Wilson, 2014, p. 32).
- Affected individuals need to be advised to avoid contact with pregnant women, those who have not had chickenpox and anyone who is immunocompromised (Corden, 2014, p. 62).
- Assessing the patient's level pain is necessary, as shingles can be painful.
- Supportive treatments such as calamine lotion and cold compresses over weeping blisters for 20 minutes three times a day could be suggested to aid with the pain and itching associated with shingles. Also, the FNP could suggest that the patient wear loose-fitting clothing to avoid friction against the rash. (Corden, 2014, p. 62).
- Recommending the Zostavax vaccine to eligible patients over the age of 60 should be considered by FNPs (CDC, 2016).

Conclusion

Shingles is caused by the reactivation of VZV due to a decline in cell-mediated immunity (Cohen et al., 2013, p. 217). Signs and symptoms of shingles can be vague at first, including malaise, headache, itching, tingling and localized pain (Cohen et al., 2013, p. 218). As the virus progresses along a dermatome and reaches the skin, a maculopapular rash presents unilaterally within 7-10 days (Cohen et al., 2013, p. 218). Treatment with an antiviral medication, such as acyclovir, within 72 hours of onset of symptoms is currently the standard of care for shingles (Wilson, 2014, p. 33). Complications like post-herpetic neuralgia, cerebral vasculitis and herpes zoster ophthalmicus can occur after a shingles infection, making early diagnosis and treatment crucial (Cohen et al., 2013, p. 219). Zostavax is the only vaccine for shingles that is approved in the United States and is recommended by the CDC for eligible individuals over the age of 60 (CDC, 2016).

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