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Efficacy of Herpes Zoster Vaccine

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Abstract

Herpes zoster can be prevented by a vaccine of the live attenuated virus. It is estimated that practically all adults in the United States have latent varicella zoster virus which puts them at risk for herpes zoster eruption leading to the estimated 1 million cases of herpes zoster each year (Hales, Harpaz, Joesoef, & Bialek, 2013). Herpes zoster is the “reactivation of the varicella virus in the dorsal ganglia of the spinal cord due to a decrease in cell-mediated immunity” (Ganty, 2014, p. 37). Ensuring vaccinations are up to date is critical to providing care for patients as these diseases are preventable. By using resources to provide vaccinations, it is possible to prevent certain conditions including herpes zoster.

Background

The purpose of the following report is to discuss the efficacy of the herpes zoster vaccination. Anytime a painful condition such as herpes zoster can be prevented with a vaccination, it is vital to have those in our care current on their vaccinations. It is of the utmost importance to know current guidelines as well as variables that may affect the efficacy of vaccines. According to the Centers for Disease Control and Prevention (CDC), current guidelines recommend adults 60 years of age and older receive the herpes zoster vaccine (2016). The following will address the effectiveness of the vaccination.

The rationale for addressing this topic is to discuss the vaccine for herpes zoster and the negative implications of herpes zoster activation. Primary varicella zoster virus causes varicella which leads to a contagious rash that is typically mild in children but can lead to more serious complications (Hales, Harpaz, Joesoef, & Bialek, 2013). When varicella zoster is reactivated in the body, herpes zoster occurs which presents itself as a painful vesicular eruption in one or more overlapping dermatomes usually on one side of the body not crossing the midline (Hales et al., 2013). The question has been asked if whether or not the routine vaccination of children against varicella is leading to increased rates of herpes zoster activation in older adults due to the decreased exposure for adults to boost immunity. Herpes zoster can lead to dangerous complications related to the eyes and neurologic system. Postherpetic neuralgia (PHN) is the most common complication of herpes zoster activation leading to lingering pain for possibly 90 days or more after the rash (Hales et al., 2013). Early intervention in the treatment of PHN is critical in success.

Case Report

History of Present Illness

A 67 year old Caucasian male presented to the primary care clinic to discuss his right lower back pain. He has a past medical history of acid reflux and arthritis in his bilateral knees. He reports no other history. The back pain started roughly three days ago. He has not been able to visualize his back so he is unaware of any unusual lesions or trauma. He reports experiencing a recent fall in which he laid on ice for a short period of time but denies musculoskeletal pain from that or any other injuries. He describes the pain as sharp. He denies experiencing this type of pain before. He states the pain is constantly a 6/10 in intensity and irritation from his clothing makes it worse along with laying down. He has been taking occasional Tylenol at home for pain relief but does not feel that it helps very much at all. The patient's current medication list includes Protonix 40mg every day for reflux.

Physical Examination

The patient is seated on the exam table. The physical examination during this clinic visit reveals an erythematous rash with blistering vesicles to the right lower back. The rash extends laterally from the middle back around the right flank area. He winced and guarded while this provider attempted to lift his shirt to visualize the area of concern. There are no other lesions or rashes noted to the skin. The head is normocephalic and atraumatic. Bilateral eyes are free of discharge, sclera white and conjunctivae is pink. The periorbital region is normal in appearance and no facial tenderness or redness noted. The patient has clear bilateral breath sounds with no adventitious lung sounds present. His heart rate is of regular rate and rhythm. Range of motion to the back is limited due to pain.

Social History

The patient lives alone. He reports that he is not around pregnant women or immunocompromised individuals. He does not use tobacco products or alcohol. He is a local mechanic.

Diagnosis

Typically, the diagnosis of herpes zoster is made based on clinical presentation and history intake from the patient. No lab tests or imaging were indicated or necessary to correctly diagnose this patient. There are times in which herpes zoster is less clinically evident and harder to diagnose based on signs, symptoms, and history. There are a couple different options including direct fluorescent antibody staining of varicella zoster virus infected cells by scraping the base of the lesions (CDC, 2016). This method is rapid, specific, and sensitive but it is much less sensitive than polymerase chain reaction (PCR) testing however PCR testing is not always available (CDC, 2016).

Treatment and Follow up

It was determined based on presentation that this patient was having a herpes zoster activation. Valacyclovir 1000mg every eight hours for seven days for herpes zoster rash was prescribed. This antiviral prescription will reduce duration as well as intensity of the pain associated with the rash. Also prescribed was a seven day supply of oxycodone 5mg to be taken every four hours as needed for pain related to herpes zoster diagnosis. There are no refills on this narcotic medication at this time. If this patient presents back to the clinic at his one week follow up and complains of persistent moderate to severe pain, extending the prescription for pain medication is a possibility. The options include tramadol 50-100 mg orally every four to six hours or oxycodone 5 mg immediate release tablets orally every four hours as needed (Epocrates,

2016). Other options if pain is unsuccessfully managed with narcotics include amitriptyline, gabapentin, and pregabalin as one meta-analysis showed there is no difference in pain relief between the gabapentin and amitriptyline (Epocrates, 2016). Specific education regarding the diagnosis was presented to the patient including the importance of not exposing pregnant or immunocompromised individuals to the lesions. Encouraged him to wear loose fitting clothing to reduce amount of friction to the area. He will receive the Zostavax vaccine when rash heals. Patient will return to the clinic in seven days for recheck of rash as well as to discuss any further pain issues. The ICD 10 code for herpes zoster is B02.

Literature Review

Herpes zoster is a painful condition that can be prevented with a routine live vaccine. The Centers for Disease Control and Prevention recommend a single dose vaccine for adults age 60 and older (2016). This report pertains to the vaccine and its efficacy. The patient from our case is 67 years old, he has not received the vaccine before, and is a candidate for the herpes zoster vaccine. The only vaccine for herpes zoster approved in the United States at this time is Zostavax and it reduces the risk for developing herpes zoster by 51% (CDC, 2016). Protection against herpes zoster is demonstrated four to six weeks after the Zostavax administration (Adams, Parnapy, & Bautista, 2010). In the study termed the Zostavax Efficacy and Safety Trial, it was demonstrated that the Zostavax vaccine decreased the number of cases of herpes zoster in those age 50-59 (Keating, 2013). There have been many large studies that show the same result. The Shingles Prevention Study was conducted and demonstrated that the Zostavax vaccine reduced the complications associated with herpes zoster in adults age 60 and older including postherpetic neuralgia and further herpes zoster infections (Keating, 2013). This study showed that the

immune response was present for up to three years after vaccination with Zostavax (Keating, 2013).

The efficacy of Zostavax is altered under a variety of different conditions. Interestingly, patients that had a diagnosis of depression that were not taking an antidepressant had less of a response to the vaccine than those that were taking antidepressants for depression or those without a diagnosis of depression at all (Keating, 2013). There is no increase in immune response with a second dose of vaccine in adults over 60 or over 70 so that has been found unnecessary (Keating, 2013). It is always ideal to administer recommended vaccinations to patients during one visit if able to prevent needing additional visits which increase the risk of missed vaccinations. When the Zostavax vaccine and influenza vaccine were given with separate injections in separate locations, there was no evidence of inferior results however, it was found that the Zostavax vaccine should not be given at the same visit as the pneumococcal vaccine (Keating, 2013). Zostavax and 23-valent pneumococcal polysaccharide should be administered at separate visits to prevent decreased response from the Zostavax. According to Adams et al., the efficacy of the pneumonia vaccine was decreased when given at the same visit as the Zostavax vaccine as demonstrated by significantly lower varicella zoster virus antibody levels in those that had both vaccines at the same time (2010). The studied time was a 4 week span and it was then noted to have a decreased level of varicella zoster virus antibodies (Adams et al., 2010). As with many conditions, patients with an altered immune status respond differently to the herpes zoster vaccine. In a 2013 study by Wasan et al., patients diagnosed with inflammatory bowel disease that were taking immunosuppressant medications, there was a decreased response to the vaccine compared to those that are immunocompetent (as cited in Keating, 2013). The vaccine is contraindicated in those that are immunocompromised.

The live attenuated varicella zoster vaccine was developed to prevent varicella, also known as chickenpox (Ganty, 2014). Due to the age related decrease in cell-mediated immunity, older adults require a high titre of the virus so Zostavax was developed to provide protection against herpes zoster in particular (Ganty, 2014). When comparing the zoster vaccine and the varicella vaccine, there is a difference in the virus concentration. The zoster vaccine contains 14-fold more virus than the varicella vaccine (Cook & Flaherty, 2015). In a large 2005 study named The Shingles Prevention Study from Oxman et al., 39,000 patients aged 60 years and older were followed for three years to determine efficacy (Ganty, 2014). It was determined that the vaccine prevented herpes zoster better in adults between ages 60 and 69 than it did in those age 70 years and older (Ganty, 2014). This same study showed that adults age 70 years and older reported less pain than those age 60 to 69 years (Ganty, 2014). The results of this study are important to note because although the efficacy of the vaccine may not be the same as adults get older, it still holds important value in the long term.

There were two short-term trials that studied this vaccine and its efficacy in adults older than age 60 by following subject for 4.9 years after vaccination. (Cook & Flaherty, 2015). This study found the relative risk reduction of herpes zoster in vaccinated individuals to be 63.9% that were age 60-69 and 37.6% in adults age 70 and older (Cook & Flaherty, 2015).

The United States Advisory Committee on Immunization Practices began recommending routine vaccination of children 18 months to 12 years of age for varicella (Hales et al., 2013). There have been various studies to determine if the routine vaccination of children for varicella is increasing the risk for herpes zoster in adults because adults are not exposed to varicella due to children being vaccinated. Some studies have shown a decreased risk for herpes zoster in adults that have close proximity to children while other studies have not shown this (Hales et al., 2013).

In the study by Hales et al., it was found that even though herpes zoster cases are increased in the elderly, there is no evidence that routine vaccinations for varicella in the United States have influenced this statistic (2013). As of 2010, only 14.4% of adults age 60 and older have received the herpes zoster vaccine (Hales et al., 2013, p. 739). The mean age of herpes zoster diagnosis for men was 76.1 in 1992 and 77.1 years of age in 2010 (Hales et al., 2013, p. 714). Due to the possibilities of complications arising from herpes zoster activation, it is crucial that providers screen patients to ensure they are current on their vaccinations, including the one to prevent shingles.

In a study by Aspinall, Del Giudice, Effros, Grubeck-Loebenstein, Sambhara, it is discussed that during the aging process the body experiences a decline in immune responsiveness to vaccinations as well as a decreased length of time that the vaccine produces immunity (as cited in Levin et al., 2016). One trial showed the Zostavax vaccine having a 51.3% efficacy in preventing herpes zoster and 66.7% efficacy in preventing postherpetic neuralgia in adults older than 60 years of age (Levin et al., 2016). During the 7-11 years following Zostavax administration, the vaccine had an efficacy of 21.1% of preventing herpes zoster and an efficacy of 35.4% for preventing postherpetic neuralgia (Levin et al., 2016). The risk of contracting herpes zoster in adults age 85 and older is 50% (Ganty, 2014). In individuals age 85 years and older, the implications of acquiring herpes zoster would negatively impact their quality of life due to pain and isolation. The further complication of developing postherpetic neuralgia would lead to the need to manage their pain. Managing pain in postherpetic neuralgia can be very difficult, especially in the elderly population. The pain may lead to such intense discomfort that the patient may have difficulty getting out of bed which can lead to depression (Ganty, 2014). The loss of independence and the inability to complete activities of daily living is extremely

difficult for anyone, especially the elderly population. These changes in their lives can be very distressing by decreasing quality of life.

There are no contraindications with regards to prior history of herpes zoster in getting the Zostavax vaccine. In a 2013 study by Morrison, safety of the Zostavax vaccine was similar in those that had recent herpes zoster outbreak to those that had not had recent herpes zoster. This reinforces the importance of offering the vaccine to patients no matter the history, including to the patients that may not remember if they got the vaccine or not. There are barriers to administering the vaccine including patient's desire or lack of desire to seek healthcare, belief in vaccines, and lack of education.

The Shingles Prevention Study spanned from November 1998 to September 2003 and watched for new cases of herpes zoster (Keating, 2013). The participants in the Shingles Prevention Study had to be citizens of the United States of America for greater than 30 years or age 60 and older with a history of varicella (Sanford & Keating, 2010). At this point, the study was stalled until December 2004 when they restarted with the Short-Term Persistence Substudy and the Long-Term Persistence Substudy (Keating, 2013). This study proved that the amount of herpes zoster and postherpetic neuralgia was much lower in those that received Zostavax than those that did not. The zoster vaccine "reduced the HZ burden of illness by 50%, the incidence of PHN by 60%, and the incidence of HZ by nearly 40%, compared with placebo, in the Short-Term Persistence Substudy population evaluated from 3.3-7.8 years after vaccination" (Schmader et al., 2012, p. 1325). These are rather important numbers because, as discussed earlier, the complications of herpes zoster including PHN can significantly negatively affect quality of life. The Zoster Brief Pain Inventory ADL Burden of Interference is a scale that was used during this study to determine the effects of the zoster vaccine on activities of daily living.

The zoster vaccine decreased the effects of herpes zoster on the individuals' activities of daily living in the study and resulted in a relative reduction in the pain score of 73% (Keating, 2013). There are preliminary results of current studies that are showing a booster dose of Zostavax after roughly 10 of receiving the first dose that are showing it to be useful and well tolerated in patients over the age of 70 (Keating, 2013). This will be of great importance for current and future providers to be aware of as guidelines may change in the future. The efficacy of the herpes zoster vaccine beyond five years after vaccination is currently not known as the Long-Term Persistence Substudy is being investigated at this time (Schmader et al., 2012).

Learning Points

- It is critical to utilize the Zostavax vaccine to prevent herpes zoster as a way to avoid the challenging complications of the condition including painful postherpetic neuralgia.
- Not knowing prior vaccination history is not a contraindication to receiving the Zostavax vaccine. If a patient is unsure if they have received the vaccine or not, it is safe to give it. It is important to share with patients that insurance may not cover the vaccine if they have in fact already received it. This will need to be a personal decision and will vary patient to patient.
- There are options for pain control with this condition. Oxycodone, amitriptyline, and gabapentin are examples of options for pain relief. Studies have that if narcotics are unsuccessful in relieving pain, there has been no difference between amitriptyline and gabapentin so either one is a fair option.
- The efficacy of the vaccine decreases with age and this was demonstrated in multiple studies.

- Zostavax and pneumococcal vaccines should be given during separate visits to prevent decreasing the efficacy of the Zostavax. The time of separation should be at least 4 weeks.
- Zostavax has shown its effectiveness in lowering the score related to burden of illness associated with herpes zoster in older adults which is critical to their quality of life.

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