



Vaccines and Adverse Reactions in Horses

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Introduction

There is no doubt vaccinations have greatly reduced the incidence of life threatening diseases in horses. Tetanus, eastern viral encephalitis, western viral encephalitis and Venezuelan viral encephalitis are examples of diseases that have been greatly reduced in horses due to vaccination. But vaccinating is not a innocuous procedure. Local reactions that vary from mild soreness to full blown abscesses are possible. Systemic reaction from mild fever to life threatening anaphylactic reactions can occur. This article discusses these reactions, treatment, and prevention.

Also discussed are the various vaccines propensity for causing reactions versus their efficacy.

Diagnosing Vaccine Reactions

Just about any illness that occurs around a vaccination can be suspect as a vaccine reaction. However atypical events away from the injection site may or may not be related to the vaccine and investigations for other causes should be undertaken. The type of reaction along with its frequency and severity varies by the type vaccine given and the technique used, for information on a specific vaccine efficacy and reaction rate see the article on the disease.

Vaccine reactions are usually divided into 2 types: reactions at the site of the injection called local reactions, and those that are due to a systemic response.

Local Reactions

Local reactions can range from local inflammation to infection. Good technique will minimize reactions. Taking the symptoms in approximate order of severity and from symptoms of transient inflammation to abscessation: Symptoms of transient inflammation usually occurring 24 to 72 hours post vaccination. One or all of these symptoms may be present, usually developing in the order given:

- Mild soreness at the site of injection
- Stiffness walking. If given in the neck it may appear as a generalized stiffness and inability to lower the head and if given in the hip or leg lameness may result. The stiffness and soreness following vaccination can be remarkable accompanied by a short shuffling gait resembling founder.
- Fever, depression, inappetence (lack of appetite) that responds to NSAID's (see treatment below).
- Mild painful swelling that responds to NSAID's (see treatment below).

Symptoms of abscess formation, usually following a week of symptoms of inflammation:

- persistent and worsening remarkable swelling, soreness, stiffness, depression, fever that does not respond to NSAID's.

Vaccines differ in their ability to cause local irritation. Most of the common vaccines for life threatening diseases (tetanus, the viral encephalitides, and rabies) are efficacious and have a low local reaction rate. It is probable that all horses receiving these vaccines have some reaction: have you ever had a tetanus shot that did not cause some soreness? But when given properly most of these reactions are subclinical and do not cause overt soreness or swelling, the local reaction rate of these is on the order of 5%. On the other hand influenza and herpes vaccines have a higher reaction rate that approach 10 to 20%. Worse of the commonly used injectable vaccines is the Strangles vaccine, with a local reaction rate of around 30 to 60%, with the stiffness worse than for the other vaccines. The abscess can be either sterile or infected. Sterile abscesses form when the reaction is severe enough to cause local



necrosis and white blood cells flood the area in an attempt to clean up the necrosis. Infections may be introduced by the injection but may also be activated bacteria that were lying dormant in the muscle tissue. Serious clostridial myositis can occur this way.

Systemic Reactions

Systemic reactions can develop within minutes to hours after administration of the vaccine.

- Hives: may be a precursor to developing anaphylaxis
- Colic: cause unknown, perhaps a drop in blood pressure?
- Anaphylaxis: allergic shock, usually first noted as respiratory distress in horses.
- Purpura: immune mediated vasculitis, bilateral hot swelling in the legs, may take weeks to develop***

Whether you get a local reactions or systemic reaction depends on which part of the immune system is over stimulated.

How Vaccines Cause Reactions

Vaccines cause undesirable reactions by inducing more inflammation than planned for. It is important to understand that vaccines are *made* to cause immune reactions so in the future it will quickly eliminate the disease if it enters the horse's body. By inducing a mild inflammation along with the vaccine itself it does a better job of stimulating the immune system, more. If every horses immune system reacted exactly the same there would be no problem and minimal reaction vaccines easy to design and manufacture. However what one horse's immune system looks at and does not even react to another horses' immune system will treat as a 3 alarm fire and release a life threatening chemical barrage. If this seems odd, think of peanut butter. For most a regular part of their diet, for a few who are allergic to it: serious illness and even death.

A number of factors control the severity of local reactions some have to do with the vaccine and others they horses immune system and environment:

- How irritating or reactive the vaccine itself is. A property of the vaccine itself.
- How reactive the horses immune system is to the vaccine. If the immune system is already activated against the disease the vaccine is protecting against it may increase the reaction rate and severity or reaction to a vaccine.
- Where the vaccine was given, if soreness develops there will be loss of function of the vaccinated area.
- Light exercise following vaccination may decrease reactions.
- Bacterial contamination leading to abscess formation

Using proper technique, mild reactions to most vaccines will occur in about 5 to 10% of horses, more severe local reactions in about 1% of the population. Severe systemic reactions to properly administered commonly given vaccines is very rare and may effect less than 0.1% of the population. The strangles injectable vaccine has a local reaction rate that approaches 50%. Deciding whether to use a vaccine with a high reaction rate depends on the risk of contracting the disease and the of the disease. This is an important point, the more serious and prevalent the disease, the more adverse the reaction that can be tolerated.

While even properly administered vaccines can cause reactions, poor technique can greatly exacerbate the severity and frequency of reactions to vaccines: superficial injection, dirt, bacteria, poorly handled vaccines can all greatly increase the problem of local reactions.

Systemic reactions are much more likely with inadvertent injection into a blood vessel.

Treatment of Local Reactions

Most non-infectious local reactions will respond to non-steroidal anti-

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inflammatory drugs (NSAID's) like flunixin (Banamine), and phenylbutazone within 12 to 24 hours of beginning treatment. Usually started at the high end of dosage recommendations the treatment, the dosage is lowered to moderate levels as the horse improves but is continued until all signs are resolved. Sometimes once treatment is withdrawn symptoms returned and the NSAID started up again. Other ancillary therapy for warm, painful swellings may include cold packing or cold hosing. However such therapy requires at least 30 minutes of administration in order to be helpful. Horses with local reactions will improve with exercise but the horse should not be pushed if the soreness is remarkable. Turn out where he can freely move about should be adequate. In cases where there is persistent, worsening fever, swelling, and pain that does not respond well to Bute a abscess should be considered.

Treatment of Systemic Reactions

Systemic reactions can be spawned from local reactions or happen independently and include in their mild form as fever, depression, and inappetence. When secondary to the pain and inflammation of local reactions they tend to be very Bute responsive, if abscesses are not involved. But there are also systemic reactions that are caused by stimulation of parts of the immune system that have nothing to do with local reactions. These immune mediator chemicals into the blood stream that circulate to target organs and cause allergic type reactions and can vary from mild to life threatening.

Hives

The mildest of these would be when the skin is the target organ and hives develop.

Coughing and Labored Breathing: Anaphylaxis

More serious forms of systemic reactions have the blood vessels and the lungs as targets and can cause fluid to be secreted into the lungs and a precipitous drop in blood pressure. We call these serious allergic reactions anaphylaxis and is a form of shock and can be life threatening. The incidence of anaphylaxis with the commonly used vaccines is quiet rare and may be a complication of inadvertent IV injection of the vaccine. These reactions develop within minutes or a few hours of the injection. The initial symptoms may be just hives, but will lead to coughing, labored breathing, followed by weakness and collapse. This is an emergency situation that requires immediate treatment.

Colic

Occasionally a horse will dependably colic following vaccine, usually within several hours of being given the vaccine. Most likely this is a form of anaphylaxis and lowered blood pressure and resulting ischemia causing abdominal pain. Pretreatment with flunixin just prior to vaccination is usually preventive and the treatment of choice.

Swollen Hot Limbs: Purpura***

Another form of a serious systemic immune reaction to vaccines is called purpura. In this reaction immune complexes of vaccine and antibodies lodge in the smallest blood vessels of the legs. These immune complexes activate a cascade of inflammation that effects the blood vessels, a vasculitis develops. The result is heat, pain, and swelling in the legs. Usually the rear legs are affected but all 4 can be involved. This is a real problem for the legs that have little area for the swelling to go and gravity impedes resolution. The swelling worsens the circulation which increases the swelling, and a cycle develops that can result in serum exudation from the skin, skin necrosis, secondary infection, and founder.

Though this may occur with any vaccine or any potentially antigenic substance, it is most often associated with the Strangles vaccine and usually seen when a horse is vaccinated after it already has developed a strong immune response. For instance, vaccinating a horse for a disease that the

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horse was recently exposed to and developed an immune response to the same disease.

Prevention of Severe Reactions

The most important step to prevention of severe reactions is proper technique. Be sure to follow label directions when giving a vaccine. Despite good technique some horses will get local reactions to a vaccine year after year. Though they may be pretty bad if the risk of exposure to a life threatening disease is high enough, continued vaccination may make sense if the reactions can be controlled. It will decrease a reactions severity if you pretreat just prior to vaccination with the upper end dosages of NSAID's or antihistamines (diphenhydramine: 1 to 2 mg/kg every 8 to 12 hours). If colic is the problem flunixin should be used. NSAID's should be continued at moderate doses through the usual reaction time.

Often several combination vaccines are given together in a annual series. After consideration of what vaccines may be eliminated from the annual series, the next step in eliminating reactions is to give the vaccines separately with a week or two between injections. Not only does this lessen the chance of a reaction it helps flesh out the culprit. If the reaction is identified with a specific combination vaccine this combination vaccine can be further split apart until the culprit is identified. In most cases giving the vaccine less often or reduced dosages will reduce the severity of reactions. How this will effect the efficacy of the vaccine is not known. If several different vaccines of the same brand are causing the problem the adjuvant, a chemical added to a vaccine to make it more potent, may be the cause. Sometimes in this case changing brands might help.

When a horse has had a severe systemic reaction or local reactions that they cannot control the owner is in a quandary as to what to do the following year: to vaccinate or not. When faced with such a question consider the balance of the risk of disease against the risk of the disease caused by the vaccine to the horse. If the risk from a disease is low and the chance of a severe reaction high it is difficult to justify the routine use of the vaccine.

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***** Student Miriam Braun has sent us this story about a severe case of Purpura:**

Horse: Brioso

Breed: TBxAndalusian/Lusitano

Age: aprox 3 yrs old

When: Feb 1998

Vaccine administered: 2/05/98

Initial reaction: 2/19/98

@ 1:30am the stall cleaner woke up owner and myself, horse appeared to be kicking high up with hind-legs along stall wall (about 6-8 feet in the air) without any apparent reason.

He was moved to the hot-walker, kicking was not as frequent, but discomfort was apparent.

Vet was called an hour afterwards, no idea as to what this may be. Two quarter-sized bumps appear on medial side, just below knee first on one leg, then the other.

Every hour until 5am, we would check on him, give him water/hay – he refused both.

As the hours go by the swelling slowly gets more prominent

He becomes more and more lethargic (he is a very lively horse by nature).

different vet's had been called out during these hours, none knew what to do, I think but I am not sure, he probably was given banamine.

At 5am he dehydrates, and displays possible colic symptoms, he is transported to the clinic.

At the clinic all vital signs are taken and checked, yet 5 vets' still could not figure out what was wrong with him.

At this point from the knee down his legs are very swollen and yellow secretion is oozing from his legs.

We were being questioned in detail as to what possibly could have changed in the last view days, nothing came to mind.

As one vet checks his gums for circulation, and notices little veins which had burst, I brought up the fact that all horses had been vaccinated two weeks ago, but I didn't think this would have anything to with it.

It was then that it was confirmed that he had a Purpura reaction, and immediately received appropriate treatment.

He remained at the clinic for 7 more days. I never saw him, but was told that his legs from stifle/elbow down to the hoof looked like a stove-pipe.

Photo1.: One day after his return from the clinic (8 days after initial reaction)

- swelling has completely subsided
- sloughing has begun
- shown no tenderness when walked

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- receiving steroid-, anti-biotic-injections, 5 times a day, plus oral antibiotics
- walked twice a day for 15 min, stall cleaned 3 times a day, bandaged changed 2 times a day

Photo2.: approximately taken 2 weeks after photo1.

- swelling re-occurred due to proud-flesh production and infection
- same regiment as above



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Photo3: same sequence - 2 weeks after Photo1



Photo4: same sequence - 2 weeks after Photo1



Photo5:
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Photo6: taken approximately 2 weeks after photo sequence 2-5



Photos 7 and 8: taken 1.5 to 2 weeks after photo6.



- during bandage change the owner noticed that his RR tendon had sloughed completely at pastern
- horse was immediately shipped back to the clinic, by the time they

had arrived he could not get up, revealing that all 4 tendons had sloughed in the same matter. He was euthanized right there then.

